

**LONGHORN ARMY  
AMMUNITION PLANT  
KARNACK, TEXAS**

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RECORD**

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***LONGHORN ARMY AMMUNITION PLANT  
KARNACK, TEXAS  
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**QUARTERLY EVALUATION REPORT  
4<sup>TH</sup> QUARTER (OCTOBER-DECEMBER) 2018  
GROUNDWATER TREATMENT PLANT  
LONGHORN ARMY AMMUNITION PLANT  
KARNACK, TEXAS**

**JUNE 2019**

Prepared For:



**U.S. Army Corps of Engineers  
Tulsa District**

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GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

## TABLE OF CONTENTS

Acronyms and Abbreviations .....	iii
Executive Summary .....	v
<b>1 Evaluation of Groundwater Treatment Plant .....</b>	<b>1</b>
1.1 Treatment Configuration .....	1
1.2 Work Performed at the GWTP .....	3
1.2.1 Routine Maintenance .....	3
1.2.2 Major Maintenance .....	3
1.2.3 Routine Maintenance at LHAAP-16 .....	4
1.2.4 Routine Maintenance (Potable Water Wells) .....	4
1.3 Filter Cake Operations and Management .....	5
1.4 Fluidized Bed Reactor Operations .....	5
1.5 Process Chemical Usage at GWTP .....	7
<b>2 Evaluation of LHAAP-18/24 ICT Effectiveness .....</b>	<b>9</b>
2.1 Groundwater Elevation .....	9
2.2 Performance of Plume Capture .....	9
2.3 Quantity of Water Extracted from LHAAP-18/24 .....	11
2.4 Sampling Activities .....	11
2.4.1 LHAAP-18/24 Analytical Results .....	12
2.4.2 Perchlorate Sampling .....	15
2.4.3 VOC Sampling .....	16
2.4.4 Monthly Metals Sampling .....	16
2.4.5 Quarterly Sampling .....	16
<b>3 Evaluation of LHAAP-16 Extraction System .....</b>	<b>45</b>
3.1 Quantity of Groundwater Extracted From LHAAP-16 .....	45
3.2 Groundwater Elevation .....	45
<b>4 Quality Control .....</b>	<b>49</b>
<b>5 Treated Groundwater Discharged .....</b>	<b>51</b>
<b>6 Air Monitoring .....</b>	<b>53</b>
6.1 Summary of Air Monitoring Approach .....	53
6.2 Air Monitoring Results for the 4 <sup>th</sup> Quarter of 2018 .....	54
6.2.1 Summa Canister Monitoring Results .....	54
6.2.2 PID Results .....	55
<b>7 Comments and Responses .....</b>	<b>57</b>

**GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018**  
**LONGHORN ARMY AMMUNITION PLANT**

**Figures**

Figure ES-1: Groundwater Recovery Between September 2012 & December 2018 .....	ix
Figure ES-2: Water Treated and Discharged Monthly from June 2012 through December 2018 .....	x
Figure 2-1: Quarterly Extraction Rate .....	17

**Tables**

Table ES-1. Discharge Information to Harrison Bayou During 4 <sup>th</sup> Quarter 2018.....	xi
Table 1. Enhanced Fluidized Bed Reactor Operating Parameters – 4 <sup>th</sup> Quarter 2018 .....	5
Table 2. Chemical Usage and Delivery Data .....	8
Table 3. Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells, and Surface Water .....	19
Table 4. Treated Groundwater Discharged – October through December 2018.....	23
Table 5. Monthly Groundwater Extraction Quantities – October through December 2018 .....	27
Table 6. LHAAP-18/24 Analytical Results – December 2018 .....	29
Table 7. Weekly Perchlorate Sample Results – 4 <sup>th</sup> Quarter 2018.....	37
Table 8. Bi-Weekly GWTP Sampling Results for October 2018 .....	38
Table 9. Bi-Weekly GWTP Sampling Results for December 2018.....	40
Table 10. Quarterly GWTP Analytical Sampling Results for 4 <sup>th</sup> Quarter 2018.....	42
Table 11. Groundwater Elevations at LHAAP-16 Piezometers and Monitoring Wells .....	47

**Appendices**

Appendix A ICT Layout and GWTP Process Flow Diagram
Appendix B Groundwater Elevation Contour Maps
Appendix C Isoconcentration Maps
Appendix D Trend Analysis
Appendix E Water Sampling Analytical Results (Provided on CD Only)
Appendix F Protocol for Discharging GWTP Effluent
Appendix G Quality Control Summary Report
Appendix H Air Analytical Laboratory Report
Appendix I Air Monitoring Calculations, PID Readings, and Calibration Logs

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

## ACRONYMS AND ABBREVIATIONS

AECOM	AECOM Technical Services, Inc.
AMCV	Air Monitoring Comparison Value
amsl	Above mean sea level
bgs	Below ground surface
Bhate	Bhate Environmental Associates, Inc.
CD	Compact disc
COC	Chemical of concern
COD	Chemical oxygen demand
DCE	Dichloroethene
ESD	Explanation of Significant Difference
ESL	Effects Screening Level
FBR	Fluidized bed reactor
ft	Feet or foot
gpd	Gallons per day
gph	Gallons per hour
gpm	Gallons per minute
GWTP	Groundwater Treatment Plant
HCl	Hydrochloric acid
HDPE	High density polyethylene
ICT	Interception-collection trench
IRA	Interim Remedial Action
lbs/hr	Pounds per hour
LHAAP	Longhorn Army Ammunition Plant
MC	Methylene chloride
MCL	Maximum Contaminant Level
µg/L	Micrograms per liter
Mg(OH) <sub>2</sub>	Magnesium hydroxide
MSC	Medium Specific Concentration
mV	Millivolts
NA	Not applicable
NaOH	Sodium hydroxide

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

No.	Number
ORP	Oxidation-reduction potential
PCE	Tetrachloroethene
PCL	Protective Concentration Level
PID	Photoionization detector
PLC	Programmable Logic Controller
ppmv	Parts per million by volume
psi	Pounds per square inch
ROD	Record of Decision
RTC	Response to comment
SWEPCO	Southwestern Electric Power Company
TAC	Texas Administrative Code
TCE	Trichloroethene
TCEQ	Texas Commission on Environmental Quality
tpy	Tons per year
UEP	Unlined Evaporation Pond
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

## EXECUTIVE SUMMARY

The operation of the Groundwater Treatment Plant (GWTP) is part of the Interim Remedial Action (IRA) at Burning Ground Number (No.) 3, also referred to as Longhorn Army Ammunition Plant (LHAAP)-18/24. A historical pilot test for nearby landfill LHAAP-16 resulted in the installation of eight extraction wells which also contribute groundwater to the GWTP. Groundwater extraction, treatment, and monitoring activities consist of:

- Continuous extraction of groundwater from multiple interception-collection trenches (ICTs) and extraction wells at both LHAAP-18/24 and LHAAP-16;
- Treatment of extracted groundwater for heavy metals, chlorinated compounds, and perchlorate using precipitation, air stripping, and biological methods, respectively;
- Evaluation of the hydraulic effectiveness of the extraction system by groundwater monitoring;
- Monitoring of treated groundwater to ensure compliance with the discharge limits; and
- Discharge of treated water to Harrison Bayou, or to a holding pond (INF Pond), or release of treated water as irrigation water on LHAAP-18/24.

The location of the extraction wells and ICTs are shown on **Figure A-1** in **Appendix A**. The process flow diagram of the GWTP is shown on **Figure A-2** in **Appendix A**.

**Figure ES-1** depicts the monthly total volume of groundwater that was extracted from the ICTs and extraction wells at LHAAP-18/24 and LHAAP-16 between September 2012 and December 2018.

The GWTP was not operational during June, July, and August 2012. This was related to meltdown of the scrubber system, associated with the catalytic oxidizer, due to system overheating. Overheating occurred when the blower became inoperable after the bearing on the scrubber blower unit was shattered and damaged the blower. This occurred around 1:00 PM on May 21, 2012.

After developing an interim air monitoring plan and obtaining concurrence from the Texas Commission on Environmental Quality (TCEQ) and the United States Environmental Protection Agency (USEPA) to operate the GWTP without use of air abatement equipment, a pilot run of the GWTP was conducted on September 6, 2012. In that first pilot run, 85,170 gallons of water that had been stored in the influent equalization tank (TK-140) were treated. The treated water was re-circulated through the fluidized bed reactor (FBR) to revive the FBR after 3 months of dormancy. Treated groundwater and air samples were collected and analyzed respectively for perchlorate, metals, and Volatile Organic Compounds (VOCs); and VOCs only. On September 19, 2012, a second pilot run was performed at the GWTP and 107,264 gallons of water were treated. Based on the successful re-start of the GWTP, continuous groundwater extraction began again on September 24, 2012. While groundwater extraction occurs on a continuous basis, operation of the GWTP occurs intermittently due to the low volume of water available for treatment with respect to the design capacity of the GWTP. During the 4<sup>th</sup> quarter of 2012, groundwater extraction occurred only from LHAAP-18/24. Groundwater extraction from LHAAP-16 was not

## GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018

### LONGHORN ARMY AMMUNITION PLANT

performed due to equipment failure. However, extraction from LHAAP-16 began in October 2012 and the extraction volumes increased steadily throughout the 4<sup>th</sup> quarter of 2012, as pumping equipment was gradually repaired/replaced. The GWTP operated under normal conditions until September 2015.

On September 14, 2015, at 11:15 AM, the blower on the air stripper (BL-340) malfunctioned during routine operation. The wiring on the blower was repaired and the blower operated for less than 2 hours on September 17, 2015, when the blower malfunctioned again. It was determined that the blower needed to be replaced, and groundwater extraction and operation of the GWTP ceased beginning September 18, 2015, as the influent equalization tank (TK-140) became full. Beginning on October 2, 2015, it was determined that the GWTP could operate without the blower at a reduced extraction rate. The operation of the GWTP allowed extraction of groundwater from ICTs 12E, 13A, 13B, and 13C (13C was changed to ICT 13E on October 12, 2015), which were considered critical ICTs to prevent migration of contaminants to Harrison Bayou. Groundwater extraction was switched frequently between ICTs 12E, 13A, 13B, and 13E to ICTs 14B, 14C, and 14D beginning on December 14, 2015.

On December 12, 2016, flange bolts at TK-380 failed and allowed hydrochloric acid (HCl) to drain into the sump. The containment area was washed down and the sump contents were transferred into the equalization tank (TK-140). Because of the acid release, extraction of groundwater from the ICTs was halted, and the GWTP was put into recycle mode (effluent sent back as influent) until the acid was neutralized and perchlorate, metals, and VOCs were below discharge criteria on March 17, 2017.

On August 12, 2017, severe storms caused a power outage at LHAAP-18/24. When electrical service was restored, the main transformer failed due to a manufacturing defect. A portable emergency generator was brought on-site on August 21, 2017, to allow the FBR to operate in full recycle mode. After a replacement transformer was installed on September 12, 2017, extraction began from ICT-13B, 13C, 13D, 13E, 13F, 7, and EW01 and the FBR was put into normal operation. Beginning on September 21, 2017, groundwater was extracted from all of the ICTs.

As shown on **Figure ES-1**, the total extracted groundwater volume from LHAAP-18/24 during the 4<sup>th</sup> quarter of 2018 was within normal range. The extracted groundwater volume was measured on a monthly basis as the sum of the ICTs flow meter totalizers' differences between the beginning and end of each month. Due to loss of power, only 78,443 gallons of groundwater was extracted in November 2018 from LHAAP-18/24, and no groundwater was extracted from LHAAP-16 in November 2018. The quantities in LHAAP-18/24 ranged between 78,443 gallons in November 2018 and 733,549 gallons in December 2018.

Approximately 1,501,759 gallons of groundwater were extracted from LHAAP-18/24 and LHAAP 16 during the 4<sup>th</sup> quarter of 2018 compared to approximately 1,108,407 gallons extracted during the 4<sup>th</sup> quarter of 2017. No treated water was returned to ICTs 6 and 9 during the 4<sup>th</sup> quarter of 2018 because this practice was discontinued after system restart in September 2012. Treated effluent was only discharged after laboratory results confirmed that the perchlorate levels were acceptable, which resulted in delays in the treated batches being discharged.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

The average discharged flowrate from the GWTP was calculated as approximately 12 gallons per minute (gpm) during the 4<sup>th</sup> quarter of 2018. Approximately 1,872,334 gallons of groundwater treated by the GWTP was discharged to the Harrison Bayou, with a majority of the discharged water from the INF Pond.

Grab perchlorate samples from the GWTP influent were collected on October 10 and December 6, 2018, and the following concentrations were reported: 7,500 micrograms per liter ( $\mu\text{g/L}$ ) and 4,900  $\mu\text{g/L}$ , respectively. A quarterly influent sample was collected and analyzed for perchlorate on December 18, 2018, and had a detection of 5,700  $\mu\text{g/L}$ . Considering these three perchlorate results, the average perchlorate concentration in the GWTP influent during the quarter was 6,033  $\mu\text{g/L}$ . No perchlorate concentrations in any effluent (TK-650) samples discharged to the Harrison Bayou exceeded the daily maximum effluent limit of 589  $\mu\text{g/L}$  during the quarter. Groundwater was treated by both the FBR and the ion exchange vessels prior to discharge to the INF Pond to ensure that perchlorate would be less than 17  $\mu\text{g/L}$ .

As shown in **Table ES-1**, 856,049 gallons of treated groundwater was discharged directly to the Harrison Bayou, with less than 100,000 gallons discharged in November 2018. An additional 1,016,285 was discharged from the INF Pond to the Harrison Bayou during the 4<sup>th</sup> quarter. **Table ES-1** also presents the INF Pond staff gauge readings by date, which is used to determine the freeboard available in the pond. A total of 93,820 gallons was discharged to the INF Pond in October 2018, which was the only month in the 4<sup>th</sup> quarter 2018 that treated effluent was sent to the INF Pond for storage.

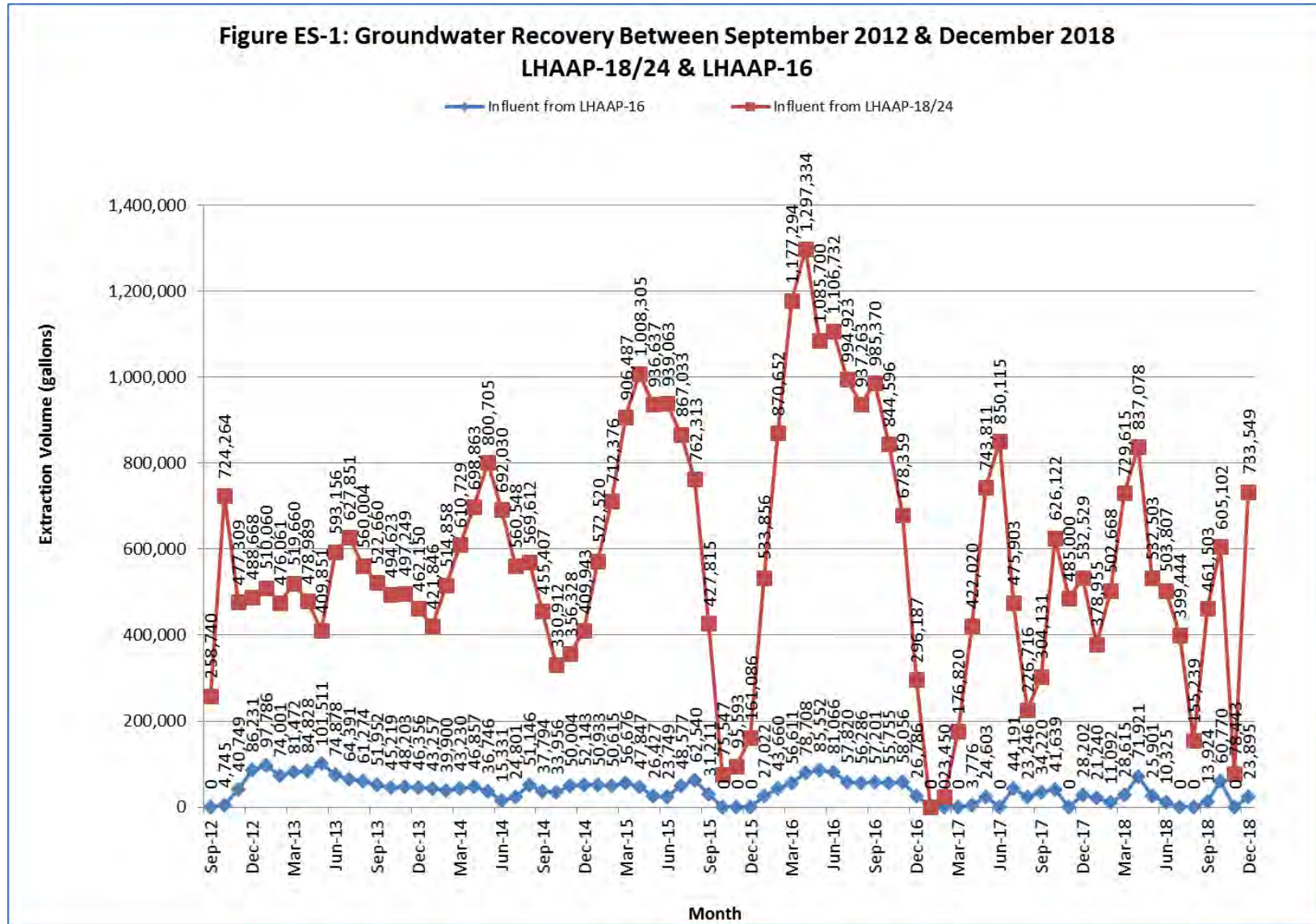
The groundwater volume extracted for treatment at the GWTP ranged from a low of 78,443 gallons in November 2018 to a high of 757,444 gallons in December 2018. The total water extracted for treatment by the GWTP in the 4<sup>th</sup> quarter of 2018 was 1,501,759 gallons. The 3 month average was 500,586 gallons per month. The water quantities treated and discharged each month, based upon FIT-140, since June 2012 are shown on **Figure ES-2**. The total volume of water extracted based upon the sum of the individual extraction wells and ICTs from LHAAP-18/24 and LHAAP-16 in the 4<sup>th</sup> quarter of 2018 (1,501,759 gallons) is higher than the volume of water discharged to the Harrison Bayou and the INF Pond combined (949,869 gallons). The primary reason for the difference is the volume of groundwater stored in the GWTP at the end of December 2018 (314,613 gallons), the amount of water lost with the removed metals precipitation sludge, and the amount of evaporative water lost in the air stripper (which is included in the volume processed, but not in the volume discharged).

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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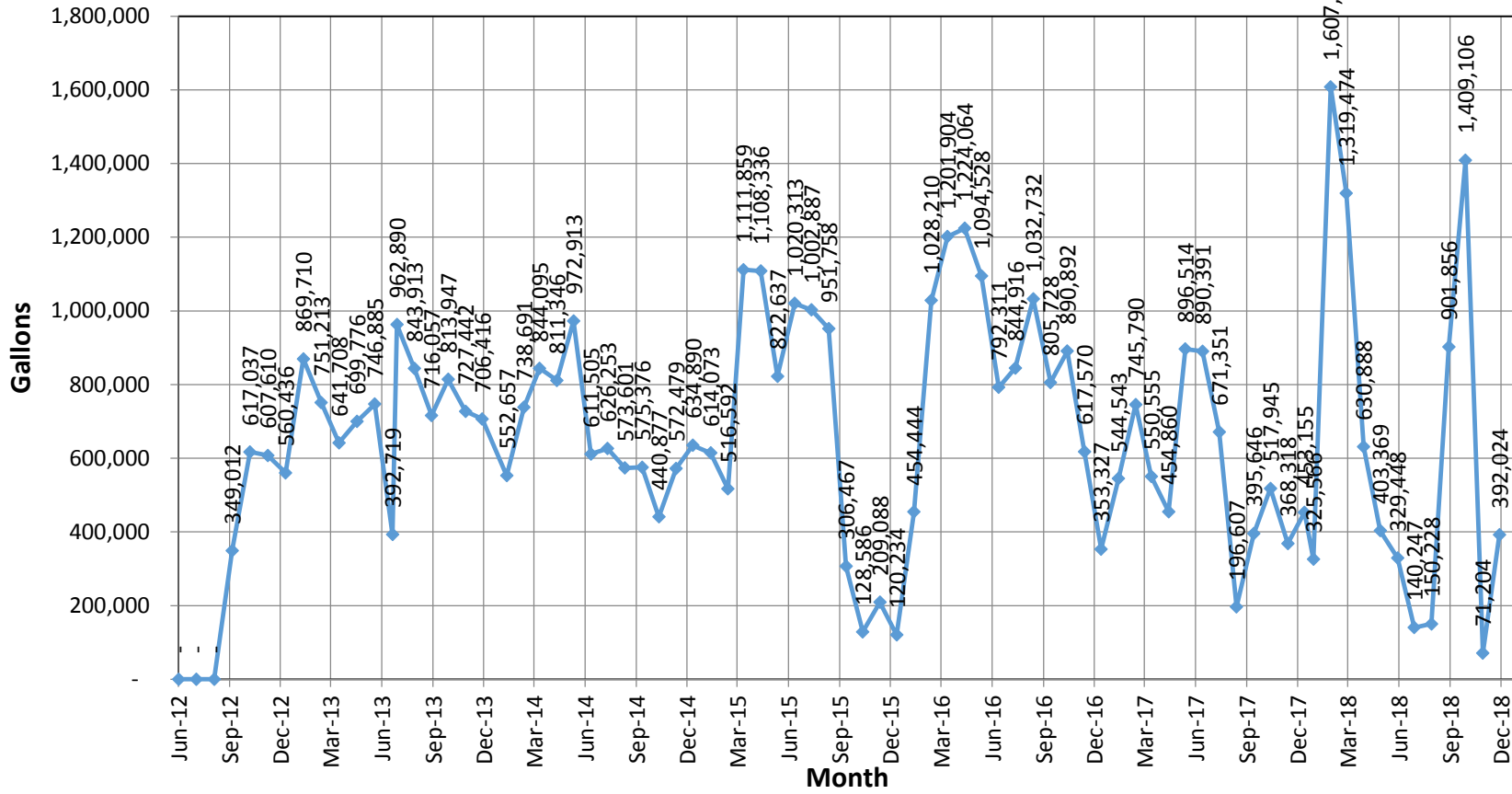


GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
 LONGHORN ARMY AMMUNITION PLANT



GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
 LONGHORN ARMY AMMUNITION PLANT

**Figure ES-2 Water Treated and Discharged Monthly  
 from June 2012 through December 2018**



GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

**Table ES-1. Discharge Information to Harrison Bayou During 4<sup>th</sup> Quarter 2018**

Date	Harrison Bayou Flow (gpm)	Calculated Maximum Rate Allowable (gpm)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
10/01/2018	1,498	274	12,431	73,038	0	12,431	85,469	4.49
10/02/2018	1,323	242	9,314	61,828	0	9,314	71,142	4.28
10/03/2018	725	132	9,808	137,643	0	9,808	147,451	3.85
10/04/2018	423	77	9,854	83,957	0	9,854	93,811	3.56
10/05/2018	450	82	6,985	0	0	6,985	6,985	3.56
10/06/2018	157	28	9,657	0	0	9,657	9,657	3.56
10/07/2018	141	25	9,126	0	0	9,126	9,126	0.36
10/08/2018	116	21	10,223	0	3,988	14,211	10,223	3.55
10/09/2018	No Release	NA	0	0	12,600	12,600	0	3.61
10/10/2018	No Release	NA	0	0	13,460	13,460	0	3.68
10/11/2018	No Release	NA	0	0	14,456	14,456	0	3.73
10/12/2018	No Release	NA	0	0	11,374	11,374	0	3.80
10/13/2018	No Release	NA	0	0	0	0	0	3.84
10/14/2018	No Release	NA	0	0	0	0	0	3.95
10/15/2018	13,799	3152	2,663	0	37,942	40,605	2,663	4.00
10/16/2018	10,071	2300	14,765	0	0	14,765	14,765	4.28
10/17/2018	Flood Stage	MAXIMUM	21,059	89,440	0	21,059	110,499	4.18
10/18/2018	29,694	6,783	22,011	65,982	0	22,011	87,993	3.97
10/19/2018	8,586	1,961	18,278	33,250	0	18,278	51,528	3.86
10/20/2018	18,410	4,205	18,210	117,733	0	18,210	135,943	3.75
10/21/2018	28,857	6,591	20,151	93,170	0	20,151	113,321	3.47
10/22/2018	12,268	2,802	27,139	91,020	0	27,139	118,159	3.16
10/23/2018	4,282	978	16,542	70,350	0	16,542	86,892	2.85
10/24/2018	2,813	642	18,796	45,322	0	18,796	64,118	2.62
10/25/2018	Flood Stage	MAXIMUM	18,082	17,460	0	18,082	35,542	2.85
10/26/2018	Flood Stage	MAXIMUM	14,867	11,216	0	14,867	26,083	2.80
10/27/2018	10,713	2,447	21,181	10,871	0	21,181	32,052	2.70
10/28/2018	8,037	1,835	20,507	6,575	0	20,507	27,082	2.65

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

Date	Harrison Bayou Flow (gpm)	Calculated Maximum Rate Allowable (gpm)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
10/29/2018	3,339	762	25,329	7,430	0	25,329	32,759	2.55
10/30/2018	1,616	295	17,078	0	0	17,078	17,078	2.54
10/31/2018	1,265	231	18,765	0	0	18,765	18,765	2.54
11/01/2018	23,372	4,275	8,431	0	0	8,431	8,431	2.80
11/02/2018	31,841	5,824	19,459	0	0	19,459	19,459	2.80
11/03/2018	11,870	2,171	0	0	0	0	0	2.79
11/04/2018	10,841	1,983	18,772	0	0	18,772	18,772	2.85
11/05/2018	Flood Stage	MAXIMUM	18,122	0	0	18,122	18,122	2.85
11/06/2018	16,028	2,932	6,420	0	0	6,420	6,420	2.85
11/07/2018	No Release	NA	0	0	0	0	0	2.86
11/08/2018	No Release	NA	0	0	0	0	0	2.86
11/09/2018	No Release	NA	0	0	0	0	0	3.00
11/10/2018	No Release	NA	0	0	0	0	0	3.00
11/11/2018	No Release	NA	0	0	0	0	0	3.00
11/12/2018	No Release	NA	0	0	0	0	0	3.70
11/13/2018	No Release	NA	0	0	0	0	0	4.00
11/14/2018	No Release	NA	0	0	0	0	0	4.00
11/15/2018	No Release	NA	0	0	0	0	0	4.00
11/16/2018	No Release	NA	0	0	0	0	0	4.00
11/17/2018	No Release	NA	0	0	0	0	0	4.00
11/18/2018	No Release	NA	0	0	0	0	0	3.99
11/19/2018	No Release	NA	0	0	0	0	0	3.99
11/20/2018	No Release	NA	0	0	0	0	0	3.99
11/21/2018	No Release	NA	0	0	0	0	0	3.99
11/22/2018	No Release	NA	0	0	0	0	0	3.99
11/23/2018	No Release	NA	0	0	0	0	0	3.98
11/24/2018	No Release	NA	0	0	0	0	0	3.98
11/25/2018	No Release	NA	0	0	0	0	0	3.98
11/26/2018	No Release	NA	0	0	0	0	0	3.97
11/27/2018	No Release	NA	0	0	0	0	0	3.97

**GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018**  
**LONGHORN ARMY AMMUNITION PLANT**

Date	Harrison Bayou Flow (gpm)	Calculated Maximum Rate Allowable (gpm)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
11/28/2018	No Release	NA	0	0	0	0	0	3.97
11/29/2018	No Release	NA	0	0	0	0	0	3.96
11/30/2018	No Release	NA	0	0	0	0	0	3.96
12/01/2018	2,156	492	13,298	0	0	13,298	13,298	4.05
12/02/2018	2,613	596	14,761	0	0	14,761	14,761	4.05
12/03/2018	2,765	631	23,881	0	0	23,881	23,881	4.05
12/04/2018	2,210	504	17,272	0	0	17,272	17,272	4.04
12/05/2018	1,778	406	19,589	0	0	19,589	19,589	4.04
12/06/2018	1,505	343	15,440	0	0	15,440	15,440	4.03
12/07/2018	1,621	370	12,515	0	0	12,515	12,515	4.03
12/08/2018	No Release	NA	0	0	0	0	0	4.78
12/09/2018	No Release	NA	0	0	0	0	0	5.21
12/10/2018	Flood Stage	MAXIMUM	51,463	0	0	51,463	51,463	5.21
12/11/2018	Flood Stage	MAXIMUM	17,525	0	0	17,525	17,525	5.20
12/12/2018	37,780	8,629	19,509	0	0	19,509	19,509	5.20
12/13/2018	Flood Stage	MAXIMUM	17,010	0	0	17,010	17,010	5.35
12/14/2018	Flood Stage	MAXIMUM	13,004	0	0	13,004	13,004	5.77
12/15/2018	No Release	NA	0	0	0	0	0	5.77
12/16/2018	No Release	NA	0	0	0	0	0	5.77
12/17/2018	8,290	1,893	44,031	0	0	44,031	44,031	5.77
12/18/2018	5,223	1,193	13,887	0	0	13,887	13,887	5.76
12/19/2018	5,381	1,175	13,994	0	0	13,994	13,994	5.82
12/20/2018	5,680	1,240	11,383	0	0	11,383	11,383	5.82
12/21/2018	20,099	4,390	11,301	0	0	11,301	11,301	5.82
12/22/2018	No Release	NA	0	0	0	0	0	5.82
12/23/2018	No Release	NA	0	0	0	0	0	5.82
12/24/2018	No Release	NA	0	0	0	0	0	5.81
12/25/2018	No Release	NA	0	0	0	0	0	5.81
12/26/2018	3,591	784	58,427	0	0	58,427	58,427	5.81
12/27/2018	3,064	669	3,734	0	0	3,734	3,734	5.81

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
 LONGHORN ARMY AMMUNITION PLANT

Date	Harrison Bayou Flow (gpm)	Calculated Maximum Rate Allowable (gpm)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
12/28/2018	No Release	NA	0	0	0	0	0	6.03
12/29/2018	No Release	NA	0	0	0	0	0	6.03
12/30/2018	No Release	NA	0	0	0	0	0	6.03
12/31/2018	No Release	NA	0	0	0	0	0	6.02
<b>Totals</b>			<b>856,049</b>	<b>1,016,285</b>	<b>93,820</b>	<b>949,869</b>	<b>1,872,334</b>	
Notes: gpm = gallons per minute								

# 1 EVALUATION OF GROUNDWATER TREATMENT PLANT

The Groundwater Treatment Plant (GWTP) was constructed as part of the Interim Remedial Action (IRA) at Burning Ground Number (No.) 3, also referred to as Longhorn Army Ammunition Plant (LHAAP)-18/24, to treat groundwater extracted from interception-collection trenches (ICTs) and extraction wells. **Figure A-1** located in **Appendix A** presents the layout of the ICTs and extraction wells at LHAAP-18/24. The groundwater contamination at LHAAP-18/24 likely resulted from infiltration from an Unlined Evaporation Pond (UEP) that was used to store manufacturing wastewater, and from burning trenches and other industrial processes used to flash pyrotechnic, propellant, and explosive waste streams. The groundwater at LHAAP-18/24 is contaminated mainly with chlorinated ethenes and perchlorate, with lesser concentrations of 1,4-dioxane.

The GWTP also receives flow from eight extraction wells installed at LHAAP-16 as part of a historical treatability study. The extraction wells were installed in 1996 and 1997. The wells are located between the landfill at LHAAP-16 and Harrison Bayou. The groundwater at LHAAP-16 is also contaminated mainly with chlorinated ethenes and perchlorate.

## 1.1 Treatment Configuration

The process flow diagram for the GWTP is presented in **Appendix A, Figure A-2**. The GWTP was not operational between May 24, 2012, and September 6, 2012, due to malfunction of the scrubber unit associated with the catalytic oxidizer. Since September 6, 2012, the GWTP has operated without air abatement equipment. Although major repairs were conducted on the GWTP (e.g., replacement of level alarms, repair of the hydrochloric acid [HCl] tank, replacement of TK-650, replacement of malfunctioning valves and flow meters, replacement of metering pumps, repair or replacement of various system pumps, rust removal and repainting of various tanks, and replacement and repair of various extraction pumps, motors, and level switches), the GWTP treatment configuration has remained unchanged.

Malfunction of the blower on the air stripper (BL-340) on September 14, 2015, and on September 17, 2015, disrupted continuous extraction and routine operations of the GWTP, which lasted through January 7, 2016. Prior to this occurrence, the GWTP performed as designed and the GWTP was operated on an as needed basis (i.e., semi-continuous operational basis). During the 4<sup>th</sup> quarter of 2015, groundwater was extracted from a limited number of ICTs (ICTs 12E, 13A, 13B, 13C, and/or 13E, or ICTs 14B, 14C, and 14D). Operation of the GWTP occurred on a batch basis through the fluidized bed reactor (FBR). After replacement of the blower, attempts were made to restore continuous operations to the FBR but remained predominantly on a batch basis throughout January 2016.

In December 2016, a HCl spill caused plant operations to shut down until the issue could be properly addressed. The FBR performance was challenged by the increased chlorides in the neutralized wastewater, but performance gradually returned to normal in the 1<sup>st</sup> quarter of 2017. Groundwater extraction was gradually increased to full rates during the 2<sup>nd</sup> quarter of 2017.



**GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018**  
**LONGHORN ARMY AMMUNITION PLANT**

On August 12, 2017, severe storms caused a power outage at LHAAP-18/24. When electrical service was restored, the main transformer failed due to a manufacturing defect. A portable emergency generator was brought on-site on August 21, 2017, to allow the FBR to operate in full recycle mode. After a replacement transformer was installed on September 12, 2017, extraction began from ICT-13B, 13C, 13D, 13E, 13F, 7, and EW01 and the FBR was put into normal operation. Beginning on September 21, 2017, groundwater was extracted from all of the ICTs.

Flow rates for the treatment processes for metals and Volatile Organic Compounds (VOCs) ranged between 195 and 198 gallons per minute (gpm) with an average of approximately 197 gpm for the operating hours (i.e., this flow rate does not represent continuous flows). The GWTP operated for 128.25 hours during the quarter. The treatment configuration of the plant at these rates (with minor variations) is as follows:

**GWTP Metals Precipitation Operating Parameters**

<b>Pretreatment Settings</b>	<b>Tank 200-A Mg(OH)<sub>2</sub> Mixing</b>	<b>Tank 200-B NaOH Mixing</b>	<b>Tank 200-C Polymer Mixing</b>	<b>Tank 300 feed line to Air Stripper</b>
pH Adjustment	9.0	10.5	NA	5.0 to meet ≤ 8.0 release from stripper
Feed Pump Settings	Speed 100% Stroke 100% 10 gph Mg(OH) <sub>2</sub>	Speed 100% Stroke 100% 9.0 gph NaOH	Speed 90% Stroke 100% 40 gph water	Speed 80% Stroke 80% 10 gph HCl

Notes: gph - gallons per hour, NaOH - sodium hydroxide, Mg(OH)<sub>2</sub> - magnesium hydroxide, NA - not applicable

**GWTP Air Compressors Operating Parameters**

<b>Air Compressors</b>	<b>K-700A</b>	<b>K-700B</b>	<b>K-701</b>
Air Pressure Settings	88 psi	88 psi	105 psi

Note: psi - pounds per square inch

**GWTP Stripper Operating Parameters**

pH Setting	7.4
Inlet Pressure Gauge	Not operational
Stripper Pressure Gauge	Not operational
Air Flow Rate	Not operational

**GWTP Fluidized Bed Reactor Operating Parameters**

Carbon Bed Height	12 feet & 8 to 11 inches
Recycle Flow Rate	200 gpm
pH	7.1 to 7.4
Recycle oxidation-reduction potential (ORP)	<-430 mV

Note: mV - millivolts



GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

## 1.2 Work Performed at the GWTP

Work performed at the GWTP during the 4<sup>th</sup> quarter of 2018 is described in the following subsections.

### 1.2.1 Routine Maintenance

- Performed housekeeping in GWTP office, the Army trailer, the GWTP shop, and around the GWTP and containment area.
- Mowed grass around GWTP and Army trailer.
- Collected quarterly surface water samples from Harrison Bayou and Goose Prairie Creek.
- Removed old ion exchange vessels from GWTP and sent off site for disposal.
- Completed sampling at Site 18/24 with the exception of three wells due to those wells being under water.
- Removed fallen tree from power lines.

### 1.2.2 Major Maintenance

The major maintenance items that were completed at the GWTP during this quarterly reporting period are:

- October 1, 2018: BLOC Design was onsite to repair a problem with the programmable logic controller (PLC).
- October 2, 2018: BLOC Design was on site to repair electrical problem with ICT 12B.
- November 2, 2018: Zef's Construction was on site to form up and pour a concrete pedestal for the new ion exchange vessels.
- November 2, 2018: Power lines broken due to fallen tree, unable to get in to repair it as ground was too wet, a generator was brought in to power the FBR.
- November 6, 2018: Received two, new ion exchange vessels, which required installation of new piping to the new vessels.
- November 27, 2018: Ark-La-Tex Electric was on site to start the repair of broken power lines.
- November 29, 2018: Ark-La-Tex Electric was on site to finish the repairs to broken power lines.
- December 28, 2018: Ark-La-Tex Electric was on site to repair broken power line.

#### 1.2.2.1 Safety

No safety issues or training occurred during the reporting period.

#### 1.2.2.2 Lubrication

No lubrication maintenance was conducted during the reporting period.

#### 1.2.2.3 Air Compressors

- Performed preventive maintenance on K-700B air compressor.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

#### **1.2.2.4 Belt Press and Waste Disposal**

No belt press or waste disposal was conducted during the reporting period.

#### **1.2.2.5 Sand Filter**

No maintenance or repairs were conducted on the sand filter during the reporting period.

#### **1.2.2.6 Well Field at LHAAP-18/24**

- Collected monthly flow meter readings and water level measurements.
- Replaced a broken 1-inch tee on ICT 13A
- Cleaned level probes on ICT 14C

#### **1.2.2.7 Miscellaneous Activities**

- October 9, 2018: GWTP operators responded to a call out for loss of power at 16:45. Power was out on SWEPCO's side, power was restored to the GWTP at 19:15.
- October 13, 2018: GWTP operators responded to a call out for loss of power at 18:30. Power was out on SWEPCO's side, power was restored to the GWTP at 20:15.
- November 27, 2018: BLOC Design was on site to install a camera at the Harrison Bayou staff plate for remote gauging.
- December 8, 2018: GWTP operators responded to a call out for loss of power at 15:00. Power was out on SWEPCO's side, power was restored to the GWTP at 16:00 and the FBR was restarted.

#### **1.2.3 Routine Maintenance at LHAAP-16**

- Checked site daily.
- Collected monthly water levels.
- Cleared brush and weed-eated around monitoring wells at Site 16.
- Cleared brush and weed-eated around Geosyntec wells at Site 16.
- Re-developed at total of five wells at Geosyntec site at Site 16.

#### **1.2.4 Routine Maintenance (Potable Water Wells)**

- Flushed potable water lines.
- Added chlorine tablets to potable water well # 1.
- Potable water pressure was lost on October 10, 2018.
- Worked to restore potable water pressure. Efforts in the 4<sup>th</sup> quarter of 2018 did not result in potable water pressure being restored. However, Caddo Well Service was procured to complete installation of a new bladder tank, a new pump, and piping that did result in potable water being restored in early 2019.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

### 1.3 Filter Cake Operations and Management

No filter cake operations took place during this reporting period.

### 1.4 Fluidized Bed Reactor Operations

The ion exchange vessels were brought online when treated effluent was to be discharged to the INF pond. The average perchlorate concentration in the GWTP influent (based upon monthly and quarterly influent samples collected in October and December 2018) during the 4<sup>th</sup> quarter of 2018 was 6,033 micrograms per liter (µg/L).

The operating parameters for the GWTP FBR are presented in **Table 1**. None of the operating parameters were outside of the optimal ranges in the 4<sup>th</sup> quarter of 2018. Following maintenance of the FBR in July 2018, perchlorate has not been detected in water sampled. During the 4<sup>th</sup> quarter of 2018, the ORP ranged between -465 and -519 mV, and the pH ranged between 7.2 and 7.4 standard units.

**Table 1. Enhanced Fluidized Bed Reactor Operating Parameters – 4<sup>th</sup> Quarter 2018**

Date	pH (7.1-7.4)	ORP (<-430mV)	Temperature (Degrees Fahrenheit)
10/1/2018	7.4	-477	79
10/2/2018	7.3	-479	80
10/3/2018	7.3	-482	81
10/4/2018	7.4	-478	81
10/5/2018	7.4	-487	80
10/6/2018	7.4	-482	81
10/7/2018	7.3	-484	82
10/8/2018	7.4	-476	82
10/9/2018	7.4	-483	81
10/10/2018	7.4	-490	80
10/11/2018	7.4	-493	79
10/12/2018	7.4	-494	78
10/13/2018	7.4	-493	78
10/14/2018	7.4	-495	78
10/15/2018	7.4	-483	73
10/16/2018	7.4	-475	68
10/17/2018	7.4	-485	68
10/18/2018	7.4	-484	67
10/19/2018	7.4	-485	66
10/20/2018	7.4	-484	66
10/21/2018	7.4	-483	66
10/22/2018	7.4	-484	66
10/23/2018	7.4	-483	65

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

Date	pH (7.1-7.4)	ORP (<-430mV)	Temperature (Degrees Fahrenheit)
10/24/2018	7.4	-486	65
10/25/2018	7.4	-486	64
10/26/2018	7.4	-485	63
10/27/2018	7.4	-486	64
10/28/2018	7.4	-487	65
10/29/2018	7.4	-491	70
10/30/2018	7.4	-496	70
10/31/2018	7.4	-499	71
11/1/2018	7.4	-487	68
11/2/2018	7.4	-495	68
11/3/2018	7.4	-496	67
11/4/2018	7.4	-500	67
11/5/2018	7.4	-510	68
11/6/2018	7.4	-511	69
11/7/2018	7.4	-516	68
11/8/2018	7.4	-518	67
11/9/2018	7.4	-515	66
11/10/2018	7.4	-512	63
11/11/2018	7.4	-514	62
11/12/2018	7.4	-514	55
11/13/2018	7.4	-506	56
11/14/2018	7.4	-500	55
11/15/2018	7.3	-495	55
11/16/2018	7.3	-495	56
11/17/2018	7.3	-493	56
11/18/2018	7.3	-494	57
11/19/2018	7.3	-491	57
11/20/2018	7.3	-500	57
11/21/2018	7.3	-497	57
11/22/2018	7.3	-495	56
11/23/2018	7.3	-494	56
11/24/2018	7.3	-493	57
11/25/2018	7.3	-496	58
11/26/2018	7.3	-494	57
11/27/2018	7.3	-494	57
11/28/2018	7.3	-496	58
11/29/2018	7.3	-500	60
11/30/2018	7.4	-498	63
8/31/2018	7.2	-519	93

**GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018**  
**LONGHORN ARMY AMMUNITION PLANT**

<b>Date</b>	<b>pH (7.1-7.4)</b>	<b>ORP (&lt;-430mV)</b>	<b>Temperature (Degrees Fahrenheit)</b>
12/1/2018	7.4	-493	63
12/2/2018	7.4	-490	62
12/3/2018	7.4	-496	62
12/4/2018	7.4	-497	60
12/5/2018	7.3	-480	58
12/6/2018	7.3	-485	56
12/7/2018	7.4	-487	55
12/8/2018	7.4	-484	53
12/9/2018	7.3	-487	52
12/10/2018	7.3	-475	52
12/11/2018	7.4	-477	52
12/12/2018	7.4	-474	52
12/13/2018	7.4	-473	55
12/14/2018	7.3	-475	55
12/15/2018	7.3	-476	55
12/16/2018	7.3	-477	55
12/17/2018	7.3	-478	55
12/18/2018	7.3	-476	55
12/19/2018	7.3	-465	55
12/20/2018	7.3	-466	55
12/21/2018	7.2	-471	54
12/22/2018	7.2	-472	56
12/23/2018	7.2	-470	56
12/24/2018	7.2	-468	56
12/25/2018	7.2	-469	56
12/26/2018	7.2	-467	59
12/27/2018	No power	No power	No power
12/28/2018	7.3	-465	58
12/29/2018	7.4	-481	56
12/30/2018	7.4	-492	56
12/31/2018	7.4	-493	56

## 1.5 Process Chemical Usage at GWTP

Approximate chemical consumption and the quantities delivered during the 4<sup>th</sup> quarter of 2018 are shown in **Table 2**.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

**Table 2. Chemical Usage and Delivery Data**

<b>Chemical</b>	<b>Usage 4<sup>th</sup> Quarter 2018</b>	<b>Quantity Delivered 4<sup>th</sup> Quarter 2018</b>
Hydrochloric acid	405 gallons	0
Sodium hydroxide (35%)	675 gallons	0
Acetic acid (50%)	9 drums = 495 gallons	0
Phosphoric acid (75%)	47.3 liters	0
Magnesium hydroxide	195 gallons	0
Urea	351.1 pounds	500 pounds
Polymer (magnafloc 110-L)	7.0 liters	0

## 2 EVALUATION OF LHAAP-18/24 ICT EFFECTIVENESS

The ICT system at Burning Ground No. 3 is composed of 14 sections ranging in length from 100 feet (ft) to 1,300 ft. A total of approximately 5,000 linear ft of trench was installed within and around three sides of Burning Ground No. 3. The trench sections extend approximately 22 ft to 45 ft below ground surface (bgs). Most, but not all of the trenches are as deep as the confining clay layer of the shallow groundwater zone. High density polyethylene (HDPE) liners were installed in ICTs 12 and 13, located on the western and northern boundaries of LHAAP-18/24, respectively. The locations of the liners are shown on **Figure A-1** in **Appendix A**. **Table A-1** in **Appendix A** presents the depths of the ICTs.

### 2.1 Groundwater Elevation

Water levels from 95 monitoring wells and 11 piezometers (piezometer 12 was damaged and plugged and abandoned in May 2013) are measured monthly to generate potentiometric surface maps that assist in monitoring the effectiveness of the groundwater extraction system on plume containment. The groundwater contours are generated using the water levels from the shallow zone and Wilcox Formation wells. The water level data are presented in **Table 3**. No reinjection of treated groundwater or reapplication to LHAAP-18/24 grounds via the existing irrigation system occurred during the 4<sup>th</sup> quarter of 2018. Potentiometric surface maps are presented in **Appendix B**, and groundwater elevations from the 4<sup>th</sup> quarter of 2018 are discussed in Section 2.2.

### 2.2 Performance of Plume Capture

The intent of the ICTs is to control groundwater gradients, prevent off-site migration of contaminated groundwater, extract the most highly contaminated groundwater, and reduce the mass of contaminants in groundwater. Liners were installed in the ICTs on the northern (ICT 13) and western (ICT 12) site boundaries to limit migration of contaminated water from the site towards Harrison Bayou. At the same time, the liners reduce or prevent removal of contaminated groundwater that is outside the containment zone, between the site and Harrison Bayou. The ICTs are installed within the shallow subsurface at the site and capture primarily shallow groundwater (e.g., < 40 ft bgs).

In 2007 and 2008, in consultation with the Texas Commission on Environmental Quality (TCEQ) and the USEPA, the Army ceased operations of ICTs 1, 3, 5, 10, and 12A for groundwater extraction (note that extraction from ICT 12A was resumed after pump replacement in December 2012). Two other ICTs (ICT 6 and ICT 9) were changed from extraction ICTs to re-injection ICTs. Groundwater extraction from well EW-1 located in the northeast central portion of the site began in October 2008 and well 18WW17 located to the northeast of the ICT containment area began in January 2008. **Table B-1** in **Appendix B** presents a summary of extraction equipment replacement since 2011, as dictated by poor extraction performance (malfunctioning pumps, poor pump positioning with respect to groundwater, non-operational level probes, scale build up, etc.). Further discussion of extraction performance of various ICTs and extraction wells is presented in Section 2.3.

## GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018

### LONGHORN ARMY AMMUNITION PLANT

Potentiometric surface maps of the shallow zone groundwater in the vicinity of LHAAP-18/24, based on groundwater elevations measured on October 30, November 29, and December 27, 2018, are shown on **Figures B-1, B-2, and B-3 in Appendix B**, respectively.

The HDPE liners in the ICTs, where present, are interpreted as groundwater flow barriers. The potentiometric surface maps for October, November, and December 2018 continue to reflect high groundwater elevations in the northern/northwestern portion of the site with groundwater flow occurring radially from groundwater highs at monitoring well AWD-2 (171.93 ft above mean sea level [amsl] in October 2018). However, there is also a highpoint in the southwestern portion of site around monitoring well 102.

The elevated potentiometric surface contours within the ICTs compared to the lower potentiometric surface contours on the outside of the ICTs is likely due to a no flow boundary condition caused by the ICT liners and groundwater extraction along the ICTs. From the groundwater highs at monitoring well AWD-2, groundwater flows radially towards the surrounding ICTs which include ICT 13 to the north and northwest, and ICT 12 to the west and southwest. East of the groundwater mound and in the northeastern third of the site, groundwater flow is primarily towards ICT 14 along the northeast site boundary.

Groundwater extraction rates from the ICTs were 605,102 gallons in October 2018, 78,443 gallons in November 2018, and 733,549 gallons in December 2018. Rainfall amounts recorded at the GWTP were 8.02 inches in October 2018, 6.75 inches in November 2017, and 11.43 inches in December 2018. It should be noted that the rainfall in any given month in the 4<sup>th</sup> quarter 2018 was greater than the combined rainfall for the fourth quarter in 2017.

During the reporting period, approximately 1,872,334 gallons of treated groundwater was discharged to Harrison Bayou. Discharge to the bayou was limited in November 2018 due to lack of power to the GWTP. Overall groundwater levels increased from October 2018 to November 2018 but then decreased nearly the same amount from November 2018 to December 2018. Overall the average decrease in the 4<sup>th</sup> quarter of 2018 was 0.10 ft.

Groundwater levels in Wilcox Formation wells (generally > 40 to 50 ft bgs) were measured during the 4<sup>th</sup> quarter of 2018 groundwater gauging events. Wilcox Formation wells correspond generally to those wells previously identified as “Intermediate” and “Deep” wells. “Intermediate” wells are designated as Upper Wilcox Formation wells and “Deep” wells are designated as Lower Wilcox Formation wells. Generally, groundwater in the Upper and Lower Wilcox Formation wells are in hydraulic communication and so can be treated as a single hydrogeologic unit. Therefore, the groundwater elevations in Upper Wilcox wells were used to construct the potentiometric surface maps for the Wilcox Formation. **Figures B-4, B-5, and B-6 of Appendix B** show the locations of the Wilcox Formation monitoring wells and the potentiometric surface of the Wilcox Formation, based on static water levels measured during the October, November, and December 2018 gauging events, respectively. Groundwater in the Wilcox Formation generally flows in a northerly direction, towards Caddo Lake and there is a downward vertical gradient between the overlying shallow zone and the Wilcox Formation. However, a groundwater high in the Wilcox Formation occurs in the area of MW-14.



GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

## 2.3 Quantity of Water Extracted from LHAAP-18/24

The average daily extraction rates from the ICTs were 19,519 gallons per day (gpd) in October 2018, approximately 2,615 gpd in November 2018, and approximately 23,663 gpd in December 2018. The decrease in extraction rates observed in November was due to a loss of power for much of the month. Power was lost again on December 27, 2018, and was not restored in the 4<sup>th</sup> quarter.

The volume of groundwater removed from LHAAP-18/24 during the 4<sup>th</sup> quarter of 2018 measured approximately 1,417,094 gallons, based on total flow measured from the extraction wells and ICT wells. LHAAP-16 contributed 84,665 gallons to the GWTP. No groundwater was extracted from LHAAP-16 in November 2018 due to power loss. Together, approximately 1,501,759 gallons was extracted from both LHAAP-16 and LHAAP-18/24 based upon flow readings from the individual well readings. **Figure 2-1** shows the historical trends of extracted volumes by quarter based upon readings from the influent totalizer, FIT-140.

In contrast to the approximate total extracted volume based on total flow measured at the GWTP, the total estimated volume discharged to the INF pond and/or Harrison Bayou (**Table 4**) following treatment by the GWTP was 486,641 gallons in October 2018; 71,204 in November 2018; and 392,024 gallons in December 2018 for a total of 949,869 gallons in the 4<sup>th</sup> quarter of 2018. This volume is based upon the readings from the effluent totalizer, FIT686, which is located after tank 650. Therefore, this volume does not account for water present in the decant tank at the end of December 2018 or the influent that was not treated after the GWTP last ran on December 26, 2018. The difference between the influent and effluent volumes is approximately 46 %. However, considering the over 314,600 gallons of water within the treatment plant as of December 28, 2018, this percent difference is closer to 18% variation, which is contributable to variations in the influent flow meter recordings and evaporative losses.

As indicated by **Table 5**, 19 of 27 ICTs and wells produced water during the 4<sup>th</sup> quarter of 2018. In addition, 14D produced water during only a portion of the quarter. In general, the reduction in production is associated with pumps or motors requiring repairs. The pump located in 13F is placed shallow in the extraction well resulting in low output. Repairs to the pumps and motors are completed as time allows. During the 1<sup>st</sup> Quarter 2019, pump replacements will be completed in ICTs 12D, 13C, 2, 14A, 14C, 14D, 14E, and EW-01.

## 2.4 Sampling Activities

The following 55 monitoring wells were sampled in December 2018; 109, 120, 125, 126, 18CPTMW01SW, 18CPTMW03SW, 18CPTMW04, 18CPTMW04SW, 18CPTMW06, 18CPTMW07, 18CPTMW08DW, 18CPTMW08SW, 18CPTMW10SW, 18CPTMW10DW, 18CPTMW12SW, 18CPTMW12DW, 18CPTMW14, 18CPTMW15, 18CPTMW16, 18CPTMW18, 18CPTMW19, 18CPTMW22R, 18CPTMW22SW, 18CPTMW23, 18CPTMW24, 18WW02, 18WW06, 18WW08, 18WW10, 18WW17, 18WW22, 18WW24, AWD1, AWD3, AWD4, C-03, C-04, C-08, C-09, MW-2, MW-3, MW-5, MW-7, MW-8, MW-9, MW-10, MW-14, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, MW-22, and MW-23. All wells sampled were analyzed for perchlorate and most of the wells were also sampled for VOCs and total metals. Select wells (18CPTMW03SW,

## GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018

### LONGHORN ARMY AMMUNITION PLANT

18CPTMW22R, and 18CPTMW22SW) were sampled for 1,4-dioxane. The analytical results are presented in **Table 6**. Note that monitoring well 123 was not sampled based upon the response to comments (RTCs) for the LHAAP-17 Pre-Design Investigation Report. Monitoring well 18WW10 replaced 123 per the RTCs.

Parameters exceeding their respective United States Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCL) or Texas Risk Reduction Program Groundwater Industrial Medium Specific Concentration (MSC) are arsenic; barium; chromium; manganese, nickel; carbon tetrachloride; 1,1-dichloroethene (DCE); 1,2-dichloroethane; 1,1,2-trichloroethane; benzene; cis-1,2-DCE; trans-1,2-DCE; methylene chloride (MC); tetrachloroethene (PCE); trichloroethene (TCE); and vinyl chloride. Perchlorate was compared to the Texas Risk Reduction Program Protective Concentration Level (PCL) of 17 µg/L, which was exceeded at LHAAP-18/24. Note that MW-2 has the highest detections of PCE; 1,1-DCE; cis-1,2-DCE; and MC. Section 2.4.1 presents a detailed discussion of the analytical results to evaluate the interim remedial action performance.

Sampling was conducted between December 17, 2018, and January 7, 2019, as presented in **Table 6**. Groundwater chemical of concern (COC) maps depicting the results of the December 2018 groundwater sampling event for perchlorate, TCE, and MC are presented as **Figures C-1 through C-6 in Appendix C**. The time series plots of COC concentrations from various monitoring wells are included in **Appendix D**.

#### 2.4.1 LHAAP-18/24 Analytical Results

The highest perchlorate concentrations in the shallow zone are observed in 18WW17, MW-3, MW-5, MW-7, MW-21, MW-23, and 120 with concentrations in these wells ranging between 12,000 µg/L in MW-3 and 73,000 µg/L in 18WW17 (**Figure C-1**). Perchlorate in groundwater has migrated off-site in all directions. The perchlorate concentration in 18CPTMW23, which is located northwest just outside of the LHAAP-18/24 boundary, was reported at 140 µg/L in December 2017 compared to the concentration of 3,220 µg/L in June 2017; 91.3 µg/L in December 2016; 2,310 µg/L in June 2016; 5,700 µg/L in June 2018; and 4,200 µg/L in December 2018. This well has a history of order of magnitude fluctuations in perchlorate concentrations, which are likely influenced by groundwater level fluctuations, rain amounts, and performance of the ICTs.

Perchlorate in the Wilcox Formation was detected in monitoring well 18CPTMW08SW in June 2018 at a concentration of 61,000 µg/L, but dropped to 22,000 µg/L in December 2018 (**Figure C-2**), which is in the same order of magnitude as the concentration reported in December 2016, June 2017, and December 2017 of 33,300 µg/L, 32,900 µg/L, and 31,000 µg/L, respectively. Perchlorate concentration decreases rapidly away from this well. Another area where perchlorate in the Wilcox Formation was identified at an elevated concentration is in MW-14, with a reported concentration of 76,000 µg/L in December 2018 and 94,000 µg/L in June 2018. These results for MW-14 are consistent with recent results that include 150,000 µg/L in December 2017; 84,200 µg/L in December 2016; and 137,000 µg/L in June 2017. **Figure C-2** presents the concentrations of perchlorate in the Wilcox Formation.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

TCE concentrations in the shallow zone remained consistent in December 2018 with the concentrations reported in June 2018 with the following exceptions. The most significant decrease in TCE detected was within MW2 where the June 2018 detection of 5,000 µg/L decreased to 2,300 µg/L in December 2018. In December 2018, TCE increased in 18CPTMW04 to 2,500 µg/L from 800 µg/L in June 2018. TCE increased from 1,500 µg/L in June 2018 to 4,800 µg/L in December 2018 in MW23, which are both within the historical detection range. TCE also increased in 18CPTMW14 from a detection of 600 µg/L in June 2018 to 1,100 µg/L in December 2018. The trend of TCE concentrations is such that the highest concentrations occur within the northwestern portion of the site, primarily at monitoring well 120 (**Figure C-3**). Monitoring well 120 increased from 17,000 µg/L in June 2018 to 22,000 µg/L in December 2018.

TCE in the Wilcox Formation is present at low concentrations with the highest concentration of 9,000 µg/L identified in MW-14. This concentration has increased from a concentration of 7,300 µg/L in June 2018 but is within historical ranges. Overall, the TCE detected in the Wilcox Formation is much lower than in the shallow zone with the exception of the TCE detected at MW-14 (**Figure C-4**).

The elevated concentration of MC in the shallow zone remains generally centered on MW-2 with a concentration of 170,000 µg/L detected in December 2018, which is back within the range detected in December 2016 and December 2017 but is less than the 240,000 µg/L measured in June 2018. No other monitoring wells had detections of MC in the shallow zone. The extent of MC in the shallow formation is depicted on **Figure C-5**.

MC in the Wilcox Formation is present at a concentration of 1,600 µg/L identified in 18CPTMW01SW which is similar to the concentration reported in December 2016 of 1,590 µg/L and in December 2017 of 1,500 µg/L, but more than the June 2018 detection of 840 µg/L. MC was not detected in the other monitoring wells sampled for MC analysis. The extent of MC in the Wilcox Formation is depicted on **Figure C-6**.

Time-series graphs for the shallow zone and Wilcox Formation wells are presented in **Appendix D**. Graphs for shallow zone wells C-08, MW-2, MW-7, MW-8, MW-16, MW-17, MW-20, MW-21, MW-22, MW-23, 18WW08, 109, 120, 126, and AWD-3 are included. Graphs for Wilcox wells C-03 and MW-14 are also included. Note that Wilcox well C-03 is not discussed below as the detections of TCE, MC, and perchlorate are below the applicable cleanup levels. The following observations were made, based on the December 2018 groundwater monitoring results:

- MW-2 is located inside the containment in the shallow zone. The concentration of MC increased sharply from June 2016 and December 2016; however, a sharp decrease was observed during the same time period in 2017. MC concentrations decreased from 604,000 µg/L in June 2017 to 140,000 µg/L in December 2017. The 2018 results fluctuated with the June 2018 detection of 240,000 µg/L and the December 2018 detection of 170,000 µg/L. Similarly, TCE decreased significantly from 15,300 µg/L in June 2017 to 2,600 µg/L in December 2017. This trend remained in 2018 with the December 2018 detection of 2,300 µg/L. The concentration of perchlorate also significantly decreased from 4,830 µg/L in June 2017 to 160 µg/L in December 2017. In 2018, perchlorate decreased further to 1.3 µg/L in June 2018 and then non-detect in

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

December 2018. Previous similar fluctuations in MC, TCE, and perchlorate concentrations have been observed in this well. ·

- Perchlorate and TCE concentrations in MW-21 remained similar to previous results in June 2016 and 2017. However, TCE did increase in December 2018 to 9,800 µg/L which is less than the detection in December 2015 but greater than the detections in the previous 3 years.
- Concentrations of TCE and MC in MW-22 inside the containment in the shallow zone remained similar to previous results since 2011. However, perchlorate has begun to display a decreasing trend since December 2015.
- Perchlorate concentrations in MW-23 remained similar to previous results observed over the past 5 years. TCE increased to 4,800 µg/L in December 2018. Perchlorate increased to 91,000 µg/L in June 2018 and decreased again in December 2018 to 52,000 µg/L. The detection of TCE in December 2018 and perchlorate in June 2018 represent the highest detections in recent years.
- Perchlorate and TCE concentrations in monitoring well 120 remained within levels detected since 2016, which supports a stable trend.
- MC and perchlorate remained below the detection limits in the sample from C-08, to the northeast of the containment area. TCE was detected at 2.2 µg/L, which is below the MCL of 5 µg/L.
- The other northeastern well, 109, demonstrates a decreasing trend in TCE with a detection 420 µg/L, which is the lowest TCE detection in over 10 years. Similarly perchlorate levels remained stable and significantly less than detections observed in 2016 or 2017.
- Wells to the southwest of the containment area include MW-7, MW-8, and MW-17. TCE increased in both MW-7 and MW-8 in December 2018 compared to detections over the past 3 years. Perchlorate was detected in both MW-7 and MW-8 at levels within the historical range over the past 3 years. Monitoring well MW-17 did not have detections of perchlorate or TCE.
- The concentration of TCE in MW-16 in December 2018 (780 µg/L) increased from the June 2018 detection (520 µg/L) but was within typical detections of TCE over the past 3 years. Perchlorate increased from non-detect or near non-detect since June 2016 to 90 µg/L. MC remained below the detection limit.
- Perchlorate was detected at significantly lower levels than in recent years in AWD-3 with a detection of 6.9 µg/L in December 2018. TCE increased in December 2018 but was within historic levels.
- Concentrations of perchlorate in 18WW08 decreased in 2018 to levels observed within the past 5 years. MC and TCE remained non-detect in 2018.

## GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018

### LONGHORN ARMY AMMUNITION PLANT

- Concentrations of TCE and perchlorate in Wilcox Formation well MW-14 show an overall decreasing trend since 2016. MC was not detected in either the June or the December 2018 sampling events.
- Monitoring wells MW-20 and 126 continue to have no detections of MC, TCE, and perchlorate. These wells should be considered for removal from the monitoring program.

In general, other than the changes observed above in perchlorate, TCE, and MC concentrations, the COC concentration trends indicate that the plumes are stable, suggesting that the extraction system is effective in containing the plumes. Groundwater Treatment Plant Sampling and Analysis

As part of the GWTP operations, samples from various water streams are required to be collected and analyzed for the parameters in accordance with the *Final Revised Sampling and Analysis Plan for Groundwater Treatment Plan and Well Fields* (AECOM Technical Services, Inc. [AECOM], September 2017), which was developed in accordance with the Interim Record of Decision (ROD) and the TCEQ letter dated January 8, 2002 (see Administrative Record Volume 1 of 4 in 2002, Document A). Besides the ROD sampling requirement, additional sample analyses are typically performed on the influent and effluent samples to monitor the effectiveness of the perchlorate treatment (FBR and/or ion exchange vessels) process. Sections 2.5.1 through 2.5.4 present the results of analyses conducted during the 4<sup>th</sup> quarter of 2018. The complete laboratory results are provided on a compact disc (CD) (**Appendix E**).

#### 2.4.2 Perchlorate Sampling

**Table 7** presents the weekly effluent perchlorate results for the 4<sup>th</sup> quarter of 2018. None of the effluent samples exceeded the protocol for discharge (**Appendix F**) for perchlorate. Effluent released to the INF pond was treated by the ion exchange vessels prior to discharge resulting in non-detect results for perchlorate. In addition, use of the ion exchange vessels ensured perchlorate was fully treated prior to being discharged to the INF Pond. Samples presented in **Table 7** also include samples collected before the ion exchange to assess the FBR performance. Treated groundwater from the GWTP was discharged to Harrison Bayou during the current quarter when effluent perchlorate concentrations were less than the daily maximum concentration of 589 µg/L and adequate flow in the bayou was observed.

**Table 7** also presents the effluent concentration of ammonia as N and ortho-phosphate, which are soluble nutrients used by the microbes in the metabolic process within the FBR. Effluent samples at the reactor outlet are analyzed to verify that trace amounts of these are present, which indicates that there is enough to sustain the biomass. If there is bypassing or short circuiting in the reactor and perchlorate is not being fully degraded, elevated levels of these nutrients may be present at the FBR outlet. While ortho-phosphate and ammonia as N increased following the restoration of power to the GWTP, the levels dropped throughout December 2018 when the FBR was continually operated. The table also notes which samples were collected after the ion exchange vessels. Perchlorate in the effluent is treated by the FBR prior to the ion exchange vessels, which are used to polish the effluent prior to discharge to the INF Pond.

## GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018

### LONGHORN ARMY AMMUNITION PLANT

Due to the power to the plant being down in November 2018, only two monthly grab samples from the influent to the GWTP (TK-140) were collected in the 4<sup>th</sup> quarter of 2018. The perchlorate concentrations in these samples was 7,500 µg/L in October 2018 and 4,900 µg/L in December 2018.

#### 2.4.3 VOC Sampling

**Tables 8 and 9** present the effluent VOC results for October and December 2018. Due to the power loss, no effluent samples were collected for analysis in November 2018. VOCs are conducted on a biweekly basis to the extent possible. The results, where applicable, were below the discharge limits. The tables also provide monthly influent concentrations for VOCs and perchlorate.

#### 2.4.4 Monthly Metals Sampling

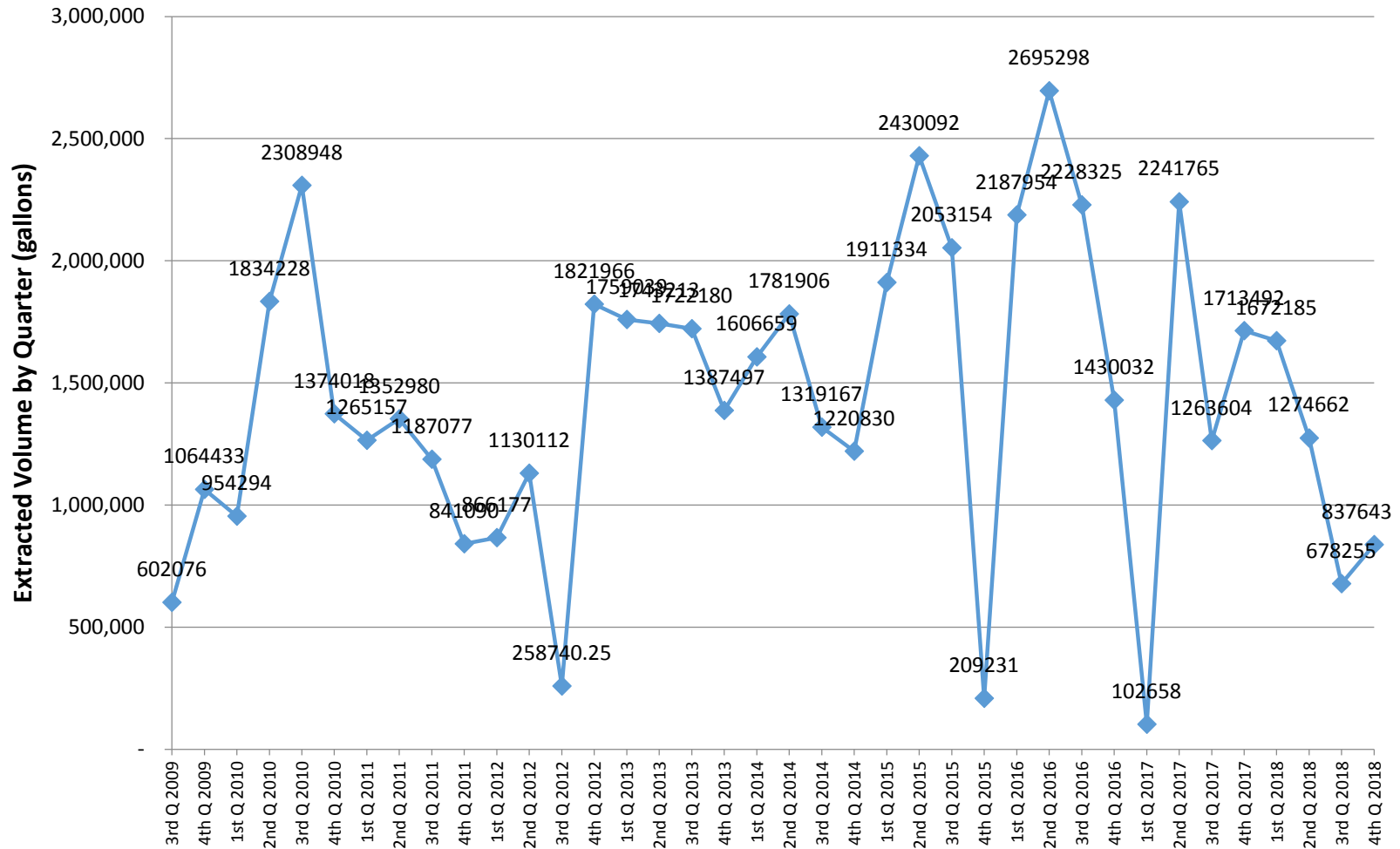
As per the Final Installation-Wide Work Plan (Bhate, May 2018), the monthly metals sampling is reported in **Tables 8 and 9**. None of the metals exceeded the effluent discharge limits.

#### 2.4.5 Quarterly Sampling

Sampling of the effluent for VOCs, anions, chemical oxygen demand (COD), oil and grease, metals, and perchlorate was conducted during this quarter and the results were below the discharge limits. **Table 10** presents the analytical results for the 4<sup>th</sup> quarter of 2018.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
 LONGHORN ARMY AMMUNITION PLANT

**Figure 2-1**  
**Quarterly Extraction Rate**



GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

**Table 3. Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells, and Surface Water**

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 10/30/18	Groundwater Elevation (feet amsl) 10/30/18	Depth to Water (feet) 11/29/18	Groundwater Elevation (feet amsl) 11/29/18	Depth to Water (feet) 12/27/18	Groundwater Elevation (feet amsl) 12/27/18
BGPZ-1	Piezometer	184.99	9.08	175.91	6.77	178.22	9.29	175.70
BGPZ-2	Piezometer	184.39	14.82	169.57	13.88	170.51	14.91	169.48
BGPZ-3	Piezometer	180.35	9.77	170.58	7.75	172.60	9.89	170.46
BGPZ-4	Piezometer	177.77	9.78	167.99	7.60	170.17	9.74	168.03
BGPZ-5	Piezometer	180.76	12.90	167.86	11.83	168.93	12.95	167.81
BGPZ-6	Piezometer	197.82	26.40	171.42	25.90	171.92	26.48	171.34
BGPZ-7	Piezometer	195.96	28.83	167.13	28.35	167.61	28.90	167.06
BGPZ-8	Piezometer	197.08	30.67	166.41	30.12	166.96	30.73	166.35
BGPZ-9	Piezometer	196.45	29.42	167.03	28.94	167.51	29.51	166.94
BGPZ-10	Piezometer	197.00	28.78	168.22	28.18	168.82	28.89	168.11
BGPZ-11	Piezometer	196.99	28.70	168.29	28.05	168.94	28.78	168.21
BGPZ-12	Piezometer	188.17	NM	Plugged	NM	Plugged	NM	Plugged
AWD-1	Monitoring Well	182.27	11.35	170.92	9.37	172.90	11.49	170.78
AWD-2	Monitoring Well	186.78	14.85	171.93	12.89	173.89	14.93	171.85
AWD-3	Monitoring Well	200.13	30.20	169.93	28.06	172.07	30.25	169.88
AWD-4	Monitoring Well	193.89	25.25	168.64	24.13	169.76	25.21	168.68
MW-1	Monitoring Well	199.22	28.57	170.65	27.39	171.83	28.63	170.59
MW-2	Monitoring Well	196.73	28.23	168.50	26.97	169.76	28.31	168.42
MW-3	Monitoring Well	196.54	27.70	168.84	26.76	169.78	27.80	168.74
MW-4	Monitoring Well	197.27	27.83	169.44	26.92	170.35	27.91	169.36
MW-5	Monitoring Well	194.97	26.56	168.41	25.45	169.52	26.65	168.32
MW-6	Monitoring Well	192.18	24.50	167.68	23.77	168.41	24.59	167.59
MW-7	Monitoring Well	188.47	19.81	168.66	19.00	169.47	19.98	168.49
MW-8	Monitoring Well	187.13	18.13	169.00	17.65	169.48	18.24	168.89
MW-9	Monitoring Well	184.73	15.45	169.28	14.27	170.46	15.50	169.23
MW-10	Monitoring Well	178.12	9.81	168.31	8.25	169.87	9.89	168.23
MW-11	Monitoring Well	184.65	14.69	169.96	13.95	170.70	14.80	169.85

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 10/30/18	Groundwater Elevation (feet amsl) 10/30/18	Depth to Water (feet) 11/29/18	Groundwater Elevation (feet amsl) 11/29/18	Depth to Water (feet) 12/27/18	Groundwater Elevation (feet amsl) 12/27/18
MW-12	Monitoring Well	178.33	9.76	168.57	8.24	170.09	9.87	168.46
MW-13	Monitoring Well	176.72	8.42	168.30	7.39	169.33	8.55	168.17
MW-14	Monitoring Well	186.19	14.84	171.35	13.25	172.94	14.95	171.24
MW-16	Monitoring Well	178.59	9.79	168.80	7.72	170.87	9.93	168.66
MW-17	Monitoring Well	179.03	10.35	168.68	9.45	169.58	10.39	168.64
MW-18	Monitoring Well	178.58	9.35	169.23	8.95	169.63	9.48	169.10
MW-19	Monitoring Well	178.60	9.51	169.09	9.10	169.50	9.69	168.91
MW-20	Monitoring Well	186.64	12.18	174.46	9.84	176.80	12.22	174.42
MW-21	Monitoring Well	198.70	31.30	167.40	29.68	169.02	31.33	167.37
MW-22	Monitoring Well	197.51	28.47	169.04	27.96	169.55	28.56	168.95
MW-23	Monitoring Well	198.79	28.20	170.59	27.44	171.35	28.29	170.50
101	Monitoring Well	197.53	9.28	188.25	5.17	192.36	9.43	188.10
102	Monitoring Well	193.94	22.11	171.83	21.42	172.52	22.23	171.71
109	Monitoring Well	197.02	29.70	167.32	27.67	169.35	29.83	167.19
120	Monitoring Well	184.19	15.30	168.89	12.27	171.92	15.38	168.81
123	Monitoring Well	186.21	14.95	171.26	12.53	173.68	15.02	171.19
125	Monitoring Well	196.28	26.55	169.73	25.50	170.78	26.69	169.59
126	Monitoring Well	199.37	30.19	169.18	29.85	169.52	30.30	169.07
129	Monitoring Well	197.24	27.07	170.17	26.67	170.57	27.15	170.09
130	Monitoring Well	177.73	8.70	169.03	6.78	170.95	8.78	168.95
C-01	Monitoring Well	193.89	25.15	168.74	24.45	169.44	25.26	168.63
C-02	Monitoring Well	175.95	7.08	168.87	5.83	170.12	7.19	168.76
C-03	Monitoring Well	196.34	28.10	168.24	26.95	169.39	28.18	168.16
C-04	Monitoring Well	194.64	26.45	168.19	25.62	169.02	26.58	168.06
C-04A	Monitoring Well	194.61	26.13	168.48	25.33	169.28	26.25	168.36
C-05	Monitoring Well	180.74	13.80	166.94	12.69	168.05	13.92	166.82
C-06	Monitoring Well	192.22	26.50	165.72	25.89	166.33	26.53	165.69
C-07	Monitoring Well	196.80	29.33	167.47	28.79	168.01	29.29	167.51
C-08	Monitoring Well	193.10	24.54	168.56	24.30	168.80	24.67	168.43

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 10/30/18	Groundwater Elevation (feet amsl) 10/30/18	Depth to Water (feet) 11/29/18	Groundwater Elevation (feet amsl) 11/29/18	Depth to Water (feet) 12/27/18	Groundwater Elevation (feet amsl) 12/27/18
C-09	Monitoring Well	202.35	33.58	168.77	33.19	169.16	33.70	168.65
C-10	Monitoring Well	201.86	33.19	168.67	32.80	169.06	33.27	168.59
17WW08	Monitoring Well	179.72	10.42	169.30	9.43	170.29	10.57	169.15
18WW01	Monitoring Well	201.31	32.70	168.61	32.07	169.24	32.75	168.56
18WW02	Monitoring Well	179.30	10.08	169.22	9.29	170.01	10.21	169.09
18WW03	Monitoring Well	195.59	27.39	168.20	26.97	168.62	27.49	168.10
18WW04	Monitoring Well	183.74	16.65	167.09	15.85	167.89	16.79	166.95
18WW05	Monitoring Well	189.59	22.13	167.46	21.59	168.00	22.10	167.49
18WW06	Monitoring Well	179.70	11.53	168.17	9.78	169.92	11.64	168.06
18WW07	Monitoring Well	183.67	NM	NM	NM	NM	NM	NM
18WW08	Monitoring Well	177.77	10.05	167.72	6.75	171.02	10.22	167.55
18WW09	Monitoring Well	177.51	9.00	168.51	6.39	171.12	9.09	168.42
18WW10	Monitoring Well	182.26	11.21	171.05	10.89	171.37	11.32	170.94
18WW11	Monitoring Well	182.29	12.70	169.59	12.34	169.95	12.87	169.42
18WW14	Monitoring Well	186.47	18.59	167.88	17.89	168.58	18.65	167.82
18WW15	Monitoring Well	186.24	17.79	168.45	17.22	169.02	17.90	168.34
18WW16	Monitoring Well	201.88	33.60	168.28	32.97	168.91	33.69	168.19
18WW18	Monitoring Well	196.82	27.68	169.14	26.79	170.03	28.77	168.05
18WW19	Monitoring Well	179.56	12.37	167.19	11.55	168.01	12.44	167.12
18WW20	Monitoring Well	180.42	13.07	167.35	12.27	168.15	13.18	167.24
18WW21	Monitoring Well	195.20	27.30	167.90	26.69	168.51	27.42	167.78
18WW22	Monitoring Well	195.37	28.40	166.97	26.28	169.09	28.52	166.85
18WW24	Monitoring Well	176.40	6.70	169.70	4.39	172.01	6.75	169.65
18WW25	Monitoring Well	175.15	5.73	169.42	3.87	171.28	5.82	169.33
18CPTMW01SW	Monitoring Well	198.20	28.80	169.40	27.72	170.48	28.91	169.29
18CPTMW01DW	Monitoring Well	197.92	29.49	168.43	27.60	170.32	29.60	168.32
18CPTMW03SW	Monitoring Well	198.53	30.55	167.98	29.47	169.06	30.71	167.82
18CPTMW04	Monitoring Well	196.60	25.82	170.78	24.38	172.22	25.96	170.64

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 10/30/18	Groundwater Elevation (feet amsl) 10/30/18	Depth to Water (feet) 11/29/18	Groundwater Elevation (feet amsl) 11/29/18	Depth to Water (feet) 12/27/18	Groundwater Elevation (feet amsl) 12/27/18
18CPTMW04SW	Monitoring Well	196.42	28.20	168.22	27.02	169.40	28.27	168.15
18CPTMW06	Monitoring Well	198.12	29.45	168.67	27.96	170.16	29.55	168.57
18CPTMW07	Monitoring Well	197.32	29.17	168.15	27.82	169.50	29.31	168.01
18CPTMW08SW	Monitoring Well	196.38	28.15	168.23	27.10	169.28	28.29	168.09
18CPTMW08DW	Monitoring Well	196.59	29.60	166.99	27.56	169.03	29.70	166.89
18CPTMW10SW	Monitoring Well	186.98	18.62	168.36	17.50	169.48	18.72	168.26
18CPTMW10DW	Monitoring Well	187.38	19.51	167.87	18.33	169.05	19.57	167.81
18CPTMW12SW	Monitoring Well	190.90	22.79	168.11	21.77	169.13	22.93	167.97
18CPTMW12DW	Monitoring Well	190.25	22.29	167.96	21.23	169.02	22.37	167.88
18CPTMW14	Monitoring Well	196.69	27.83	168.86	26.88	169.81	27.95	168.74
18CPTMW15	Monitoring Well	179.79	10.68	169.11	8.30	171.49	10.82	168.97
18CPTMW16	Monitoring Well	175.37	7.04	168.33	4.73	170.64	7.20	168.17
18CPTMW18	Monitoring Well	194.53	27.80	166.73	27.40	167.13	27.89	166.64
18CPTMW19	Monitoring Well	193.59	24.95	168.64	24.86	168.73	25.07	168.52
18CPTMW19SW	Monitoring Well	193.29	25.50	167.79	25.20	168.09	25.59	167.70
18CPTMW22SW	Monitoring Well	187.79	19.65	168.14	18.75	169.04	19.72	168.07
18CPTMW22R	Monitoring Well	187.23	11.02	176.21	4.00	183.23	11.15	176.08
18CPTMW22DW	Monitoring Well	188.00	19.51	168.49	18.88	169.12	19.65	168.35
18CPTMW23	Monitoring Well	177.47	8.82	168.65	5.46	172.01	8.95	168.52
18CPTMW23SW	Monitoring Well	177.43	8.60	168.83	5.31	172.12	8.71	168.72
18CPTMW24	Monitoring Well	194.89	27.45	167.44	26.53	168.36	27.53	167.36
18CPTMW26	Monitoring Well	182.60	17.40	165.20	16.98	165.62	17.44	165.16
18CPTMW26SW	Monitoring Well	182.00	12.80	169.20	11.79	170.21	12.93	169.07
1824HBSW7	Surface Water Sample	167.92	1.58	166.34	5.20	162.72	1.45	166.47
Notes: amsl = above mean sea level, NM = not measured								

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

**Table 4. Treated Groundwater Discharged – October through December 2018**

Date	Harrison Bayou Flow (gpm)	Calculated Maximum Rate Allowable (gpm)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
10/01/2018	1,498	274	12,431	73,038	0	12,431	85,469	4.49
10/02/2018	1,323	242	9,314	61,828	0	9,314	71,142	4.28
10/03/2018	725	132	9,808	137,643	0	9,808	147,451	3.85
10/04/2018	423	77	9,854	83,957	0	9,854	93,811	3.56
10/05/2018	450	82	6,985	0	0	6,985	6,985	3.56
10/06/2018	157	28	9,657	0	0	9,657	9,657	3.56
10/07/2018	141	25	9,126	0	0	9,126	9,126	0.36
10/08/2018	116	21	10,223	0	3,988	14,211	10,223	3.55
10/09/2018	No Release	NA	0	0	12,600	12,600	0	3.61
10/10/2018	No Release	NA	0	0	13,460	13,460	0	3.68
10/11/2018	No Release	NA	0	0	14,456	14,456	0	3.73
10/12/2018	No Release	NA	0	0	11,374	11,374	0	3.80
10/13/2018	No Release	NA	0	0	0	0	0	3.84
10/14/2018	No Release	NA	0	0	0	0	0	3.95
10/15/2018	13,799	3152	2,663	0	37,942	40,605	2,663	4.00
10/16/2018	10,071	2300	14,765	0	0	14,765	14,765	4.28
10/17/2018	Flood Stage	MAXIMUM	21,059	89,440	0	21,059	110,499	4.18
10/18/2018	29,694	6,783	22,011	65,982	0	22,011	87,993	3.97
10/19/2018	8,586	1,961	18,278	33,250	0	18,278	51,528	3.86
10/20/2018	18,410	4,205	18,210	117,733	0	18,210	135,943	3.75
10/21/2018	28,857	6,591	20,151	93,170	0	20,151	113,321	3.47
10/22/2018	12,268	2,802	27,139	91,020	0	27,139	118,159	3.16
10/23/2018	4,282	978	16,542	70,350	0	16,542	86,892	2.85
10/24/2018	2,813	642	18,796	45,322	0	18,796	64,118	2.62
10/25/2018	Flood Stage	MAXIMUM	18,082	17,460	0	18,082	35,542	2.85
10/26/2018	Flood Stage	MAXIMUM	14,867	11,216	0	14,867	26,083	2.80
10/27/2018	10,713	2,447	21,181	10,871	0	21,181	32,052	2.70
10/28/2018	8,037	1,835	20,507	6,575	0	20,507	27,082	2.65

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

Date	Harrison Bayou Flow (gpm)	Calculated Maximum Rate Allowable (gpm)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
10/29/2018	3,339	762	25,329	7,430	0	25,329	32,759	2.55
10/30/2018	1,616	295	17,078	0	0	17,078	17,078	2.54
10/31/2018	1,265	231	18,765	0	0	18,765	18,765	2.54
11/01/2018	23,372	4,275	8,431	0	0	8,431	8,431	2.80
11/02/2018	31,841	5,824	19,459	0	0	19,459	19,459	2.80
11/03/2018	11,870	2,171	0	0	0	0	0	2.79
11/04/2018	10,841	1,983	18,772	0	0	18,772	18,772	2.85
11/05/2018	Flood Stage	MAXIMUM	18,122	0	0	18,122	18,122	2.85
11/06/2018	16,028	2,932	6,420	0	0	6,420	6,420	2.85
11/07/2018	No Release	NA	0	0	0	0	0	2.86
11/08/2018	No Release	NA	0	0	0	0	0	2.86
11/09/2018	No Release	NA	0	0	0	0	0	3.00
11/10/2018	No Release	NA	0	0	0	0	0	3.00
11/11/2018	No Release	NA	0	0	0	0	0	3.00
11/12/2018	No Release	NA	0	0	0	0	0	3.70
11/13/2018	No Release	NA	0	0	0	0	0	4.00
11/14/2018	No Release	NA	0	0	0	0	0	4.00
11/15/2018	No Release	NA	0	0	0	0	0	4.00
11/16/2018	No Release	NA	0	0	0	0	0	4.00
11/17/2018	No Release	NA	0	0	0	0	0	4.00
11/18/2018	No Release	NA	0	0	0	0	0	3.99
11/19/2018	No Release	NA	0	0	0	0	0	3.99
11/20/2018	No Release	NA	0	0	0	0	0	3.99
11/21/2018	No Release	NA	0	0	0	0	0	3.99
11/22/2018	No Release	NA	0	0	0	0	0	3.99
11/23/2018	No Release	NA	0	0	0	0	0	3.98
11/24/2018	No Release	NA	0	0	0	0	0	3.98
11/25/2018	No Release	NA	0	0	0	0	0	3.98
11/26/2018	No Release	NA	0	0	0	0	0	3.97
11/27/2018	No Release	NA	0	0	0	0	0	3.97

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

Date	Harrison Bayou Flow (gpm)	Calculated Maximum Rate Allowable (gpm)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
11/28/2018	No Release	NA	0	0	0	0	0	3.97
11/29/2018	No Release	NA	0	0	0	0	0	3.96
11/30/2018	No Release	NA	0	0	0	0	0	3.96
12/01/2018	2,156	492	13,298	0	0	13,298	13,298	4.05
12/02/2018	2,613	596	14,761	0	0	14,761	14,761	4.05
12/03/2018	2,765	631	23,881	0	0	23,881	23,881	4.05
12/04/2018	2,210	504	17,272	0	0	17,272	17,272	4.04
12/05/2018	1,778	406	19,589	0	0	19,589	19,589	4.04
12/06/2018	1,505	343	15,440	0	0	15,440	15,440	4.03
12/07/2018	1,621	370	12,515	0	0	12,515	12,515	4.03
12/08/2018	No Release	NA	0	0	0	0	0	4.78
12/09/2018	No Release	NA	0	0	0	0	0	5.21
12/10/2018	Flood Stage	MAXIMUM	51,463	0	0	51,463	51,463	5.21
12/11/2018	Flood Stage	MAXIMUM	17,525	0	0	17,525	17,525	5.20
12/12/2018	37,780	8,629	19,509	0	0	19,509	19,509	5.20
12/13/2018	Flood Stage	MAXIMUM	17,010	0	0	17,010	17,010	5.35
12/14/2018	Flood Stage	MAXIMUM	13,004	0	0	13,004	13,004	5.77
12/15/2018	No Release	NA	0	0	0	0	0	5.77
12/16/2018	No Release	NA	0	0	0	0	0	5.77
12/17/2018	8,290	1,893	44,031	0	0	44,031	44,031	5.77
12/18/2018	5,223	1,193	13,887	0	0	13,887	13,887	5.76
12/19/2018	5,381	1,175	13,994	0	0	13,994	13,994	5.82
12/20/2018	5,680	1,240	11,383	0	0	11,383	11,383	5.82
12/21/2018	20,099	4,390	11,301	0	0	11,301	11,301	5.82
12/22/2018	No Release	NA	0	0	0	0	0	5.82
12/23/2018	No Release	NA	0	0	0	0	0	5.82
12/24/2018	No Release	NA	0	0	0	0	0	5.81
12/25/2018	No Release	NA	0	0	0	0	0	5.81
12/26/2018	3,591	784	58,427	0	0	58,427	58,427	5.81
12/27/2018	3,064	669	3,734	0	0	3,734	3,734	5.81

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
 LONGHORN ARMY AMMUNITION PLANT

Date	Harrison Bayou Flow (gpm)	Calculated Maximum Rate Allowable (gpm)	Released From GWTP To Harrison Bayou	Released From INF Pond to Harrison Bayou	Released From GWTP to INF Pond	Combined Total Released from GWTP	Combined Total Released to Harrison Bayou	INF Pond Staff Reading (6.20 = 3 ft. Freeboard)
12/28/2018	No Release	NA	0	0	0	0	0	6.03
12/29/2018	No Release	NA	0	0	0	0	0	6.03
12/30/2018	No Release	NA	0	0	0	0	0	6.03
12/31/2018	No Release	NA	0	0	0	0	0	6.02
<b>Totals</b>			<b>856,049</b>	<b>1,016,285</b>	<b>93,820</b>	<b>949,869</b>	<b>1,872,334</b>	
Notes: gpm = gallons per minute								



GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

**Table 5. Monthly Groundwater Extraction Quantities – October through December 2018**

ICT or Well Number	October 2018 (gallons)	November 2018 (gallons)	December 2018 (gallons)	Total
1	0	0	0	0
2	114,886	11,235	105,218	231,339
3	0	0	0	0
4	41,843	6,093	84,741	132,677
5	0	0	0	0
EW-1	0	0	0	0
7	4,554	1,313	17,871	23,738
8	100,519	7,143	100,913	208,575
18WW17	202	121	5,503	5,826
10	0	0	0	0
11	51,321	4,773	91,490	147,584
12A	8,130	768	7,965	16,863
12B	14,507	1,367	21,483	37,357
12C	9,041	1,163	27,689	37,893
12D	0	0	0	0
12E	17,538	1,527	33,351	52,416
13A	38,706	4,428	24,699	67,833
13B	1	20,174	112,232	132,407
13C	0	0	0	0
13D	23,066	4,566	40,673	68,305
13E	10,709	1,247	22,127	34,083
13F	369	4	1,843	2,216
14A	0	0	0	0
14B	17,252	750	24,333	42,335
14C	31,499	1,468	11,418	44,385
14D	37,734	0	0	37,734
14E	83,225	10,303	0	93,528
<b>Total LHAAP-18/24</b>	<b>605,102</b>	<b>78,443</b>	<b>733,549</b>	<b>1,417,094</b>
LHAAP-16	60,770	0	23,895	
<b>Total LHAAP-16</b>	<b>60,770</b>	<b>0</b>	<b>23,895</b>	<b>84,665</b>
<b>TOTAL</b>	<b>665,872</b>	<b>78,443</b>	<b>757,444</b>	<b>1,501,759</b>

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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Table 6. LHAAP-18/24 Analytical Results - December 2018

Location ID: Sample Date:	Units	MCL/MSC/ PCL	AWD1_121818 12/18/18	AWD3_121718 12/17/18	AWD4_121918 12/19/18	AWD4_121918-a 12/19/18	18CPTMW01SW _122118 12/21/18	18CPTMW03SW _122018 12/20/18	18CPTMW04_1 21818 12/18/18	18CPTMW04SW _121818 12/18/18	18CPTMW06_1 22018 12/20/18	18CPTMW06_1 22018_a 12/20/18	18CPTMW07_ 122818 12/28/18	18CPTMW08SW_ 121818 12/18/18	18CPTMW08DW_ 121818 12/18/18	18CPTMW10SW_ 121818 12/18/18	18CPTMW10DW_ 121818 12/18/18
Lab Package			HS18121123	HS18121123	HS18121264	HS18121264	HS18121324	HS18121267	HS18121123	HS18121123	HS18121267	HS18121267	HS18121558	HS18121117	HS18121117	HS18121117	HS18121117
<b>Perchlorate (6850)</b>																	
Perchlorate	µg/L	17*	1.2 J	6.9	1,300	1,300	< 2.0 U	< 2.0 U	220	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	22,000	3,300	< 2.0 U	3.4 J
<b>Volatile Organic Compounds (8260C)</b>																	
1,1,1,2-Tetrachloroethane	µg/L	110	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,1,1-Trichloroethane	µg/L	200	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,1,2,2-Tetrachloroethane	µg/L	14	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/L	5	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,1-Dichloroethane	µg/L	10,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,1-Dichloroethene	µg/L	7	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,1-Dichloropropene	µg/L	2.9	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,2,3-Trichlorobenzene	µg/L	310	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,2,3-Trichloropropane	µg/L	0.041	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,2,4-Trichlorobenzene	µg/L	70	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,2,4-Trimethylbenzene	µg/L	5,100	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,2-Dibromoethane	µg/L	0.05	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,2-Dichlorobenzene	µg/L	600	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,2-Dichloroethane	µg/L	5	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	3.2	5.6	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,2-Dichloropropane	µg/L	5	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,3,5-Trimethylbenzene	µg/L	5,100	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,3-Dichlorobenzene	µg/L	3,100	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	0.8 J	NA	< 0.5 U	< 0.5 U
1,3-Dichloropropane	µg/L	29	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
1,4-Dichlorobenzene	µg/L	75	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
2,2-Dichloropropane	µg/L	42	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
2-Butanone	µg/L	61,000	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U
2-Chlorotoluene	µg/L	2,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
2-Hexanone	µg/L	6,100	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U
4-Chlorotoluene	µg/L	2,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
4-Isopropyltoluene	µg/L	10,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
4-Methyl-2-pentanone	µg/L	8,200	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U
Acetone	µg/L	92,000	NA	< 2.0 U	< 2.0 U	< 2.0 U	< 20 U	< 2.0 U	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	4.2	NA	< 2.0 U	< 2.0 U
Benzene	µg/L	5	NA	< 0.5 U	< 0.5 U	< 0.5 U	7.7 J	2.1	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Bromobenzene	µg/L	2,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Bromochloromethane	µg/L	4,100	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Bromodichloromethane	µg/L	4.6	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Bromoform	µg/L	36	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Bromomethane	µg/L	140	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Carbon disulfide	µg/L	10,000	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	1.1 J
Carbon tetrachloride	µg/L	5	NA	5.7	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Chlorobenzene	µg/L	100	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Chloroethane	µg/L	41,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Chloroform	µg/L	1,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	3.3 J	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	0.65 J	NA	< 0.5 U	< 0.5 U
Chloromethane	µg/L	220	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
cis-1,2-Dichloroethene	µg/L	70	NA	1.8	1.0	0.98 J	54	8.1	110	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	19	NA	< 0.5 U	< 0.5 U
cis-1,3-Dichloropropene	µg/L	5.3	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Dibromochloromethane	µg/L	34	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Dibromomethane	µg/L	380	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Dichlorodifluoromethane	µg/L	20,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Ethylbenzene	µg/L	700	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Hexachlorobutadiene	µg/L	20	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Isopropylbenzene	µg/L	10,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
m,p-Xylene	µg/L	10,000**	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	5	NA	< 1.0 U	< 1.0 U	< 1.0 U	1,600	< 1.0 U	< 2.5 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U
Naphthalene	µg/L	2,000	NA														

Table 6. LHAAP-18/24 Analytical Results - December 2018

Location ID: Sample Date:	Units	MCL/MSC/ PCL	AWD1_121818 12/18/18	AWD3_121718 12/17/18	AWD4_121918 12/19/18	AWD4_121918-a 12/19/18	18CPTMW01SW _122118 12/21/18	18CPTMW03SW _122018 12/20/18	18CPTMW04_1 21818 12/18/18	18CPTMW04SW _121818 12/18/18	18CPTMW06_1 22018 12/20/18	18CPTMW06_1 22018_a 12/20/18	18CPTMW07_ 122818 12/28/18	18CPTMW08SW_ 121818 12/18/18	18CPTMW08DW_ 121818 12/18/18	18CPTMW10SW_ 121818 12/18/18	18CPTMW10DW_ 121818 12/18/18
n-Propylbenzene	µg/L	4,100	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
o-Xylene	µg/L	10,000**	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
sec-Butylbenzene	µg/L	4,100	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Styrene	µg/L	100	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
tert-Butylbenzene	µg/L	4,100	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Tetrachloroethene	µg/L	5	NA	1.3	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Toluene	µg/L	1,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
trans-1,2-Dichloroethene	µg/L	100	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	2.3	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
trans-1,3-Dichloropropene	µg/L	29	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Trichloroethene	µg/L	5	NA	160	2.9	2.7	76	46	2,500	1.0 J	1.5	1.5	0.55 J	77	NA	0.72 J	4.2
Trichlorofluoromethane	µg/L	31,000	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U
Vinyl chloride	µg/L	2	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	7.3	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	8.6	NA	< 0.5 U	< 0.5 U
<b>Metals (6020A)</b>																	
Aluminum	mg/L	100	1.39	0.247	0.848	0.699	0.0199	0.0254	NA	0.0834	NA	NA	NA	NA	NA	NA	0.0856
Antimony	mg/L	0.006	0.00150 J	< 0.00100 U	0.000424 J	0.000404 J	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	0.000508 J
Arsenic	mg/L	0.01	0.0155	< 0.00100 U	0.000671 J	0.000556 J	0.0140	0.00218	NA	0.00429	NA	NA	NA	NA	NA	NA	0.00248
Barium	mg/L	2	0.406	0.0240	0.295	0.302	1.14	0.548	NA	0.977	NA	NA	NA	NA	NA	NA	0.100
Beryllium	mg/L	0.004	0.000576 J	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	< 0.00100 U
Cadmium	mg/L	0.005	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	< 0.00100 U
Calcium	mg/L	NV	3.69	0.645	24.8	25.1	38.3	72.5	NA	34.8	NA	NA	NA	NA	NA	NA	8.91
Chromium	mg/L	0.1	0.0127	0.0533	1.27	1.11	0.00440	0.00654	NA	0.00781	NA	NA	NA	NA	NA	NA	0.00702
Cobalt	mg/L	6.1	0.0119	0.000380 J	0.0235	0.0239	0.000680 J	0.00120 J	NA	0.0146	NA	NA	NA	NA	NA	NA	0.000219 J
Copper	mg/L	1.3	0.00329	< 0.00100 U	0.0120	0.0119	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	< 0.00100 U
Iron	mg/L	NV	9.78	0.459	10.2	9.75	68.8	3.66	NA	19.9	NA	NA	NA	NA	NA	NA	2.47
Lead	mg/L	0.015	0.00368	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	< 0.00100 U
Magnesium	mg/L	NV	4.43	0.411	9.90	9.87	26.2	17.3	NA	20.0	NA	NA	NA	NA	NA	NA	5.39
Manganese	mg/L	1.1*	0.346	0.00633	0.199	0.197	0.714	0.189	NA	0.750	NA	NA	NA	NA	NA	NA	0.0365
Nickel	mg/L	0.49*	0.0227	0.00771	1.41	1.43	0.00141 J	0.00609	NA	0.00974	NA	NA	NA	NA	NA	NA	0.00120 J
Potassium	mg/L	NV	3.51	0.482	0.553	0.506	7.64	175	NA	44.7	NA	NA	NA	NA	NA	NA	119
Selenium	mg/L	0.05	0.00380	0.00467	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	< 0.00100 U
Silver	mg/L	0.51	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	< 0.00100 U
Sodium	mg/L	NV	107	29.4	51.6	51.6	108	285	NA	118	NA	NA	NA	NA	NA	NA	210
Thallium	mg/L	0.002	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	< 0.00100 U
Vanadium	mg/L	0.72	0.0124	0.00209 J	0.00309 J	0.00272 J	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	0.000947 J
Zinc	mg/L	31	0.0244	0.00582	0.00604	0.00549	0.00458	0.00646	NA	0.0382	NA	NA	NA	NA	NA	NA	0.00307 J
Mercury	mg/L	0.002	< 0.000100 U	< 0.000100 U	0.000109 J	0.000115 J	< 0.000100 U	< 0.000100 U	NA	< 0.000100 U	NA	NA	NA	NA	NA	NA	< 0.000100 U
<b>1,4-Dioxane (8270D SIM)</b>																	
1,4-Dioxane	µg/L	26	NA	NA	NA	NA	NA	0.17 J	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Blue highlighting indicates concentrations above the MCL/MS/PCL

MCL/MS/PCL - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

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

UB - considered a non-detect due to blank contamination

NV - No Value

\*Perchlorate, manganese, and nickel compared to the PCL

\*\* Value is for total xylenes

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

a - duplicate sample



Table 6. LHAAP-18/24 Analytical Results - December 2018

Location ID: Sample Date:	Units	MCL/MSL/ PCL	18CPTMW12SW _121718 12/17/18	18CPTMW12DW_ 121718 12/17/18	18CPTMW14_0 10719 1/7/19	18CPTMW14_0 10719-a 1/7/19	18CPTMW15_1 21918 12/19/18	18CPTMW16_ 010719 1/7/19	18CPTMW18_1 22118 12/21/18	18CPTMW19_1 21918 12/19/18	18CPTMW19_1 21918_a 12/19/18	18CPTMW22R_ 122018 12/20/18	18CPTMW22SW_ 122018 12/20/18	18CPTMW23_ 121918 12/19/18	18CPTMW24_ 122718 12/27/18	18WW02_122 718 12/27/18	18WW06_122 718 12/27/18	18WW06_122 718_a 12/27/18
n-Propylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
o-Xylene	µg/L	10,000**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
sec-Butylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Styrene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
tert-Butylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Tetrachloroethene	µg/L	5	< 0.5 U	< 0.5 U	1.6	1.6	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Toluene	µg/L	1,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
trans-1,2-Dichloroethene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	2.7 J	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
trans-1,3-Dichloropropene	µg/L	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Trichloroethene	µg/L	5	1.7 J	< 0.5 U	1,100	1,100	3.1	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	1.5	5,000	18	< 0.5 U	< 0.5 U	< 0.5 U
Trichlorofluoromethane	µg/L	31,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Vinyl chloride	µg/L	2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	1.2	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	6.8	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
<b>Metals (6020A)</b>																		
Aluminum	mg/L	100	0.0248 J	0.0142 UB	1.68	1.50	NA	NA	0.0360	NA	NA	3.60	0.134	NA	0.0428	0.499	NA	NA
Antimony	mg/L	0.006	< 0.00100 U	0.00172 J	0.000493 J	0.000527 J	NA	NA	< 0.00100 U	NA	NA	< 0.00100 U	< 0.00100 U	NA	0.000426 J	< 0.00100 U	NA	NA
Arsenic	mg/L	0.01	0.00123 J	0.00398	0.00266	0.00260	NA	NA	0.00210	NA	NA	0.000864 J	0.00132 J	NA	0.0116	0.000962 J	NA	NA
Barium	mg/L	2	0.784	0.136	2.61	2.45	NA	NA	0.712	NA	NA	0.0543	0.330	NA	9.17	0.0530	NA	NA
Beryllium	mg/L	0.004	< 0.00100 U	< 0.00100 U	< 0.00050 U	< 0.00050 U	NA	NA	< 0.00100 U	NA	NA	0.000331 J	< 0.00100 U	NA	< 0.00200 U	< 0.00100 U	NA	NA
Cadmium	mg/L	0.005	< 0.00100 U	< 0.00100 U	< 0.00050 U	< 0.00050 U	NA	NA	< 0.00100 U	NA	NA	< 0.00100 U	< 0.00100 U	NA	0.000431 J	< 0.00100 U	NA	NA
Calcium	mg/L	NV	65.4	7.55	390	381	NA	NA	341	NA	NA	0.876	154	NA	447	8.80	NA	NA
Chromium	mg/L	0.1	0.0113	0.00978	0.0292	0.0290	NA	NA	0.00937	NA	NA	0.00352 J	0.0321	NA	0.00233 J	0.00726	NA	NA
Cobalt	mg/L	6.1	0.00315 J	< 0.00100 U	0.00196 J	0.00189 J	NA	NA	0.0174	NA	NA	0.00479 J	< 0.00100 U	NA	0.00579	0.000306 J	NA	NA
Copper	mg/L	1.3	< 0.00100 U	< 0.00100 U	0.00193 J	0.00194 J	NA	NA	< 0.00100 U	NA	NA	0.00195 J	< 0.00100 U	NA	0.00133 J	0.00755	NA	NA
Iron	mg/L	NV	1.74	1.74	0.857	0.857	NA	NA	1.21	NA	NA	3.21	0.272	NA	11.9	2.51	NA	NA
Lead	mg/L	0.015	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U	NA	NA	0.00157 J	< 0.00100 U	NA	< 0.00100 U	0.00130 J	NA	NA
Magnesium	mg/L	NV	42.1	5.77	56.0	55.7	NA	NA	213	NA	NA	0.807	9.92	NA	245	1.69	NA	NA
Manganese	mg/L	1.1*	0.601	0.0423	0.0921	0.0918	NA	NA	2.50	NA	NA	0.0361	0.207	NA	0.635	0.106	NA	NA
Nickel	mg/L	0.49*	0.00890	< 0.00100 U	0.00304	0.00292	NA	NA	0.0154	NA	NA	0.00284	0.000944 J	NA	0.00770	0.00420	NA	NA
Potassium	mg/L	NV	49.2	93.4	19.8	19.5	NA	NA	4.98	NA	NA	0.448	218	NA	5.88	2.04	NA	NA
Selenium	mg/L	0.05	< 0.00100 U	< 0.00100 U	< 0.00250 U	< 0.00250 U	NA	NA	< 0.00100 U	NA	NA	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	< 0.00100 U	NA	NA
Silver	mg/L	0.51	< 0.00100 U	< 0.00100 U	< 0.00050 U	< 0.00050 U	NA	NA	< 0.00100 U	NA	NA	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	< 0.00100 U	NA	NA
Sodium	mg/L	NV	249	207	479	464	NA	NA	803	NA	NA	21.0	339	NA	990	22.3	NA	NA
Thallium	mg/L	0.002	0.000707 J	0.000542 J	< 0.00100 U	< 0.00100 U	NA	NA	0.000985 J	NA	NA	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	< 0.00100 U	NA	NA
Vanadium	mg/L	0.72	< 0.00100 U	< 0.00100 U	0.00482 J	0.00468 J	NA	NA	0.00118 J	NA	NA	0.00570	0.00116 J	NA	0.00307 J	0.00499 J	NA	NA
Zinc	mg/L	31	0.0137	0.00291 J	0.00536	0.00513	NA	NA	0.0163	NA	NA	0.00982	0.00584	NA	0.00646	0.00483	NA	NA
Mercury	mg/L	0.002	< 0.000100 U	< 0.000100 U	0.0000320 UB	0.0000340 UB	NA	NA	< 0.000100 U	NA	NA	< 0.000100 U	< 0.000100 U	NA	< 0.000100 U	< 0.000100 U	NA	NA
<b>1,4-Dioxane (8270D SIM)</b>																		
1,4-Dioxane	µg/L	26	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.012 J	0.3 J	NA	NA	NA	NA	NA

Notes:

Blue highlighting indicates concentrations above the MCL/MSL/PCL

MCL/MSL - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

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

UB - considered a non-detect due to blank contamination

NV - No Value

\*Perchlorate, manganese, and nickel compared to the PCL

\*\* Value is for total xylenes

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

a - duplicate sample





Table 6. LHAAP-18/24 Analytical Results - December 2018

Location ID: Sample Date:	Units	MCL/MSL/ PCL	18WW08_1219 18 12/19/18	18WW10_1226 18 12/26/18	18WW17_1226 18 12/26/18	18WW22_1221 18 12/21/18	18WW22_1221 18_a 12/21/18	18WW24_12261 8 12/26/18	CO3_122118 12/21/18	CO4_122118 12/21/18	CO8_122118 12/21/18	CO9_122118 12/21/18	MW2_122018 12/20/18	MW3_122818 12/28/18	MW5_121818 12/18/18	MW7_121718 12/17/18	MW8_010719 1/7/19	MW9_121818 12/18/18
n-Propylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 25 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U
o-Xylene	µg/L	10,000**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 25 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U
sec-Butylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 25 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U
Styrene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 25 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U
tert-Butylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 25 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U
Tetrachloroethene	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	71	1.7	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U
Toluene	µg/L	1,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	33 J	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U
trans-1,2-Dichloroethene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	110	4.6	< 0.5 U	< 2.5 U	< 0.5 U	0.63 J
trans-1,3-Dichloropropene	µg/L	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 25 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U
Trichloroethene	µg/L	5	< 0.5 U	< 0.5 U	56	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	2.2	< 0.5 U	2,300	600	62	2,000	480	1,400
Trichlorofluoromethane	µg/L	31,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 25 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U
Vinyl chloride	µg/L	2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	86	36	6.1	5.6	< 0.5 U	1.2
<b>Metals (6020A)</b>																		
Aluminum	mg/L	100	NA	NA	0.00895 UB	0.233	0.238	0.0967	NA	NA	0.0247	0.0423	0.0399	0.00670 UB	0.0126 UB	NA	NA	0.0277
Antimony	mg/L	0.006	NA	NA	< 0.00100 U	0.000442 J	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	0.000727 J	NA	NA	0.000690 J
Arsenic	mg/L	0.01	NA	NA	0.000912 J	0.00114 J	0.00114 J	0.000779 J	NA	NA	0.000435 J	0.000711 J	0.0119	0.000445 J	0.000413 J	NA	NA	< 0.00100 U
Barium	mg/L	2	NA	NA	3.78	0.225	0.240	0.0460	NA	NA	1.05	0.170	2.97	0.484	1.02	NA	NA	0.170
Beryllium	mg/L	0.004	NA	NA	< 0.00200 U	< 0.00100 U	< 0.00100 U	0.000882 J	NA	NA	< 0.00100 U	< 0.00100 U	0.000605 J	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U
Cadmium	mg/L	0.005	NA	NA	0.000426 J	< 0.00100 U	< 0.00100 U	< 0.00200 U	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U	0.000236 J	0.000879 J	NA	NA	< 0.00100 U
Calcium	mg/L	NV	NA	NA	376	54.8	54.3	65.4	NA	NA	78.8	70.8	84.3	30.5	26.3	NA	NA	20.5
Chromium	mg/L	0.1	NA	NA	0.0165	0.0201	0.0208	0.000522 J	NA	NA	< 0.00100 U	0.00101 J	0.012	< 0.00100 U	0.0929	NA	NA	0.0575
Cobalt	mg/L	6.1	NA	NA	0.000704 J	0.000238 J	0.000221 J	0.00365 J	NA	NA	0.00371 J	0.000257 J	0.0861	0.00789	0.00396 J	NA	NA	0.00172 J
Copper	mg/L	1.3	NA	NA	0.00460	< 0.00100 U	< 0.00100 U	0.00106 J	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	0.00192 J	NA	NA	< 0.00100 U
Iron	mg/L	NV	NA	NA	0.259	0.112 J	0.0644 J	0.200	NA	NA	0.617	0.0364 J	24.6	0.421	0.465	NA	NA	0.369
Lead	mg/L	0.015	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U
Magnesium	mg/L	NV	NA	NA	236	5.82	5.81	56.5	NA	NA	32.2	5.53	58.7	17.4	26.9	NA	NA	6.46
Manganese	mg/L	1.1*	NA	NA	0.0448	0.00371 UB	0.00399 UB	0.498	NA	NA	0.425	0.0247	5.23	2.03	0.118	NA	NA	0.0747
Nickel	mg/L	0.49*	NA	NA	0.0516	< 0.00100 U	< 0.00100 U	0.0456	NA	NA	0.00173 J	0.00142 J	0.0538	0.00506	0.086	NA	NA	0.0549
Potassium	mg/L	NV	NA	NA	1.83	3.74	3.75	0.653	NA	NA	0.567	0.419	3.27	1.68	2.35	NA	NA	0.430
Selenium	mg/L	0.05	NA	NA	0.00383	0.00156 J	0.00144 J	< 0.00100 U	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U
Silver	mg/L	0.51	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U
Sodium	mg/L	NV	NA	NA	1,100	26.8	26.3	874	NA	NA	134	18.2	268	240	133	NA	NA	22.5
Thallium	mg/L	0.002	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U
Vanadium	mg/L	0.72	NA	NA	0.00315 J	0.00804	0.00810	0.00116 J	NA	NA	0.00229 J	0.00273 J	0.000698 J	0.00130 J	0.00181 J	NA	NA	0.00113 J
Zinc	mg/L	31	NA	NA	0.0273	0.00250 U	0.00250 U	0.0332	NA	NA	0.00563	< 0.00250 U	0.0595	0.00661	0.0275	NA	NA	0.0287
Mercury	mg/L	0.002	NA	NA	0.0000330 J	< 0.000100 U	< 0.000100 U	< 0.000100 U	NA	NA	< 0.000100 U	< 0.000100 U	< 0.000100 U	0.0000300 J	< 0.000100 U	NA	NA	< 0.000100 U
<b>1,4-Dioxane (8270D SIM)</b>																		
1,4-Dioxane	µg/L	26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

## Notes:

Blue highlighting indicates concentrations above the MCL/MSL/PCL

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µg/L - micrograms per liter

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\*Perchlorate, manganese, and nickel compared to the PCL

\*\* Value is for total xylenes

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

a - duplicate sample



Table 6. LHAAP-18/24 Analytical Results - December 2018

Location ID: Sample Date:	Units	MCL/MSC/ PCL	MW10_121918 12/19/18	MW14_122018 12/20/18	MW16_122618 12/26/18	MW17_122618 12/26/18	MW18_122618 12/26/18	MW19_122618 12/26/18	MW20_122018 12/20/18	MW21_122818 12/28/18	MW22_122018 12/20/18	MW23_122618 12/26/18	109_122718 12/27/18	120_122018 12/20/18	125_122718 12/27/18	126_122618 12/26/18
Lab Package			HS18121264	HS18121267	HS18121520	HS18121520	HS18121520	HS18121520	HS18121264	HS18121558	HS18121267	HS18121520	HS18121523	HS18121267	HS18121523	HS18121520
<b>Perchlorate (6850)</b>																
Perchlorate	µg/L	17*	< 2.0 U	76,000	90	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	23,000	84	52,000 J	3,200	47,000	8,000	< 2.0 U
<b>Volatile Organic Compounds (8260C)</b>																
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,1,1-Trichloroethane	µg/L	200	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/L	5	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	14	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,1-Dichloroethane	µg/L	10,000	< 0.5 U	29	1.8	NA	< 0.5 U	< 0.5 U	< 0.5 U	4.4 J	< 0.5 U	< 2.5 U	0.84 J	31	< 2.5 U	< 0.5 U
1,1-Dichloroethene	µg/L	7	< 0.5 U	110	11	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	210	< 2.5 U	< 0.5 U
1,1-Dichloropropene	µg/L	2.9	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,2,3-Trichlorobenzene	µg/L	310	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,2,3-Trichloropropane	µg/L	0.041	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,2,4-Trichlorobenzene	µg/L	70	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,2-Dibromoethane	µg/L	0.05	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,2-Dichlorobenzene	µg/L	600	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,2-Dichloroethane	µg/L	5	< 0.5 U	71	65	NA	< 0.5 U	< 0.5 U	< 0.5 U	47	8.1	110 J	< 0.5 U	52	< 2.5 U	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,3-Dichloropropane	µg/L	29	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
1,4-Dichlorobenzene	µg/L	75	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
2,2-Dichloropropane	µg/L	42	< 0.5 U	< 5.0 UJ	< 0.5 UJ	NA	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 UJ
2-Butanone	µg/L	61,000	< 1.0 U	< 10 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 5.0 U	< 1.0 U	< 20 U	< 5.0 U	< 1.0 U
2-Chlorotoluene	µg/L	2,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
2-Hexanone	µg/L	6,100	< 1.0 U	< 10 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 5.0 U	< 1.0 U	< 20 U	< 5.0 U	< 1.0 U
4-Chlorotoluene	µg/L	2,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
4-Isopropyltoluene	µg/L	10,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
4-Methyl-2-pentanone	µg/L	8,200	< 1.0 U	< 10 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 5.0 U	< 1.0 U	< 20 U	< 5.0 U	< 1.0 U
Acetone	µg/L	92,000	< 2.0 U	< 20 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U	< 20 U	< 2.0 U	< 10 U	< 2.0 U	< 40 U	< 10 U	< 2.0 U
Benzene	µg/L	5	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	4.8	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Bromobenzene	µg/L	2,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Bromochloromethane	µg/L	4,100	< 0.5 U	< 5.0 UJ	< 0.5 UJ	NA	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 UJ
Bromodichloromethane	µg/L	4.6	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Bromoform	µg/L	36	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Bromomethane	µg/L	140	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Carbon disulfide	µg/L	10,000	< 1.0 U	< 10 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 5.0 U	< 1.0 U	< 20 U	< 5.0 U	< 1.0 U
Carbon tetrachloride	µg/L	5	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	5.3 J	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Chlorobenzene	µg/L	100	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Chloroethane	µg/L	41,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Chloroform	µg/L	1,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	18	5.7	12 J	1.4	54	< 2.5 U	< 0.5 U
Chloromethane	µg/L	220	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
cis-1,2-Dichloroethene	µg/L	70	< 0.5 U	3,000	31	NA	< 0.5 U	4.9	< 0.5 U	490	7.1	24 J	130	2,300	3.3 J	< 0.5 U
cis-1,3-Dichloropropene	µg/L	5.3	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Dibromochloromethane	µg/L	34	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Dibromomethane	µg/L	380	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Dichlorodifluoromethane	µg/L	20,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Ethylbenzene	µg/L	700	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Hexachlorobutadiene	µg/L	20	< 0.5 U	< 10 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 5.0 U	< 0.5 U	< 20 U	< 5.0 U	< 0.5 U
Isopropylbenzene	µg/L	10,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
m,p-Xylene	µg/L	10,000**	< 1.0 U	< 10 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 5.0 U	< 1.0 U	< 20 U	< 5.0 U	< 1.0 U
Methylene chloride	µg/L	5	< 1.0 U	< 5.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 2.5 U	< 1.0 U	< 10 U	< 2.5 U	< 1.0 U
Naphthalene	µg/L	2,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
n-Butylbenzene	µg/L	4,100	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U

Table 6. LHAAP-18/24 Analytical Results - December 2018

Location ID: Sample Date:	Units	MCL/MSC/ PCL	MW10_121918 12/19/18	MW14_122018 12/20/18	MW16_122618 12/26/18	MW17_122618 12/26/18	MW18_122618 12/26/18	MW19_122618 12/26/18	MW20_122018 12/20/18	MW21_122818 12/28/18	MW22_122018 12/20/18	MW23_122618 12/26/18	109_122718 12/27/18	120_122018 12/20/18	125_122718 12/27/18	126_122618 12/26/18
n-Propylbenzene	µg/L	4,100	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
o-Xylene	µg/L	10,000**	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
sec-Butylbenzene	µg/L	4,100	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Styrene	µg/L	100	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
tert-Butylbenzene	µg/L	4,100	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Tetrachloroethene	µg/L	5	< 0.5 U	< 5.0 U	<b>0.71 J</b>	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	<b>0.98 J</b>	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Toluene	µg/L	1,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
trans-1,2-Dichloroethene	µg/L	100	< 0.5 U	<b>21</b>	<b>0.76 J</b>	NA	< 0.5 U	< 0.5 U	< 0.5 U	<b>9.4 J</b>	< 0.5 U	<b>5.0 J</b>	<b>1.4</b>	<b>20 J</b>	< 2.5 U	< 0.5 U
trans-1,3-Dichloropropene	µg/L	29	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Trichloroethene	µg/L	5	< 0.5 U	<b>9,000</b>	<b>780</b>	NA	<b>5.7</b>	<b>2.5</b>	< 0.5 U	<b>9,800</b>	<b>680</b>	<b>4,800</b>	<b>420</b>	<b>22,000</b>	<b>11</b>	< 0.5 U
Trichlorofluoromethane	µg/L	31,000	< 0.5 U	< 5.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 2.5 U	< 0.5 U	< 10 U	< 2.5 U	< 0.5 U
Vinyl chloride	µg/L	2	< 0.5 U	<b>14</b>	<b>1.7</b>	NA	< 0.5 U	< 0.5 U	< 0.5 U	<b>42</b>	<b>2.2</b>	< 2.5 U	< 0.5 U	<b>78</b>	< 2.5 U	< 0.5 U
<b>Metals (6020A)</b>																
Aluminum	mg/L	100	NA	0.0212 UB	NA	NA	NA	<b>0.194</b>	NA	<b>0.0276</b>	0.0126 UB	NA	NA	NA	<b>4.2</b>	<b>0.0257</b>
Antimony	mg/L	0.006	NA	< 0.00100 U	NA	NA	NA	< 0.00100 U	NA	<b>0.000449 J</b>	< 0.00100 U	NA	NA	NA	< 0.00100 U	< 0.00100 U
Arsenic	mg/L	0.01	NA	<b>0.00460</b>	NA	NA	NA	<b>0.00792</b>	NA	<b>0.00116 J</b>	<b>0.00102 J</b>	NA	NA	NA	<b>0.00382</b>	<b>0.00401</b>
Barium	mg/L	2	NA	<b>0.484</b>	NA	NA	NA	<b>0.606</b>	NA	<b>7.53</b>	<b>1.29</b>	NA	NA	NA	<b>0.17</b>	<b>11.1</b>
Beryllium	mg/L	0.004	NA	< 0.00100 U	NA	NA	NA	< 0.00200 U	NA	<b>0.000305 J</b>	< 0.00100 U	NA	NA	NA	<b>0.000305 J</b>	< 0.00100 U
Cadmium	mg/L	0.005	NA	<b>0.00101 J</b>	NA	NA	NA	<b>0.000613 J</b>	NA	<b>0.000669 J</b>	<b>0.000552 J</b>	NA	NA	NA	< 0.00100 U	<b>0.000497 J</b>
Calcium	mg/L	NV	NA	<b>125</b>	NA	NA	NA	<b>92.1</b>	NA	<b>222</b>	<b>156</b>	NA	NA	NA	<b>3.32</b>	<b>360</b>
Chromium	mg/L	0.1	NA	<b>0.0616</b>	NA	NA	NA	<b>0.122</b>	NA	<b>0.552</b>	<b>0.0505</b>	NA	NA	NA	<b>0.00752</b>	< 0.00100 U
Cobalt	mg/L	6.1	NA	<b>0.0388</b>	NA	NA	NA	<b>0.0211</b>	NA	<b>0.0753</b>	<b>0.0134</b>	NA	NA	NA	<b>0.00233 J</b>	<b>0.0102</b>
Copper	mg/L	1.3	NA	<b>0.00666</b>	NA	NA	NA	<b>0.00402</b>	NA	<b>0.0700</b>	<b>0.00443</b>	NA	NA	NA	<b>0.00462</b>	<b>0.00102 J</b>
Iron	mg/L	NV	NA	<b>109</b>	NA	NA	NA	<b>70.4</b>	NA	<b>5.25</b>	<b>1.04</b>	NA	NA	NA	<b>6.02</b>	<b>3.28</b>
Lead	mg/L	0.015	NA	< 0.00100 U	NA	NA	NA	< 0.00100 U	NA	< 0.00100 U	< 0.00100 U	NA	NA	NA	<b>0.00385</b>	< 0.00100 U
Magnesium	mg/L	NV	NA	<b>49.5</b>	NA	NA	NA	<b>52.3</b>	NA	<b>167</b>	<b>57.8</b>	NA	NA	NA	<b>2.85</b>	<b>266</b>
Manganese	mg/L	1.1*	NA	<b>3.78</b>	NA	NA	NA	<b>2.39</b>	NA	<b>2.13</b>	<b>0.356</b>	NA	NA	NA	<b>0.043</b>	<b>0.151</b>
Nickel	mg/L	0.49*	NA	<b>0.329</b>	NA	NA	NA	<b>0.0774</b>	NA	<b>0.609</b>	<b>0.493</b>	NA	NA	NA	<b>0.00749</b>	<b>0.0163</b>
Potassium	mg/L	NV	NA	<b>15.9</b>	NA	NA	NA	<b>4.58</b>	NA	<b>2.51</b>	<b>2.46</b>	NA	NA	NA	<b>1.24</b>	<b>3.59</b>
Selenium	mg/L	0.05	NA	< 0.00100 U	NA	NA	NA	< 0.00100 U	NA	< 0.00100 U	< 0.00100 U	NA	NA	NA	< 0.00100 U	< 0.00100 U
Silver	mg/L	0.51	NA	< 0.00100 U	NA	NA	NA	< 0.00100 U	NA	< 0.00100 U	< 0.00100 U	NA	NA	NA	< 0.00100 U	< 0.00100 U
Sodium	mg/L	NV	NA	<b>350</b>	NA	NA	NA	<b>741</b>	NA	<b>603</b>	<b>436</b>	NA	NA	NA	<b>57.8</b>	<b>927</b>
Thallium	mg/L	0.002	NA	< 0.00100 U	NA	NA	NA	< 0.00100 U	NA	< 0.00100 U	< 0.00100 U	NA	NA	NA	< 0.00100 U	< 0.00100 U
Vanadium	mg/L	0.72	NA	< 0.00100 U	NA	NA	NA	<b>0.00112 J</b>	NA	<b>0.00284 J</b>	< 0.00100 U	NA	NA	NA	<b>0.00987</b>	<b>0.00309 J</b>
Zinc	mg/L	31	NA	<b>0.789</b>	NA	NA	NA	<b>0.0128</b>	NA	<b>0.0265</b>	<b>0.00427</b>	NA	NA	NA	<b>0.0201</b>	<b>0.0366</b>
Mercury	mg/L	0.002	NA	< 0.000100 U	NA	NA	NA	< 0.000100 U	NA	<b>0.0000420 J</b>	< 0.000100 U	NA	NA	NA	<b>0.000077 J</b>	<b>0.0000440 J</b>
<b>1,4-Dioxane (8270D SIM)</b>																
1,4-Dioxane	µg/L	26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

## Notes:

Blue highlighting indicates concentrations above the MCL/MS/PCL

MCL/MS/PCL - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

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

UB - considered a non-detect due to blank contamination

NV - No Value

\*Perchlorate, manganese, and nickel compared to the PCL

\*\* Value is for total xylenes

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

a - duplicate sample

Table 7. Weekly Perchlorate Sample Results – 4<sup>th</sup> Quarter 2018

Sample Identification	Lab Package	Date Sampled	Sample Location	Effluent Discharge Point	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
								Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_100418/BIX	HS18100278	10/4/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	11	2.36	7.7
LH18/24-SP650_101018/AIX	HS18100546	10/10/2018	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	19	0.48	242 J
LH18/24-SP650_101018/AIX (monthly)	HS18100544	10/10/2018	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_101018 (monthly)	HS18100549	10/10/2018	TK-140	--	--	--	NA	7,500	NA		NA	--	--	--
LH18/24-SP650_101718/BIX	HS18100975	10/17/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	8.8	1.92	10.6
LH18/24-SP650_102318/BIX	HS18101286	10/23/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	6	1.71	7.9
LH18/24-SP650_103018/BIX	HS18101687	10/30/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	11	2.5	6.32
LH18/24_SP650_113018/BIX	HS18120299	11/30/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	81 J	2.55 J	69.4
LH18/24-SP650_120618/BIX	HS18120380	12/6/2018	TK-650	INF Pond	589	17	4	NA	2.2	J	Yes	24	4.76	16
LH18/24-SP650_120618_BIX (Monthly)	HS18120375	12/6/2018	TK-650	INF Pond	589	17	4	NA	2.0	J	Yes	--	--	--
LH18/24-SP140_120618 (Monthly)	HS18120379	12/6/2018	TK-140	--	--	--	NA	4,900	NA		NA	--	--	--
LH18/24-SP650_121218	HS18120731	12/12/2018	TK-650	INF Pond	589	17	4	NA	2.6	J	Yes	14	2.23 J	24.7
LH18/24-SP650_121818/BIX	HS18121078	12/18/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	7.9	1.53	12.2
LH18/24-SP650_121818_BIX (quarterly)	HS18120194	12/18/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_121818 (quarterly)	HS18120193	12/18/2018	TK-140	--	--	--	NA	5,700	NA			--	--	--

Notes: Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter, mg/L – milligrams per liter, NA – not applicable, AIX – after ion exchange, BIX – before ion exchange

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

U - non detect and reported to the limit of detection

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

Table 8. Bi-Weekly GWTP Sampling Results for October 2018

Sample Location Sample Identification Lab Package Sample Date Sample Type	EFFLUENT - Biweekly			EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		Does Concentration Meet Effluent Discharge Limits? (Yes/No)		
	LH18/24-SP650_100418			LH18/24-SP650_101718		LH18/24-SP650_103018		LH18/24-SP650_101018/AIX*		LH18/24-SP140_101018				
	HS18100281			HS18100977		HS18101733		HS18100544		HS18100549				
	10/4/2018			10/17/2018		10/30/2018		10/10/2018		10/10/2018				
	GRAB			GRAB		GRAB		GRAB		GRAB				
Effluent Limitation for Discharge (µg/L) per Table 2 of ROD				Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
Daily Average Concentration	Daily Maximum Concentration	Reporting Limit												
VOLATILES	µg/L	µg/L	µg/L	µg/L						µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Acetone	1,132	2,395	2	< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U	NA		Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U	NA		Yes
Methylene Chloride	803	1,699	2	< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U	NA		Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Tetrachloroethene	85.4	180.7	1	< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U	NA		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	< 0.5	U	<b>0.68</b>	J	NA		Yes
Trichloroethene	85	181	1	<b>1.4</b>		< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Vinyl Chloride	34	72	1	< 0.5	U	<b>1.7</b>		< 0.5	U	< 0.5	U	NA		Yes

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

	Sample Location Sample Identification Lab Package Sample Date Sample Type			EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
				LH18/24-SP650_100418		LH18/24-SP650_101718		LH18/24-SP650_103018		LH18/24-SP650_101018/AIX <sup>+</sup>		LH18/24-SP140_101018		
				HS18100281		HS18100977		HS18101733		HS18100544		HS18100549		
				10/4/2018		10/17/2018		10/30/2018		10/10/2018		10/10/2018		
				GRAB		GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit											
<b>ANIONS</b>	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		mg/L		
Chloride	NA	NA	10	518		496		524		NA		NA		NA
Sulfate	NA	NA	10	79.3		34.6		124		NA		NA		NA
<b>PERCHLORATE</b>	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		
Perchlorate	278	589	4	NA		NA		NA		< 2.0	U	7,500		Yes
<b>METALS</b>	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		mg/L		
Hexavalent Chromium	0.058	0.124	0.010	NA		NA		NA		< 0.0100	U	< 0.0100	U	Yes
Barium	1	2	0.004	NA		NA		NA		0.174		NA		Yes
Lead	0.0022	0.0046	0.002	NA		NA		NA		< 0.00100	U	NA		Yes
Selenium	0.0057	0.0120	0.002	NA		NA		NA		< 0.00200	U	< 0.00200	U	Yes
Silver	0.0014	0.0030	0.002	NA		NA		NA		< 0.00100	U	< 0.00100	U	Yes
<b>SEMI-VOLATILES</b>	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		
1,4-Dioxane**	NA	134.2	1	NA		NA		NA		3.5	J	NA		Yes

## Notes:

µg/L - micrograms per liter, mg/L – milligrams per liter, NA – not applicable or not analyzed, DVQ – data validation qualifier

Grab samples are compared to the daily maximum and composite samples to the daily average.

U - not detected and reported to the limit of detection

J - estimated concentration and/or due to quality control discrepancies

\*Influent sample not compared to discharge limits

AIX - after ion exchange vessel

\*\* Calculated Effluent Limit

\* Perchlorate sample designated by AIX

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

Table 9. Bi-Weekly GWTP Sampling Results for December 2018

	Sample Location Sample Identification Lab Package Sample Date Sample Type			EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
				LH18/24-SP650_120618/BIX <sup>+</sup>		LH18/24-SP140_120618		LH18/24_SP650_121218		
				HS18120375		HS18120379		HS18120734		
				12/6/2018		12/6/2018		12/12/2018		
				GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit							
<b>VOLATILES</b>	µg/L	µg/L	µg/L	µg/L		µg/L				
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	NA		< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	NA		< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	NA		< 0.5	U	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	NA		< 0.5	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	NA		3.2	U	Yes
Benzene	85	181	1	< 0.5	U	NA		< 0.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	NA		< 0.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	NA		< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	NA		< 0.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	NA		< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	NA		< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	NA		< 1.0	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	NA		< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	NA		< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	NA		< 0.5	U	Yes
Toluene	1,980	4,189	1	< 0.5	U	NA		< 0.5	U	Yes
Trichloroethene	85	181	1	<b>0.89</b>	J	NA		<b>0.88</b>	J	Yes
Vinyl Chloride	34	72	1	< 0.5	U	NA		< 0.5	U	Yes
<b>ANIONS</b>	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		
Chloride	NA	NA	10	NA		NA		<b>387</b>		NA
Sulfate	NA	NA	10	NA		NA		<b>18.4</b>		NA
<b>PERCHLORATE</b>	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		
Perchlorate	278	589	4	<b>2</b>	J	<b>4,900</b>		NA		Yes

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

	Sample Location Sample Identification Lab Package Sample Date Sample Type			EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
				LH18/24-SP650_120618/BIX <sup>+</sup>		LH18/24-SP140_120618		LH18/24_SP650_121218		
				HS18120375		HS18120379		HS18120734		
				12/6/2018		12/6/2018		12/12/2018		
				GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit							
METALS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		
Hexavalent Chromium	0.058	0.124	0.010	< 0.0100	U	< 0.0100	U	NA		Yes
Barium	1	2	0.004	<b>0.227</b>		NA		NA		Yes
Lead	0.0022	0.0046	0.002	< 0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.002	< 0.00200	U	< 0.00200	U	NA		Yes
Silver	0.0014	0.0030	0.002	< 0.00100	U	< 0.00100	U	NA		Yes
SEMI-VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		
1,4-Dioxane**	NA	134.2	1	<b>3.4</b>		NA		NA		Yes

## Notes:

µg/L - micrograms per liter

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

U - Non detect reported to the limit of detection

mg/L - milligrams per liter

<sup>+</sup> Perchlorate sample designated by BIX

J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

NA - not applicable or not analyzed

Grab samples are compared to the daily maximum and composite samples to the daily average

\*Influent sample not compared to discharge limits

\*\* Calculated Effluent Limit

BIX - before ion exchange vessel

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

Table 10. Quarterly GWTP Analytical Sampling Results for 4<sup>th</sup> Quarter 2018

	Sample Location Sample Identification Lab Package Sample Date Sample Type			EFFLUENT*		INFLUENT		Does Concentration Meet Discharge Limits? (Yes/No)
				LH18/24-SP650_121818		LH18/24-SP140_121818		
				HS18120194		HS18120193		
				12/18/2018		12/18/2018		
				GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
<b>VOLATILES</b>	µg/L	µg/L	µg/L	µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 2.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 2.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	<b>6.7</b>		Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 2.5	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	<b>29</b>		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 2.5	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	< 10	U	Yes
Benzene	85	181	1	< 0.5	U	< 2.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 2.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 2.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	<b>6.9</b>		Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 2.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 5.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	<b>9.3</b>	J	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 2.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 2.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	<b>6.8</b>		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 2.5	U	Yes
Trichloroethene	85	181	1	<b>1.2</b>		<b>2,200</b>		Yes
Vinyl Chloride	34	72	1	< 0.5	U	<b>910</b>		Yes
<b>ANIONS</b>	mg/L	mg/L	mg/L	mg/L		mg/L		
Chloride	NA	NA	10	<b>404</b>		<b>408</b>		NA
Sulfate	NA	NA	10	<b>30.8</b>		<b>233</b>		NA
<b>PERCHLORATE</b>	µg/L	µg/L	µg/L	µg/L		µg/L		
Perchlorate	278	589	4	< 2.0	U	<b>5,700</b>		Yes
<b>METALS</b>	mg/L	mg/L	mg/L	mg/L		mg/L		
Aluminum	0.777	1.644	0.0100	<b>0.0279</b>		<b>0.0516</b>		Yes
Antimony	NA	NA	0.00200	<b>0.000591</b>	J	<b>0.000654</b>	J	NA
Arsenic	0.365	0.772	0.00200	<b>0.000557</b>	J	<b>0.00273</b>		Yes
Barium	1	2	0.00400	<b>0.245</b>		<b>0.231</b>		Yes
Beryllium	NA	NA	0.00200	< 0.00100	U	0.00100	U	NA
Cadmium	0.0016	0.0034	0.00200	< 0.00100	U	0.00100	U	Yes
Calcium	NA	NA	0.500	<b>26.8</b>		<b>72.6</b>		NA



GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

	Sample Location Sample Identification Lab Package Sample Date Sample Type			EFFLUENT*		INFLUENT		Does Concentration Meet Discharge Limits? (Yes/No)
				LH18/24-SP650_121818		LH18/24-SP140_121818		
				HS18120194		HS18120193		
				12/18/2018		12/18/2018		
				GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
Chromium	0.355	0.752	0.00400	0.00182	J	0.00681		Yes
Cobalt	5.433	11.495	0.00500	0.000808	J	0.00650		Yes
Iron	1.132	2.395	0.200	0.208		3.02		Yes
Lead	0.0022	0.0046	0.00200	< 0.00100	U	< 0.00100	U	Yes
Magnesium	NA	NA	0.200	23.2		55.4		NA
Manganese	7.323	15.494	0.00500	0.163		0.438		Yes
Nickel	0.087	0.184	0.00200	0.00209		0.0130		Yes
Potassium	NA	NA	0.200	1.48		1.74		NA
Selenium	0.0057	0.012	0.00200	< 0.00100	U	< 0.00100	U	Yes
Silver	0.0014	0.003	0.00200	< 0.00100	U	< 0.00100	U	Yes
Sodium	NA	NA	1.00	262		447		NA
Thallium	NA	NA	0.00200	< 0.00100	U	< 0.00100	U	NA
Vanadium	1.698	3.592	0.00500	0.00128	J	0.00123	J	Yes
Zinc	0.146	0.31	0.00400	0.0249		0.108		Yes
Mercury	NA	NA	0.000200	< 0.000100	U	< 0.000100	U	NA
<b>1,4-DIOXANE</b>	<b>µg/L</b>	<b>µg/L</b>	<b>µg/L</b>	<b>µg/L</b>		<b>µg/L</b>		
1,4-Dioxane	NA	134.2	1	2.0		3.6		Yes
<b>CHEMICAL OXYGEN DEMAND (COD)</b>	<b>mg/L</b>	<b>mg/L</b>	<b>mg/L</b>	<b>mg/L</b>		<b>mg/L</b>		
COD	NA	200	75	45		8.0	J	Yes
<b>OIL AND GREASE (O&amp;G)</b>	<b>mg/L</b>	<b>mg/L</b>	<b>mg/L</b>	<b>mg/L</b>		<b>mg/L</b>		
O&G	NA	15	2	< 1.0	U	< 1.0	U	Yes

## Notes:

µg/L - micrograms per liter

DVQ - data validation qualifier

Grab samples are compared to the daily maximum and composite samples to the daily average

\* only Effluent sample is compared to discharge limits

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

U - non detect and reported to the limit of detection

mg/L - milligrams per liter

NA - not applicable

GWTP - Groundwater Treatment Plant

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### 3 EVALUATION OF LHAAP-16 EXTRACTION SYSTEM

#### 3.1 Quantity of Groundwater Extracted From LHAAP-16

Groundwater was not extracted from LHAAP-16 during November 2018 due lack of power from a fallen power line. The volume of extracted groundwater from LHAAP-16 is shown in **Table 5** and on **Figure ES-1**. These flows are based on the sum of individual flow meter readings.

#### 3.2 Groundwater Elevation

The groundwater elevations in the piezometers and monitoring wells at LHAAP-16 for October, November and December 2018 are presented in **Table 11**. The potentiometric surface maps for the shallow and Upper Wilcox (intermediate) groundwater zones at LHAAP-16 for October, November, and December 2018 are presented on **Figures B-7 through B-12** in **Appendix B**. Due to the lack of extraction in November 2018, the groundwater flow is more true to natural conditions for that month. Based on the potentiometric surface maps, the general groundwater flow direction in the shallow and intermediate zone is southeast towards the Harrison Bayou. The intermediate zone also demonstrated a southeastern flow towards the Harrison Bayou. However, limited flow towards the northeast was also observed in the intermediate zone.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

**Table 11. Groundwater Elevations at LHAAP-16 Piezometers and Monitoring Wells**

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 10/30/18	Groundwater Elevation (feet amsl) 10/30/18	Depth to Water (feet) 11/29/18	Groundwater Elevation (feet amsl) 11/29/18	Depth to Water (feet) 12/27/18	Groundwater Elevation (feet amsl) 12/27/18
16PZ-1	Piezometer	199.44	28.44	171.00	27.79	171.65	28.51	170.93
16PZ-2	Piezometer	199.75	28.58	171.17	27.95	171.80	28.69	171.06
16PZ-3	Piezometer	198.61	27.40	171.21	26.83	171.78	27.45	171.16
16PZ-4	Piezometer	198.81	28.00	170.81	27.44	171.37	28.11	170.70
16PZ-5	Piezometer	198.31	27.12	171.19	26.59	171.72	27.26	171.05
16PZ-6	Piezometer	198.61	28.03	170.58	27.65	170.96	28.14	170.47
16PZ-7	Piezometer	200.10	29.30	170.80	28.91	171.19	29.42	170.68
16PZ-8	Piezometer	199.93	28.85	171.08	28.19	171.74	28.94	170.99
16PZ-9	Piezometer	196.49	25.60	170.89	24.90	171.59	25.69	170.80
16PZ-10	Piezometer	196.65	25.81	170.84	25.11	171.54	25.93	170.72
16PZ-11	Piezometer	198.88	27.77	171.11	27.06	171.82	27.90	170.98
16PZ-12	Piezometer	199.00	28.60	170.40	27.99	171.01	28.69	170.31
16PZ-13	Piezometer	196.58	25.68	170.90	24.92	171.66	25.73	170.85
16PZ-14	Piezometer	196.09	25.41	170.68	24.57	171.52	25.35	170.74
16PZ-15	Piezometer	191.93	20.58	171.35	19.92	172.01	20.70	171.23
16PZ-16	Piezometer	190.79	19.90	170.89	19.40	171.39	20.03	170.76
16PZ-17	Piezometer	186.67	15.35	171.32	16.71	169.96	15.42	171.25
16PZ-18	Piezometer	185.99	15.40	170.59	16.80	169.19	15.47	170.52
16PZ-19	Piezometer	183.98	12.15	171.83	11.18	172.80	12.27	171.71
16PZ-20	Piezometer	183.12	11.85	171.27	10.73	172.39	11.98	171.14
16WW12	Monitoring Well	188.81	17.79	171.02	16.78	172.03	17.89	170.92
16WW14	Monitoring Well	198.87	27.10	171.77	26.39	172.48	27.22	171.65
16WW22	Monitoring Well	200.13	29.11	171.02	28.53	171.60	29.20	170.93
16WW25	Monitoring Well	188.77	19.37	169.40	18.89	169.88	19.50	169.27
16WW26	Monitoring Well	188.83	18.00	170.83	17.33	171.50	18.09	170.74
16WW29	Monitoring Well	178.24	7.11	171.13	5.93	172.31	7.22	171.02
16WW30	Monitoring Well	178.47	7.80	170.67	6.21	172.26	7.88	170.59

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
 LONGHORN ARMY AMMUNITION PLANT

Location Identification	Type	Reference Elevation (feet amsl)	Depth to Water (feet) 10/30/18	Groundwater Elevation (feet amsl) 10/30/18	Depth to Water (feet) 11/29/18	Groundwater Elevation (feet amsl) 11/29/18	Depth to Water (feet) 12/27/18	Groundwater Elevation (feet amsl) 12/27/18
16WW31	Monitoring Well	202.78	31.30	171.48	30.81	171.97	31.41	171.37
16WW33	Monitoring Well	203.09	31.25	171.84	30.75	172.34	31.38	171.71
16WW35	Monitoring Well	191.23	19.82	171.41	19.15	172.08	19.97	171.26
16WW36	Monitoring Well	190.94	19.05	171.89	18.39	172.55	19.17	171.77

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

## 4 QUALITY CONTROL

This report summarizes the data for samples collected during October, November, and December 2018. The samples were reviewed and validated in accordance with the guidelines in the *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA, January 2017); *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (USEPA, January 2017); and the quality control criteria specified in the *Basewide Uniform Federal Policy - Quality Assurance Project Plan Longhorn Army Ammunition Plant* which is in Appendix C of the *Final Installation-Wide Work Plan for Longhorn Army Ammunition Plant Karnack, Texas* (Bhate, May 2018).

The purpose of the sampling program is to evaluate the effectiveness of the groundwater pump and treat system, assess water quality within the capture zone, and assure compliance with the effluent discharge requirements of the Interim ROD. Quality control and quality assurance problems noted in the case narratives received from the laboratory are minor and do not affect the usability of the data for compliance at the GWTP. No sample results from the 4<sup>th</sup> quarter of 2018 were rejected due to quality control problems.

ALS Environmental analyzed the compliance samples collected from the GWTP. Independent data verification and validation was performed by the Bhate Environmental Associates, Inc. (Bhate) project chemist as described in the Quality Control Summary Report in **Appendix G**. The laboratory reports for the 4<sup>th</sup> quarter of 2018 are included in **Appendix E** on a CD. Air monitoring data is presented in **Appendix H**.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

## 5 TREATED GROUNDWATER DISCHARGED

Reinjection of groundwater in ICT 6 and ICT 9 was discontinued as of July 15, 2012. The last injection occurred on May 24, 2012, immediately prior to the scrubber system malfunction which caused GWTP operation to cease temporarily.

Treated groundwater that met the perchlorate discharge criteria was discharged to Harrison Bayou or the INF Pond in accordance with the Protocol for Discharging GWTP Effluent (**Appendix F**). **Table 4** summarizes flow rates from the GWTP to the Harrison Bayou, the maximum flow rate allowed by chloride and sulfate concentrations, the daily volume discharged to the INF Pond, and the approximate flow rate discharged for October, November, and December 2018.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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## 6 AIR MONITORING

### 6.1 Summary of Air Monitoring Approach

Operation of the GWTP without air abatement was approved by the TCEQ and USEPA conditioned on collection of air monitoring data to determine the effect of GWTP operation on ambient air quality with respect to potential human health exposure risk. An Interim Air Monitoring Plan was developed by AECOM in August 2012 and used to implement the air monitoring program. The air monitoring program included sampling emission concentrations from the air stripper, ambient air at the GWTP, and ambient air downwind of the GWTP. Collection of air data occurred on a weekly basis between September 2012 and September 2013, on a monthly basis between September 2013 and September 2014, and on a quarterly basis since that time. The sampling program includes use of Summa canisters and a photoionization detector (PID) to measure vapor phase concentrations. The air stripper emission sample is collected as a grab sample, while the ambient air samples are collected as composite samples. The GWTP sample is collected over 8 hours to represent a work day and the downwind sample is collected over 24 hours to represent potential exposure to an off-site receptor<sup>1</sup>. The downwind sample is collected at the closest downwind property boundary, based on prevailing wind direction.

PID data (after system calibration) are collected each time the GWTP is operated and serve as a real-time indicator of ambient air conditions at and downwind of the GWTP. Correlations between definitive analytical air data and PID measurements were established and a means to calculate contaminant concentration from PID measurements was developed. A PID threshold of 0.4 parts per million by volume (ppmv) in ambient air was established, such that Summa canister measurements would occur when the PID threshold is exceeded.

The Summa canister samples are analyzed for VOCs using USEPA Method TO-15. The PID measurements are collected after instrument calibration. The air sampling results are summarized and reported to the USEPA and TCEQ in the GWTP quarterly reports; however, the air results are reviewed immediately upon receipt for the potential presence of any exceedances of ambient air concentrations. **Appendix H** includes the analytical data from the laboratory. PID readings, calculations of emission rates from the emission point, comparison of ambient air concentrations with TCEQ Air Monitoring Comparison Values (AMCVs) or the short-term Effects Screening Levels (ESLs) for chemicals with no published AMCVs, and a compilation of PID results and calibration records are provided in **Appendix I**. The air monitoring results to date indicate that all ambient air concentrations are lower than the AMCVs or ESLs. The stripper stack sample concentrations are used to calculate emission rates in pounds per hour (lbs/hr) and tons per year

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<sup>1</sup> Off-site receptor - Any recreational area, residence, commercial/industrial facility, or other normally occupied structures not used solely by the owner or operator of the facilities or the owner of the site upon which the facilities are located. Measurements of distances to determine compliance with this distance restriction must be taken toward structures that are in use as of the date that a notification is filed with the commission.

## GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018

### LONGHORN ARMY AMMUNITION PLANT

(tpy). The calculated emission rates in lbs/hr are then compared to the allowable emission rates per 30 Texas Administrative Code (TAC) §106.533(f)(1). The emission rates have been lower than the allowable emission rates to the conservatively-selected off-site receptor. The calculated emission rate in tpy is compared to the allowable limit of 5 tpy per chemical.

The air monitoring results from the first few months of operation between September and November 2012 were compiled and submitted in a separate report (December 2012) (along with validated data) to TCEQ to demonstrate compliance with Texas Permit by Rule emission standards. Approval of the analytical results and concurrence that the site will continue to meet Title 30 TAC §106.533 without the use of air abatement using a catalytic oxidation system was obtained from the TCEQ via email on February 22, 2013.

On February 18, 2013, AECOM presented analysis of the approach applicable to obtaining a variance for operating the GWTP without air abatement equipment to the TCEQ and USEPA. The analysis indicated that the use of an Explanation of Significant Difference (ESD) was the appropriate approach for the site. Approval of use of an ESD was obtained from the USEPA via email on March 21, 2013. The ESD was developed, reviewed, and accepted by USEPA and TCEQ. The ESD was signed by the designated parties on April 3, 2014, and concurrence from the TCEQ was obtained in a letter dated April 16, 2014.

## 6.2 Air Monitoring Results for the 4<sup>th</sup> Quarter of 2018

During the 4<sup>th</sup> quarter of 2018, air sampling was completed on December 19, 2018. A summary of the air sampling results is presented in **Appendix I**. All results met the criteria described in Section 6.1.

### 6.2.1 Summa Canister Monitoring Results

One sampling event was conducted on December 19, 2018, for presentation during the 4<sup>th</sup> quarter 2018 reporting period using Summa canisters. The samples were collected and analyzed as described in Section 6.1 and per the approved air monitoring plan dated August 2012. The analytical results were then compiled in spreadsheets where calculations were completed and comparisons to applicable criteria were made as described in Section 6.1.

#### 6.2.1.1 Ambient Air Results

Acetone, benzene, methylene chloride, trichloroethene, n-hexane, toluene, dichlorodifluoromethane, trichlorofluoromethane, trichlorotrifluoroethane, and alpha-pinene were detected in December 2018 in ambient air downwind of the GWTP. Compounds originating at the GWTP would be expected to have lower concentrations in the downwind sampling location than at the GWTP sampling location. However, seven compounds detected downwind had the same detections or slightly higher concentrations (benzene, methylene chloride, n-hexane, dichlorodifluoromethane, trichlorofluoromethane, trichlorotrifluoroethane, and alpha-pinene) compared to at the GWTP. Compounds such as alpha-pinene, dichlorodifluoromethane, and trichlorofluoromethane typically have had similar concentrations in both GWTP ambient air and downwind ambient air and are suspected to be present in the ambient (background) air. Several

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

compounds were detected in the ambient air at the GWTP, but not downgradient. These compounds include cis-1,2-dichloroethene (DCE), propene, and ethanol.

The ambient air results during the quarter met the ambient air criteria, as presented in **Table 1** within **Appendix I**.

### 6.2.1.2 Air Stripper Effluent Results

The VOCs present in groundwater that are removed via the air stripper include 1,1-DCE; 1,2-dichloroethane; cis-1,2-DCE; methylene chloride; TCE; vinyl chloride; and trichlorotrifluoroethane. The highest reported concentrations from the air stripper stack exhaust (air) are for TCE; cis-1,2-DCE; and trichlorotrifluoroethane. These compounds are frequently reported in groundwater at the site, with the exception of trichlorotrifluoroethane which is not typically a groundwater analyte at LHAAP. Trichlorotrifluoroethane, however, appears to be present in groundwater as indicated by limited analysis conducted in December 2013, where it was detected in several wells, and from historical accounts. Many of the chemicals that are reported in ambient air are not detected in the air stripper effluent. This is likely because the reporting limit for the air stripper effluent is higher than the reporting limit for the ambient air samples or the source for some of these chemicals are extraneous to groundwater.

The air stripper effluent concentrations were below the emission criteria, as presented in **Table 2** within **Appendix I**.

### 6.2.2 PID Results

Along with collection of Summa canister air samples, PID measurements from the same sources/areas are collected and recorded. These simultaneous measurements allowed establishing a correlation between PID readings and VOC concentrations in the Summa canister air samples. Conversion from PID to compound concentrations was established by TCEQ in 30 TAC §106.533(h). The TCEQ equation allows use of a PID to determine individual compound concentrations if the distribution of chemicals in the ambient air is known or assumed. This allows the use of a PID as a tool to measure VOC concentrations and convert the PID results to estimates of compound concentrations. Ambient air PID measurements during this quarter at the GWTP were reported at 0.0 parts per million. The results of the PID readings collected during GWTP operations are presented in **Table 3** within **Appendix I**.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

## 7 COMMENTS AND RESPONSES

TCEQ had the following comments on the 3<sup>rd</sup> Quarter 2018 report per an email issued on January 28, 2019.

**TCEQ Comment 1:** Figure 2-1 Last data point is incorrect. Please revise.

**Response to TCEQ Comment 1:** The last data point is correct. However, the data point (678,225 gallons) does not match the value provided in Section 2.3 of 667,847 gallons. The variation in values is because Figure 2-1 is created using the influent totalizer FIT-140 whereas the data in Section 2.3 is based upon effluent readings from FIT-686. The basis for the readings and volume provided will be further clarified in future reports in a manner similar to that provided within Section 2.3 of this 4<sup>th</sup> quarter report.

**TCEQ Comment 2:** Appendix B Figures (potentiometric maps) – This comment is specific to the GWTP reports but also a general request to improve the usability of future figures. For the next GWTP Report, please revise the figures to remove the satellite image layer, create more contrast between features (site boundaries, water features, and potentiometric surface/isoconcentration), and label placement.

**Response to TCEQ Comment 2:** Satellite image layer will not be used. Labels will be adjusted, as necessary to provide improved usability of figures.

The USEPA sent an email on 27 February 2018, that the 3<sup>rd</sup> Quarter 2018 Report was approved without comments.

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

**APPENDIX A**  
**ICT LAYOUT AND GWTP PROCESS FLOW DIAGRAM**

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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Table A-1: ICTs Completion Depths

ICT	TOC Elevation	Total Depth	Sump Elevation	Comment
1	186.07	22.5	163.57	Taken out of service in 2007.
2	185.02	29.5	155.52	
3	192.27	37.75	154.52	Taken out of service in 2007.
4	193.51	37.5	156.01	
5	192.67	35	157.67	Taken out of service in 2007.
6	197.30	40.75	156.55	Converted to infiltration in 2007. Ceased reinjection in July 2012.
7	198.03	32.33	165.7	
8	198.97	44.5	154.47	
9	197.64	45.5	152.14	Converted to infiltration in 2007. Ceased reinjection in July 2012.
10	198.07	45.42	152.65	Taken out of service in 2007.
11	198.01	43.33	154.68	
12A	189.06	31.5	157.56	Taken out of service in 2007. Reinstated in December 2012.
12B	191.97	36.25	155.72	
12C	193.90	34.33	159.57	
12D	185.64	33.75	151.89	
12E	183.38	32.25	151.13	
13A	182.59	28.17	154.42	
13B	184.72	29.58	155.14	
13C	186.13	28.17	157.96	
13D	186.72	26.17	160.55	
13E	191.79	27.08	164.71	
13F	197.81	32.33	165.48	
13G	197.03	27.25	169.78	Taken out of service in 2008.
14A	196.8	43.00	153.8	
14B	197.61	43.42	154.19	
14C	197.86	41.33	156.53	
14D	198.47	44.25	154.22	
14E	198.47	43.08	155.39	

## Note(s):

ICT - interception-collection trench

TOC - top of casing, measuring point for groundwater elevations

Elevations are reported as feet above mean sea level.

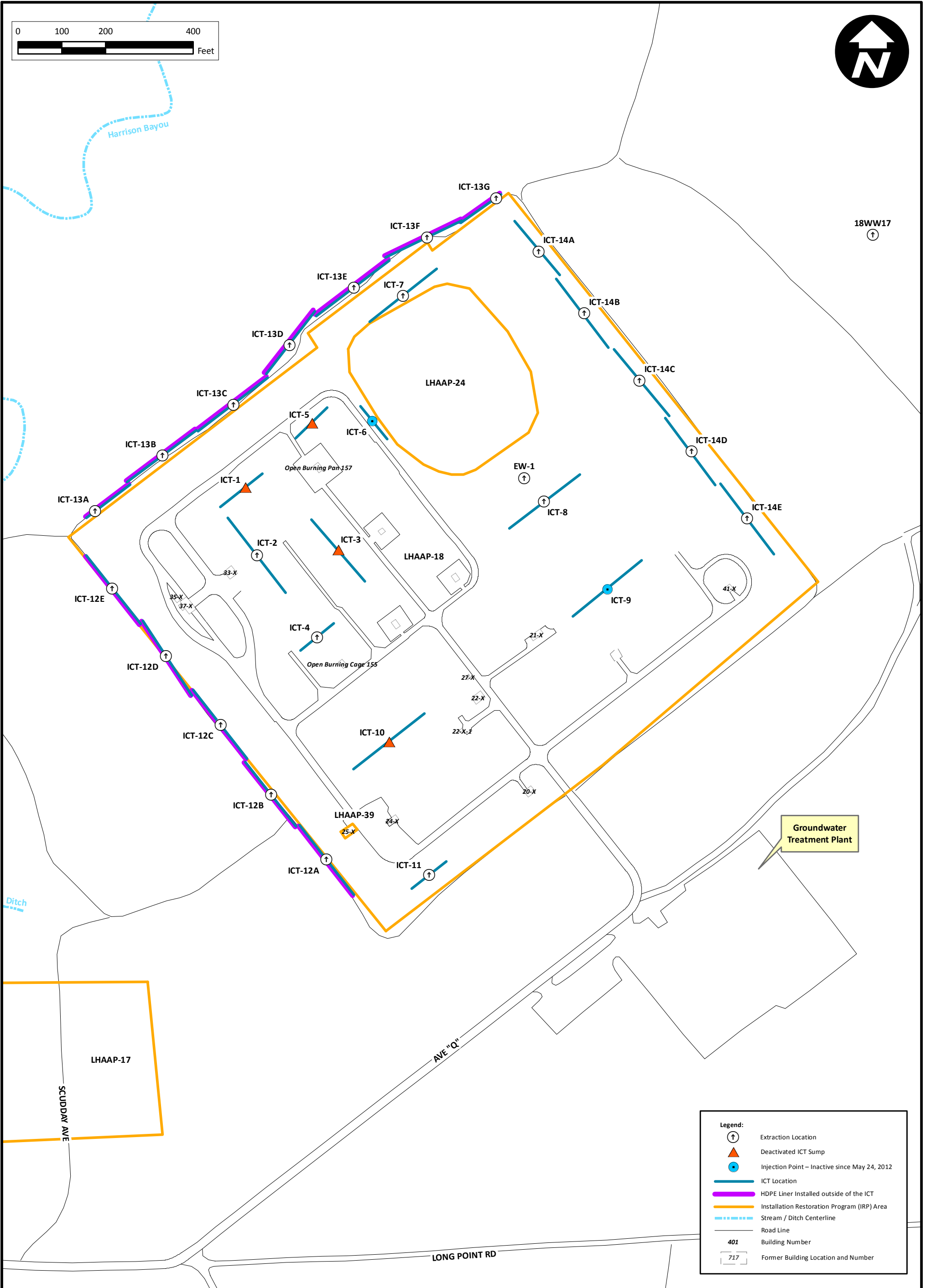
Total depths are reported as feet below TOC.

Sump elevation calculated by subtracting total depth from TOC elevation.

ICTs were installed in 1998.

ICT 12A was replaced on December 5, 2012, and extraction has resumed.

TOC Elevations and total depth measured in October 2003, 4th Quarter 2003, Groundwater Treatment Plant Report.



**Legend:**

- Extraction Location
- Deactivated ICT Sump
- Injection Point – Inactive since May 24, 2012
- ICT Location
- HDPE Liner Installed outside of the ICT
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line
- Building Number
- Former Building Location and Number

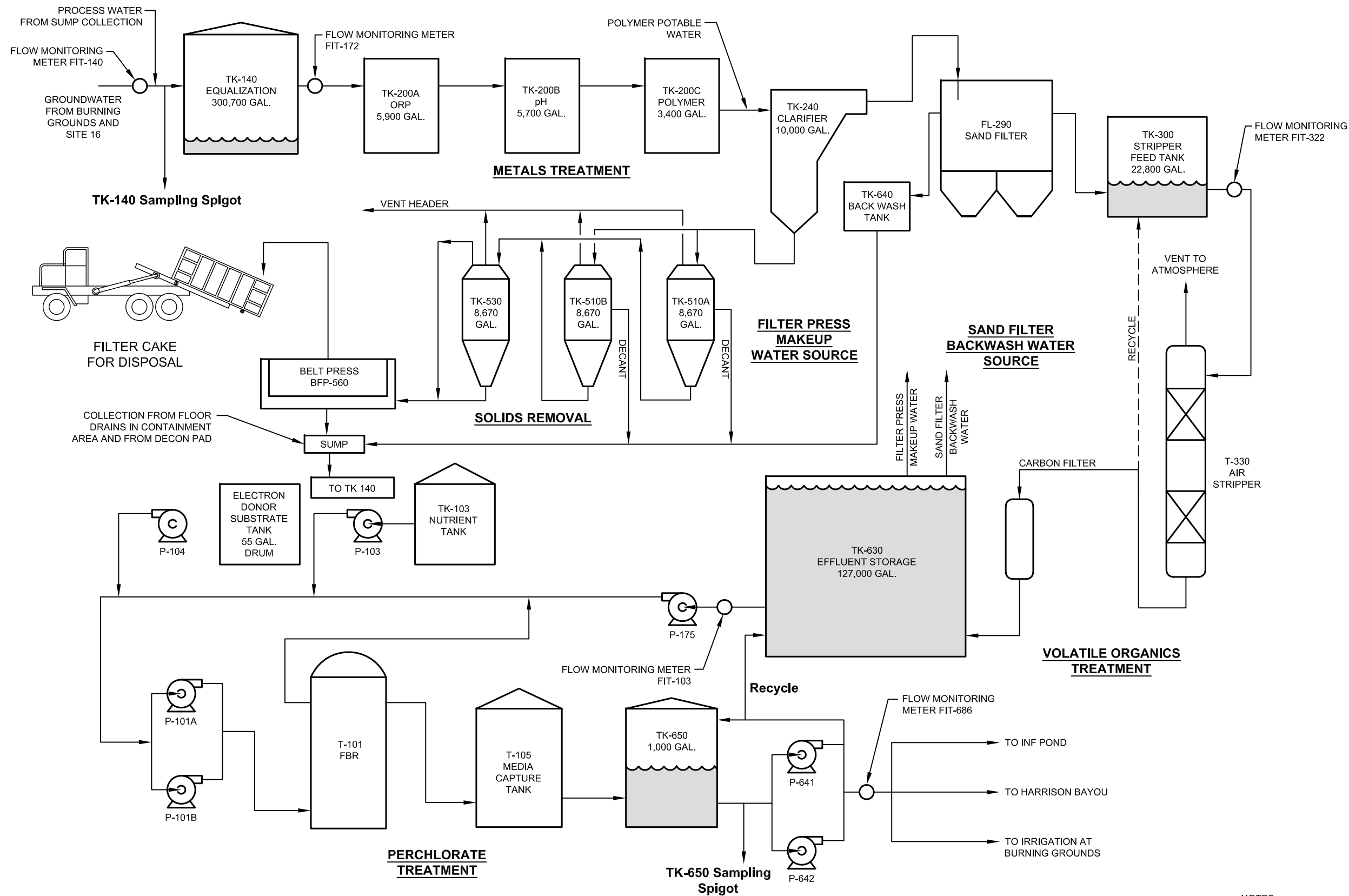


Quarterly Evaluation Report  
Groundwater Treatment Plant  
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	2/14/2019	MRM

ICT Layout Map

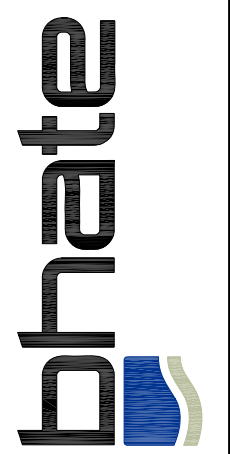
Figure A-1



NOTES:  
 GAL. GALLON  
 TK or T TANK  
 BFP BELT FILTER PRESS  
 P PUMP  
 FL FILTER  
 FBR FLUIDIZED BED REACTOR

Quarterly Evaluation Report  
 Groundwater Treatment Plant  
 Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	NW01312.0150
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GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

**APPENDIX B**  
**GROUNDWATER ELEVATION CONTOUR MAPS**

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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Table B-1: Extraction Equipment Maintenance Since 2011

LHAAP-18/24			
Well I.D.	Replaced Parts	Date	Contractor
ICT 14E	Pump	3/15/2012	Shaw
ICT 14D	Pump, motor, level probes	3/16/2012	Shaw
ICT 14B	Pump, level probes, level probe wire	3/16/2012	Shaw
ICT 14A	Pump, motor, level probes, level probe wire	3/17/2012	Shaw
ICT 2	Pump, motor	3/17/2012	Shaw
ICT 13D	Pump	3/19/2012	Shaw
ICT 13B	Pump	3/20/2012	Shaw
ICT 14E	Pump, motor, broken piping	11/19/2012	AECOM
ICT 13C	Pump	11/20/2012	AECOM
ICT13E	Pump	11/20/2012	AECOM
ICT 12A	Pump, motor, wiring harness, level probes, level probe wire	12/5/2012	AECOM
ICT 7	Pump, motor, wiring harness, level probes	12/6/2012	AECOM
ICT2	Pump	6/10/2013	AECOM
ICT 13C	Pump	6/11/2013	AECOM
ICT 13D	Pump	6/12/2013	AECOM
ICT 14E	Pump rebuilt	6/15/2013	AECOM
ICT 14E	Replaced low level switch	6/19/2013	AECOM
ICT 13C	Pump, wiring harness, flow meter	4/15/2014	AECOM
ICT 14D	Repaired level probes	6/24/2014	AECOM
ICT 14E	Repaired level probes	6/24/2014	AECOM
ICT 14E	Pump and motor troubleshooting	6/26/2014	AECOM
ICT2, 13F, 14C, 14D, 14E	Repaired level probes	7/7/2014	AECOM
ICT 12E	Pump, motor	10/2/2014	AECOM
ICT 12E	Wiring harness, fixed leak	10/8/2014	AECOM
ICT 12E	Level probes	10/9/2014	AECOM
ICT13A	Pump, piping	10/15/2014	AECOM
ICT 12E	Repaired leaking fittings	10/16/2014	AECOM
ICT 11	1" tee and 1" elbow	1/13/2015	AECOM
ICT 12B	Flow meter	1/13/2015	AECOM
ICT 7	1" tee, repaired 1" pipe	1/13/2015	AECOM
ICT 13A	Flow meter	1/15/2015	AECOM
ICT 13B	Pump	1/15/2015	AECOM
ICT 13C	Pump	1/16/2015	AECOM
ICT 7	Low level probe	1/16/2015	AECOM
ICT 13D	Pump, level probes	1/17/2015	AECOM
ICT 14C	Low level probe	1/17/2015	AECOM
ICT 14C	Low level probe	1/29/2015	AECOM
ICT 14D	Low level probe	1/29/2015	AECOM
ICT 13D	Level probes	1/29/2015	AECOM
ICT 2	Pump	1/30/2015	AECOM
ICT 8	Fuse	3/2/2015	AECOM
ICT 8	Fuse	3/9/2015	AECOM
ICT 12E	Flow meter	3/13/2015	AECOM
ICT 13D	Union	3/13/2015	AECOM
ICT 14C	Cleaned level probes	4/1/2015	AECOM
ICT 14D	Cleaned level probes	4/1/2015	AECOM
ICT 13A	Cleaned level probes	4/21/2015	AECOM
ICT 14C	Cleaned level probes	4/21/2015	AECOM
ICT 8	Low level probe	7/24/2015	AECOM
ICT 13C	Installed New Pump	7/28/2015	AECOM



**Table B-1: Extraction Equipment Maintenance Since 2011**

<b>Well I.D.</b>	<b>Replaced Parts</b>	<b>Date</b>	<b>Contractor</b>
ICT 14C	Installed New Pump and Electric Motor	7/29/2015	AECOM
ICT 14E	Installed New Pump and Electric Motor	7/31/2015	AECOM
ICT 12E	Repaired wiring	8/12/2015	AECOM
ICT 13E	Replaced high and low level probes	8/12/2015	AECOM
ICT 2	Installed Rebuilt Pump	9/9/2015	AECOM
ICT 12 E, ICT 14E	Replaced high level probe and wiring	9/15/2015	AECOM
ICT 13A	Installed new pump	12/23/2015	AECOM
ICT 13B	Installed new pump	12/24/2015	AECOM
ICT 13D	Replaced high level probe	2/11/2016	Aerotek
ICT 14C	Replace low level probe on ICT 14C	2/15/2016	Aerotek
ICT 8	Installed new pump and electric motor	2/19/2016	Aerotek
ICT 14C	Repaired piping leak	3/10/2016	Aerotek
ICT 14E	Installed high and low level probes, level probe wire	3/22/2016	Aerotek
ICT 13D, ICT 14B	Installed high and low level probes, level probe wire	3/24/2016	Aerotek
ICT 14B	Installed new pump and electric motor	3/31/2016	Aerotek
ICT 14C	Installed new low level probe	4/20/2016	Aerotek
ICT 12B	Installed new mechanical flow meter	6/16/2016	Aerotek
ICT 13C	Installed rebuilt pump and new flow meter	8/10/2016	Aerotek
ICT 13A	Installed rebuilt pump, new flow meter, and new 1" unions	8/24/2016	Aerotek
ICT 14E	Installed new mechanical flow meter	8/26/2016	Aerotek
ICT 12C	Repair flow meter	8/30/2016	Aerotek
ICT 2	Install rebuilt pump and new flow meter	8/31/2016	Aerotek
ICT 14C	Clean and adjust level probes	9/7/2016	Aerotek
ICT 14C	Replaced level probes	9/12/2016	Aerotek
ICT 14C	Installed new level probe wire and level probes	9/21/2016	Aerotek
ICT 12C	Installed rebuilt pump, new electric motor, new wiring harness, new level probe wire, and new level probes	9/27/2016	Aerotek
ICT 14C	Cleaned and adjusted level probes	10/14/2016	Aerotek
ICT 13C	Cleaned and adjusted level probes	10/21/2016	Aerotek
ICT 13B	Installed rebuilt pump	10/25/2016	Aerotek
ICT 14D	Installed rebuilt pump	10/27/2016	Aerotek
ICT 13C	Replace low level probe	11/8/2016	Aerotek
ICT 13B	Replace relay base plate	11/8/2016	Aerotek
ICT 13E	Clean and adjust low level probe	11/15/2016	Aerotek
ICT 13B	Replace broken relay base plate and bad level probe wire	11/17/2016	Aerotek
ICT 13C	Clean & repair leaking flow meter	11/18/2016	Aerotek
ICT 13B	Clean & adjust low level probe	11/18/2016	Aerotek
ICT 13A, 13B, & 13E	Clean and adjust low level probes	12/2/2016	Aerotek
ICT 13C & 14C	Pulled piping and pumps	2/8/2017	Aerotek
ICT 14C	Installed new electric motor	2/8/2017	Aerotek
ICT 13C & 14C	Installed rebuilt grundfos pumps	2/8/2017	Aerotek
ICT 7, 13A, & 14D	Repaired sample ports	2/9/2017	Aerotek
ICT 13B & 14E	Cleaned and adjusted low level probes	3/30/2017	Aerotek
ICT 13B & 13F	Installed new flow meters	3/30/2017	Aerotek
ICT 12B	Repair flow meter	4/13/2017	Aerotek
ICT 12C	Replace broken 1" tee	5/1/2017	Aerotek
ICT 11	Installed new manual flow meter	5/5/2017	Aerotek
ICT 2	Installed new flow meter	5/9/2017	Aerotek
ICT 14C & 14D	Cleaned and adjusted low level probes	5/31/2017	Aerotek
ICT 14C	Cleaned and adjusted low level probe	6/27/2017	Aerotek
ICT 8	Clean low level probe	7/11/2017	Aerotek
ICT 2 & 14D	Cleaned and replaced level probes	7/17/2017	Aerotek
ICT 14C	Cleaned low level probe	7/24/2017	Aerotek

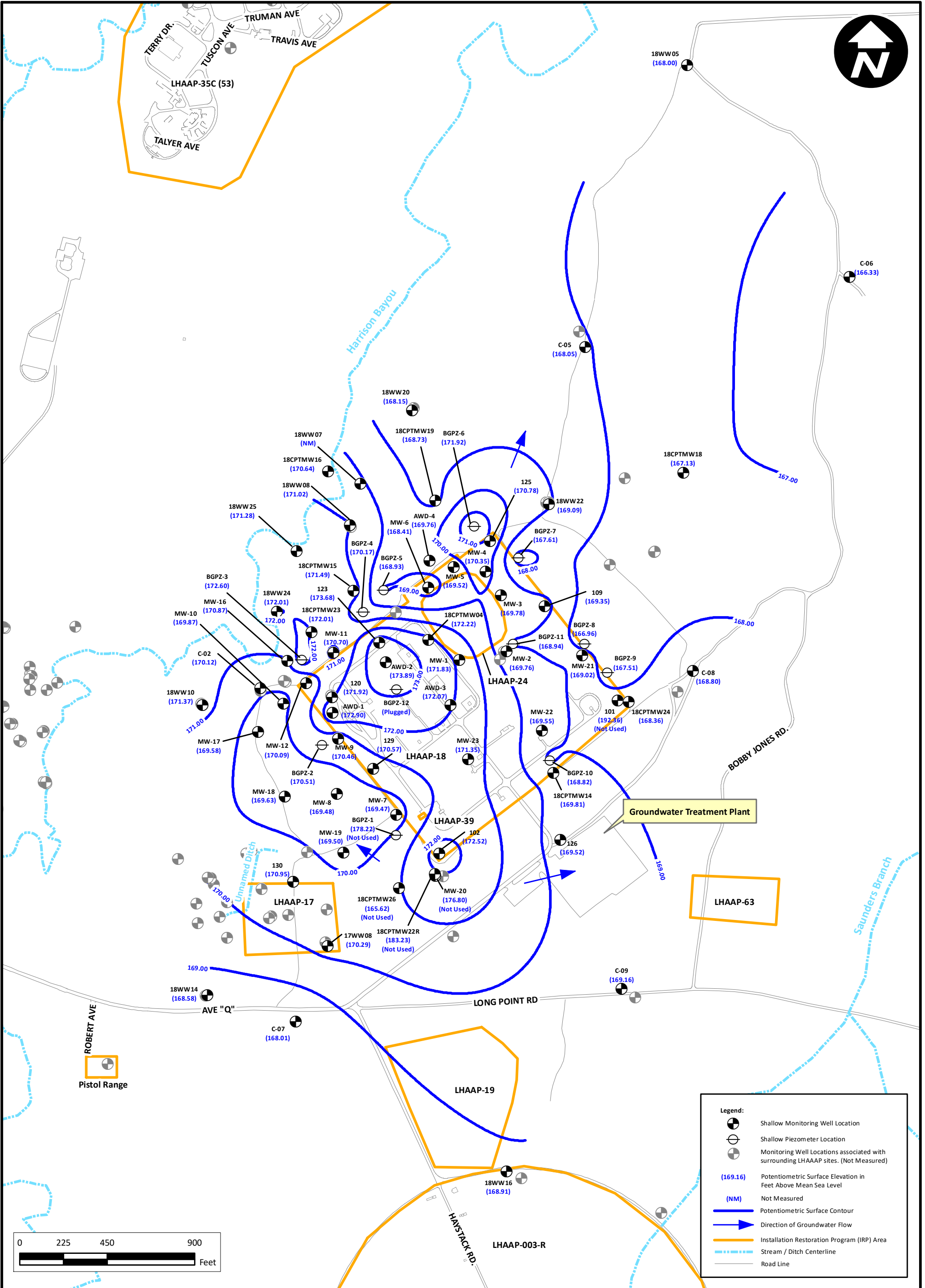
**Table B-1: Extraction Equipment Maintenance Since 2011**

<b>Well I.D.</b>	<b>Replaced Parts</b>	<b>Date</b>	<b>Contractor</b>
ICT 13A	Installed new pump and flow meter	8/8/2017	Aerotek
ICT 13C & 13B	Installed new pump and flow meter	8/9/2017	Aerotek
ICT 13B	Installed new low level probe	8/10/2017	Aerotek
ICT 11	Installed new pump and flow meter	8/11/2017	Aerotek
ICT 4	Replaced low level probe	8/11/2017	Aerotek
ICT 2	Installed rebuilt pump	9/19/2017	Aerotek
ICT 13D	Adjusted level probes	9/22/2017	Aerotek
ICT 14C	Cleaned level probes	10/11/2017	Bhate
ICT 13E	Clean and adjust level probes	10/24/2017	Bhate
ICT 12B	Adjust level probes	11/15/2017	Bhate
ICT 14D	Cleaned level probes	11/15/2017	Bhate
ICT 8	Clean and adjust level probes	11/28/2017	Bhate
ICT 2	Cleaned level probes	12/20/2017	Bhate
ICT 13C	Install new flow meter	1/30/2018	Bhate
ICT 14C	Cleaned level probes	1/30/2018	Bhate
ICT 13C	Cleaned & adjusted level probes	2/1/2018	Bhate
ICT 13B	Repair broken 1" union	2/1/2018	Bhate
ICT 14A	Repair 2 broken 1" elbows & lower high level probe	2/1/2018	Bhate
ICT 14B	Repair broken 1" tee & lower high level probe	2/1/2018	Bhate
ICT 14D	Install new flow meter	2/8/2018	Bhate
ICT 8	Replace broken 1" tee & cleaned level probes	2/8/2018	Bhate
ICT 14D	Cleaned level probes	2/28/2018	Bhate
ICT 14C	Replace low level probe	2/28/2018	Bhate
ICT 13B	Cleaned level probes	2/28/2018	Bhate
ICT 13A	Install new motor & replace leaking 1" union	3/14/2018	Bhate
ICT 13C	Cleaned & adjusted level probes	3/21/2018	Bhate
ICT 12B	Replace broken 1" elbow & install new flow meter	3/21/2018	Bhate
ICT 2	Install new pump	3/22/2018	Bhate
ICT 13B	Replaced level probes	3/30/2018	Bhate
ICT 14E	Lower high level probe	3/30/2018	Bhate
ICT 14C	Cleaned level probes	4/27/2018	Bhate
ICT 11	Install new breaker	4/27/2018	Bhate
ICT 14E	Cleaned level probes	6/7/2018	Bhate
ICT 12C	Cleaned level probes	6/7/2018	Bhate
EW 01	Cleaned level probes	6/7/2018	Bhate
ICT 14E	Replaced level probes	6/8/2018	Bhate
ICT 11	Install new electrical wire from breaker to well	6/14/2018	Bhate
ICT 12B	Replaced pump	6/25/2018	Bhate
ICT 14E	Cleaned level probes	6/26/2018	Bhate
ICT 8	Cleaned level probes	6/26/2018	Bhate
ICT 14C	Replaced pump	6/27/2018	Bhate
EW01	Replaced level probes	9/12/2018	Bhate
ICT 7	Cleaned level probes	9/12/2018	Bhate
ICT 12C	Replaced low level probe wire and probe	9/12/2018	Bhate
ICT 14D	Replaced high level probe wire & probe	9/13/2018	Bhate
ICT 12B	Replaced high and low level probe wires & probes	9/13/2018	Bhate
ICT 12B	Replaced electrical relay and relay base plate	9/13/2018	Bhate
ICT 14C	Cleaned level probes	9/13/2018	Bhate
ICT 13E	Replaced flow meter	9/14/2018	Bhate
ICT 14D	Replaced low level probe	10/31/2018	Bhate
ICT 8	Cleaned level probes	10/31/2018	Bhate
ICT 14C	Cleaned level probes	10/31/2018	Bhate
ICT 13A	Replaced broken 1" Tee	12/12/2018	Bhate
ICT 14C	Cleaned level probes	12/12/2018	Bhate

**Table B-1: Extraction Equipment Maintenance Since 2011**

<b>Well I.D.</b>	<b>Replaced Parts</b>	<b>Date</b>	<b>Contractor</b>
<b>LHAAP-16</b>			
EW08	New pump	2/28/2011	Shaw
EW01	Rebuild pump	8/25/2011	Shaw
EW06	Rebuild pump	8/25/2011	Shaw
EW02	Rebuild pump	2/12/2012	Shaw
EW03	Rebuild pump	2/12/2012	Shaw
EW08	Rebuild pump	11/8/2012	AECOM
EW01	Rebuild pump	11/8/2012	AECOM
EW04	Repair pump	11/13/2012	AECOM
EW07	Rebuild pump	11/13/2012	AECOM
EW04	Installed New Pump	11/28/2012	AECOM
EW06	Installed New Pump	11/28/2012	AECOM
EW02	Installed New Pump	12/4/2012	AECOM
EW03	Installed New Pump	12/4/2012	AECOM
EW01	Installed New Pump	12/17/2012	AECOM
EW01	Replaced low level probe	1/17/2015	AECOM
EW01	Cleaned and adjusted level probes	10/21/2016	Aerotek





**Legend:**

- Shallow Monitoring Well Location
- Shallow Piezometer Location
- Monitoring Well Locations associated with surrounding LHAAP sites. (Not Measured)
- (169.16)** Potentiometric Surface Elevation in Feet Above Mean Sea Level
- (NM)** Not Measured
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line



Quarterly Evaluation Report 4th Quarter (October – December) 2018  
 Groundwater Treatment Plant  
 Longhorn Army Ammunition Plant, Karnack, Texas

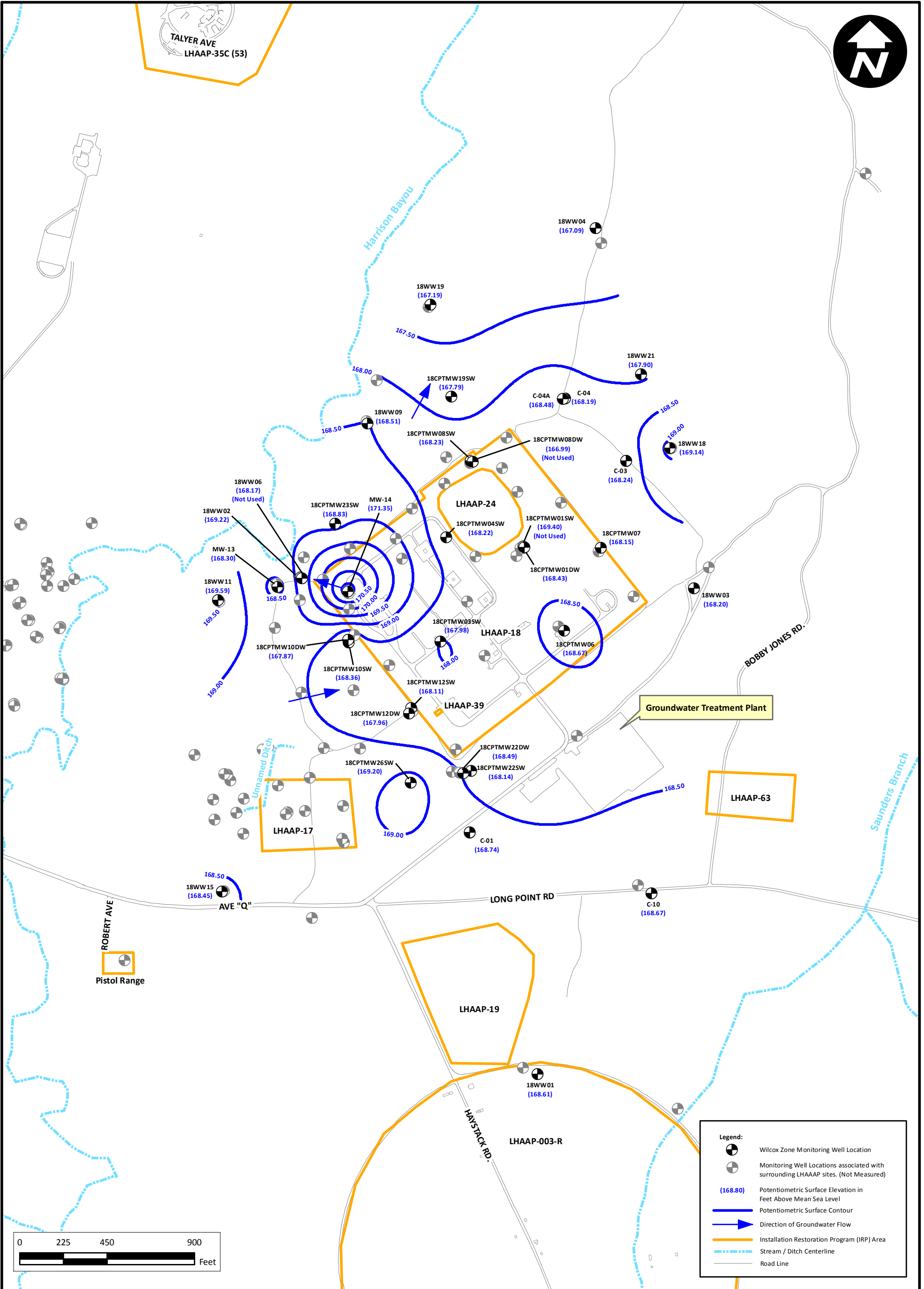
**Groundwater Potentiometric Surface Map  
 Shallow Zone (November 29, 2018) LHAAP-18/24**

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	4/24/2019	MRM

**Figure B-2**





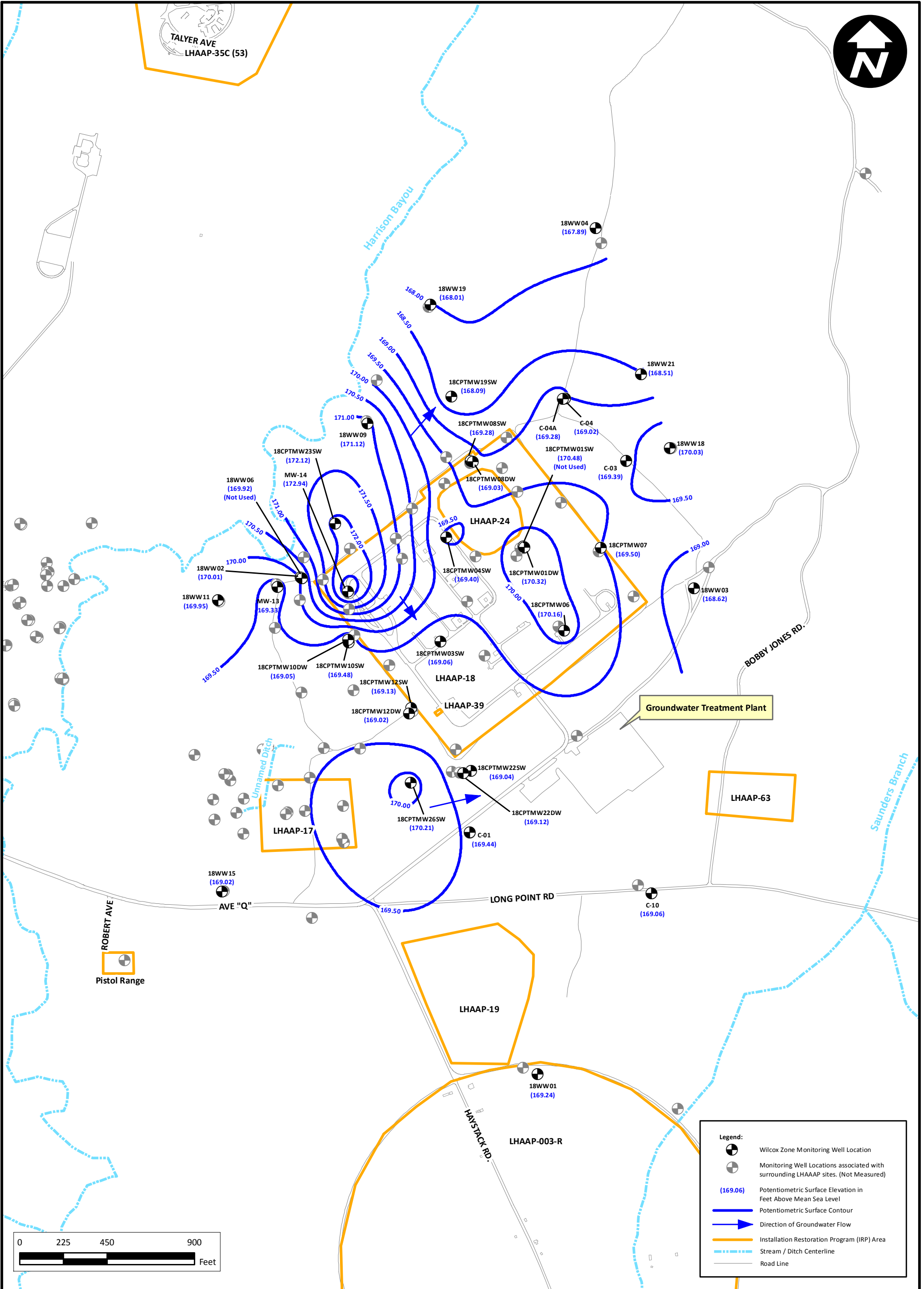


Quarterly Evaluation Report 4th Quarter (October – December) 2018  
 Groundwater Treatment Plant  
 Longhorn Army Ammunition Plant, Karnack, Texas

Groundwater Potentiometric Surface Map  
 Wilcox Zone (October 30, 2018) LHAAP-18/24

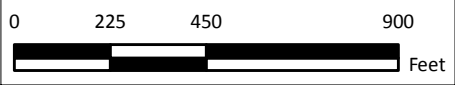
PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	2/14/2019	MRM

Figure B-4



**Legend:**

- Wilcox Zone Monitoring Well Location
- Monitoring Well Locations associated with surrounding LHAAAP sites. (Not Measured)
- (169.06)** Potentiometric Surface Elevation in Feet Above Mean Sea Level
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line



Quarterly Evaluation Report 4th Quarter (October – December) 2018  
 Groundwater Treatment Plant  
 Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
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**Groundwater Potentiometric Surface Map  
 Wilcox Zone (November 29, 2018) LHAAP-18/24**

**Figure B-5**





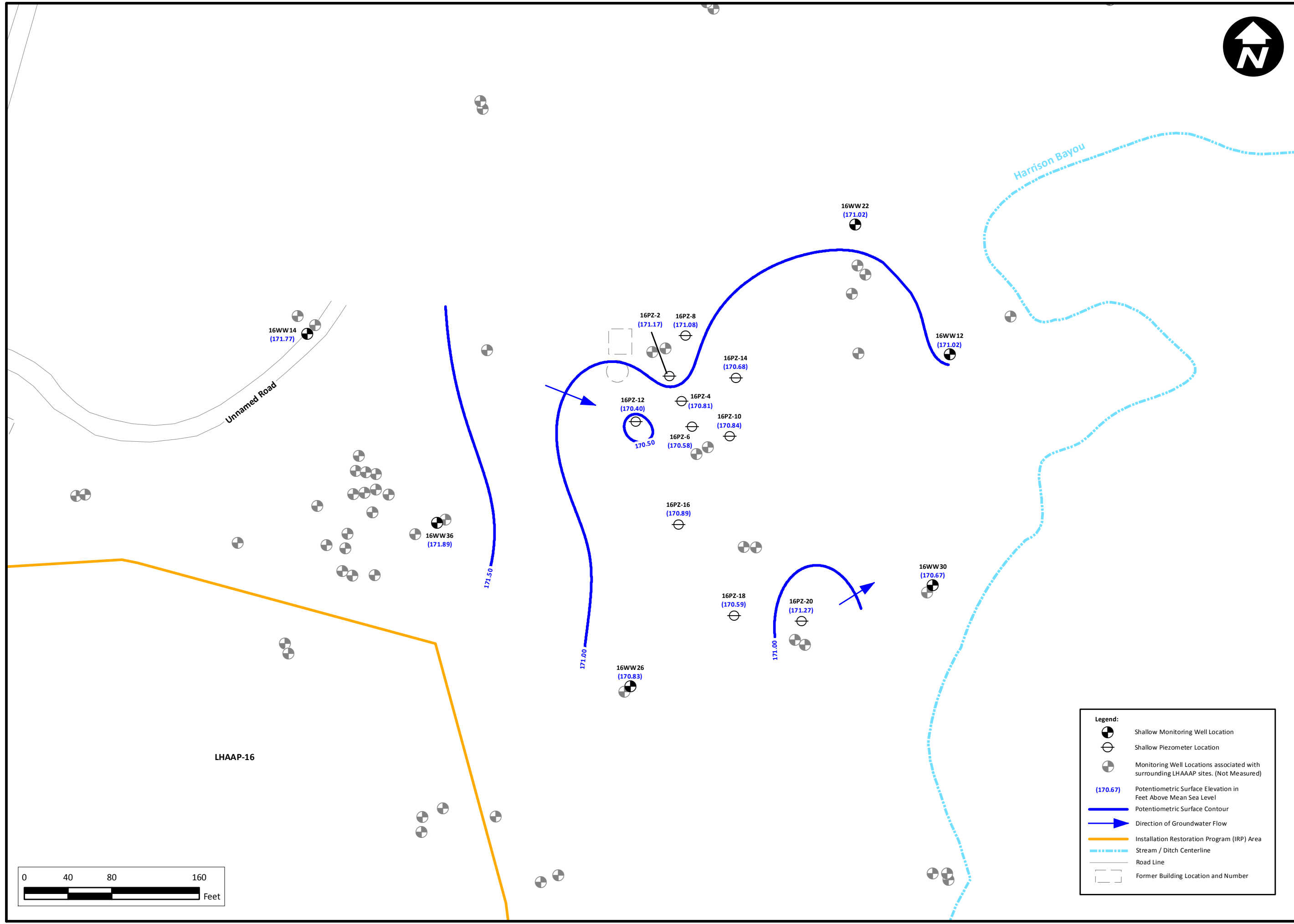


Groundwater Potentiometric Surface Map  
Shallow Zone (October 30, 2018) LHAAP-16

Figure B-7

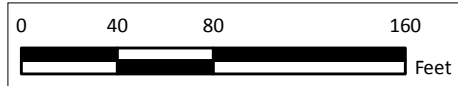
Quarterly Evaluation Report 4th Quarter (October - December) 2018  
Groundwater Treatment Plant  
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	NW01312.0150	SCALE:	As Shown	DATE:	2/14/2019	DRAWN BY:	MRM
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**Legend:**

- Shallow Monitoring Well Location
- Shallow Piezometer Location
- Monitoring Well Locations associated with surrounding LHAAAP sites. (Not Measured)
- (170.67)** Potentiometric Surface Elevation in Feet Above Mean Sea Level
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line
- Former Building Location and Number



LHAAP-16





Groundwater Potentiometric Surface Map  
Shallow Zone (December 27, 2018) LHAAP-16

Figure B-9

Quarterly Evaluation Report 4th Quarter (October - December) 2018  
Groundwater Treatment Plant  
Longhorn Army Ammunition Plant, Karnack, Texas

DRAWN BY:

MRM

DATE:

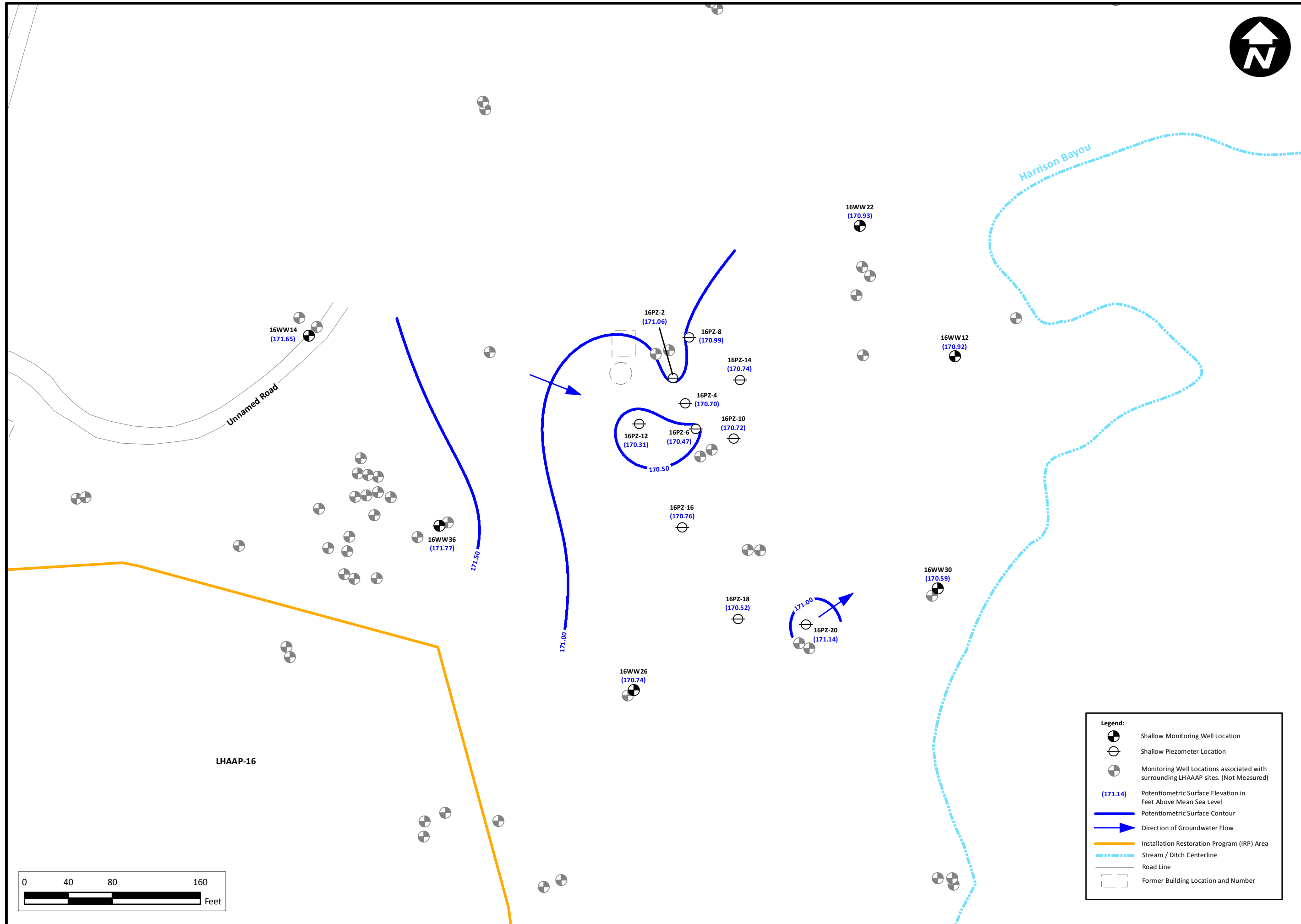
2/14/2019

SCALE:

As Shown

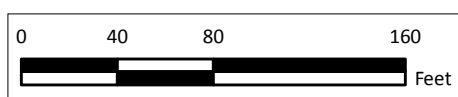
PROJECT NO:

NW01312.0150



**Legend:**

- Shallow Monitoring Well Location
- Shallow Piezometer Location
- Monitoring Well Locations associated with surrounding LHAAP sites. (Not Measured)
- Potentiometric Surface Elevation in Feet Above Mean Sea Level
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line
- Former Building Location and Number



LHAAP-16

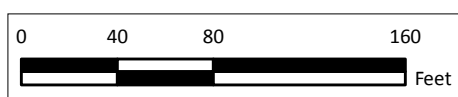
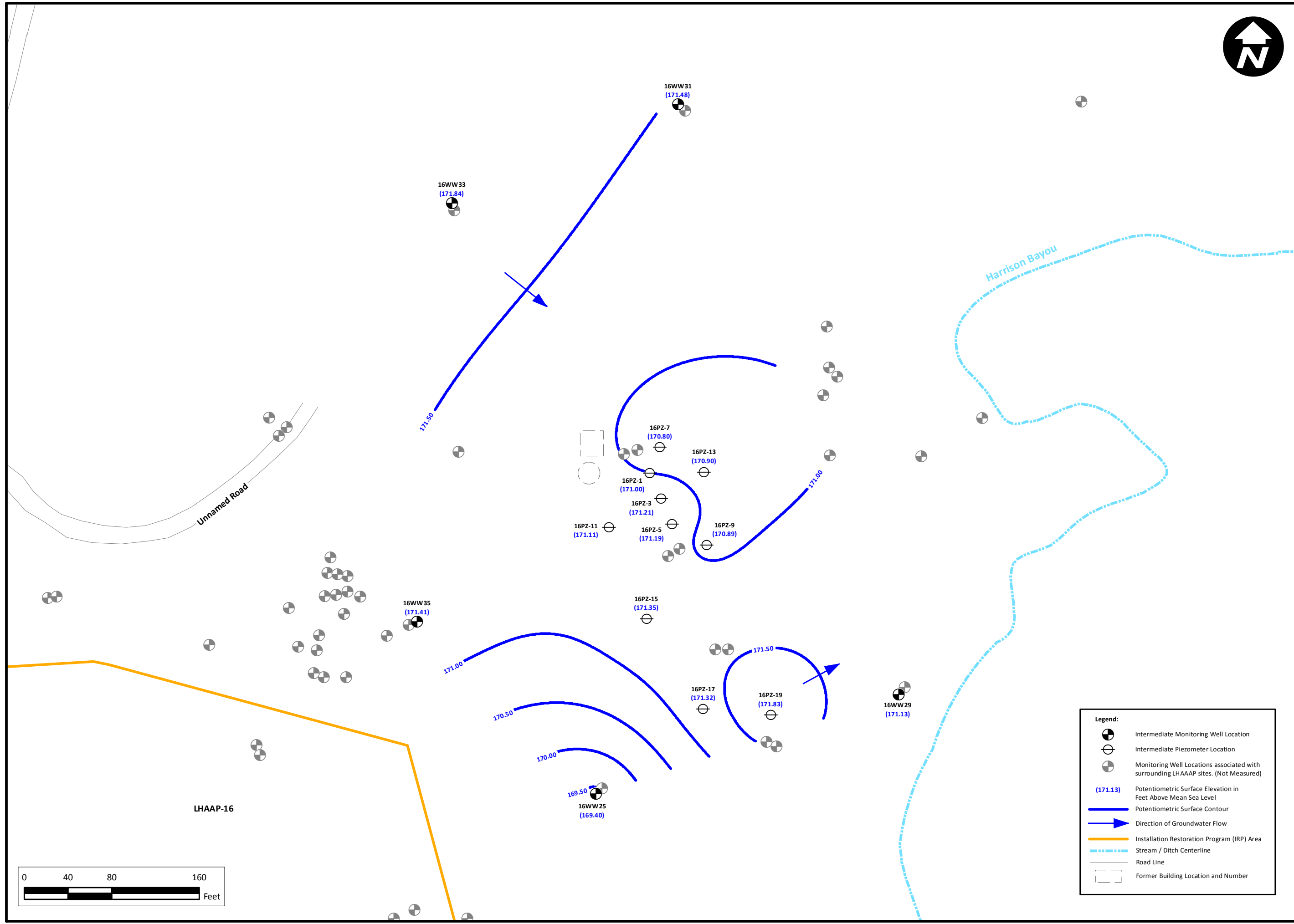


Groundwater Potentiometric Surface Map  
Intermediate Zone (October 30, 2018) LHAAP-16

Figure B-10

Quarterly Evaluation Report 4th Quarter (October - December) 2018  
Groundwater Treatment Plant  
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	NW01312.0150
SCALE:	As Shown
DATE:	2/14/2019
DRAWN BY:	MRM



**Legend:**

- Intermediate Monitoring Well Location
- Intermediate Piezometer Location
- Monitoring Well Locations associated with surrounding LHAAP sites. (Not Measured)
- (171.13) Potentiometric Surface Elevation in Feet Above Mean Sea Level
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line
- Former Building Location and Number



LHAAP-16

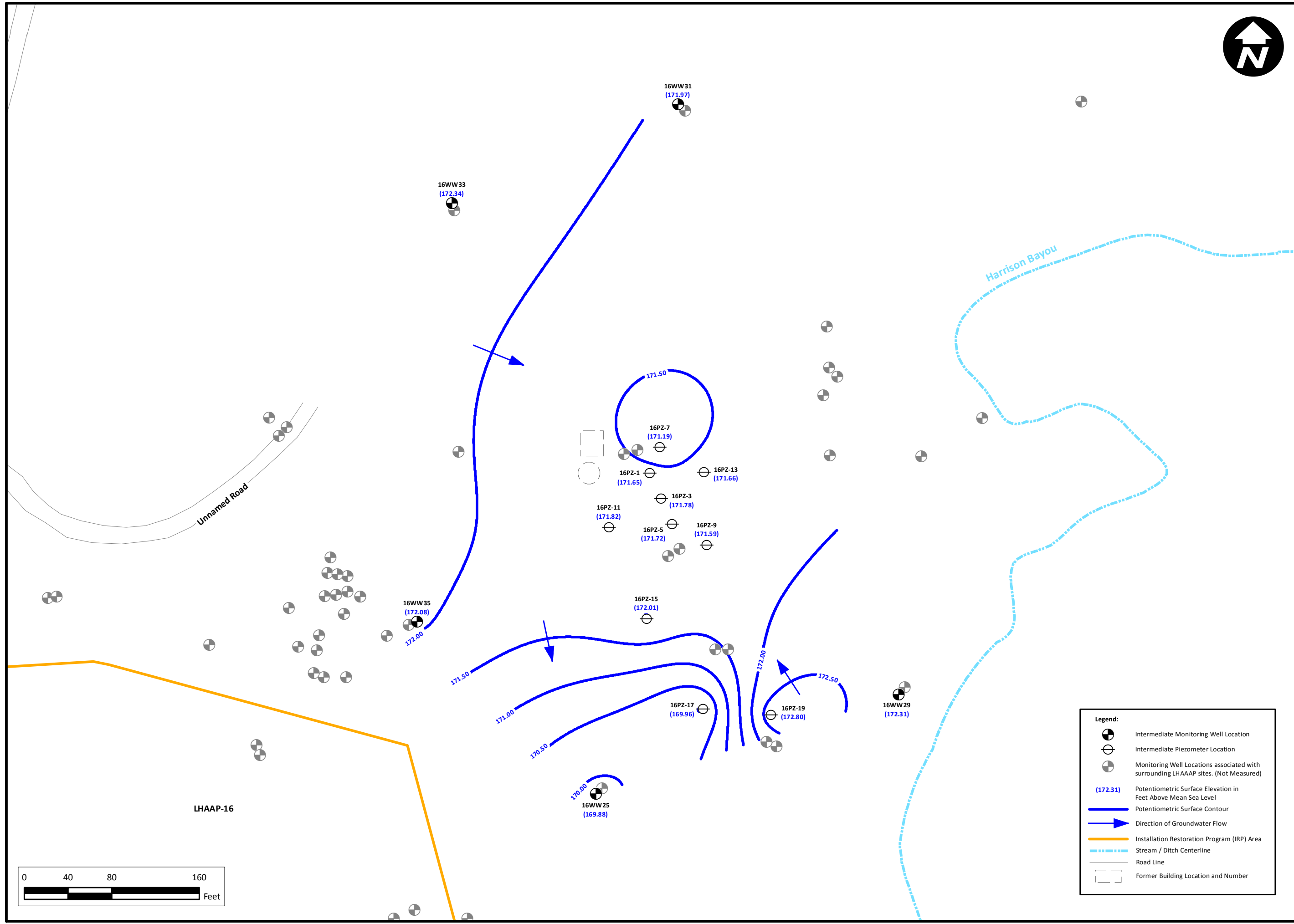


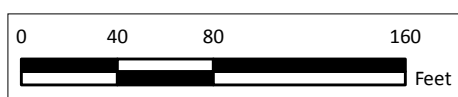
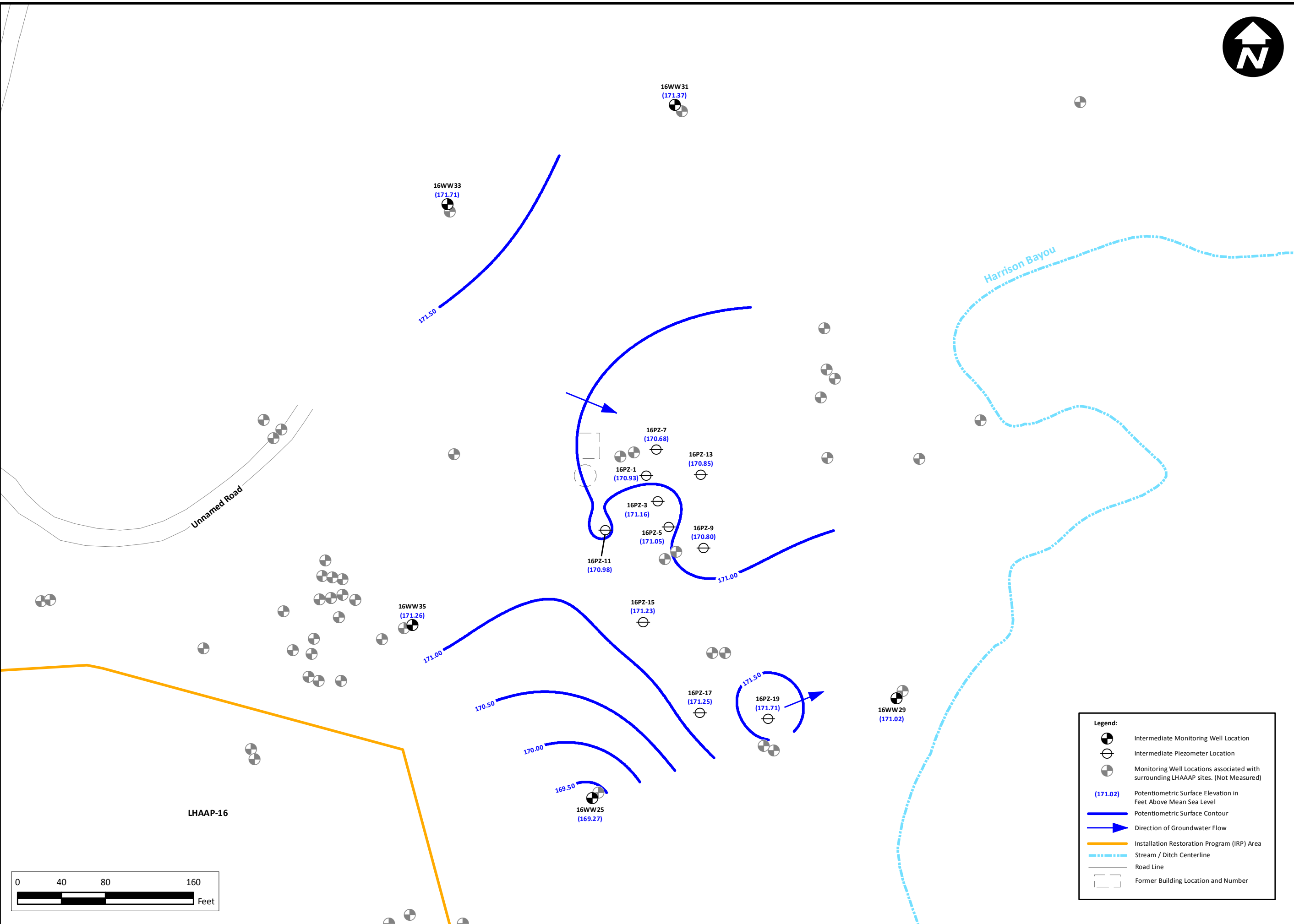
Groundwater Potentiometric Surface Map  
Intermediate Zone (November 29, 2018) LHAAP-16

Figure B-11

Quarterly Evaluation Report 4th Quarter (October - December) 2018  
Groundwater Treatment Plant  
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	NW01312.0150	SCALE:	As Shown	DATE:	2/14/2019	DRAWN BY:	MRM
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**Legend:**

- Intermediate Monitoring Well Location
- Intermediate Piezometer Location
- Monitoring Well Locations associated with surrounding LHAAAP sites. (Not Measured)
- (171.02) Potentiometric Surface Elevation in Feet Above Mean Sea Level
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- - - Stream / Ditch Centerline
- Road Line
- Former Building Location and Number

Quarterly Evaluation Report 4th Quarter (October – December) 2018  
 Groundwater Treatment Plant  
 Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	NW01312.0150
SCALE:	As Shown
DATE:	2/14/2019
DRAWN BY:	MRM



Groundwater Potentiometric Surface Map  
 Intermediate Zone (December 27, 2018) LHAAAP-16  
 Figure B-12

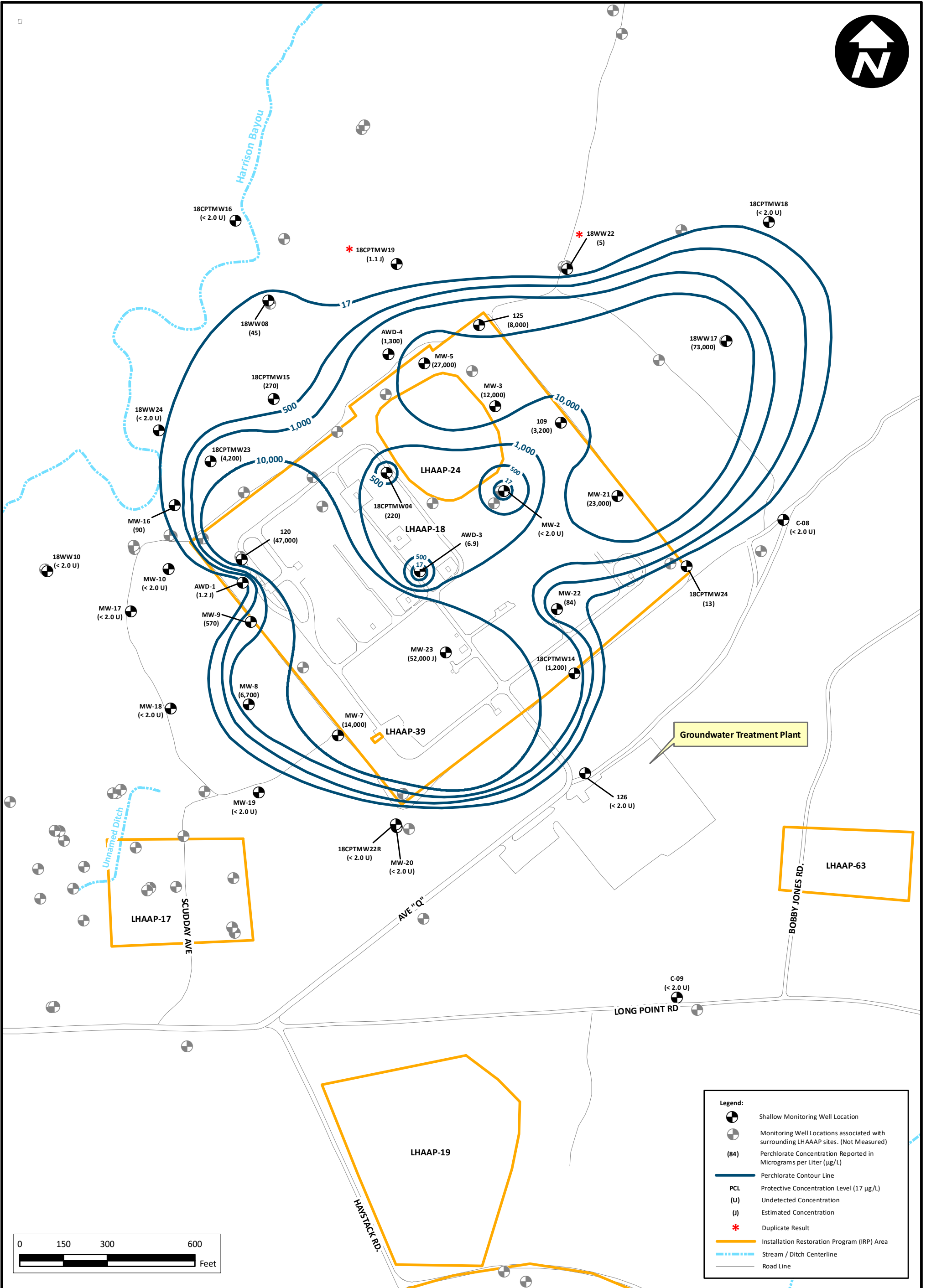
GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

**APPENDIX C**  
**ISOCONCENTRATION MAPS**



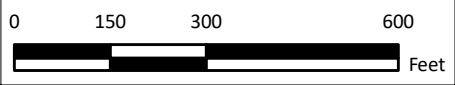
GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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**Legend:**

- Shallow Monitoring Well Location
- Monitoring Well Locations associated with surrounding LHAAP sites. (Not Measured)
- (84)** Perchlorate Concentration Reported in Micrograms per Liter ( $\mu\text{g/L}$ )
- Perchlorate Contour Line
- PCL** Protective Concentration Level (17  $\mu\text{g/L}$ )
- (U)** Undetected Concentration
- (J)** Estimated Concentration
- Duplicate Result
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line

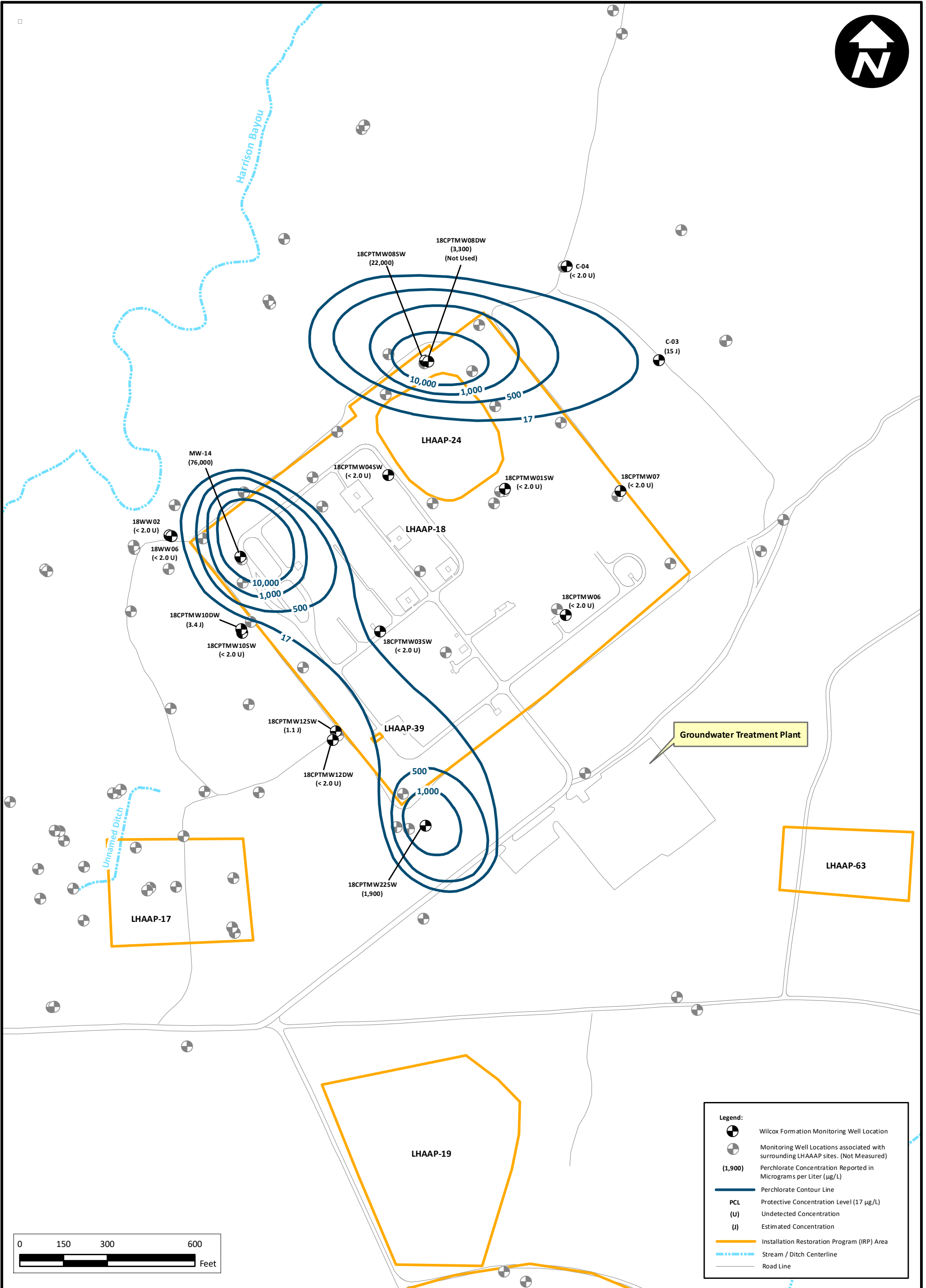


Quarterly Evaluation Report 4th Quarter (October – December) 2018  
 Groundwater Treatment Plant  
 Longhorn Army Ammunition Plant, Karnack, Texas

Perchlorate Isopleth Contours in Shallow Zone  
 (December 2018)

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	5/1/2019	MRM

Figure C-1

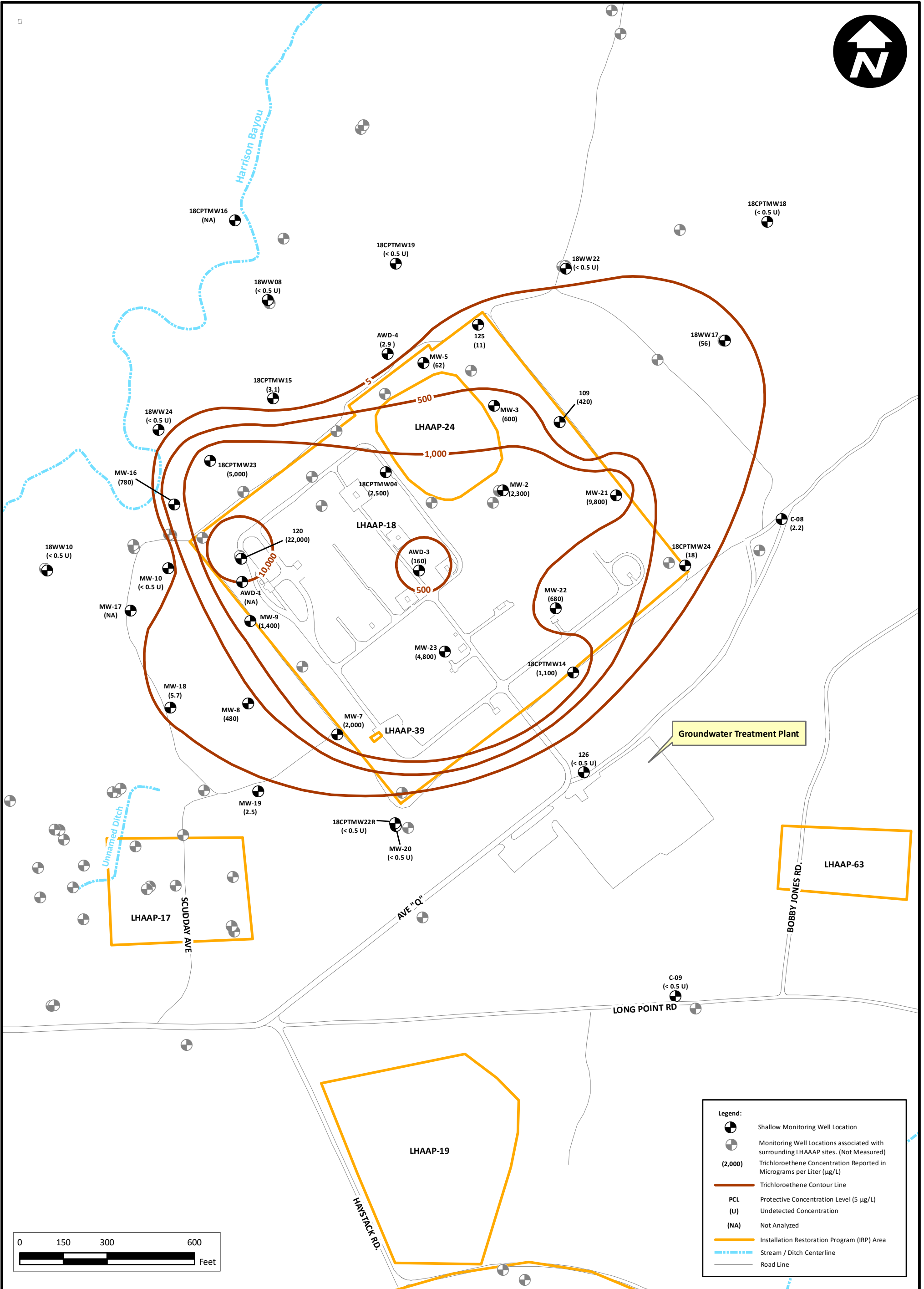


Quarterly Evaluation Report 4th Quarter (October – December) 2018  
 Groundwater Treatment Plant  
 Longhorn Army Ammunition Plant, Karnack, Texas

Perchlorate Isopleth Contours in Wilcox Formation  
 (December 2018)

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	5/1/2019	MRM

Figure C-2



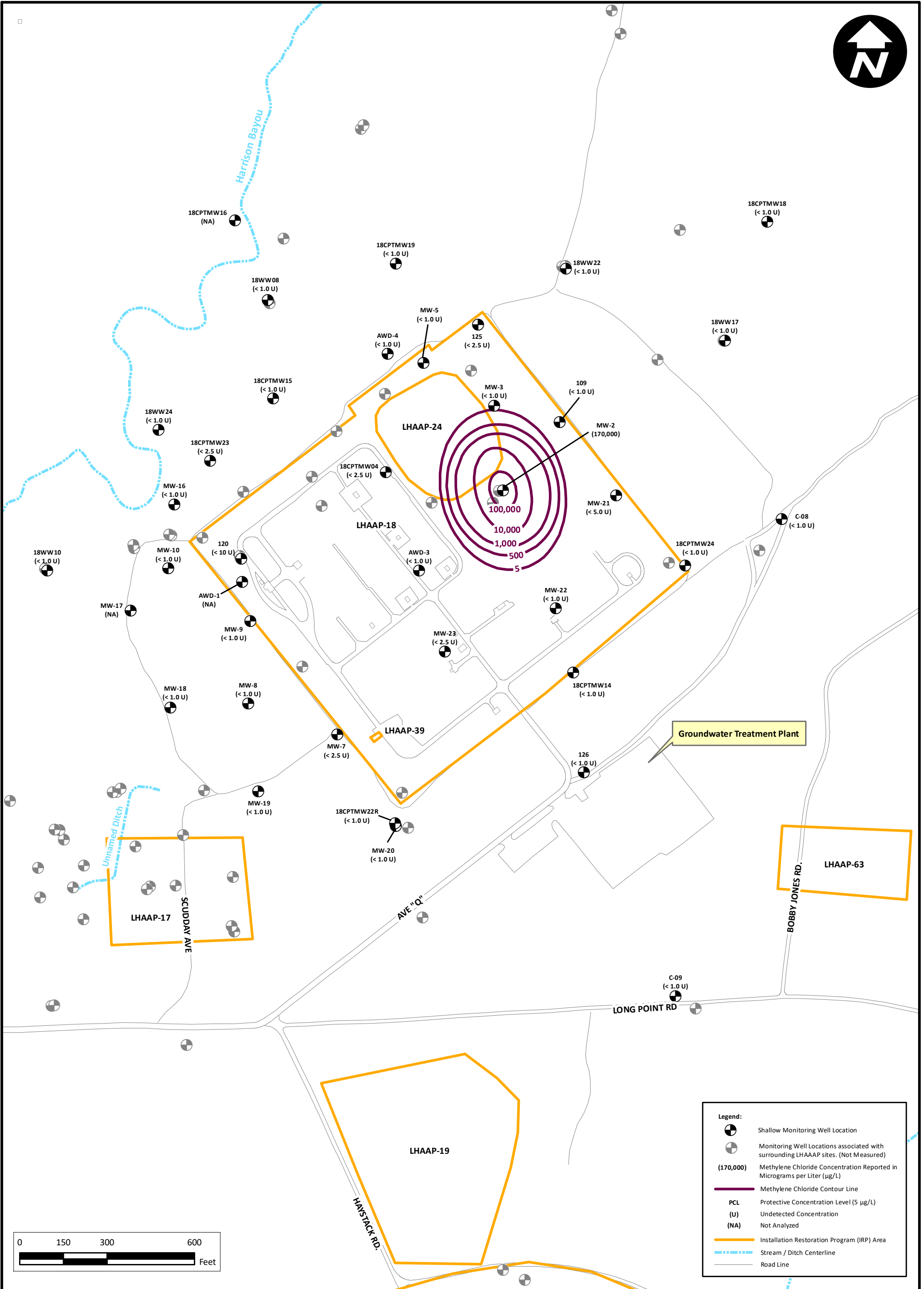
Quarterly Evaluation Report 4th Quarter (October – December) 2018  
 Groundwater Treatment Plant  
 Longhorn Army Ammunition Plant, Karnack, Texas

Trichloroethene Isopleth Contours in Shallow Zone (December 2018)

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	5/1/2019	MRM

Figure C-3





**Legend:**

- Shallow Monitoring Well Location
- Monitoring Well Locations associated with surrounding LHAAP sites. (Not Measured)
- (170,000)** Methylene Chloride Concentration Reported in Micrograms per Liter (µg/L)
- Methylene Chloride Contour Line
- PCL** Protective Concentration Level (5 µg/L)
- (U)** Undetected Concentration
- (NA)** Not Analyzed
- Installation Restoration Program (IRP) Area
- Stream / Ditch Centerline
- Road Line



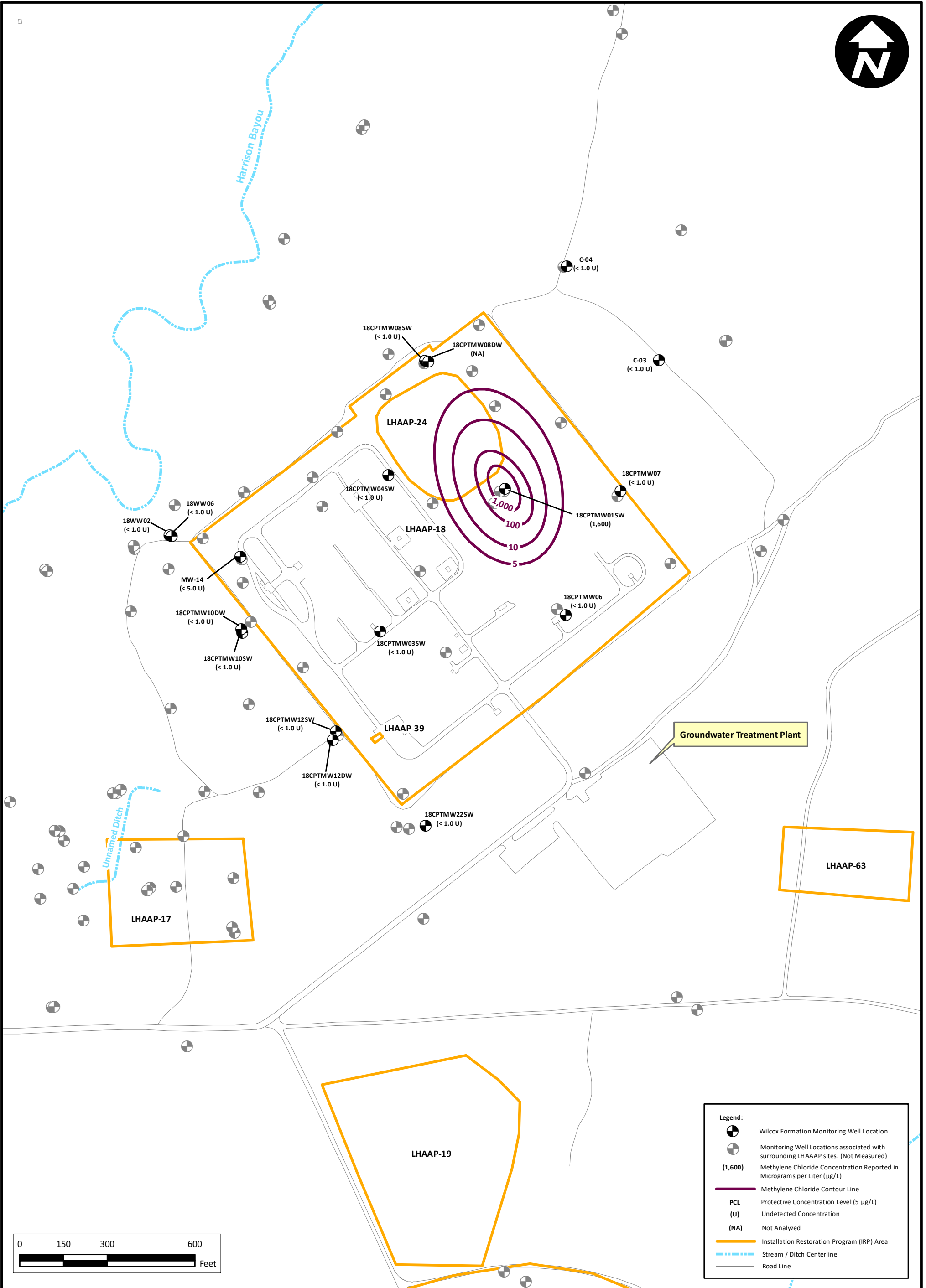
Quarterly Evaluation Report 4th Quarter (October – December) 2018  
 Groundwater Treatment Plant  
 Longhorn Army Ammunition Plant, Karnack, Texas

**Methylene Chloride Isopleth Contours in Shallow Zone (December 2018)**

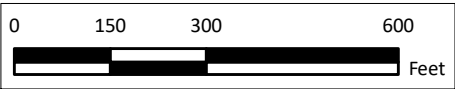
PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	5/1/2019	MRM

**Figure C-5**





Legend:	
	Wilcox Formation Monitoring Well Location
	Monitoring Well Locations associated with surrounding LHAAP sites. (Not Measured)
<b>(1,600)</b>	Methylene Chloride Concentration Reported in Micrograms per Liter ( $\mu\text{g/L}$ )
	Methylene Chloride Contour Line
<b>PCL</b>	Protective Concentration Level (5 $\mu\text{g/L}$ )
<b>(U)</b>	Undetected Concentration
<b>(NA)</b>	Not Analyzed
	Installation Restoration Program (IRP) Area
	Stream / Ditch Centerline
	Road Line



Quarterly Evaluation Report 4th Quarter (October – December) 2018  
 Groundwater Treatment Plant  
 Longhorn Army Ammunition Plant, Karnack, Texas

Methylene Chloride Isopleth Contours in  
 Wilcox Formation (December 2018)

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	5/1/2019	MRM

Figure C-6

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

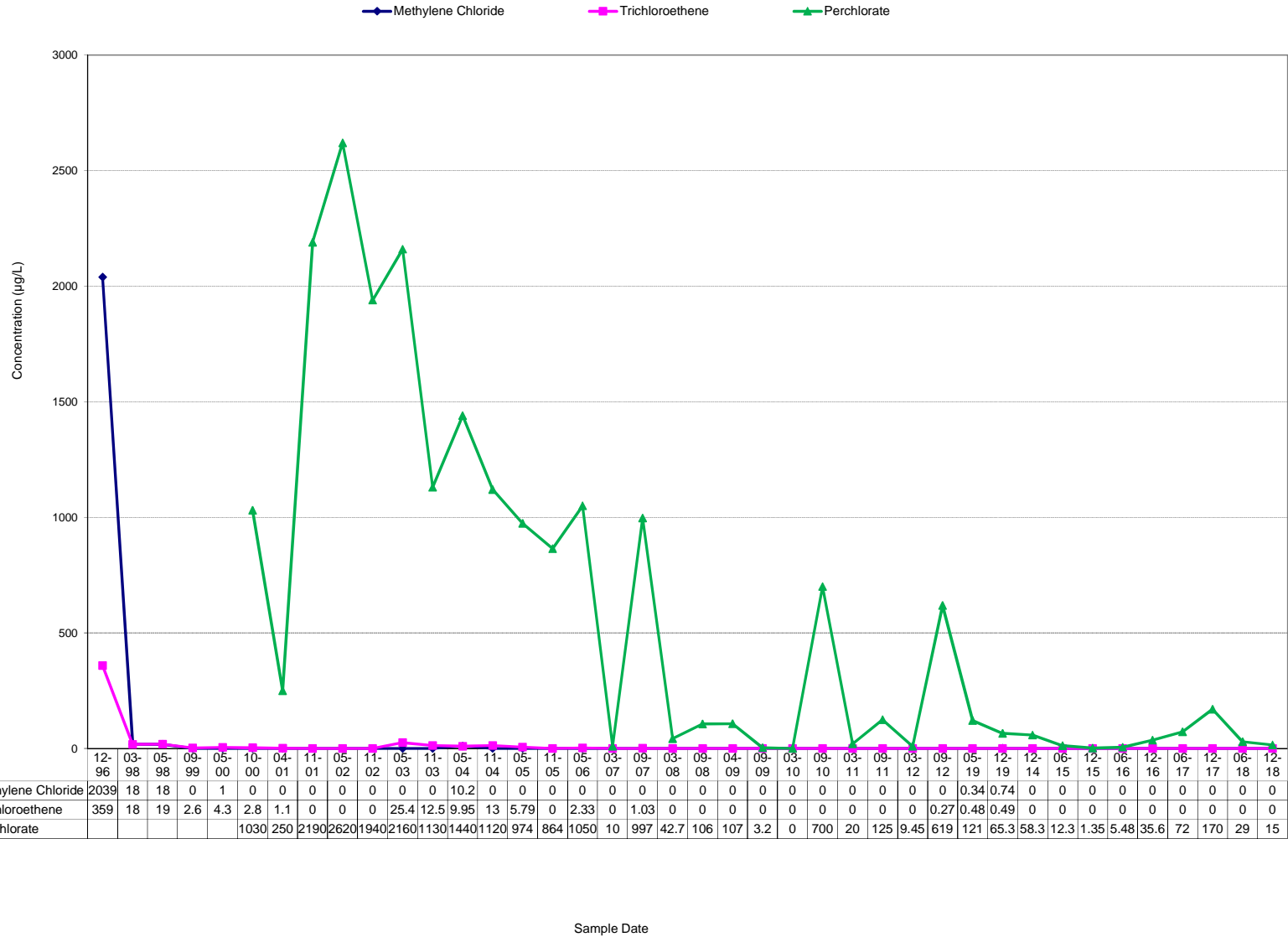
**APPENDIX D**  
**TREND ANALYSIS**



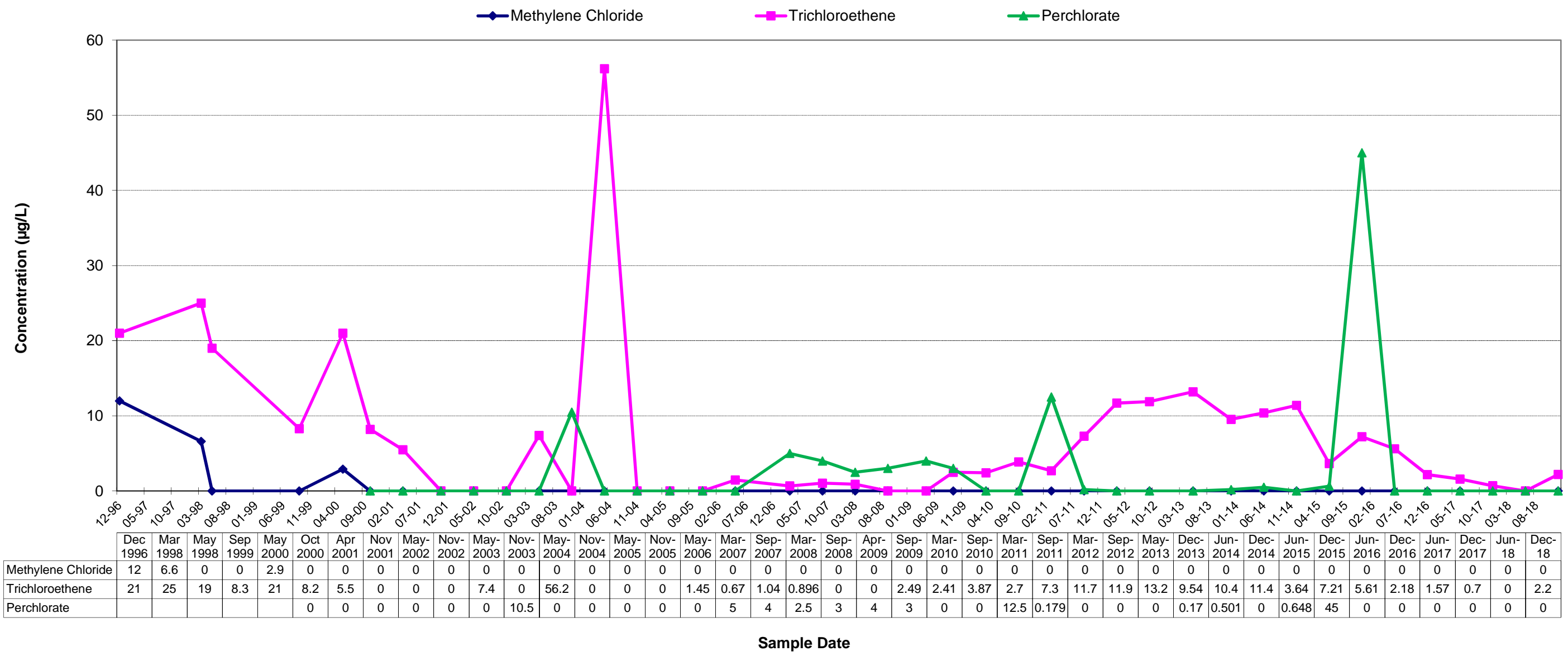
GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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Monitoring Well C-03

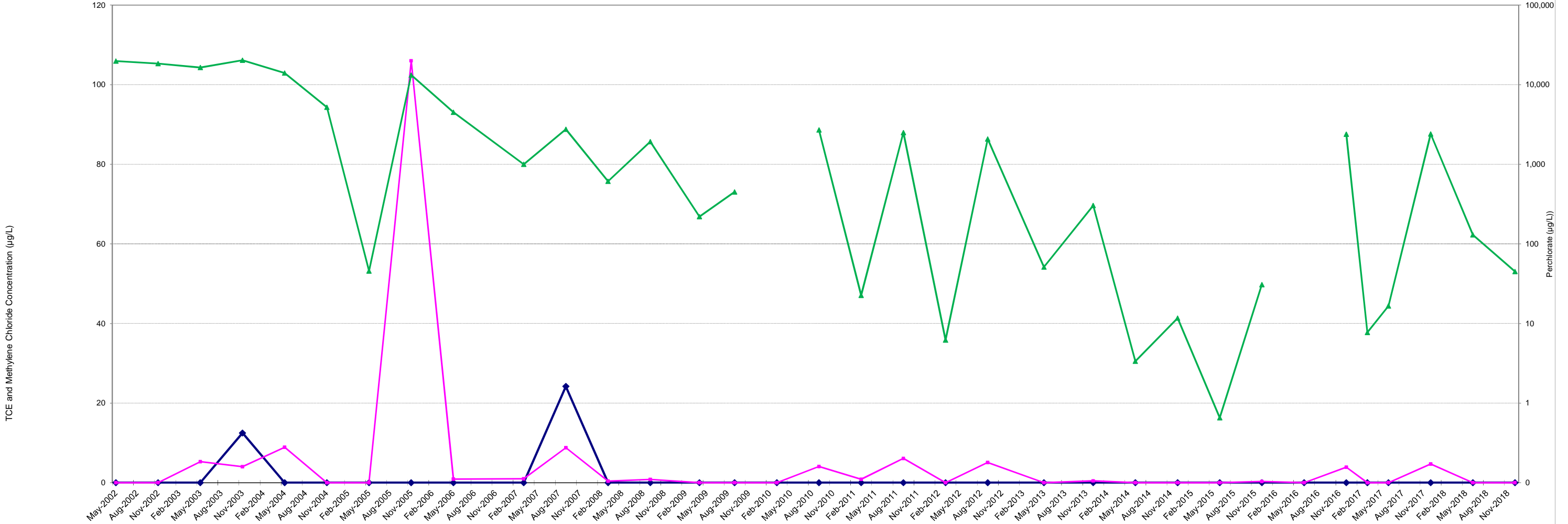


Monitoring Well C-08



Monitoring Well 18WW08

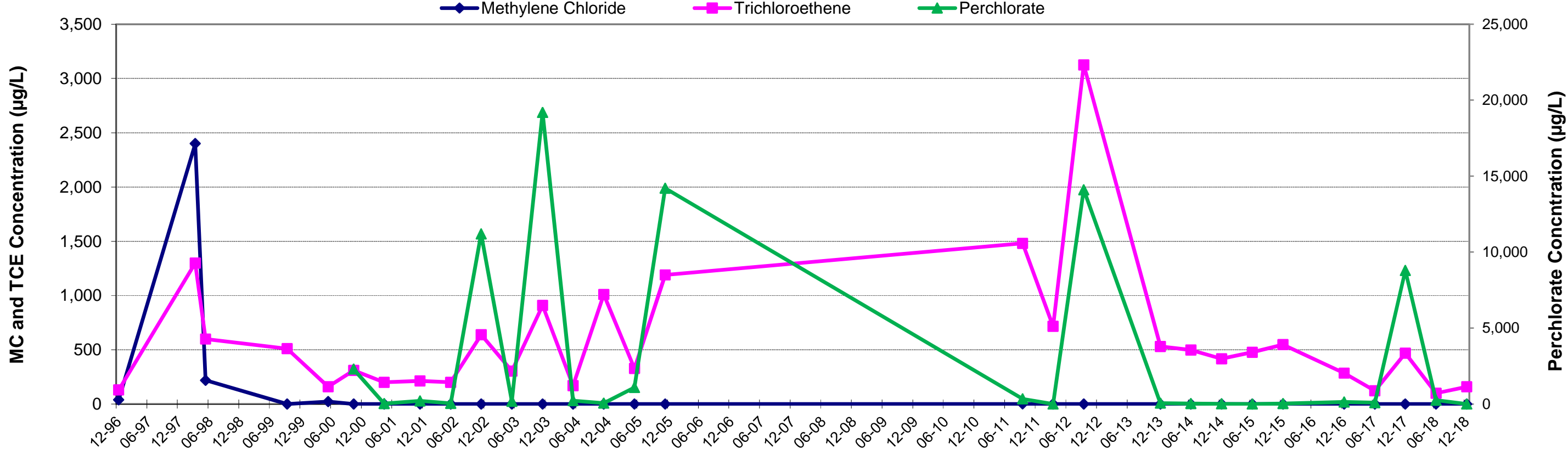
Methylene Chloride Trichloroethene Perchlorate



	May-2002	Nov-2002	May-2003	Nov-2003	May-2004	Nov-2004	May-2005	Nov-2005	May-2006	Mar-2007	Sep-2007	Mar-2008	Sep-2008	Apr-2009	Sep-2009	Mar-2010	Sep-2010	Mar-2011	Sep-2011	Mar-2012	Sep-2012	May-2013	Dec-2013	Jun-2014	Dec-2014	Jun-2015	Dec-2015	Jun-2016	Dec-2016	Mar-2017	Jun-2017	Dec-2017	Jun-2018	Dec-18	
Methylene Chloride	0	0	0	12.5	0	0	0	0	0	0	24.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichloroethene	0	0	5.27	4.03	8.89	0	0	106	0.914	1	8.79	0.405	0.83	0	0	0	4.09	0.858	6.12	0	5.09	0	0.459	0	0	0	0.331	0	3.91	0	0	4.7	0	0	
Perchlorate	19800	18400	16400	20300	14000	5200	45.7	13200	4500	1000	2750	610	1920	220	450	0	2700	22.6	2500	6.19	2080	51.2	304	3.36	11.7	0.655	30.8	0	2390	7.72	16.6	2400	130	45	

Sample Date

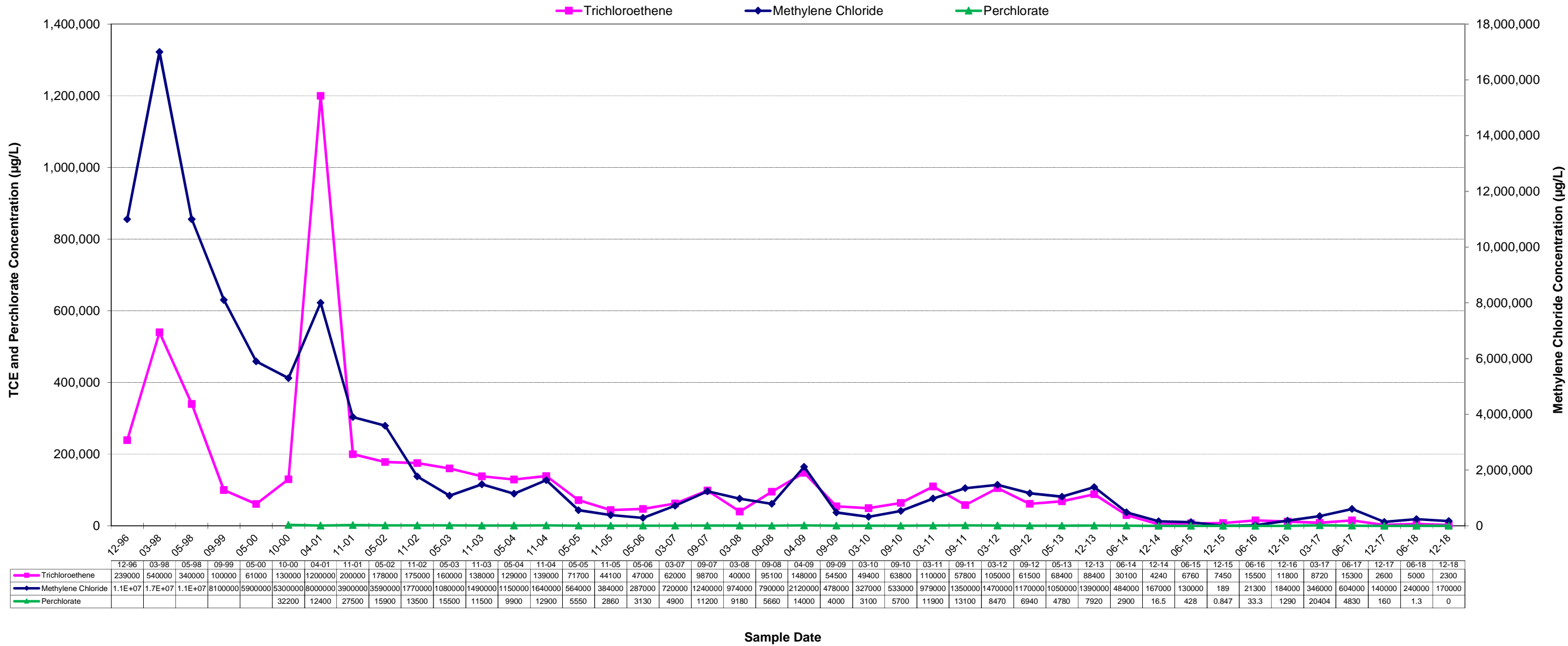
### Monitoring Well AWD-3



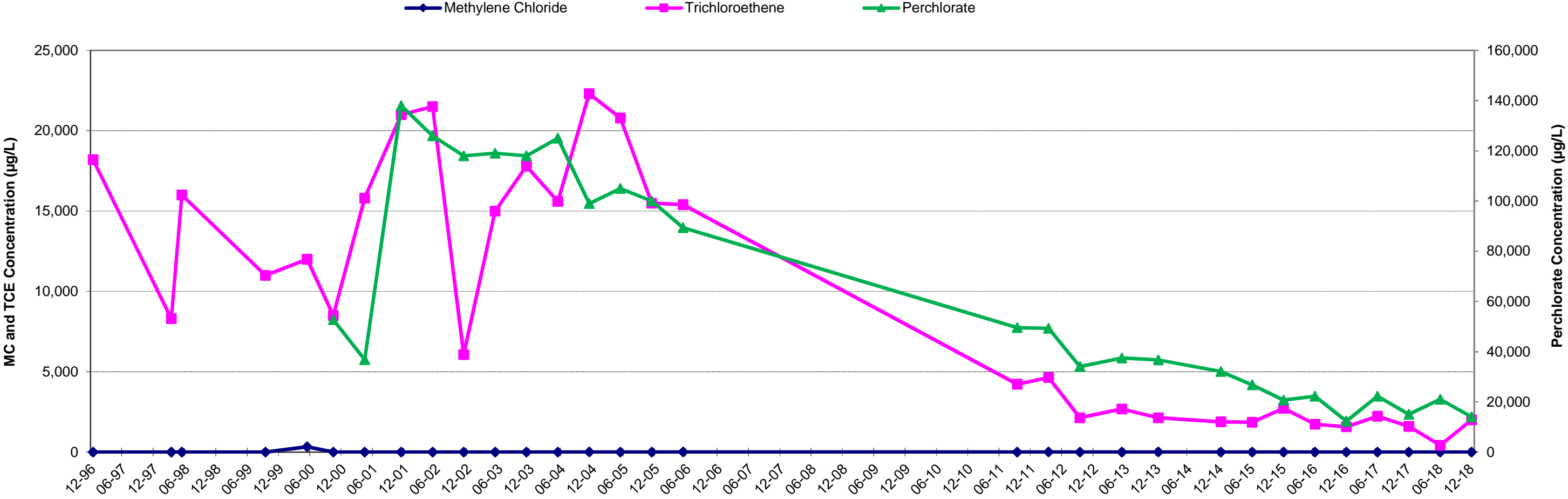
	Dec 1996	Mar 1998	May 1998	Sep 1999	May 2000	Oct 2000	Apr 2001	Nov 2001	May 2002	Nov-2002	May 2003	Nov-2003	May-2004	Nov-2004	May-2005	Nov-2005	Sep-2011	Mar-2012	Sep-2012	Dec-2013	Jun-2014	Dec-2014	Jun-2015	Dec-2015	Dec-2016	Jun-2017	Dec-2017	Jun-2018	Dec-18
◆ Methylene Chloride	39	2400	220	0	23	0	0	0	0	0	0	0	0	0	0	0	2.92J	0	0	0	0	0	0	0	0	0	0	0	0
■ Trichloroethene	130	1300	600	510	160	310	200	212	200	639	303	909	170	1010	329	1190	1480	716	3125	530	499	417	477	547	285	122	470	100	160
▲ Perchlorate						2300	38.3	209	52.5	11200	176	19200	225	55.6	1100	14200	342	3.88	14100	67.2	25	13.6	8.33	33.8	140	95.4	8800	250	6.9

Sample Date

### Monitoring Well MW-2



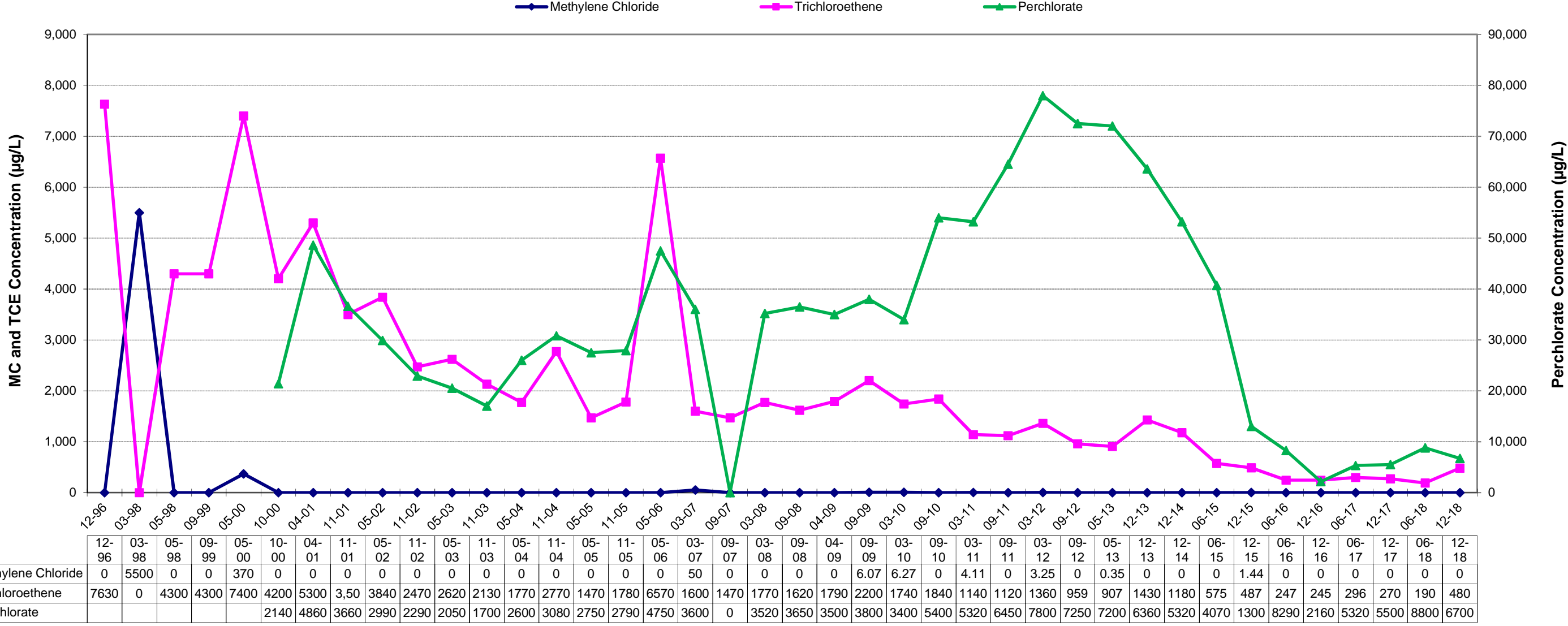
### Monitoring Well MW-7



	Dec 1996	Mar 1998	May 1998	Sep 1999	May 2000	Oct 2000	Apr 2001	Nov 2001	May 2002	Nov-2002	May 2003	Nov-2003	May-2004	Nov-2004	May-2005	Nov-2005	May-2006	Sep-2011	Mar-2012	Sep-2012	May-2013	Dec-2013	Dec-2014	Jun-2015	Dec-2015	Jun-2016	Dec-2016	Jun-2017	Dec-2017	Jun-2018	Dec-18
◆ Methylene Chloride	0	0	0	0	330	0	0	0	0	0	0	0	5.42	0	0	2.33	0	7.75	0	0	7.81	0	0.352	0	0	0	0.314	0	0	0	
■ Trichloroethene	18200	8300	16000	11000	12000	8500	15800	21,000	21500	6070	15000	17800	15600	22300	20800	15500	15400	4220	4640	2130	2690	2140	1880	1860	2730	1740	1570	2230	1600	420	2000
▲ Perchlorate						52700	36800	13800	12600	11800	11900	11800	12500	99000	10500	10000	89400	49600	49300	34100	37500	36700	32100	26800	20700	22200	12300	22200	15000	21000	14000

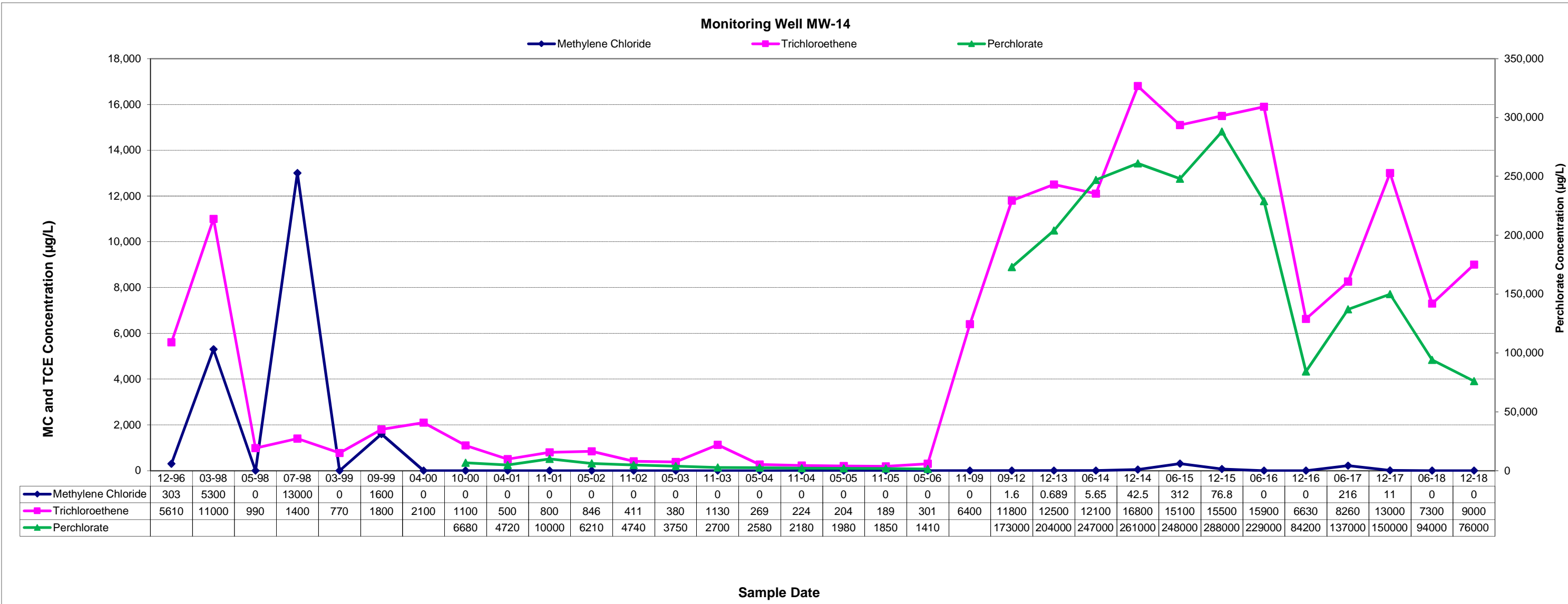
Sample Date

Monitoring Well MW-8

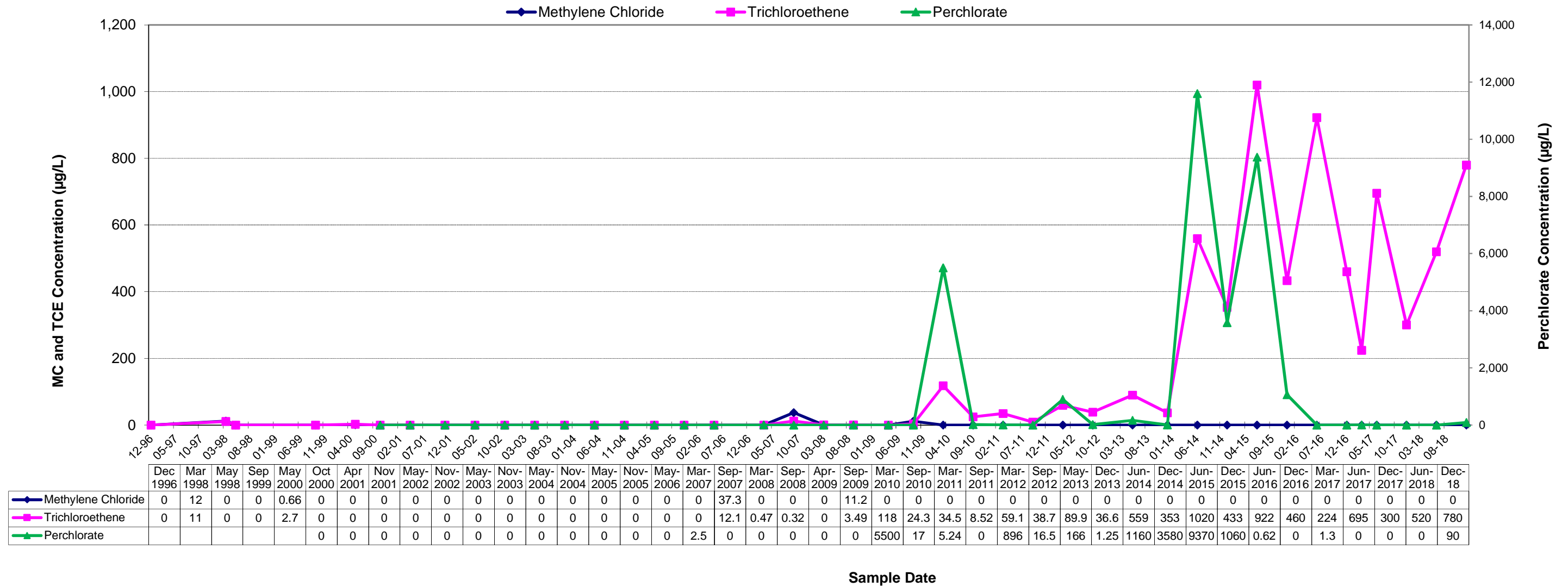


Sample Date

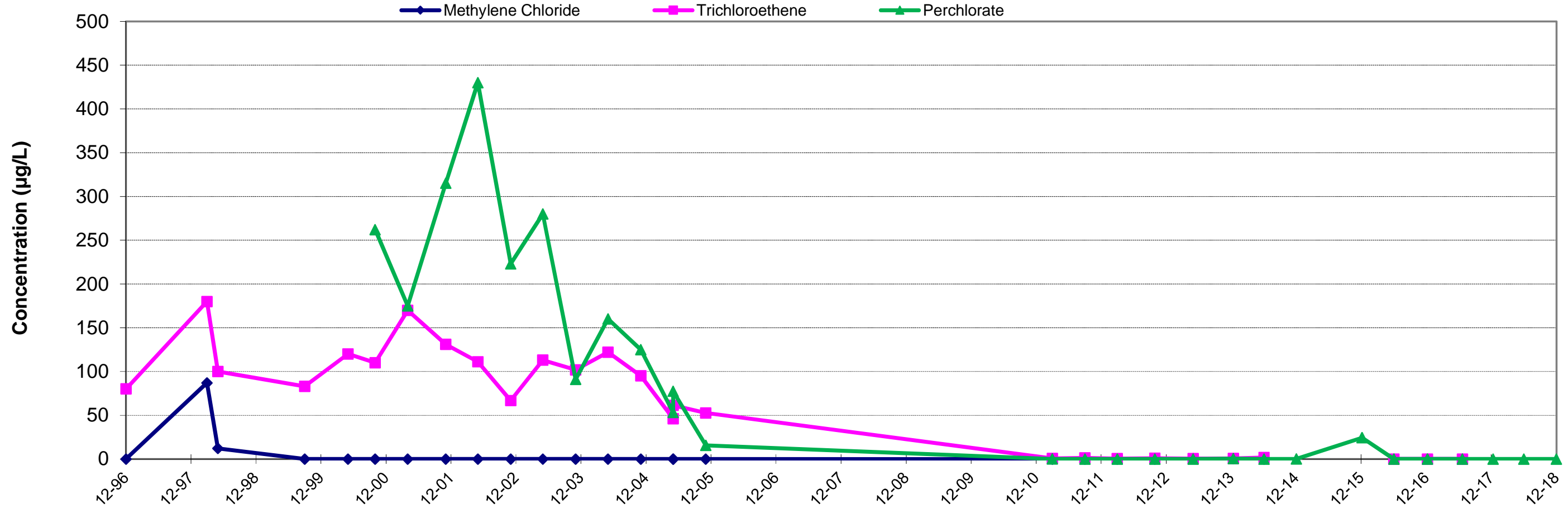




Monitoring Well MW-16



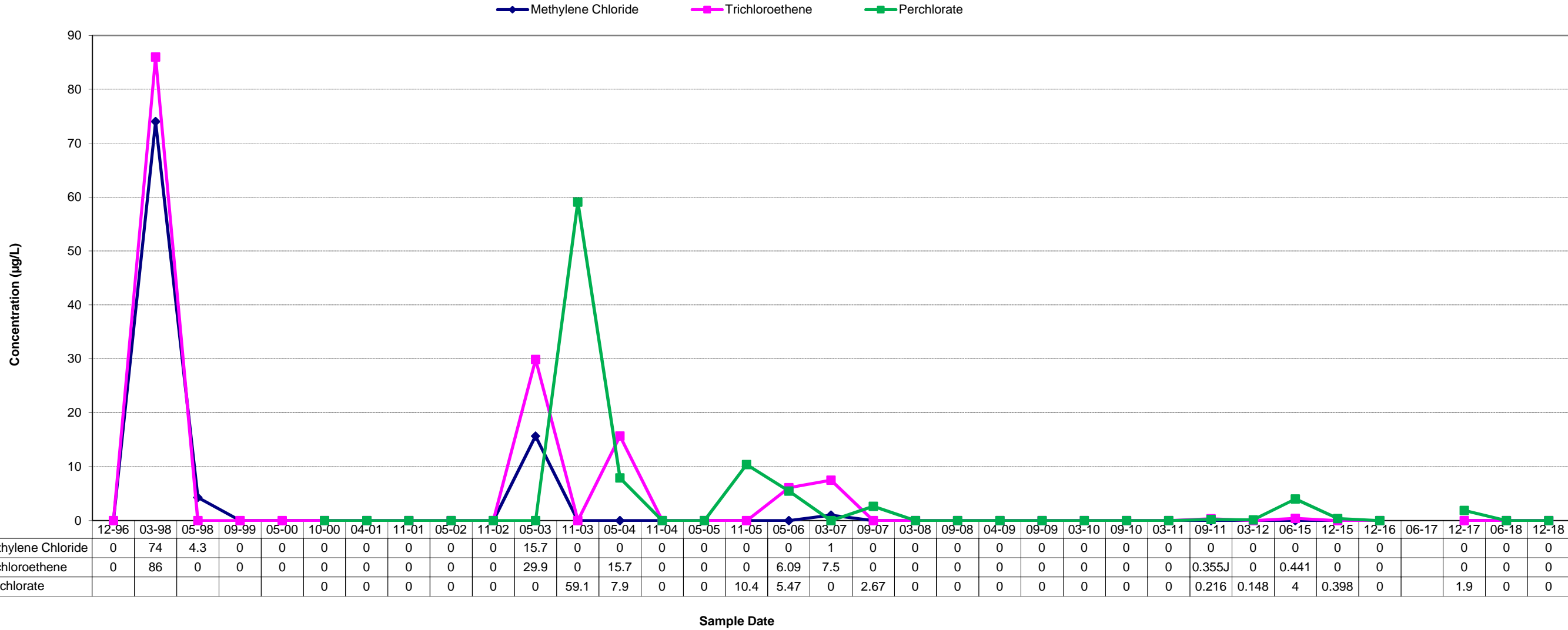
### Monitoring Well MW-17



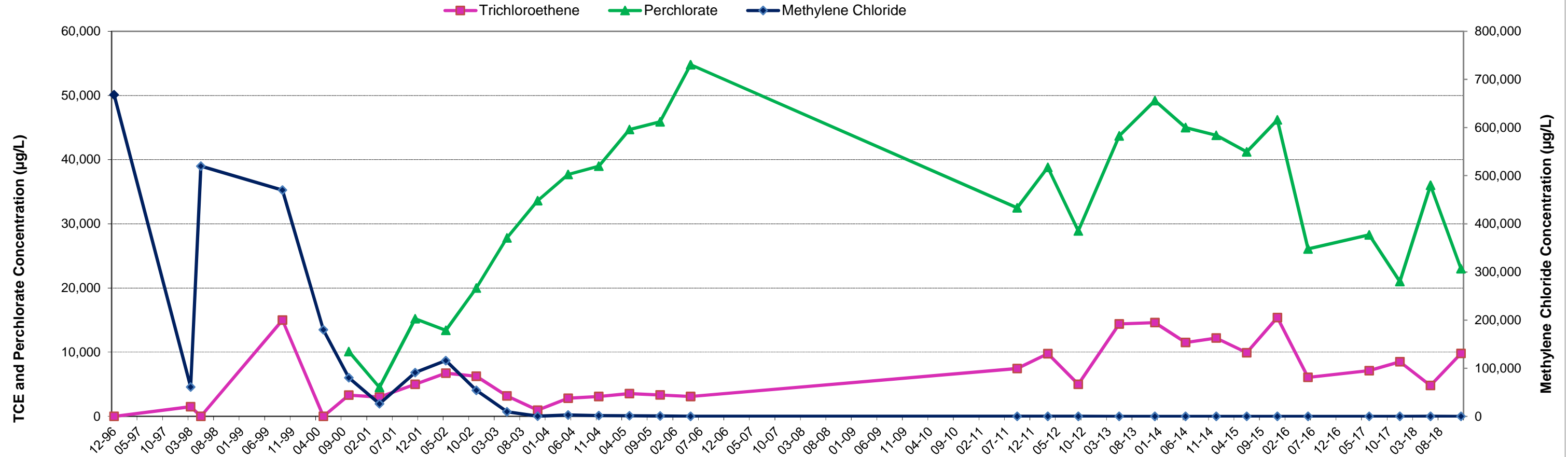
	Dec 1996	Mar 1998	May 1998	Sep 1999	May 2000	Oct 2000	Apr 2001	Nov 2001	May-2002	Nov-2002	May-2003	Nov-2003	May-2004	Nov-2004	May-2005	May-2005	Nov-2005	Mar-2011	Sep-2011	Mar-2012	Sep-2012	May-2013	Dec-2013	Jun-2014	Dec-2014	Dec-2015	Jun-2016	Dec-2016	Jun-2017	Dec-2017	Jun-2018	Dec-18
◆ Methylene Chloride	0	87	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.335	0.346	0			0	0	0			
■ Trichloroethene	80	180	100	83	120	110	170	131	111	66.8	113	102	122	95.1	46.1	52.7	61.4	0.551	1.14	0.537	0.943	0.519	0.656	1.69			0	0	0			
▲ Perchlorate						262	175	315	430	223	280	91	160	125	53.2	15.6	77.3	0.179	0	0	0	0	0.376	0	0.143	24.4	0	0	0	0	0	0

Sample Date

Monitoring Well MW-20



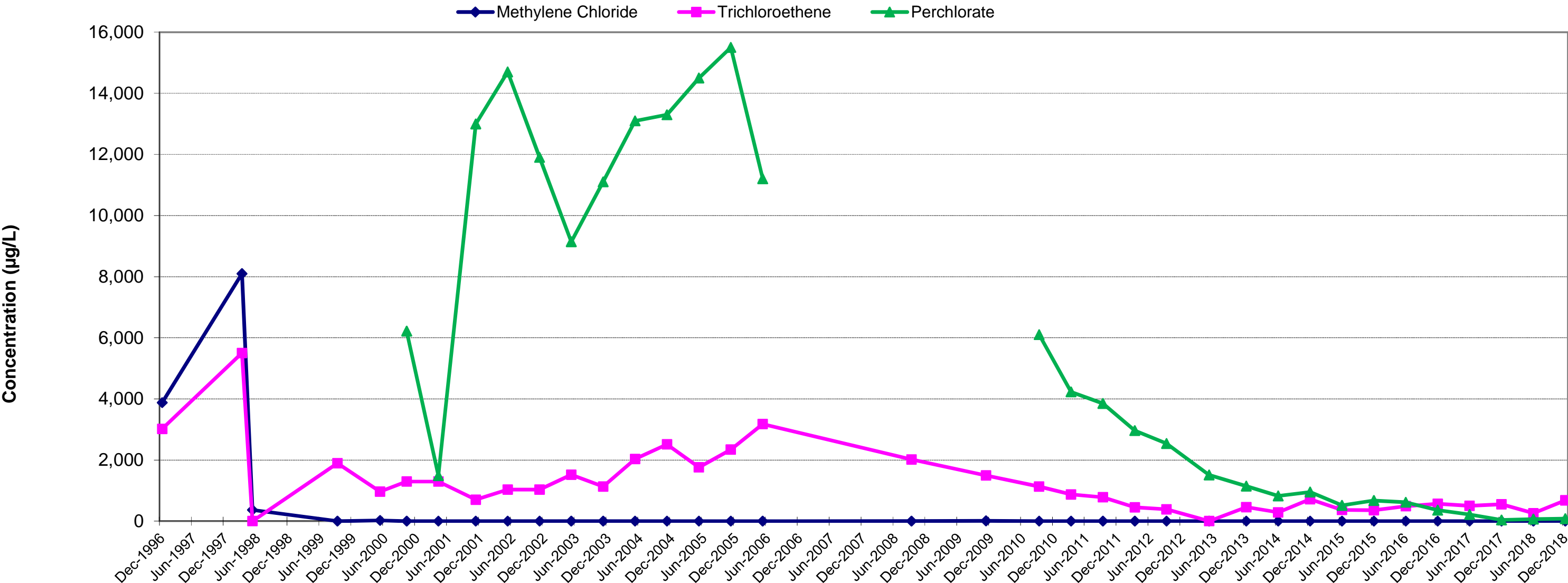
### Monitoring Well MW-21



	Dec 1996	Mar 1998	May 1998	Sep 1999	May 2000	Oct 2000	Apr 2001	Nov 2001	May 2002	Nov 2002	May 2003	Nov 2003	May 2004	Nov 2004	May 2005	Nov 2005	May 2006	Sep 2011	Mar 2012	Sep 2012	May 2013	Dec 2013	Jun 2014	Dec 2014	Jun 2015	Dec 2015	Jun 2016	Jun 2017	Dec 2017	Jun 2018	Dec 18
Trichloroethene	0	1500	0	15000	0	3300	3000	5,000	6730	6260	3200	965	2830	3110	3540	3330	3090	7470	9760	4980	14400	14600	11500	12200	9910	15400	6080	7140	8500	4800	9800
Perchlorate						10100	4510	15,200	13400	20000	27800	33600	37700	39000	44700	45900	54800	32500	38800	28900	43700	49200	45000	43800	41200	46200	26100	28300	21000	36000	23000
Methylene Chloride	668000	61000	520000	470000	180000	80000	26000	91,000	116000	54000	9770	320	2740	1490	1370	816	59.5	18.3J	12.5	11.9	0	0	0	0	0	0	0	0	0	1.5	0

Sample Date

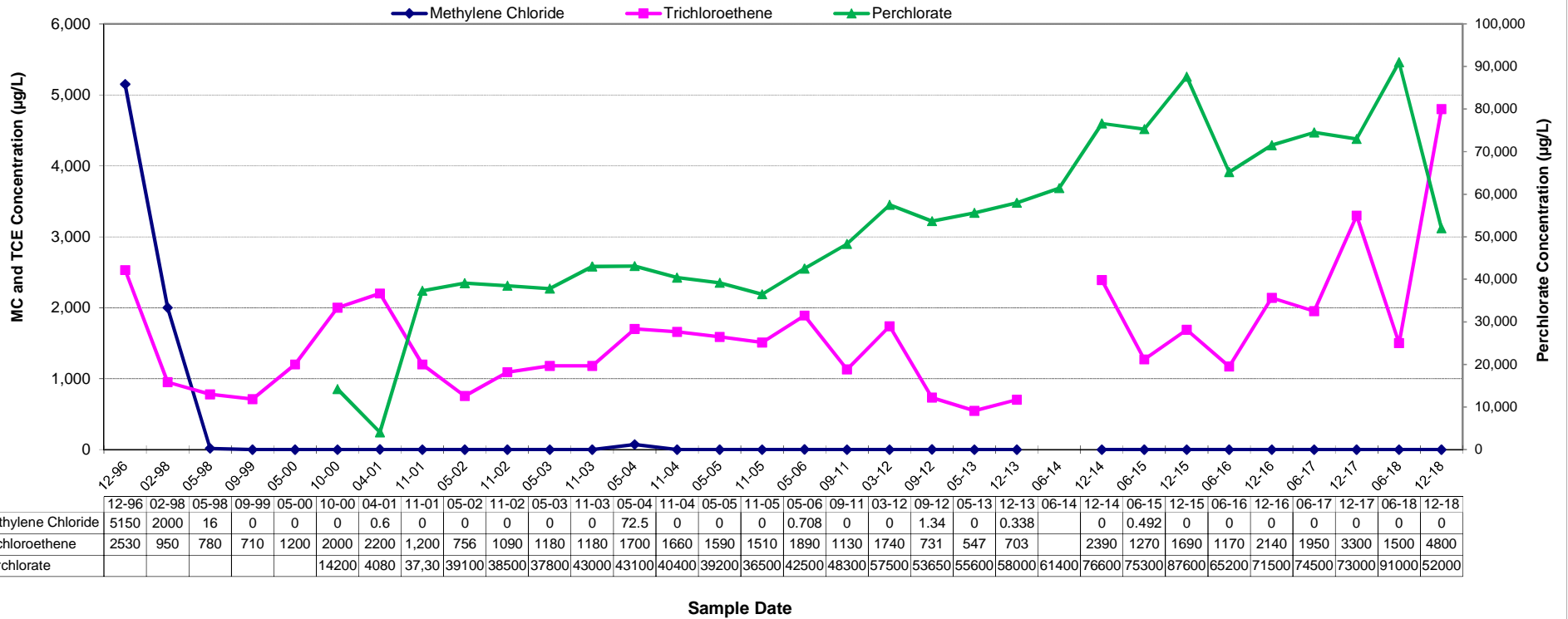
Monitoring Well MW-22



	Dec-1996	Mar-1998	May-1998	Sep-1999	May-2000	Oct-2000	Apr-2001	Nov-2001	May-2002	Nov-2002	May-2003	Nov-2003	May-2004	Nov-2004	May-2005	Nov-2005	May-2006	Sep-2008	Nov-2009	Sep-2010	Mar-2011	Sep-2011	Mar-2012	Sep-2012	May-2013	Dec-2013	Jun-2014	Dec-2014	Jun-2015	Dec-2015	Jun-2016	Dec-2016	Jun-2017	Dec-2017	Jun-18	Dec-18
◆ Methylene Chloride	3880	8100	370	0	24	0	0.91	0	0	0	0	0	0	0	0	0	0.39	5.45	12	0	3.04	0	0	0	0.53	0	0	0	0.6	0	0	0	0	0	0	0
■ Trichloroethene	3020	5500	0	1900	970	1300	1300	700	1030	1030	1520	1130	2030	2510	1760	2340	3180	2020	1500	1130	877	779	450	388	0	463	288	719	364	359	488	566	500	550	260	680
▲ Perchlorate						6220	1490	13,0	1470	1190	9140	1110	1310	1330	1450	1550	1120			6100	4230	3850	2960	2540	1510	1150	824	953	519	671	615	363	214	40	66	84

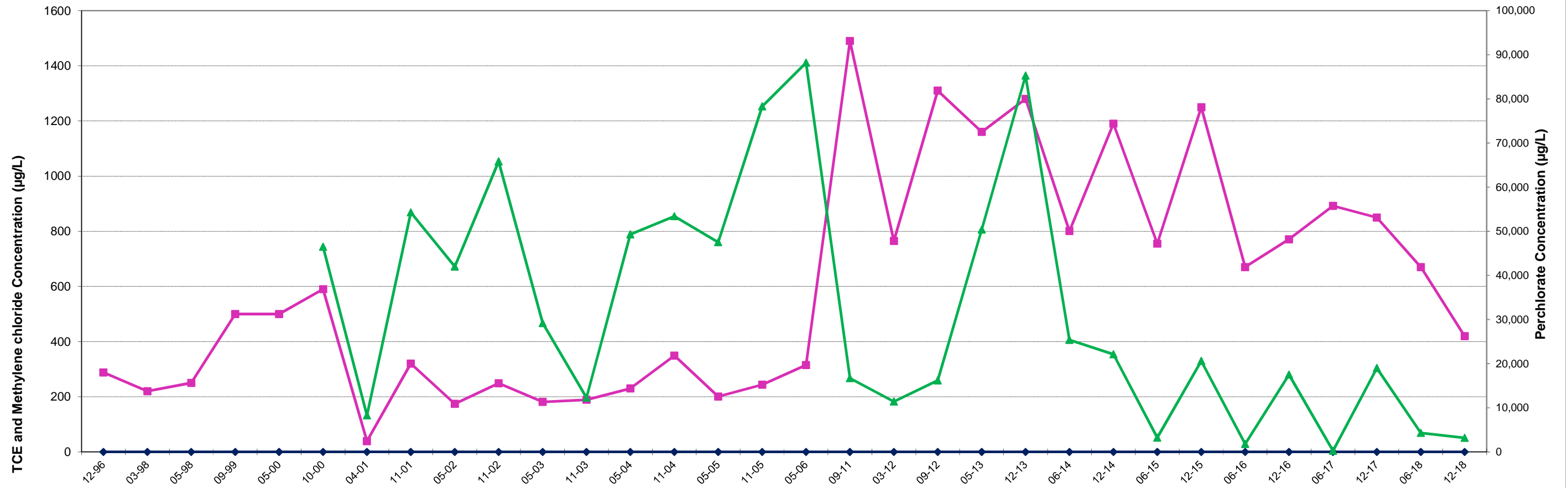
Sample Date

Monitoring Well MW-23



Monitoring Well 109

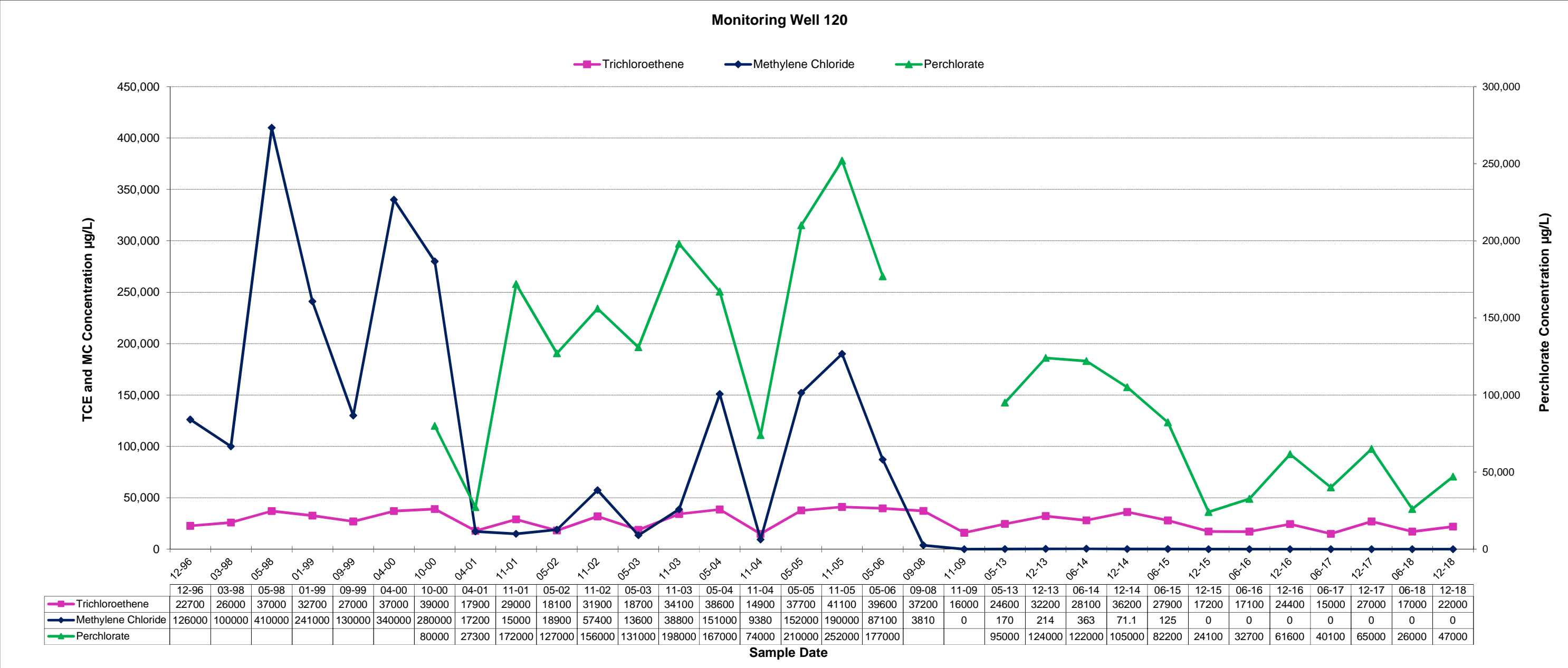
Trichloroethene Methylene Chloride Perchlorate



	12-96	03-98	05-98	09-99	05-00	10-00	04-01	11-01	05-02	11-02	05-03	11-03	05-04	11-04	05-05	11-05	05-06	09-11	03-12	09-12	05-13	12-13	06-14	12-14	06-15	12-15	06-16	12-16	06-17	12-17	06-18	12-18	
Trichloroethene	288	220	250	500	500	590	39	320	174	249	181	189	230	349	201	244	315	1490	765	1310	1160	1280	801	1190	755	1250	670	771	892	850	670	420	
Methylene Chloride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perchlorate						46500	8270	54300	42000	65800	29200	12300	49300	53400	47500	78300	88200	16700	11400	16200	50400	85300	25400	22100	3220	20600	1810	17500	265	19000	4300	3200	

Sample Date







GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

**APPENDIX E**  
**WATER SAMPLING ANALYTICAL RESULTS**  
**(PROVIDED ON CD ONLY)**

GWTP QUARTERLY EVALUATION REPORT – 4<sup>TH</sup> QUARTER 2018  
LONGHORN ARMY AMMUNITION PLANT

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Houston, TX 77099  
T: +1 281 530 5656  
F: +1 281 530 5887

October 24, 2018

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

Work Order: **HS18100278**

Laboratory Results for: **Groundwater Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Oct 05, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 24-Oct-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18100278

---

**SAMPLE SUMMARY**

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18100278-01	LH18/24-SP650_100418	Water		04-Oct-2018 14:00	05-Oct-2018 08:45	<input type="checkbox"/>
HS18100278-02	LH18/24-SP650_100418_BIX	Water		04-Oct-2018 14:00	05-Oct-2018 08:45	<input type="checkbox"/>

---

**ALS Houston, US**

Date: 24-Oct-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18100278

---

**CASE NARRATIVE**

---

**Work Order Comments**

- The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.
  - The analysis for Total Organic Carbon was subcontracted to ALS Kelso, WA. Final report attached.
- 

**WetChemistry by Method E350.3****Batch ID: R325460**

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

**WetChemistry by Method E365.3****Batch ID: R325124**

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

## ALS Houston, US

Date: 24-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_100418  
 Collection Date: 04-Oct-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18100278  
 Lab ID:HS18100278-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>AMMONIA AS N BY E350.3(ISE)</b>								Analyst: MZD
	Method:E350.3							
Nitrogen, Ammonia (As N)	11		0.20	0.20	0.20	mg/L	1	15-Oct-2018 10:35
<b>ORTHO PHOSPHATE (PO4) AS P BY E365.3</b>								Analyst: MZD
	Method:E365.3							
Phosphorus, Total Orthophosphate (As P)	2.36		0.100	0.250	0.250	mg/L	10	05-Oct-2018 17:36
<b>SUBCONTRACT ANALYSIS - TOC ANALYSIS</b>								Analyst: SUBK
	Method:NA							
Subcontract Analysis	See Attached		0	0			1	22-Oct-2018 09:40

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



## ALS Houston, US

Date: 24-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_100418\_BIX  
 Collection Date: 04-Oct-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18100278  
 Lab ID:HS18100278-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>		Analyst: SUB				
Subcontract Analysis	See Attached		0	0		NA	1	23-Oct-2018 09:23

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

ALS Houston, US

Date: 24-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100278

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R325124	<b>Test Name</b> : ORTHO PHOSPHATE (PO4) AS P BY E365.3		<b>Matrix:</b> Water			
HS18100278-01	LH18/24-SP650_100418	04 Oct 2018 14:00			05 Oct 2018 17:36	10
<b>Batch ID</b> R325460	<b>Test Name</b> : AMMONIA AS N BY E350.3(ISE)		<b>Matrix:</b> Water			
HS18100278-01	LH18/24-SP650_100418	04 Oct 2018 14:00			15 Oct 2018 10:35	1
<b>Batch ID</b> R325853	<b>Test Name</b> : SUBCONTRACT ANALYSIS - TOC ANALYSIS		<b>Matrix:</b> Water			
HS18100278-01	LH18/24-SP650_100418	04 Oct 2018 14:00			22 Oct 2018 09:40	1
<b>Batch ID</b> R325934	<b>Test Name</b> : SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18100278-02	LH18/24-SP650_100418_BIX	04 Oct 2018 14:00			23 Oct 2018 09:23	1

ALS Houston, US

Date: 24-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100278

**QC BATCH REPORT**

Batch ID: R325124		Instrument: UV-2450		Method: E365.3						
<b>MBLK</b>	Sample ID: <b>MBLK-325124</b>	Units: <b>mg/L</b>		Analysis Date: <b>05-Oct-2018 17:36</b>						
Client ID:	Run ID: <b>UV-2450_325124</b>	SeqNo: <b>4766136</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.0250	0.0250							U	
<b>LCS</b>	Sample ID: <b>LCS-325124</b>	Units: <b>mg/L</b>		Analysis Date: <b>05-Oct-2018 17:36</b>						
Client ID:	Run ID: <b>UV-2450_325124</b>	SeqNo: <b>4766137</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.238	0.0250	0.25	0	95.2	85 - 115				
<b>MS</b>	Sample ID: <b>HS18100278-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>05-Oct-2018 17:36</b>						
Client ID: <b>LH18/24-SP650_100418</b>	Run ID: <b>UV-2450_325124</b>	SeqNo: <b>4766139</b>		PrepDate:			DF: <b>10</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	5.16	0.250	2.5	2.36	112	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18100278-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>05-Oct-2018 17:36</b>						
Client ID: <b>LH18/24-SP650_100418</b>	Run ID: <b>UV-2450_325124</b>	SeqNo: <b>4766140</b>		PrepDate:			DF: <b>10</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	5.14	0.250	2.5	2.36	111	80 - 120	5.16	0.388	20	

The following samples were analyzed in this batch: HS18100278-01

ALS Houston, US

Date: 24-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100278

**QC BATCH REPORT**

Batch ID:	R325460	Instrument:	WetChem_HS	Method:	E350.3					
<b>MBLK</b>	Sample ID: <b>MBLK-325460</b>	Units: <b>mg/L</b>	Analysis Date: <b>15-Oct-2018 10:35</b>							
Client ID:	Run ID: <b>WetChem_HS_325460</b>	SeqNo: <b>4773156</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.20	0.20								U
<b>LCS</b>	Sample ID: <b>LCS-325460</b>	Units: <b>mg/L</b>	Analysis Date: <b>15-Oct-2018 10:35</b>							
Client ID:	Run ID: <b>WetChem_HS_325460</b>	SeqNo: <b>4773157</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.739	0.20	10	0	97.4	80 - 120				
<b>MS</b>	Sample ID: <b>HS18100300-01MS</b>	Units: <b>mg/L</b>	Analysis Date: <b>15-Oct-2018 10:35</b>							
Client ID:	Run ID: <b>WetChem_HS_325460</b>	SeqNo: <b>4773159</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.146	0.20	10	0.4074	87.4	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18100300-01MSD</b>	Units: <b>mg/L</b>	Analysis Date: <b>15-Oct-2018 10:35</b>							
Client ID:	Run ID: <b>WetChem_HS_325460</b>	SeqNo: <b>4773160</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.15	0.20	10	0.4074	87.4	80 - 120	9.146	0.0437	20	

The following samples were analyzed in this batch: HS18100278-01

**ALS Houston, US**

Date: 24-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100278

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**


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







 <b>ALS</b> 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax. +1 281 530 5887	<b>CUSTODY SEAL</b>		Seal Broken By: <i>[Signature]</i>
	Date: <i>10/4/18</i>	Time: <i>1402</i>	Date:
	Name: <i>Scott Beesinger</i>	Company: <i>SGRA</i>	Date: <i>10/5/18</i>

*44123* OCT 05 2018

Must Deliver Next Business Day  
Time and Temperature Sensitive!



*44123*

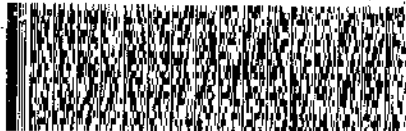
ORIGIN ID: SGRA (903) 930 6193  
 SCOTT BEESINGER  
 AP/IT/ ENVIRONMENTAL & INFRASTRUCTURE  
 1303-B EAST BRAND AVE  
 PHB 202  
 MARSHALL, TX 75670  
 UNITED STATES US

SHIP DATE: 25OCT18  
 ACTWGT: 1.00 LB MAN  
 CAD: 300190/CAFES111  
 DIMS: 26x14x14 IN

TO CLIENT SERVICES  
 ALS LABORATORY GROUP  
 10450 STANCLIFF ROAD  
 SUITE 210  
 HOUSTON TX 77099

(713) 530-6656  
 REF: LHAAP--37--RJ

RMA: 11111111



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**77099**  
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[www.alsglobal.com](http://www.alsglobal.com)

October 19, 2018

**Analytical Report for Service Request No: K1809828**

RJ Modashia  
ALS Laboratory Group  
10450 Stancliff Road  
Suite 210  
Houston, TX 77099-4338

**RE: HS18100278**

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory October 09, 2018  
For your reference, these analyses have been assigned our service request number **K1809828**.

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](http://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](mailto:Kelley.Lovejoy@alsglobal.com).

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

Kelley Lovejoy  
Project Manager



---

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## Table of Contents

Acronyms

Qualifiers

State Certifications, Accreditations, And Licenses

Case Narrative

Chain of Custody

General Chemistry

Raw Data

    General Chemistry

## 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**

<b>Agency</b>	<b>Web Site</b>	<b>Number</b>
Alaska DEH	<a href="http://dec.alaska.gov/eh/lab/cs/csapproval.htm">http://dec.alaska.gov/eh/lab/cs/csapproval.htm</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2795
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L16-58-R4
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Hawaii DOH	<a href="http://health.hawaii.gov/">http://health.hawaii.gov/</a>	-
ISO 17025	<a href="http://www.pjllabs.com/">http://www.pjllabs.com/</a>	L16-57
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	03016
Maine DHS	<a href="http://www.maine.gov/dhhs/">http://www.maine.gov/dhhs/</a>	WA01276
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-457
Nevada DEP	<a href="http://ndep.nv.gov/bsdwlabservice.htm">http://ndep.nv.gov/bsdwlabservice.htm</a>	WA01276
New Jersey DEP	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	WA005
New York - DOH	<a href="https://www.wadsworth.org/regulatory/elap">https://www.wadsworth.org/regulatory/elap</a>	12060
North Carolina DEQ	<a href="https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification">https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA100010
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/EnvironmentalLabCertification/">http://www.scdhec.gov/environment/EnvironmentalLabCertification/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704427
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C544
Wyoming (EPA Region 8)	<a href="https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water">https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water</a>	-
Kelso Laboratory Website	<a href="http://www.alsglobal.com">www.alsglobal.com</a>	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](http://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/analyte 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](http://www.alsglobal.com)



**Client:** ALS Environmental - US  
**Project:** HS18100278  
**Sample Matrix:** Water

**Service Request:** K1809828  
**Date Received:** 10/09/2018

#### CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

#### Sample Receipt:

One water sample was received for analysis at ALS Environmental on 10/09/2018. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

#### General Chemistry:

No significant anomalies were noted with this analysis.

Approved by

Kelley Anzoy

Date

10/19/2018





## 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](http://www.alsglobal.com)

K1809828



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: 9960

**SUBCONTRACT TO:**

ALS Environmental Kelso  
1317 S. 13th Avenue  
Kelso, WA 98626

Phone: +1 360 501 3312

**CUSTOMER INFORMATION:**

**INVOICE 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

**Company:** ALS Houston  
**Contact:** Accounts Payable  
**Address:** 10450 Stancliff Rd, Ste 210  
**Phone:** +1 281 530 5656  
**Reference:** HS18100278  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18100278-01	LH18/24-SP650_100418	Water	04 Oct 2018 14:00
TOC Analysis for DOD Level IV			15 Oct 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: S. MAJUMDAR

Date/Time: 10/8/18 18:00

Received By: [Signature]

Date/Time: 10/9/18 09:30

Cooler ID(s): \_\_\_\_\_

Temperature(s): \_\_\_\_\_



PC KL

Cooler Receipt and Preservation Form

Client ALS Houston Service Request K18 09828

Received: 10/9/18 Opened: 10/9/18 By: CG Unloaded: 10/9/18 By: CG

- 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 NA	Tracking Number NA	Filed
-0.5	-0.5	1.7	1.7	0.0	390	9960	438095332903	

- 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:  
**RUSH**



## General Chemistry

**ALS Environmental—Kelso Laboratory**  
1317 South 13th Avenue, Kelso, WA 98626  
Phone (360)577-7222 Fax (360)636-1068  
[www.alsglobal.com](http://www.alsglobal.com)

Analytical Report

**Client:** ALS Environmental - US  
**Project:** HS18100278  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:** K1809828  
**Date Collected:** 10/4/18  
**Date Received:** 10/9/18  
**Units:** mg/L  
**Basis:** NA

**Carbon, Total Organic**

Sample Name	Lab Code	Result	LOQ	LOD	MDL	Dil.	Date Analyzed	Q
LH18/24-SP650_100418	K1809828-001	7.7	1.0	0.4	0.2	2	10/18/18 00:35	
Method Blank	K1809828-MB1	ND U	0.50	0.20	0.07	1	10/17/18 23:15	
Method Blank	K1809828-MB2	ND U	0.50	0.20	0.07	1	10/18/18 08:36	

ALS Group USA, Corp.  
dba ALS Environmental

## QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100278  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:** K1809828  
**Date Collected:** 10/04/18  
**Date Received:** 10/09/18

**Units:** mg/L  
**Basis:** NA

Replicate Sample Summary  
Carbon, Total Organic

Sample Name:	Lab Code:	MRL	LOQ	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
LH18/24-SP650_100418	K1809828-001DUP	1.0	0.4	0.2	7.7	7.6	7.65	<1	10	10/18/18

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.

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100278  
**Sample Matrix:** Water

**Service Request:** K1809828  
**Date Collected:** 10/04/18  
**Date Received:** 10/09/18  
**Date Analyzed:** 10/18/18  
**Date Extracted:** NA

**Matrix Spike Summary**  
**Carbon, Total Organic**

**Sample Name:** LH18/24-SP650\_100418  
**Lab Code:** K1809828-001  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA

**Matrix Spike**  
K1809828-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Carbon, Total Organic	7.7	56.6	50.0	98	83-117

Results flagged with an asterisk (\*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.  
dba ALS Environmental

## QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100278  
**Sample Matrix:** Water

**Service Request:** K1809828  
**Date Analyzed:** 10/17/18  
**Date Extracted:** NA

**Lab Control Sample Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA  
**Analysis Lot:** 611322

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K1809828-LCS1	21.6	21.9	99	83-117
Lab Control Sample	K1809828-LCS2	21.4	21.9	98	83-117



**Client:** ALS Environmental - US  
**Project:** HS18100278

**Service Request:** K1809828

**Continuing Calibration Verification (CCV) Summary**

**Carbon, Total Organic**

**Analysis Method:** SM 5310 C

**Units:** mg/L

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>True Value</b>	<b>Measured Value</b>	<b>Percent Recovery</b>	<b>Acceptance Limits</b>
CCV1	611322	KQ1814953-06	10/17/18 22:41	25.0	23.9	95	90-110
CCV2	611322	KQ1814953-07	10/18/18 02:43	25.0	24.4	98	90-110
CCV3	611322	KQ1814953-08	10/18/18 08:02	25.0	24.0	96	90-110
CCV4	611322	KQ1814953-09	10/18/18 12:20	25.0	23.8	95	90-110
CCV5	611322	KQ1814953-10	10/18/18 14:30	25.0	23.7	95	90-110

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100278

**Service Request:**K1809828

**Continuing Calibration Blank (CCB) Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C**Units:**mg/L

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>LOQ</b>	<b>LOD</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	611322	KQ1814953-01	10/17/18 22:58	0.50	0.20	0.07	ND	U
CCB2	611322	KQ1814953-02	10/18/18 02:59	0.50	0.20	0.07	0.09	J
CCB3	611322	KQ1814953-03	10/18/18 08:19	0.50	0.20	0.07	ND	U
CCB4	611322	KQ1814953-04	10/18/18 12:37	0.50	0.20	0.07	ND	U
CCB5	611322	KQ1814953-05	10/18/18 14:46	0.50	0.20	0.07	ND	U



## Case Narrative

**Method:** 6850  
**Analysis:** Perchlorate  
**Analysis SOP:** LC-MS-CLO4  
**ALS WO ID(s):** 1828235; 1828552

**Client:** ALS Laboratories (Houston, TX)  
**Matrix:** Water  
**ELMS Batch (HBN):** 2155 (225024)

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

**Method Summary:** Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at  $m/z$  83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of  $m/z$  83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the  $m/z$  83 peak area. An internal standard (ISTD) of  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** NA

**Method QC data:** The method blank (LMB 623352) was less than 1/2 the CRDL. The recovery for the LCS (623353) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on samples 1828552008/09 (Client ID: 16WW24-181009). 5.0 $\mu$ l of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. The spike target was 5. $\mu$ g/L. The 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  $\mu$ g/L. Results were calculated in  $\mu$ g/L by the equation  $(A) \times (B)$ ,

where: A = Analyte concentration from the standard curve ( $\mu$ g/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. Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual integrations were performed for datafiles 17OCTP09-12/19.

Thomas Bosch                      October 22, 2018  
Analyst    Date



# ANALYTICAL REPORT

Report Date: October 22, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1828235**

Project ID: HS18100278 100418

Purchase Order: HS18100278

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_100418_BIX	1828235001	10/04/18	10/09/18	



## ANALYTICAL REPORT

Workorder: 34-1828235

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP650_100418_BIX</b>	Sampling Site: NA	Collected: 10/04/2018				
Lab ID: 1828235001	Media: 125 mL Nalgene	Received: 10/09/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2155 (HBN: 225024) Analyzed: 10/17/2018 09:51	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
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 10/19/2018 15:23	/S/ Stephen Brose 10/22/2018 13:43

## Laboratory Contact Information

ALS Environmental  
960 W Levoy Drive  
Salt Lake City, Utah 84123Phone: (801) 266-7700  
Email: als.lt.lab@ALSGlobal.com  
Web: www.alsslc.com



## ANALYTICAL REPORT

Workorder: 34-1828235

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

**General Lab Comments**

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

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

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

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

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

**Result Symbol Definitions**

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

**Qualifier Symbol Definitions**

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



# Quality Control Sample Batch Report

00921581

## Analysis Information

**Workorder:** 1828235

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2155 (HBN: 225024)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 623352 <b>Analyzed:</b> 10/17/2018 09:21 <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 623353 <b>Analyzed:</b> 10/17/2018 09:35 <b>Dilution:</b> 1 <b>Units:</b> ug/L				
Analyte	Result	Target	% Rec	QC Limits
Perchlorate	4.74	5.00	94.9	78.8   123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1828552007 <b>Analyzed:</b> 10/17/2018 11:30 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MS:</b> 1828552008 <b>Analyzed:</b> 10/17/2018 11:44 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MSD:</b> 1828552009 <b>Analyzed:</b> 10/17/2018 11:58 <b>Dilution:</b> 1 <b>Units:</b> ug/L			
Analyte	Result	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Perchlorate	ND	3.94	5	78.9	78.8   123.8	4.09	81.9	3.7	0.0   20.0

## Continuing Calibration Verification

<b>CCV:</b> 623349 <b>Analyzed:</b> 10/17/2018 08:37 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 623354 <b>Analyzed:</b> 10/17/2018 12:30 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 623466 <b>Analyzed:</b> 10/17/2018 14:12 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	24.6	25.0	98.4	23.9	25.0	95.5	24.5	25.0	98.0

## Interference Check Sample

<b>ICSA:</b> 623351 <b>Analyzed:</b> 10/17/2018 09:07 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	1.05	1.00	105

## Limit of Detection Verification

<b>LODV:</b> 623350 <b>Analyzed:</b> 10/17/2018 08:53 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 623355 <b>Analyzed:</b> 10/17/2018 12:44 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 623467 <b>Analyzed:</b> 10/17/2018 14:26 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.968	1.00	96.8	0.984	1.00	98.4	1.02	1.00	102





# Quality Control Sample Batch Report

00921582

## Analysis Information

**Workorder:** 1828235

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2155 (HBN: 225024)

**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 10/19/2018 15:23	/S/ Stephen Brose 10/22/2018 13:43

## Symbols and Definitions

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

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



18698/#2

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### act Chain of Custody

COC ID: 9959

1828235

#### SUBCONTRACT TO:

ALS Laboratory Group  
960 West LeVoy Drive  
Salt Lake City, UT 84123

Phone: +1 800 356 9135

#### 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:** HS18100278  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18100278-02	LH18/24-SP650_100418_BIX	Water	04 Oct 2018 14:00
SUB_Perch-6850			15 Oct 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: J. [Signature]  
Received By: [Signature]  
Cooler ID(s): \_\_\_\_\_

Date/Time: 10/2/18 18:00  
Date/Time: 10/09/18 10:20  
Temperature(s): \_\_\_\_\_



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

1828235

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS HOUSTON Project/Task/Site: HS18100278-02/9459  
 Date/Time of Receipt: 10/09/18 10:20 Number of Coolers Received: 7

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

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

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 <u>8806</u>	<u>2</u> °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Desiree Hill Desiree Hill 10/09/18  
Signature Printed Name Date

CLIENT-RELATED INFORMATION

- |  |   |  |   |
|--|---|--|---|
| <input type="checkbox"/> Missing Cooler                  | <input type="checkbox"/> Missing Samples/Bottles          | <input type="checkbox"/> Incorrect Preservation    | <input type="checkbox"/> Insufficient Sample Volume |
| <input type="checkbox"/> Cooler Conditions               | <input type="checkbox"/> Broken/Leaking Samples           | <input type="checkbox"/> pH Criteria Not Met       | <input type="checkbox"/> Chain of Custody Problems  |
| <input type="checkbox"/> Missing Paperwork               | <input type="checkbox"/> Incorrect Bottle Type            | <input type="checkbox"/> Residual Chlorine Present | <input type="checkbox"/> Other:                     |
| <input type="checkbox"/> Missing/Incorrect Bottle Labels | <input type="checkbox"/> Cooler Temperatures Out of Range | <input type="checkbox"/> 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: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature

Must Deliver Next Business Day  
Time and Temperature Sensitive!



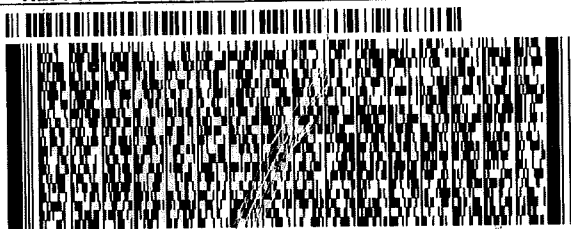
ORIGIN ID:SGRA (281) 530-5656  
SHIPPING DEPT  
ALS LABORATORY GROUP  
10450 STANCLIFF  
SUITE 210  
HOUSTON, TX 77099  
UNITED STATES US

SHIP DATE: 08OCT18  
ACTWGT: 7.30 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) 286-7700  
REF: HS18100278



**FedEx**  
Express



J181180605010V

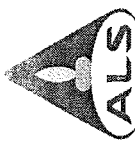
TRK# 4380 9533 2899  
0201

**TUE - 09 OCT 3:00P**  
**STANDARD OVERNIGHT**

**AX BTFA**

**84123**  
**UT-US SLC**





# Batch Worklist

HBN: 225024



Instrument:

Status: WP

Created: 10/17/2018 07:46

Analyst: T. Bosch

Batch: ELMS/ 2155  
 Rule: EPA 6850, DoD QSM Water

Workorder: 1828235 [ENV\_LVL4]  
 Workorder: 1828552 [ENV\_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mix	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	623349	CCV for HBN 225024 [ELMS/2155]				CCV	3		E685041C3Q	5311		10/22/2018	
2	623350	L0DV for HBN 225024 [ELMS/2155]				L0DV	3		E6850..D3Q	5311		10/22/2018	
3	623351	ICS for HBN 225024 [ELMS/2155]				ICS	3		E6850..D3Q	5311		10/22/2018	
4	623352	LMB for HBN 225024 [ELMS/2155]				LMB	3		E6850Q413Q	5311		10/22/2018	
5	623353	LCS for HBN 225024 [ELMS/2155]				LCS	3		E6850Q413Q	5311		10/22/2018	
6	1828235001	LH18/24-SP650_100418_BIX				SAMPLE	3	1828235001-A	E6850Q41.3	5480	11/1/2018	10/22/2018	
7	1828552001	16WW43-181009				SAMPLE	3	1828552001-A	E6850Q41.3	5480	11/6/2018	10/24/2018	
8	1828552002	16WW26-181009				SAMPLE	3	1828552002-A	E6850Q41.3	5480	11/6/2018	10/24/2018	
9	1828552003	16WW41-181009				SAMPLE	3	1828552003-A	E6850Q41.3	5480	11/6/2018	10/24/2018	
10	1828552004	16WW25-181009				SAMPLE	3	1828552004-A	E6850Q41.3	5480	11/6/2018	10/24/2018	
11	1828552005	16WW02-181009				SAMPLE	3	1828552005-A	E6850Q41.3	5480	11/6/2018	10/24/2018	
12	1828552006	16WW36-181009				SAMPLE	3	1828552006-A	E6850Q41.3	5480	11/6/2018	10/24/2018	
13	1828552007	16WW24-181009				SAMPLE	3	1828552007-A	E6850Q41.3	5480	11/6/2018	10/24/2018	
14	1828552008	16WW24-181009MS				MS	3	1828552008-A	E6850Q413Q	5480		10/22/2018	
15	1828552009	16WW24-181009MSD				MSD	3	1828552009-A	E6850Q413Q	5480		10/22/2018	
16	1828552010	16WW24-181009-FD				FLDDUP	3	1828552010-A	E6850Q41.3	5480	11/6/2018	10/24/2018	
17	1828552011	16WW06-181009				SAMPLE	3	1828552011-A	E6850Q41.3	5480	11/6/2018	10/24/2018	
18	623354	CCV for HBN 225024 [ELMS/2155]				CCV	3		E685041C3Q	5311		10/22/2018	
19	623355	L0DV for HBN 225024 [ELMS/2155]				L0DV	3		E6850..D3Q	5311		10/22/2018	
20	623466	CCV for HBN 225024 [ELMS/2155]				CCV	3		E685041C3Q	5311		10/22/2018	
21	623467	L0DV for HBN 225024 [ELMS/2155]				L0DV	3		E6850..D3Q	5311		10/22/2018	



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**

ALS Work Order #'s & Sample #('): 1828235 (001); 1828552 (001-15)  
 ELMS Batch/HBN ID: 2155 (225024)  
 Prep Date: 10/15/2018 Analysis Date: 10/17/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1SEQUENCE\CLO4\2018\OCT\17OCT18D.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: 2 Injection Volume: 25µL  
 Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

**FLOW GRADIENT:**

Time (min.)	Flow (mL/min)
0	0.80
5.0	0.80
5.3	0.25
10.0	0.25
10.5	0.80
12.5	0.80

**QC DATA:** 5.0µL of QC Solution Horizon ID 41830 was used for LCS 623353; Target = 5.0µg/L. ASTM type II water was used for LMB 623352.

**MS/MSD:** MS/MSD was performed on samples 1828552008/09 (Client ID: 16WW24-181009). 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. Samples 1828552005/06/11 had positive results for perchlorate. However, because the 83/85 ion ratio failed, these results were not 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\2018\OCT\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- 4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\225024-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#
- 5) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual integrations were performed for datafiles 17OCTP09-12/19.



### 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.

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
<u>Batch(es)/SDG: ELMS: 2155 (HBN: 225024)</u>		
<u>Sample Set IDs if Applicable: 1828235 / 1828552</u>		
<u>Calibration standards analyzed and meets criteria</u>	TB	SB
<u>Standards traceability checked and meets criteria</u>	TB	SB
<u>Standard curve coefficients evaluated and meet criteria</u>	TB	SB
<u>ICVs analyzed and meet acceptance criteria</u>	TB	SB
<u>CCVs analyzed and meet acceptance criteria</u>	TB	SB
<u>Method Blanks analyzed and meet acceptance criteria</u>	TB	SB
<u>Retention Time Windows checked</u>	TB	SR
<u>For method 8081A, Endrin/DDT Breakdown is checked for compliance</u>	—	—
<u>Surrogate recoveries checked and appropriately addressed</u>	—	—
<u>Method Preparation Blanks analyzed and meet acceptance criteria</u>	TB	SB
<u>MSS, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed</u>	TB	SB
<u>RLVS analyzed</u>	TB	SB
<u>Preparation and analysis hold times met</u>	TB	SB
<u>Preparation deviations and re-preparations noted when performed</u>	TB	SB
<u>Analysis deviations and re-analyses noted when performed</u>	TB	SB
<u>Sample dilution factors noted on reports</u>	TB	SB
<u>Electronic records in HBN transcription accuracy and completeness checked</u>	TB	SB
<u>Preparation and analysis calculations checked</u>	TB	SB
<u>NCRs are completed as necessary NC/CAR#</u>	—	—
<u>Report forms are complete and accurate</u>	TB	SB
<u>Manual integrations checked</u>	TB	SB

TB, 10-22-18

SB 10/22/18



## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK		Description - 6850-WKG Std 100.ug/L			
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

### Constituent

#### Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL	
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020	
MFG Lot: 218065075		Usable: No	
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Constituent

## Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

### Constituent

#### Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK		Description - 6850 QC WKG STD 100ug/L			
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				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		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



**STANDARD REPORT**

**Constituent**

**Solvent Standard - ASTM H2O**

<b>ASTM H2O</b>		<b>Description - ASTM Type II Water</b>	
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	Created By: Thomas Bosch	Amount: 100 mL	
MFG: Ultra Scientific	Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020	
MFG Lot: CP-0860		Usable: Yes	
Part ID: ICC-013		Lab Lot: CLO4 QC STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730		Created By: Thomas Bosch		Amount: 25 mL	
MFG: ALS/SLC		Create Date: 09/20/2018 09:09AM		Expires: 09/20/2019	
MFG Lot: TNB: 05/09/2018		Verified By: Thomas Bosch		Usable: Yes	
Pipette ID: Not Provided		Verify Date:		Lab Lot: CLO4ISTDWRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock	
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL



# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

### Description:

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

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

Solvent: water (low TOC, < 50 ppb)

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

### Traceability:

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

### Estimation of Uncertainties:

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

### Homogeneity:

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

### Intended Use:

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

### Instructions for Use:

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

### Hazards:

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

### Expiration of Certification:

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





# Certificate of Analysis



## ISO Guide 34 Reference Material

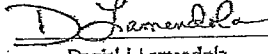
Product Number: ICC-013  
Lot Number: CP-0860

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

### Maintenance of Certification:

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

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

  
Daniel J. Lamendola  
Director of QA/RA



125 Market Street  
New Haven, CT 06513  
USA



AccuStandard®

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

# CERTIFICATE OF ANALYSIS



AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> 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

Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

Quality Standards:

ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

## Product Information

Chemical Purity Specification:  $\geq 98\%$

Labeled CAS Number: NA

Unlabeled CAS Number: 7601-89-0

MW\*: 130.4

Chemical Formula:  $\text{NaCl}^+\text{O}_4^-$

Storage: Store at room temperature away from light and moisture.

Stability: See storage and expiration date.

## Certification

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

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

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

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

Approved by: T. J. Eckersley

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

## Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



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

October 16, 2018

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

Work Order: **HS18100281**

Laboratory Results for: **Groundwater Treatment Plant Bi-Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Oct 05, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager



ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**Work Order:** HS18100281

**SAMPLE SUMMARY**

---

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18100281-01	LH18/24-SP650_100418	Water		04-Oct-2018 14:00	05-Oct-2018 08:45	<input type="checkbox"/>
HS18100281-02	Trip Blank	Water	ALS-080918-93	04-Oct-2018 00:00	05-Oct-2018 08:45	<input type="checkbox"/>

---

**ALS Houston, US**

Date: 16-Oct-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**Work Order:** HS18100281

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**CASE NARRATIVE**

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**GCMS Volatiles by Method SW8260****Batch ID: R325306****Sample ID: HS18091560-01MS**

- MS and MSD were performed on unrelated sample.

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**WetChemistry by Method SW9056****Batch ID: R325461**

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

## ALS Houston, US

Date: 16-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: LH18/24-SP650\_100418  
 Collection Date: 04-Oct-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100281  
 Lab ID:HS18100281-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	11-Oct-2018 21:35	
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	11-Oct-2018 21:35	
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	11-Oct-2018 21:35	
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	11-Oct-2018 21:35	
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	11-Oct-2018 21:35	
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	

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

## ALS Houston, US

Date: 16-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: LH18/24-SP650\_100418  
 Collection Date: 04-Oct-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100281  
 Lab ID:HS18100281-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>							Analyst: AKP
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
<b>cis-1,2-Dichloroethene</b>	<b>3.8</b>		<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>ug/L</b>	1	11-Oct-2018 21:35	
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	11-Oct-2018 21:35	
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	11-Oct-2018 21:35	
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Tetrachloroethene	1.0	U	0.30	1.0	1.0	ug/L	1	11-Oct-2018 21:35	
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
<b>Trichloroethene</b>	<b>1.4</b>		<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>ug/L</b>	1	11-Oct-2018 21:35	
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:35	
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>91.2</i>			<b>0</b>	<i>81-118</i>	<b>%REC</b>	<i>1</i>	<i>11-Oct-2018 21:35</i>	
<i>Surr: 4-Bromofluorobenzene</i>	<i>100</i>			<b>0</b>	<i>85-114</i>	<b>%REC</b>	<i>1</i>	<i>11-Oct-2018 21:35</i>	
<i>Surr: Dibromofluoromethane</i>	<i>98.1</i>			<b>0</b>	<i>80-119</i>	<b>%REC</b>	<i>1</i>	<i>11-Oct-2018 21:35</i>	
<i>Surr: Toluene-d8</i>	<i>92.3</i>			<b>0</b>	<i>89-112</i>	<b>%REC</b>	<i>1</i>	<i>11-Oct-2018 21:35</i>	
<b>ANIONS BY SW9056A</b>		<b>Method:SW9056</b>							Analyst: KMU
<b>Chloride</b>	<b>518</b>		<b>2.00</b>	<b>5.00</b>	<b>5.00</b>	<b>mg/L</b>	10	11-Oct-2018 21:21	
<b>Sulfate</b>	<b>79.3</b>		<b>2.00</b>	<b>5.00</b>	<b>5.00</b>	<b>mg/L</b>	10	11-Oct-2018 21:21	

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

## ALS Houston, US

Date: 16-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: Trip Blank  
 Collection Date: 04-Oct-2018 00:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100281  
 Lab ID:HS18100281-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	11-Oct-2018 20:46	
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	11-Oct-2018 20:46	
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	11-Oct-2018 20:46	
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	11-Oct-2018 20:46	
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	11-Oct-2018 20:46	
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	

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

## ALS Houston, US

Date: 16-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: Trip Blank  
 Collection Date: 04-Oct-2018 00:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100281  
 Lab ID:HS18100281-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>							Analyst: AKP
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	11-Oct-2018 20:46	
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	11-Oct-2018 20:46	
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Tetrachloroethene	1.0	U	0.30	1.0	1.0	ug/L	1	11-Oct-2018 20:46	
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 20:46	
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>90.2</i>			<i>0</i>	<i>81-118</i>	<i>%REC</i>	<i>1</i>	<i>11-Oct-2018 20:46</i>	
<i>Surr: 4-Bromofluorobenzene</i>	<i>98.8</i>			<i>0</i>	<i>85-114</i>	<i>%REC</i>	<i>1</i>	<i>11-Oct-2018 20:46</i>	
<i>Surr: Dibromofluoromethane</i>	<i>97.5</i>			<i>0</i>	<i>80-119</i>	<i>%REC</i>	<i>1</i>	<i>11-Oct-2018 20:46</i>	
<i>Surr: Toluene-d8</i>	<i>92.2</i>			<i>0</i>	<i>89-112</i>	<i>%REC</i>	<i>1</i>	<i>11-Oct-2018 20:46</i>	

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

ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R325306	<b>Test Name :</b> VOLATILES ORGANICS BY METHOD 8260C		<b>Matrix:</b> Water			
HS18100281-01	LH18/24-SP650_100418	04 Oct 2018 14:00			11 Oct 2018 21:35	1
HS18100281-02	Trip Blank	04 Oct 2018 00:00			11 Oct 2018 20:46	1
<b>Batch ID</b> R325461	<b>Test Name :</b> ANIONS BY SW9056A		<b>Matrix:</b> Water			
HS18100281-01	LH18/24-SP650_100418	04 Oct 2018 14:00			11 Oct 2018 21:21	10

## ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MBLK	Sample ID: VBLKW-181011	Units: ug/L			Analysis Date: 11-Oct-2018 13:52					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769923	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U



## ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MBLK	Sample ID: VBLKW-181011	Units: ug/L			Analysis Date: 11-Oct-2018 13:52					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769923	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	1.0	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	46.02	1.0	50	0	92.0	81 - 118				
Surr: 4-Bromofluorobenzene	48.32	1.0	50	0	96.6	85 - 114				
Surr: Dibromofluoromethane	48.83	1.0	50	0	97.7	80 - 119				
Surr: Toluene-d8	46.12	1.0	50	0	92.2	89 - 112				

## ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
LCS	Sample ID: VLCSW-181011	Units: ug/L			Analysis Date: 11-Oct-2018 13:27					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769922	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	21.18	1.0	20	0	106	78 - 124				
1,1,1-Trichloroethane	18.89	1.0	20	0	94.5	74 - 131				
1,1,2,2-Tetrachloroethane	17.77	1.0	20	0	88.9	71 - 121				
1,1,2-Trichloroethane	20.59	1.0	20	0	103	80 - 119				
1,1-Dichloroethane	20.06	1.0	20	0	100	77 - 125				
1,1-Dichloroethene	18.7	1.0	20	0	93.5	71 - 131				
1,1-Dichloropropene	21.91	1.0	20	0	110	78 - 125				
1,2,3-Trichlorobenzene	18.69	1.0	20	0	93.5	69 - 129				
1,2,3-Trichloropropane	17.88	1.0	20	0	89.4	73 - 122				
1,2,4-Trichlorobenzene	19.81	1.0	20	0	99.1	69 - 130				
1,2,4-Trimethylbenzene	21.56	1.0	20	0	108	76 - 124				
1,2-Dibromo-3-chloropropane	16.86	1.0	20	0	84.3	62 - 128				
1,2-Dibromoethane	20.82	1.0	20	0	104	77 - 121				
1,2-Dichlorobenzene	20.25	1.0	20	0	101	80 - 119				
1,2-Dichloroethane	20.77	1.0	20	0	104	73 - 128				
1,2-Dichloropropane	21.63	1.0	20	0	108	78 - 122				
1,3,5-Trimethylbenzene	19.65	1.0	20	0	98.2	75 - 124				
1,3-Dichlorobenzene	20.49	1.0	20	0	102	80 - 119				
1,3-Dichloropropane	20.93	1.0	20	0	105	80 - 119				
1,4-Dichlorobenzene	20.44	1.0	20	0	102	79 - 118				
2,2-Dichloropropane	23.05	1.0	20	0	115	60 - 139				
2-Butanone	36.82	2.0	40	0	92.1	56 - 143				
2-Chlorotoluene	21.67	1.0	20	0	108	79 - 122				
2-Hexanone	35.97	2.0	40	0	89.9	57 - 139				
4-Chlorotoluene	22.15	1.0	20	0	111	78 - 122				
4-Isopropyltoluene	18.88	1.0	20	0	94.4	77 - 127				
4-Methyl-2-pentanone	37.82	2.0	40	0	94.5	67 - 130				
Acetone	38.36	2.0	40	0	95.9	39 - 160				
Benzene	20.89	1.0	20	0	104	79 - 120				
Bromobenzene	20.11	1.0	20	0	101	80 - 120				
Bromochloromethane	21.14	1.0	20	0	106	78 - 123				
Bromodichloromethane	21.72	1.0	20	0	109	79 - 125				
Bromoform	19.71	1.0	20	0	98.5	66 - 130				
Bromomethane	23.57	1.0	20	0	118	53 - 141				

## ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
LCS	Sample ID: VLCSW-181011	Units: ug/L			Analysis Date: 11-Oct-2018 13:27					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769922	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	38.55	2.0	40	0	96.4	64 - 133				
Carbon tetrachloride	20.62	1.0	20	0	103	72 - 136				
Chlorobenzene	21.39	1.0	20	0	107	82 - 118				
Chloroethane	19.99	1.0	20	0	99.9	60 - 138				
Chloroform	19.96	1.0	20	0	99.8	79 - 124				
Chloromethane	18.73	1.0	20	0	93.6	50 - 139				
cis-1,2-Dichloroethene	21.17	1.0	20	0	106	78 - 123				
cis-1,3-Dichloropropene	23.12	1.0	20	0	116	75 - 124				
Dibromochloromethane	20.78	1.0	20	0	104	74 - 126				
Dibromomethane	21.62	1.0	20	0	108	79 - 123				
Dichlorodifluoromethane	16.52	1.0	20	0	82.6	32 - 152				
Ethylbenzene	22.77	1.0	20	0	114	79 - 121				
Hexachlorobutadiene	20.03	1.0	20	0	100	66 - 134				
Isopropylbenzene	20.08	1.0	20	0	100	72 - 131				
m,p-Xylene	45.76	2.0	40	0	114	80 - 121				
Methylene chloride	20.89	2.0	20	0	104	74 - 124				
Naphthalene	17.05	1.0	20	0	85.3	61 - 128				
n-Butylbenzene	20.89	1.0	20	0	104	75 - 128				
n-Propylbenzene	22.03	1.0	20	0	110	76 - 126				
o-Xylene	22.68	1.0	20	0	113	78 - 122				
sec-Butylbenzene	18.97	1.0	20	0	94.9	77 - 126				
Styrene	21.7	1.0	20	0	109	78 - 123				
tert-Butylbenzene	21.58	1.0	20	0	108	78 - 124				
Tetrachloroethene	20.04	1.0	20	0	100	74 - 129				
Toluene	20.32	1.0	20	0	102	80 - 121				
trans-1,2-Dichloroethene	20.76	1.0	20	0	104	75 - 124				
trans-1,3-Dichloropropene	23.52	1.0	20	0	118	73 - 127				
Trichloroethene	20.64	1.0	20	0	103	79 - 123				
Trichlorofluoromethane	19.71	1.0	20	0	98.5	65 - 141				
Vinyl chloride	19.68	1.0	20	0	98.4	58 - 137				
Surr: 1,2-Dichloroethane-d4	46.44	1.0	50	0	92.9	81 - 118				
Surr: 4-Bromofluorobenzene	51.01	1.0	50	0	102	85 - 114				
Surr: Dibromofluoromethane	47.52	1.0	50	0	95.0	80 - 119				
Surr: Toluene-d8	45.07	1.0	50	0	90.1	89 - 112				

## ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MS	Sample ID: HS18091560-01MS	Units: ug/L			Analysis Date: 11-Oct-2018 15:54					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769927	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	19.53	1.0	20	0	97.6	78 - 124				
1,1,1-Trichloroethane	19.21	1.0	20	0	96.1	74 - 131				
1,1,2,2-Tetrachloroethane	16.71	1.0	20	0	83.5	71 - 121				
1,1,2-Trichloroethane	19.13	1.0	20	0	95.7	80 - 119				
1,1-Dichloroethane	19.79	1.0	20	0	99.0	77 - 125				
1,1-Dichloroethene	20.54	1.0	20	0	103	71 - 131				
1,1-Dichloropropene	22.09	1.0	20	0	110	78 - 125				
1,2,3-Trichlorobenzene	16.28	1.0	20	0	81.4	69 - 129				
1,2,3-Trichloropropane	16.5	1.0	20	0	82.5	73 - 122				
1,2,4-Trichlorobenzene	17.2	1.0	20	0	86.0	69 - 130				
1,2,4-Trimethylbenzene	20.17	1.0	20	0	101	76 - 124				
1,2-Dibromo-3-chloropropane	14.76	1.0	20	0	73.8	62 - 128				
1,2-Dibromoethane	19.69	1.0	20	0	98.4	77 - 121				
1,2-Dichlorobenzene	18.62	1.0	20	0	93.1	80 - 119				
1,2-Dichloroethane	20.34	1.0	20	0	102	73 - 128				
1,2-Dichloropropane	20.71	1.0	20	0	104	78 - 122				
1,3,5-Trimethylbenzene	18.69	1.0	20	0	93.5	75 - 124				
1,3-Dichlorobenzene	19.01	1.0	20	0	95.1	80 - 119				
1,3-Dichloropropane	19.62	1.0	20	0	98.1	80 - 119				
1,4-Dichlorobenzene	19.25	1.0	20	0	96.2	79 - 118				
2,2-Dichloropropane	22.25	1.0	20	0	111	60 - 139				
2-Butanone	34.75	2.0	40	0	86.9	56 - 143				
2-Chlorotoluene	20.78	1.0	20	0	104	79 - 122				
2-Hexanone	33.39	2.0	40	0	83.5	57 - 139				
4-Chlorotoluene	20.66	1.0	20	0	103	78 - 122				
4-Isopropyltoluene	18.23	1.0	20	0	91.1	77 - 127				
4-Methyl-2-pentanone	35.1	2.0	40	0	87.7	67 - 130				
Acetone	30.49	2.0	40	0	76.2	39 - 160				
Benzene	20.36	1.0	20	0	102	79 - 120				
Bromobenzene	18.53	1.0	20	0	92.7	80 - 120				
Bromochloromethane	19.75	1.0	20	0	98.8	78 - 123				
Bromodichloromethane	20.5	1.0	20	0	102	79 - 125				
Bromoform	18.21	1.0	20	0	91.1	66 - 130				
Bromomethane	20.88	1.0	20	0	104	53 - 141				

## ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MS	Sample ID: HS18091560-01MS	Units: ug/L			Analysis Date: 11-Oct-2018 15:54					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769927	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	40.49	2.0	40	0	101	64 - 133				
Carbon tetrachloride	21.02	1.0	20	0	105	72 - 136				
Chlorobenzene	20.04	1.0	20	0	100	82 - 118				
Chloroethane	19.92	1.0	20	0	99.6	60 - 138				
Chloroform	19.29	1.0	20	0	96.4	79 - 124				
Chloromethane	20.42	1.0	20	0	102	50 - 139				
cis-1,2-Dichloroethene	21.92	1.0	20	6.295	78.1	78 - 123				
cis-1,3-Dichloropropene	21.54	1.0	20	0	108	75 - 124				
Dibromochloromethane	18.93	1.0	20	0	94.7	74 - 126				
Dibromomethane	19.85	1.0	20	0	99.2	79 - 123				
Dichlorodifluoromethane	16.07	1.0	20	0	80.4	32 - 152				
Ethylbenzene	22.09	1.0	20	0	110	79 - 121				
Hexachlorobutadiene	18.71	1.0	20	0	93.5	66 - 134				
Isopropylbenzene	20.08	1.0	20	0	100	72 - 131				
m,p-Xylene	44.16	2.0	40	0	110	80 - 121				
Methylene chloride	21.36	2.0	20	3.64	88.6	74 - 124				
Naphthalene	14.24	1.0	20	0	71.2	61 - 128				
n-Butylbenzene	19.73	1.0	20	0	98.6	75 - 128				
n-Propylbenzene	21.28	1.0	20	0	106	76 - 126				
o-Xylene	21.71	1.0	20	0	109	78 - 122				
sec-Butylbenzene	18.77	1.0	20	0	93.8	77 - 126				
Styrene	20.12	1.0	20	0	101	78 - 123				
tert-Butylbenzene	21	1.0	20	0	105	78 - 124				
Tetrachloroethene	20.24	1.0	20	0	101	74 - 129				
Toluene	19.95	1.0	20	0	99.8	80 - 121				
trans-1,2-Dichloroethene	20.89	1.0	20	0	104	75 - 124				
trans-1,3-Dichloropropene	21.34	1.0	20	0	107	73 - 127				
Trichloroethene	25.86	1.0	20	15.06	54.0	79 - 123				S
Trichlorofluoromethane	21.17	1.0	20	0	106	65 - 141				
Vinyl chloride	21.37	1.0	20	0	107	58 - 137				
Surr: 1,2-Dichloroethane-d4	47.01	1.0	50	0	94.0	81 - 118				
Surr: 4-Bromofluorobenzene	50.1	1.0	50	0	100	85 - 114				
Surr: Dibromofluoromethane	48.17	1.0	50	0	96.3	80 - 119				
Surr: Toluene-d8	44.72	1.0	50	0	89.4	89 - 112				

ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

**QC BATCH REPORT**

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MSD	Sample ID: HS18091560-01MSD	Units: ug/L			Analysis Date: 11-Oct-2018 16:18					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769928		PrepDate:		DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	19.69	1.0	20	0	98.4	78 - 124	19.53	0.828	20	
1,1,1-Trichloroethane	18.61	1.0	20	0	93.0	74 - 131	19.21	3.18	20	
1,1,2,2-Tetrachloroethane	16.71	1.0	20	0	83.5	71 - 121	16.71	0.00947	20	
1,1,2-Trichloroethane	19.24	1.0	20	0	96.2	80 - 119	19.13	0.557	20	
1,1-Dichloroethane	19.5	1.0	20	0	97.5	77 - 125	19.79	1.49	20	
1,1-Dichloroethene	19.52	1.0	20	0	97.6	71 - 131	20.54	5.12	20	
1,1-Dichloropropene	20.38	1.0	20	0	102	78 - 125	22.09	8.04	20	
1,2,3-Trichlorobenzene	16.84	1.0	20	0	84.2	69 - 129	16.28	3.4	20	
1,2,3-Trichloropropane	16.81	1.0	20	0	84.1	73 - 122	16.5	1.91	20	
1,2,4-Trichlorobenzene	18.05	1.0	20	0	90.3	69 - 130	17.2	4.83	20	
1,2,4-Trimethylbenzene	20.03	1.0	20	0	100	76 - 124	20.17	0.698	20	
1,2-Dibromo-3-chloropropane	15.77	1.0	20	0	78.9	62 - 128	14.76	6.6	20	
1,2-Dibromoethane	19.33	1.0	20	0	96.7	77 - 121	19.69	1.8	20	
1,2-Dichlorobenzene	18.66	1.0	20	0	93.3	80 - 119	18.62	0.176	20	
1,2-Dichloroethane	20.44	1.0	20	0	102	73 - 128	20.34	0.468	20	
1,2-Dichloropropane	20.35	1.0	20	0	102	78 - 122	20.71	1.75	20	
1,3,5-Trimethylbenzene	18.17	1.0	20	0	90.8	75 - 124	18.69	2.84	20	
1,3-Dichlorobenzene	18.82	1.0	20	0	94.1	80 - 119	19.01	1.04	20	
1,3-Dichloropropane	19.52	1.0	20	0	97.6	80 - 119	19.62	0.51	20	
1,4-Dichlorobenzene	18.89	1.0	20	0	94.4	79 - 118	19.25	1.87	20	
2,2-Dichloropropane	21.55	1.0	20	0	108	60 - 139	22.25	3.18	20	
2-Butanone	35.16	2.0	40	0	87.9	56 - 143	34.75	1.18	20	
2-Chlorotoluene	20.04	1.0	20	0	100	79 - 122	20.78	3.58	20	
2-Hexanone	34.12	2.0	40	0	85.3	57 - 139	33.39	2.16	20	
4-Chlorotoluene	20.54	1.0	20	0	103	78 - 122	20.66	0.583	20	
4-Isopropyltoluene	17.72	1.0	20	0	88.6	77 - 127	18.23	2.85	20	
4-Methyl-2-pentanone	35.29	2.0	40	0	88.2	67 - 130	35.1	0.562	20	
Acetone	32.51	2.0	40	0	81.3	39 - 160	30.49	6.41	20	
Benzene	19.64	1.0	20	0	98.2	79 - 120	20.36	3.58	20	
Bromobenzene	18.44	1.0	20	0	92.2	80 - 120	18.53	0.518	20	
Bromochloromethane	19.99	1.0	20	0	100.0	78 - 123	19.75	1.19	20	
Bromodichloromethane	19.93	1.0	20	0	99.7	79 - 125	20.5	2.79	20	
Bromoform	18.63	1.0	20	0	93.1	66 - 130	18.21	2.26	20	
Bromomethane	21.28	1.0	20	0	106	53 - 141	20.88	1.92	20	

## ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MSD	Sample ID: HS18091560-01MSD	Units: ug/L			Analysis Date: 11-Oct-2018 16:18					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769928	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	38.55	2.0	40	0	96.4	64 - 133	40.49	4.9	20	
Carbon tetrachloride	19.89	1.0	20	0	99.5	72 - 136	21.02	5.48	20	
Chlorobenzene	19.81	1.0	20	0	99.1	82 - 118	20.04	1.16	20	
Chloroethane	19.08	1.0	20	0	95.4	60 - 138	19.92	4.31	20	
Chloroform	18.77	1.0	20	0	93.8	79 - 124	19.29	2.74	20	
Chloromethane	17.82	1.0	20	0	89.1	50 - 139	20.42	13.6	20	
cis-1,2-Dichloroethene	20.46	1.0	20	6.295	70.8	78 - 123	21.92	6.9	20	S
cis-1,3-Dichloropropene	20.9	1.0	20	0	105	75 - 124	21.54	3.03	20	
Dibromochloromethane	19.45	1.0	20	0	97.3	74 - 126	18.93	2.71	20	
Dibromomethane	18.96	1.0	20	0	94.8	79 - 123	19.85	4.58	20	
Dichlorodifluoromethane	14.38	1.0	20	0	71.9	32 - 152	16.07	11.1	20	
Ethylbenzene	21.69	1.0	20	0	108	79 - 121	22.09	1.79	20	
Hexachlorobutadiene	18.6	1.0	20	0	93.0	66 - 134	18.71	0.611	20	
Isopropylbenzene	19.39	1.0	20	0	97.0	72 - 131	20.08	3.51	20	
m,p-Xylene	43.7	2.0	40	0	109	80 - 121	44.16	1.03	20	
Methylene chloride	20.1	2.0	20	3.64	82.3	74 - 124	21.36	6.1	20	
Naphthalene	15.26	1.0	20	0	76.3	61 - 128	14.24	6.92	20	
n-Butylbenzene	19.87	1.0	20	0	99.3	75 - 128	19.73	0.704	20	
n-Propylbenzene	20.66	1.0	20	0	103	76 - 126	21.28	2.95	20	
o-Xylene	21.18	1.0	20	0	106	78 - 122	21.71	2.49	20	
sec-Butylbenzene	18.07	1.0	20	0	90.3	77 - 126	18.77	3.79	20	
Styrene	20.3	1.0	20	0	102	78 - 123	20.12	0.927	20	
tert-Butylbenzene	20.04	1.0	20	0	100	78 - 124	21	4.69	20	
Tetrachloroethene	19.39	1.0	20	0	96.9	74 - 129	20.24	4.3	20	
Toluene	19.4	1.0	20	0	97.0	80 - 121	19.95	2.8	20	
trans-1,2-Dichloroethene	19.96	1.0	20	0	99.8	75 - 124	20.89	4.56	20	
trans-1,3-Dichloropropene	21.33	1.0	20	0	107	73 - 127	21.34	0.0145	20	
Trichloroethene	22.71	1.0	20	15.06	38.3	79 - 123	25.86	13	20	S
Trichlorofluoromethane	19.85	1.0	20	0	99.2	65 - 141	21.17	6.47	20	
Vinyl chloride	19.56	1.0	20	0	97.8	58 - 137	21.37	8.86	20	
Surr: 1,2-Dichloroethane-d4	47.92	1.0	50	0	95.8	81 - 118	47.01	1.9	20	
Surr: 4-Bromofluorobenzene	50.23	1.0	50	0	100	85 - 114	50.1	0.253	20	
Surr: Dibromofluoromethane	47.53	1.0	50	0	95.1	80 - 119	48.17	1.33	20	
Surr: Toluene-d8	45.36	1.0	50	0	90.7	89 - 112	44.72	1.43	20	

ALS Houston, US

Date: 16-Oct-18

**Client:** Bhat Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

**QC BATCH REPORT**

<b>Batch ID:</b> R325306	<b>Instrument:</b> VOA2	<b>Method:</b> SW8260
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The following samples were analyzed in this batch: 

HS18100281-01	HS18100281-02
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ALS Houston, US

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

**QC BATCH REPORT**

Batch ID: R325461		Instrument: ICS2100		Method: SW9056						
<b>MBLK</b>	Sample ID: <b>WBLKW1-101118</b>	Units: <b>mg/L</b>			Analysis Date: <b>11-Oct-2018 18:26</b>					
Client ID:	Run ID: <b>ICS2100_325461</b>	SeqNo: <b>4773169</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	0.500	0.500							U	
Sulfate	0.500	0.500							U	
<b>LCS</b>	Sample ID: <b>WLCSW1-101118</b>	Units: <b>mg/L</b>			Analysis Date: <b>11-Oct-2018 18:41</b>					
Client ID:	Run ID: <b>ICS2100_325461</b>	SeqNo: <b>4773170</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	20.54	0.500	20	0	103	80 - 120				
Sulfate	20.29	0.500	20	0	101	80 - 120				
<b>LCSD</b>	Sample ID: <b>WLCSDW1-101118</b>	Units: <b>mg/L</b>			Analysis Date: <b>11-Oct-2018 18:56</b>					
Client ID:	Run ID: <b>ICS2100_325461</b>	SeqNo: <b>4773171</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	20.14	0.500	20	0	101	80 - 120	20.54	1.96	20	
Sulfate	19.99	0.500	20	0	100.0	80 - 120	20.29	1.47	20	
<b>MS</b>	Sample ID: <b>HS18100564-02MS</b>	Units: <b>mg/L</b>			Analysis Date: <b>11-Oct-2018 19:54</b>					
Client ID:	Run ID: <b>ICS2100_325461</b>	SeqNo: <b>4773173</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	17.58	0.500	10	7.274	103	80 - 120				
Sulfate	21.24	0.500	10	11.06	102	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18100564-02MSD</b>	Units: <b>mg/L</b>			Analysis Date: <b>11-Oct-2018 20:08</b>					
Client ID:	Run ID: <b>ICS2100_325461</b>	SeqNo: <b>4773174</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	17.63	0.500	10	7.274	104	80 - 120	17.58	0.295	20	
Sulfate	21.27	0.500	10	11.06	102	80 - 120	21.24	0.136	20	

The following samples were analyzed in this batch: HS18100281-01

**ALS Houston, US**

Date: 16-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100281

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

<b>Unit Reported</b>	<b>Description</b>
mg/L	Milligrams per Liter

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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





 <b>ALS</b> 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5658 Fax. +1 281 530 5887	<b>CUSTODY SEAL</b>		Segl-Broken By: <i>SM</i>
	Date: <i>10/4/18</i>	Time: <i>1402</i>	Date: <i>10/05/18</i>
	Name: <i>Scott BEESINGER</i>		
Company: <i>BJT</i>			

*44123* OCT 05 2018

Must Deliver Next Business Day  
Time and Temperature Sensitive!



*44123*

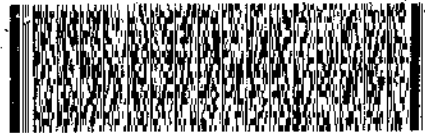
ORIGIN ID: SGRA (803) 930 6193  
 SCOTT BEESINGER  
 APTIM ENVIRONMENTAL & INFRASTRUCTURE  
 1203-B EAST GRAND AVE  
 PMB 202  
 IRVING, TX 75670  
 UNITED STATES US

SHIP DATE: 25APR18  
 ACTWGT: 1.00 LB MAX  
 CRD: 300130/CAF3111  
 DIMS: 26x14x14 IN

TO: CLIENT SERVICES  
 ALS LABORATORY GROUP  
 10450 STANCLIFF ROAD  
 SUITE 210  
 HOUSTON TX 77099

(281) 530-6068  
 REF: CHAAP-37-RJ

RNA: III III III



FedEx  
Express



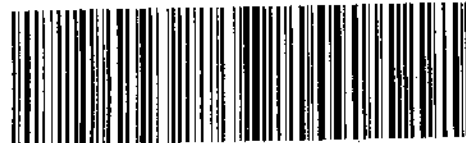
FedEx

TRK#  
0223 4380 9528 4930

FRI - 05 OCT 10:30A  
PRIORITY OVERNIGHT

77099  
TX-US  
IAH

AB SGRA



FTD 162785 040418 066A 553CL/9818/8CRA



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10450 Stancliff Rd. Suite 210  
Houston, TX 77099  
T: +1 281 530 5656  
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October 26, 2018

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

Work Order: **HS18100544**

Laboratory Results for: **Groundwater Treatment Plant Monthly Effluent Samples**

Dear Marcia,

ALS Environmental received 3 sample(s) on Oct 11, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a circular scribble.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

## ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**Work Order:** HS18100544

**SAMPLE SUMMARY**

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Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18100544-01	LH18/24-SP650_101018	Water		10-Oct-2018 14:00	11-Oct-2018 09:05	<input type="checkbox"/>
HS18100544-02	LH18/24-SP650_101018_AIX	Water		10-Oct-2018 14:00	11-Oct-2018 09:05	<input type="checkbox"/>
HS18100544-03	Trip Blank	Water	ALS- 051618-63	10-Oct-2018 00:00	11-Oct-2018 09:05	<input type="checkbox"/>

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ALS Houston, US

Date: 26-Oct-18

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**Work Order:** HS18100544

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**CASE NARRATIVE**

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**Work Order Comments**

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

**GCMS Semivolatiles by Method SW8270SIM****Batch ID: 133527****Sample ID: LH18/24-SP650\_101018 (HS18100544-01)**

- One or more of the method 8270 surrogates were recovered outside of the control limits. This was due to a dilution required for sample analysis.
  - The GCMS semi-volatile extract of this sample was run at a dilution due to a high level of matrix interference.
- 

**GCMS Volatiles by Method SW8260****Batch ID: R325306****Sample ID: HS18091560-01MS**

- MS and MSD are for an unrelated sample.
- 

**Metals by Method SW6020****Batch ID: 133598****Sample ID: HS18100713-02MS**

- MS and MSD are for an unrelated sample
- 

**WetChemistry by Method SW7196****Batch ID: R325270****Sample ID: LH18/24-SP650\_101018 (HS18100544-01)**

- Sample Filtered
-

## ALS Houston, US

Date: 26-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: LH18/24-SP650\_101018  
 Collection Date: 10-Oct-2018 14:00

## ANALYTICAL REPORT

WorkOrder:HS18100544  
 Lab ID:HS18100544-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
<b>2-Butanone</b>	<b>13</b>		<b>0.50</b>	<b>1.0</b>	<b>2.0</b>	<b>ug/L</b>	1	11-Oct-2018 22:00	
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	11-Oct-2018 22:00	
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
<b>4-Methyl-2-pentanone</b>	<b>1.2</b>	<b>J</b>	<b>0.70</b>	<b>1.0</b>	<b>2.0</b>	<b>ug/L</b>	1	11-Oct-2018 22:00	
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	11-Oct-2018 22:00	
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	11-Oct-2018 22:00	
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	

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

## ALS Houston, US

Date: 26-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: LH18/24-SP650\_101018  
 Collection Date: 10-Oct-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100544  
 Lab ID:HS18100544-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>						Analyst: AKP	
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
<b>cis-1,2-Dichloroethene</b>	<b>4.7</b>		<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>ug/L</b>	1	11-Oct-2018 22:00	
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	11-Oct-2018 22:00	
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	11-Oct-2018 22:00	
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Tetrachloroethene	1.0	U	0.30	1.0	1.0	ug/L	1	11-Oct-2018 22:00	
<b>Toluene</b>	<b>0.68</b>	<b>J</b>	<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>ug/L</b>	1	11-Oct-2018 22:00	
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 22:00	
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>92.7</i>			<b>0</b>	<i>81-118</i>	<b>%REC</b>	<i>1</i>	<i>11-Oct-2018 22:00</i>	
<i>Surr: 4-Bromofluorobenzene</i>	<i>103</i>			<b>0</b>	<i>85-114</i>	<b>%REC</b>	<i>1</i>	<i>11-Oct-2018 22:00</i>	
<i>Surr: Dibromofluoromethane</i>	<i>99.8</i>			<b>0</b>	<i>80-119</i>	<b>%REC</b>	<i>1</i>	<i>11-Oct-2018 22:00</i>	
<i>Surr: Toluene-d8</i>	<i>91.5</i>			<b>0</b>	<i>89-112</i>	<b>%REC</b>	<i>1</i>	<i>11-Oct-2018 22:00</i>	
<b>SEMIVOLATILES SIM</b>		<b>Method:SW8270SIM</b>				Prep:SW3510 / 15-Oct-2018		Analyst: ACN	
<b>1,4-Dioxane</b>	<b>3.5</b>		<b>0.10</b>	<b>0.10</b>	<b>0.10</b>	<b>ug/L</b>	10	17-Oct-2018 11:45	
<i>Surr: 2-Fluorobiphenyl</i>	<i>122</i>			<b>0</b>	<i>40-140</i>	<b>%REC</b>	<i>10</i>	<i>17-Oct-2018 11:45</i>	
<i>Surr: 4-Terphenyl-d14</i>	<i>151</i>	<b>S</b>		<b>0</b>	<i>40-140</i>	<b>%REC</b>	<i>10</i>	<i>17-Oct-2018 11:45</i>	
<i>Surr: Nitrobenzene-d5</i>	<i>103</i>			<b>0</b>	<i>40-140</i>	<b>%REC</b>	<i>10</i>	<i>17-Oct-2018 11:45</i>	
<b>ICP-MS METALS BY SW6020A</b>		<b>Method:SW6020</b>				Prep:SW3010A / 16-Oct-2018		Analyst: JC	
<b>Barium</b>	<b>0.174</b>		<b>0.00190</b>	<b>0.00250</b>	<b>0.00400</b>	<b>mg/L</b>	1	17-Oct-2018 15:26	
Lead	0.00100	U	0.000600	0.00100	0.00200	mg/L	1	17-Oct-2018 15:26	
Selenium	0.00200	U	0.00110	0.00200	0.00200	mg/L	1	17-Oct-2018 15:26	
Silver	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	17-Oct-2018 15:26	

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

## ALS Houston, US

Date: 26-Oct-18

Client: Bhat Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: LH18/24-SP650\_101018  
 Collection Date: 10-Oct-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18100544  
 Lab ID:HS18100544-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>HEXAVALENT CHROMIUM BY SW7196A</b>	<b>Method:SW7196</b>					Prep:SW7196		Analyst: KVL
Chromium, Hexavalent	0.0100	U	0.00600	0.0100	0.0100	mg/L	1	11-Oct-2018 11:45

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

## ALS Houston, US

Date: 26-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: LH18/24-SP650\_101018\_AIX  
 Collection Date: 10-Oct-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18100544  
 Lab ID:HS18100544-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>		Analyst: SUB				
Subcontract Analysis	See Attached		0	0		NA	1	26-Oct-2018 10:05

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

## ALS Houston, US

Date: 26-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: Trip Blank  
 Collection Date: 10-Oct-2018 00:00

**ANALYTICAL REPORT**

WorkOrder:HS18100544  
 Lab ID:HS18100544-03  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>						
								Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:11
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	11-Oct-2018 21:11
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	11-Oct-2018 21:11
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:11
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	11-Oct-2018 21:11
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	11-Oct-2018 21:11
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	11-Oct-2018 21:11
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11

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

## ALS Houston, US

Date: 26-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: Trip Blank  
 Collection Date: 10-Oct-2018 00:00

## ANALYTICAL REPORT

WorkOrder:HS18100544  
 Lab ID:HS18100544-03  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>VOLATILES ORGANICS BY METHOD</b>		<b>Method:SW8260</b>						
<b>8260C</b>								Analyst: AKP
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	11-Oct-2018 21:11
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	11-Oct-2018 21:11
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	11-Oct-2018 21:11
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Tetrachloroethene	1.0	U	0.30	1.0	1.0	ug/L	1	11-Oct-2018 21:11
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	11-Oct-2018 21:11
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	11-Oct-2018 21:11
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>90.9</i>			<b>0</b>	<i>81-118</i>	<i>%REC</i>	<i>1</i>	<i>11-Oct-2018 21:11</i>
<i>Surr: 4-Bromofluorobenzene</i>	<i>97.2</i>			<b>0</b>	<i>85-114</i>	<i>%REC</i>	<i>1</i>	<i>11-Oct-2018 21:11</i>
<i>Surr: Dibromofluoromethane</i>	<i>96.0</i>			<b>0</b>	<i>80-119</i>	<i>%REC</i>	<i>1</i>	<i>11-Oct-2018 21:11</i>
<i>Surr: Toluene-d8</i>	<i>93.4</i>			<b>0</b>	<i>89-112</i>	<i>%REC</i>	<i>1</i>	<i>11-Oct-2018 21:11</i>

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

**WEIGHT LOG**

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

**Batch ID:** 133527      **Method:** SEMIVOLATILES SIM      **Prep:** 3510\_B\_SIM

SamplID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18100544-01	1	980	1 (mL)	0.00102

**Batch ID:** 133598      **Method:** ICP-MS METALS BY SW6020A      **Prep:** 3010A

SamplID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18100544-01	1	10	10 (mL)	1



ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> 133527	<b>Test Name :</b> SEMIVOLATILES SIM		<b>Matrix:</b> Water			
HS18100544-01	LH18/24-SP650_101018	10 Oct 2018 14:00		15 Oct 2018 12:09	17 Oct 2018 11:45	10
<b>Batch ID</b> 133598	<b>Test Name :</b> ICP-MS METALS BY SW6020A		<b>Matrix:</b> Water			
HS18100544-01	LH18/24-SP650_101018	10 Oct 2018 14:00		16 Oct 2018 14:00	17 Oct 2018 15:26	1
<b>Batch ID</b> R325270	<b>Test Name :</b> HEXAVALENT CHROMIUM BY SW7196A		<b>Matrix:</b> Water			
HS18100544-01	LH18/24-SP650_101018	10 Oct 2018 14:00			11 Oct 2018 11:45	1
<b>Batch ID</b> R325306	<b>Test Name :</b> VOLATILES ORGANICS BY METHOD 8260C		<b>Matrix:</b> Water			
HS18100544-01	LH18/24-SP650_101018	10 Oct 2018 14:00			11 Oct 2018 22:00	1
HS18100544-03	Trip Blank	10 Oct 2018 00:00			11 Oct 2018 21:11	1
<b>Batch ID</b> R326185	<b>Test Name :</b> SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18100544-02	LH18/24-SP650_101018_AIX	10 Oct 2018 14:00			26 Oct 2018 10:05	1

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

**QC BATCH REPORT**

Batch ID: 133598		Instrument: ICPMS04		Method: SW6020						
<b>MBLK</b>	Sample ID: <b>MBLK-133598</b>	Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 14:56</b>						
Client ID:	Run ID: <b>ICPMS04_325611</b>	SeqNo: <b>4777244</b>		PrepDate: <b>16-Oct-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.00250	0.00400								U
Lead	0.00100	0.00200								U
Selenium	0.00200	0.00200								U
Silver	0.00100	0.00200								U
<b>LCS</b>	Sample ID: <b>LCS-133598</b>	Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 14:59</b>						
Client ID:	Run ID: <b>ICPMS04_325611</b>	SeqNo: <b>4777245</b>		PrepDate: <b>16-Oct-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.04969	0.00400	0.05	0	99.4	80 - 120				
Lead	0.04974	0.00200	0.05	0	99.5	80 - 120				
Selenium	0.05619	0.00200	0.05	0	112	80 - 120				
Silver	0.05173	0.00200	0.05	0	103	80 - 120				
<b>MS</b>	Sample ID: <b>HS18100713-02MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 15:05</b>						
Client ID:	Run ID: <b>ICPMS04_325611</b>	SeqNo: <b>4777248</b>		PrepDate: <b>16-Oct-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.2855	0.00400	0.05	0.2245	122	80 - 120				SO
Lead	0.05178	0.00200	0.05	0.000661	102	80 - 120				
Selenium	0.0539	0.00200	0.05	0.00039	107	80 - 120				
Silver	0.05018	0.00200	0.05	0.000403	99.6	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18100713-02MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 15:08</b>						
Client ID:	Run ID: <b>ICPMS04_325611</b>	SeqNo: <b>4777249</b>		PrepDate: <b>16-Oct-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.2759	0.00400	0.05	0.2245	103	80 - 120	0.2855	3.41	20	O
Lead	0.05	0.00200	0.05	0.000661	98.7	80 - 120	0.05178	3.5	20	
Selenium	0.05218	0.00200	0.05	0.00039	104	80 - 120	0.0539	3.25	20	
Silver	0.04849	0.00200	0.05	0.000403	96.2	80 - 120	0.05018	3.42	20	

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

**QC BATCH REPORT**

Batch ID: 133598		Instrument: ICPMS04		Method: SW6020					
<b>PDS</b>		Sample ID: <b>HS18100713-02PDS</b>		Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 15:10</b>			
Client ID:		Run ID: <b>ICPMS04_325611</b>		SeqNo: <b>4777250</b>		PrepDate: <b>16-Oct-2018</b>		DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Barium	0.3205	0.00400	0.1	0.2245	96.0	75 - 125			
Lead	0.1005	0.00200	0.1	0.000661	99.8	75 - 125			
Selenium	0.1083	0.00200	0.1	0.00039	108	75 - 125			
Silver	0.09282	0.00200	0.1	0.000403	92.4	75 - 125			
<b>SD</b>		Sample ID: <b>HS18100713-02SD</b>		Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 15:03</b>			
Client ID:		Run ID: <b>ICPMS04_325611</b>		SeqNo: <b>4777247</b>		PrepDate: <b>16-Oct-2018</b>		DF: <b>5</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	Limit Qual
Barium	0.2086	0.0200					0.2245	7.07	10
Lead	0.00500	0.0100					0.000661	0	10 U
Selenium	0.0100	0.0100					0.00039	0	10 U
Silver	0.00500	0.0100					0.000403	0	10 U
The following samples were analyzed in this batch: <span style="border: 1px solid black; padding: 2px;">HS18100544-01</span>									

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

**QC BATCH REPORT**

Batch ID: 133527		Instrument: SV-5		Method: SW8270SIM						
<b>MBLK</b>	Sample ID: <b>MBLK-133527</b>	Units: <b>ug/L</b>		Analysis Date: <b>17-Oct-2018 10:43</b>						
Client ID:	Run ID: <b>SV-5_325624</b>	SeqNo: <b>4776628</b>		PrepDate: <b>15-Oct-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.010	0.010								U
Surr: 2-Fluorobiphenyl	0.09216	0	0.08	0	115	40 - 140				
Surr: 4-Terphenyl-d14	0.07498	0	0.08	0	93.7	40 - 140				
Surr: Nitrobenzene-d5	0.0592	0	0.08	0	74.0	40 - 140				

<b>LCS</b>	Sample ID: <b>LCS-133527</b>	Units: <b>ug/L</b>		Analysis Date: <b>17-Oct-2018 11:03</b>						
Client ID:	Run ID: <b>SV-5_325624</b>	SeqNo: <b>4776629</b>		PrepDate: <b>15-Oct-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.07339	0.010	0.08	0	91.7	40 - 140				
Surr: 2-Fluorobiphenyl	0.09456	0	0.08	0	118	40 - 140				
Surr: 4-Terphenyl-d14	0.09908	0	0.08	0	124	40 - 140				
Surr: Nitrobenzene-d5	0.06167	0	0.08	0	77.1	40 - 140				

<b>LCSD</b>	Sample ID: <b>LCSD-133527</b>	Units: <b>ug/L</b>		Analysis Date: <b>17-Oct-2018 11:24</b>						
Client ID:	Run ID: <b>SV-5_325624</b>	SeqNo: <b>4776630</b>		PrepDate: <b>15-Oct-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.07396	0.010	0.08	0	92.4	40 - 140	0.07339	0.766	20	
Surr: 2-Fluorobiphenyl	0.09865	0	0.08	0	123	40 - 140	0.09456	4.24	20	
Surr: 4-Terphenyl-d14	0.0875	0	0.08	0	109	40 - 140	0.09908	12.4	20	
Surr: Nitrobenzene-d5	0.06831	0	0.08	0	85.4	40 - 140	0.06167	10.2	20	

The following samples were analyzed in this batch: HS18100544-01

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

**QC BATCH REPORT**

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MBLK	Sample ID: VBLKW-181011	Units: ug/L			Analysis Date: 11-Oct-2018 13:52					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769923	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

## ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MBLK	Sample ID: VBLKW-181011	Units: ug/L			Analysis Date: 11-Oct-2018 13:52					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769923		PrepDate:		DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	1.0	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	46.02	1.0	50	0	92.0	81 - 118				
Surr: 4-Bromofluorobenzene	48.32	1.0	50	0	96.6	85 - 114				
Surr: Dibromofluoromethane	48.83	1.0	50	0	97.7	80 - 119				
Surr: Toluene-d8	46.12	1.0	50	0	92.2	89 - 112				

## ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
LCS	Sample ID: VLCSW-181011	Units: ug/L			Analysis Date: 11-Oct-2018 13:27					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769922	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	21.18	1.0	20	0	106	78 - 124				
1,1,1-Trichloroethane	18.89	1.0	20	0	94.5	74 - 131				
1,1,2,2-Tetrachloroethane	17.77	1.0	20	0	88.9	71 - 121				
1,1,2-Trichloroethane	20.59	1.0	20	0	103	80 - 119				
1,1-Dichloroethane	20.06	1.0	20	0	100	77 - 125				
1,1-Dichloroethene	18.7	1.0	20	0	93.5	71 - 131				
1,1-Dichloropropene	21.91	1.0	20	0	110	78 - 125				
1,2,3-Trichlorobenzene	18.69	1.0	20	0	93.5	69 - 129				
1,2,3-Trichloropropane	17.88	1.0	20	0	89.4	73 - 122				
1,2,4-Trichlorobenzene	19.81	1.0	20	0	99.1	69 - 130				
1,2,4-Trimethylbenzene	21.56	1.0	20	0	108	76 - 124				
1,2-Dibromo-3-chloropropane	16.86	1.0	20	0	84.3	62 - 128				
1,2-Dibromoethane	20.82	1.0	20	0	104	77 - 121				
1,2-Dichlorobenzene	20.25	1.0	20	0	101	80 - 119				
1,2-Dichloroethane	20.77	1.0	20	0	104	73 - 128				
1,2-Dichloropropane	21.63	1.0	20	0	108	78 - 122				
1,3,5-Trimethylbenzene	19.65	1.0	20	0	98.2	75 - 124				
1,3-Dichlorobenzene	20.49	1.0	20	0	102	80 - 119				
1,3-Dichloropropane	20.93	1.0	20	0	105	80 - 119				
1,4-Dichlorobenzene	20.44	1.0	20	0	102	79 - 118				
2,2-Dichloropropane	23.05	1.0	20	0	115	60 - 139				
2-Butanone	36.82	2.0	40	0	92.1	56 - 143				
2-Chlorotoluene	21.67	1.0	20	0	108	79 - 122				
2-Hexanone	35.97	2.0	40	0	89.9	57 - 139				
4-Chlorotoluene	22.15	1.0	20	0	111	78 - 122				
4-Isopropyltoluene	18.88	1.0	20	0	94.4	77 - 127				
4-Methyl-2-pentanone	37.82	2.0	40	0	94.5	67 - 130				
Acetone	38.36	2.0	40	0	95.9	39 - 160				
Benzene	20.89	1.0	20	0	104	79 - 120				
Bromobenzene	20.11	1.0	20	0	101	80 - 120				
Bromochloromethane	21.14	1.0	20	0	106	78 - 123				
Bromodichloromethane	21.72	1.0	20	0	109	79 - 125				
Bromoform	19.71	1.0	20	0	98.5	66 - 130				
Bromomethane	23.57	1.0	20	0	118	53 - 141				

## ALS Houston, US

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
LCS	Sample ID: VLCSW-181011	Units: ug/L			Analysis Date: 11-Oct-2018 13:27					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769922	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	38.55	2.0	40	0	96.4	64 - 133				
Carbon tetrachloride	20.62	1.0	20	0	103	72 - 136				
Chlorobenzene	21.39	1.0	20	0	107	82 - 118				
Chloroethane	19.99	1.0	20	0	99.9	60 - 138				
Chloroform	19.96	1.0	20	0	99.8	79 - 124				
Chloromethane	18.73	1.0	20	0	93.6	50 - 139				
cis-1,2-Dichloroethene	21.17	1.0	20	0	106	78 - 123				
cis-1,3-Dichloropropene	23.12	1.0	20	0	116	75 - 124				
Dibromochloromethane	20.78	1.0	20	0	104	74 - 126				
Dibromomethane	21.62	1.0	20	0	108	79 - 123				
Dichlorodifluoromethane	16.52	1.0	20	0	82.6	32 - 152				
Ethylbenzene	22.77	1.0	20	0	114	79 - 121				
Hexachlorobutadiene	20.03	1.0	20	0	100	66 - 134				
Isopropylbenzene	20.08	1.0	20	0	100	72 - 131				
m,p-Xylene	45.76	2.0	40	0	114	80 - 121				
Methylene chloride	20.89	2.0	20	0	104	74 - 124				
Naphthalene	17.05	1.0	20	0	85.3	61 - 128				
n-Butylbenzene	20.89	1.0	20	0	104	75 - 128				
n-Propylbenzene	22.03	1.0	20	0	110	76 - 126				
o-Xylene	22.68	1.0	20	0	113	78 - 122				
sec-Butylbenzene	18.97	1.0	20	0	94.9	77 - 126				
Styrene	21.7	1.0	20	0	109	78 - 123				
tert-Butylbenzene	21.58	1.0	20	0	108	78 - 124				
Tetrachloroethene	20.04	1.0	20	0	100	74 - 129				
Toluene	20.32	1.0	20	0	102	80 - 121				
trans-1,2-Dichloroethene	20.76	1.0	20	0	104	75 - 124				
trans-1,3-Dichloropropene	23.52	1.0	20	0	118	73 - 127				
Trichloroethene	20.64	1.0	20	0	103	79 - 123				
Trichlorofluoromethane	19.71	1.0	20	0	98.5	65 - 141				
Vinyl chloride	19.68	1.0	20	0	98.4	58 - 137				
Surr: 1,2-Dichloroethane-d4	46.44	1.0	50	0	92.9	81 - 118				
Surr: 4-Bromofluorobenzene	51.01	1.0	50	0	102	85 - 114				
Surr: Dibromofluoromethane	47.52	1.0	50	0	95.0	80 - 119				
Surr: Toluene-d8	45.07	1.0	50	0	90.1	89 - 112				



ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

**QC BATCH REPORT**

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MS	Sample ID: HS18091560-01MS	Units: ug/L			Analysis Date: 11-Oct-2018 15:54					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769927	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	19.53	1.0	20	0	97.6	78 - 124				
1,1,1-Trichloroethane	19.21	1.0	20	0	96.1	74 - 131				
1,1,2,2-Tetrachloroethane	16.71	1.0	20	0	83.5	71 - 121				
1,1,2-Trichloroethane	19.13	1.0	20	0	95.7	80 - 119				
1,1-Dichloroethane	19.79	1.0	20	0	99.0	77 - 125				
1,1-Dichloroethene	20.54	1.0	20	0	103	71 - 131				
1,1-Dichloropropene	22.09	1.0	20	0	110	78 - 125				
1,2,3-Trichlorobenzene	16.28	1.0	20	0	81.4	69 - 129				
1,2,3-Trichloropropane	16.5	1.0	20	0	82.5	73 - 122				
1,2,4-Trichlorobenzene	17.2	1.0	20	0	86.0	69 - 130				
1,2,4-Trimethylbenzene	20.17	1.0	20	0	101	76 - 124				
1,2-Dibromo-3-chloropropane	14.76	1.0	20	0	73.8	62 - 128				
1,2-Dibromoethane	19.69	1.0	20	0	98.4	77 - 121				
1,2-Dichlorobenzene	18.62	1.0	20	0	93.1	80 - 119				
1,2-Dichloroethane	20.34	1.0	20	0	102	73 - 128				
1,2-Dichloropropane	20.71	1.0	20	0	104	78 - 122				
1,3,5-Trimethylbenzene	18.69	1.0	20	0	93.5	75 - 124				
1,3-Dichlorobenzene	19.01	1.0	20	0	95.1	80 - 119				
1,3-Dichloropropane	19.62	1.0	20	0	98.1	80 - 119				
1,4-Dichlorobenzene	19.25	1.0	20	0	96.2	79 - 118				
2,2-Dichloropropane	22.25	1.0	20	0	111	60 - 139				
2-Butanone	34.75	2.0	40	0	86.9	56 - 143				
2-Chlorotoluene	20.78	1.0	20	0	104	79 - 122				
2-Hexanone	33.39	2.0	40	0	83.5	57 - 139				
4-Chlorotoluene	20.66	1.0	20	0	103	78 - 122				
4-Isopropyltoluene	18.23	1.0	20	0	91.1	77 - 127				
4-Methyl-2-pentanone	35.1	2.0	40	0	87.7	67 - 130				
Acetone	30.49	2.0	40	0	76.2	39 - 160				
Benzene	20.36	1.0	20	0	102	79 - 120				
Bromobenzene	18.53	1.0	20	0	92.7	80 - 120				
Bromochloromethane	19.75	1.0	20	0	98.8	78 - 123				
Bromodichloromethane	20.5	1.0	20	0	102	79 - 125				
Bromoform	18.21	1.0	20	0	91.1	66 - 130				
Bromomethane	20.88	1.0	20	0	104	53 - 141				

## ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MS	Sample ID: HS18091560-01MS	Units: ug/L			Analysis Date: 11-Oct-2018 15:54					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769927	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	40.49	2.0	40	0	101	64 - 133				
Carbon tetrachloride	21.02	1.0	20	0	105	72 - 136				
Chlorobenzene	20.04	1.0	20	0	100	82 - 118				
Chloroethane	19.92	1.0	20	0	99.6	60 - 138				
Chloroform	19.29	1.0	20	0	96.4	79 - 124				
Chloromethane	20.42	1.0	20	0	102	50 - 139				
cis-1,2-Dichloroethene	21.92	1.0	20	6.295	78.1	78 - 123				
cis-1,3-Dichloropropene	21.54	1.0	20	0	108	75 - 124				
Dibromochloromethane	18.93	1.0	20	0	94.7	74 - 126				
Dibromomethane	19.85	1.0	20	0	99.2	79 - 123				
Dichlorodifluoromethane	16.07	1.0	20	0	80.4	32 - 152				
Ethylbenzene	22.09	1.0	20	0	110	79 - 121				
Hexachlorobutadiene	18.71	1.0	20	0	93.5	66 - 134				
Isopropylbenzene	20.08	1.0	20	0	100	72 - 131				
m,p-Xylene	44.16	2.0	40	0	110	80 - 121				
Methylene chloride	21.36	2.0	20	3.64	88.6	74 - 124				
Naphthalene	14.24	1.0	20	0	71.2	61 - 128				
n-Butylbenzene	19.73	1.0	20	0	98.6	75 - 128				
n-Propylbenzene	21.28	1.0	20	0	106	76 - 126				
o-Xylene	21.71	1.0	20	0	109	78 - 122				
sec-Butylbenzene	18.77	1.0	20	0	93.8	77 - 126				
Styrene	20.12	1.0	20	0	101	78 - 123				
tert-Butylbenzene	21	1.0	20	0	105	78 - 124				
Tetrachloroethene	20.24	1.0	20	0	101	74 - 129				
Toluene	19.95	1.0	20	0	99.8	80 - 121				
trans-1,2-Dichloroethene	20.89	1.0	20	0	104	75 - 124				
trans-1,3-Dichloropropene	21.34	1.0	20	0	107	73 - 127				
Trichloroethene	25.86	1.0	20	15.06	54.0	79 - 123				S
Trichlorofluoromethane	21.17	1.0	20	0	106	65 - 141				
Vinyl chloride	21.37	1.0	20	0	107	58 - 137				
Surr: 1,2-Dichloroethane-d4	47.01	1.0	50	0	94.0	81 - 118				
Surr: 4-Bromofluorobenzene	50.1	1.0	50	0	100	85 - 114				
Surr: Dibromofluoromethane	48.17	1.0	50	0	96.3	80 - 119				
Surr: Toluene-d8	44.72	1.0	50	0	89.4	89 - 112				

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

**QC BATCH REPORT**

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MSD	Sample ID: HS18091560-01MSD	Units: ug/L			Analysis Date: 11-Oct-2018 16:18					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769928	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	19.69	1.0	20	0	98.4	78 - 124	19.53	0.828	20	
1,1,1-Trichloroethane	18.61	1.0	20	0	93.0	74 - 131	19.21	3.18	20	
1,1,2,2-Tetrachloroethane	16.71	1.0	20	0	83.5	71 - 121	16.71	0.00947	20	
1,1,2-Trichloroethane	19.24	1.0	20	0	96.2	80 - 119	19.13	0.557	20	
1,1-Dichloroethane	19.5	1.0	20	0	97.5	77 - 125	19.79	1.49	20	
1,1-Dichloroethene	19.52	1.0	20	0	97.6	71 - 131	20.54	5.12	20	
1,1-Dichloropropene	20.38	1.0	20	0	102	78 - 125	22.09	8.04	20	
1,2,3-Trichlorobenzene	16.84	1.0	20	0	84.2	69 - 129	16.28	3.4	20	
1,2,3-Trichloropropane	16.81	1.0	20	0	84.1	73 - 122	16.5	1.91	20	
1,2,4-Trichlorobenzene	18.05	1.0	20	0	90.3	69 - 130	17.2	4.83	20	
1,2,4-Trimethylbenzene	20.03	1.0	20	0	100	76 - 124	20.17	0.698	20	
1,2-Dibromo-3-chloropropane	15.77	1.0	20	0	78.9	62 - 128	14.76	6.6	20	
1,2-Dibromoethane	19.33	1.0	20	0	96.7	77 - 121	19.69	1.8	20	
1,2-Dichlorobenzene	18.66	1.0	20	0	93.3	80 - 119	18.62	0.176	20	
1,2-Dichloroethane	20.44	1.0	20	0	102	73 - 128	20.34	0.468	20	
1,2-Dichloropropane	20.35	1.0	20	0	102	78 - 122	20.71	1.75	20	
1,3,5-Trimethylbenzene	18.17	1.0	20	0	90.8	75 - 124	18.69	2.84	20	
1,3-Dichlorobenzene	18.82	1.0	20	0	94.1	80 - 119	19.01	1.04	20	
1,3-Dichloropropane	19.52	1.0	20	0	97.6	80 - 119	19.62	0.51	20	
1,4-Dichlorobenzene	18.89	1.0	20	0	94.4	79 - 118	19.25	1.87	20	
2,2-Dichloropropane	21.55	1.0	20	0	108	60 - 139	22.25	3.18	20	
2-Butanone	35.16	2.0	40	0	87.9	56 - 143	34.75	1.18	20	
2-Chlorotoluene	20.04	1.0	20	0	100	79 - 122	20.78	3.58	20	
2-Hexanone	34.12	2.0	40	0	85.3	57 - 139	33.39	2.16	20	
4-Chlorotoluene	20.54	1.0	20	0	103	78 - 122	20.66	0.583	20	
4-Isopropyltoluene	17.72	1.0	20	0	88.6	77 - 127	18.23	2.85	20	
4-Methyl-2-pentanone	35.29	2.0	40	0	88.2	67 - 130	35.1	0.562	20	
Acetone	32.51	2.0	40	0	81.3	39 - 160	30.49	6.41	20	
Benzene	19.64	1.0	20	0	98.2	79 - 120	20.36	3.58	20	
Bromobenzene	18.44	1.0	20	0	92.2	80 - 120	18.53	0.518	20	
Bromochloromethane	19.99	1.0	20	0	100.0	78 - 123	19.75	1.19	20	
Bromodichloromethane	19.93	1.0	20	0	99.7	79 - 125	20.5	2.79	20	
Bromoform	18.63	1.0	20	0	93.1	66 - 130	18.21	2.26	20	
Bromomethane	21.28	1.0	20	0	106	53 - 141	20.88	1.92	20	

## ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

## QC BATCH REPORT

Batch ID: R325306		Instrument: VOA2		Method: SW8260						
MSD	Sample ID: HS18091560-01MSD	Units: ug/L			Analysis Date: 11-Oct-2018 16:18					
Client ID:	Run ID: VOA2_325306	SeqNo: 4769928		PrepDate:		DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	38.55	2.0	40	0	96.4	64 - 133	40.49	4.9	20	
Carbon tetrachloride	19.89	1.0	20	0	99.5	72 - 136	21.02	5.48	20	
Chlorobenzene	19.81	1.0	20	0	99.1	82 - 118	20.04	1.16	20	
Chloroethane	19.08	1.0	20	0	95.4	60 - 138	19.92	4.31	20	
Chloroform	18.77	1.0	20	0	93.8	79 - 124	19.29	2.74	20	
Chloromethane	17.82	1.0	20	0	89.1	50 - 139	20.42	13.6	20	
cis-1,2-Dichloroethene	20.46	1.0	20	6.295	70.8	78 - 123	21.92	6.9	20	S
cis-1,3-Dichloropropene	20.9	1.0	20	0	105	75 - 124	21.54	3.03	20	
Dibromochloromethane	19.45	1.0	20	0	97.3	74 - 126	18.93	2.71	20	
Dibromomethane	18.96	1.0	20	0	94.8	79 - 123	19.85	4.58	20	
Dichlorodifluoromethane	14.38	1.0	20	0	71.9	32 - 152	16.07	11.1	20	
Ethylbenzene	21.69	1.0	20	0	108	79 - 121	22.09	1.79	20	
Hexachlorobutadiene	18.6	1.0	20	0	93.0	66 - 134	18.71	0.611	20	
Isopropylbenzene	19.39	1.0	20	0	97.0	72 - 131	20.08	3.51	20	
m,p-Xylene	43.7	2.0	40	0	109	80 - 121	44.16	1.03	20	
Methylene chloride	20.1	2.0	20	3.64	82.3	74 - 124	21.36	6.1	20	
Naphthalene	15.26	1.0	20	0	76.3	61 - 128	14.24	6.92	20	
n-Butylbenzene	19.87	1.0	20	0	99.3	75 - 128	19.73	0.704	20	
n-Propylbenzene	20.66	1.0	20	0	103	76 - 126	21.28	2.95	20	
o-Xylene	21.18	1.0	20	0	106	78 - 122	21.71	2.49	20	
sec-Butylbenzene	18.07	1.0	20	0	90.3	77 - 126	18.77	3.79	20	
Styrene	20.3	1.0	20	0	102	78 - 123	20.12	0.927	20	
tert-Butylbenzene	20.04	1.0	20	0	100	78 - 124	21	4.69	20	
Tetrachloroethene	19.39	1.0	20	0	96.9	74 - 129	20.24	4.3	20	
Toluene	19.4	1.0	20	0	97.0	80 - 121	19.95	2.8	20	
trans-1,2-Dichloroethene	19.96	1.0	20	0	99.8	75 - 124	20.89	4.56	20	
trans-1,3-Dichloropropene	21.33	1.0	20	0	107	73 - 127	21.34	0.0145	20	
Trichloroethene	22.71	1.0	20	15.06	38.3	79 - 123	25.86	13	20	S
Trichlorofluoromethane	19.85	1.0	20	0	99.2	65 - 141	21.17	6.47	20	
Vinyl chloride	19.56	1.0	20	0	97.8	58 - 137	21.37	8.86	20	
Surr: 1,2-Dichloroethane-d4	47.92	1.0	50	0	95.8	81 - 118	47.01	1.9	20	
Surr: 4-Bromofluorobenzene	50.23	1.0	50	0	100	85 - 114	50.1	0.253	20	
Surr: Dibromofluoromethane	47.53	1.0	50	0	95.1	80 - 119	48.17	1.33	20	
Surr: Toluene-d8	45.36	1.0	50	0	90.7	89 - 112	44.72	1.43	20	

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

**QC BATCH REPORT**

**Batch ID:** R325306      **Instrument:** VOA2      **Method:** SW8260

The following samples were analyzed in this batch: HS18100544-01      HS18100544-03

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18100544

**QC BATCH REPORT**

Batch ID:	R325270	Instrument:	UV-2450	Method:	SW7196					
<b>MBLK</b>	Sample ID: <b>MBLK-R325270</b>	Units: <b>mg/L</b>	Analysis Date: <b>11-Oct-2018 11:45</b>							
Client ID:	Run ID: <b>UV-2450_325270</b>	SeqNo: <b>4769064</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Chromium, Hexavalent	0.0100	0.0100								U
<b>LCS</b>	Sample ID: <b>LCS-R325270</b>	Units: <b>mg/L</b>	Analysis Date: <b>11-Oct-2018 11:45</b>							
Client ID:	Run ID: <b>UV-2450_325270</b>	SeqNo: <b>4769063</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Chromium, Hexavalent	0.251	0.0100	0.25	0	100	80 - 120				
<b>MS</b>	Sample ID: <b>HS18100549-01MS</b>	Units: <b>mg/L</b>	Analysis Date: <b>11-Oct-2018 11:45</b>							
Client ID:	Run ID: <b>UV-2450_325270</b>	SeqNo: <b>4769066</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Chromium, Hexavalent	0.259	0.0100	0.25	-0.004	105	75 - 125				
<b>MSD</b>	Sample ID: <b>HS18100549-01MSD</b>	Units: <b>mg/L</b>	Analysis Date: <b>11-Oct-2018 11:45</b>							
Client ID:	Run ID: <b>UV-2450_325270</b>	SeqNo: <b>4769065</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Chromium, Hexavalent	0.255	0.0100	0.25	-0.004	104	75 - 125	0.259	1.56	20	

The following samples were analyzed in this batch: HS18100544-01

**ALS Houston, US**

Date: 26-Oct-18

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<b>Client:</b>	Bhate Environmental Associates, Inc.	<b>QUALIFIERS, ACRONYMS, UNITS</b>
<b>Project:</b>	Groundwater Treatment Plant Monthly Effluent Samples	
<b>WorkOrder:</b>	<b>HS18100544</b>	

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<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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







 <b>ALS</b> 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5856 Fax. +1 281 530 5887	<b>CUSTODY SEAL</b>		Ship By: <b>PM</b> Date: <b>10/11/82</b>
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	Name: <b>Scott Bellingard</b>	Company: <b>SHATE</b>	

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## Case Narrative

**Method:** 6850

**Analysis:** Perchlorate

**Analysis SOP:** LC-MS-CLO4

**ALS WO ID(s):** 1828819; 1828820; 1828821;  
1828822

**Client:** ALS Laboratories (Houston, TX)

**Matrix:** Water

**ELMS Batch (HBN):** 2156 (225255)

**General Set Information:** There were sixteen 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  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** Field sample 1828821001 was analyzed and reported from a 1:1,000 dilution. Field samples 1828822008/09/15 were analyzed and reported from a 1:10 dilutions. The reporting limits have been adjusted accordingly.

**Method QC data:** The method blank (LMB 623846) was less than 1/2 the CRDL. The recovery for the LCS (623847) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on samples 18288011/12 (Client ID: 16WW31-181010). 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 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

Thomas Bosch                      October 25, 2018  
Analyst    Date



# ANALYTICAL REPORT

Report Date: October 25, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1828819**

Project ID: HS18100544 101018

Purchase Order: HS18100544

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_101018_AIX	1828819001	10/10/18	10/12/18	



## ANALYTICAL REPORT

Workorder: 34-1828819

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP650_101018_AIX</b>	Sampling Site: NA	Collected: 10/10/2018				
Lab ID: 1828819001	Media: 125 mL Nalgene	Received: 10/12/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2156 (HBN: 225255) Analyzed: 10/19/2018 09:14	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
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 10/24/2018 13:21	/S/ Stephen Brose 10/25/2018 13:31

## Laboratory Contact Information

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

Phone: (801) 266-7700  
Email: [alslt.lab@ALSGlobal.com](mailto:alslt.lab@ALSGlobal.com)  
Web: [www.alsslc.com](http://www.alsslc.com)



## ANALYTICAL REPORT

**Workorder:** 34-1828819

**Client:** ALS Environmental  
(Houston)

**Project Manager:** Kevin W. Griffiths

### General Lab Comments

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

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

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

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

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

### Result Symbol Definitions

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

### Qualifier Symbol Definitions

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





# Quality Control Sample Batch Report

00921662

## Analysis Information

**Workorder:** 1828819

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2156 (HBN: 225255)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 623846 <b>Analyzed:</b> 10/19/2018 08:46 <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 623847 <b>Analyzed:</b> 10/19/2018 09:00 <b>Dilution:</b> 1 <b>Units:</b> ug/L				
Analyte	Result	Target	% Rec	QC Limits
Perchlorate	4.90	5.00	98.0	78.8   123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1828822010 <b>Analyzed:</b> 10/19/2018 12:35 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MS:</b> 1828822011 <b>Analyzed:</b> 10/19/2018 13:32 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MSD:</b> 1828822012 <b>Analyzed:</b> 10/19/2018 14:47 <b>Dilution:</b> 1 <b>Units:</b> ug/L			
Analyte	Result	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Perchlorate	ND	4.96	5	99.1	78.8   123.8	4.83	96.5	2.69	0.0   20.0

## Continuing Calibration Verification

<b>CCV:</b> 623843 <b>Analyzed:</b> 10/19/2018 08:02 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 623848 <b>Analyzed:</b> 10/19/2018 11:38 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 623850 <b>Analyzed:</b> 10/19/2018 15:03 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	24.4	25.0	97.8	24.7	25.0	98.6	24.4	25.0	97.6

## Interference Check Sample

<b>ICSA:</b> 623845 <b>Analyzed:</b> 10/19/2018 08:32 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	1.01	1.00	101

## Limit of Detection Verification

<b>LODV:</b> 623844 <b>Analyzed:</b> 10/19/2018 08:18 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 623849 <b>Analyzed:</b> 10/19/2018 11:52 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 623851 <b>Analyzed:</b> 10/19/2018 15:17 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.978	1.00	97.8	1.02	1.00	102	0.983	1.00	98.3



# Quality Control Sample Batch Report

00921663

## Analysis Information

**Workorder:** 1828819

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2156 (HBN: 225255)

**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 10/24/2018 13:21	/S/ Stephen Brose 10/25/2018 13:31

## 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



186928/#2

10450 Stancliff Rd, Ste 210  
Houston, TX 77099  
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www.alsglobal.com



### Chain of Custody

COC ID: 9991

1828819

#### SUBCONTRACT TO:

ALS Laboratory Group  
960 West LeVoy Drive  
Salt Lake City, UT 84123

Phone: +1 800 356 9135

#### 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:** HS18100544  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18100544-02	LH18/24-SP650_101018_AIX	Water	10 Oct 2018 14:00
SUB_Perch-6850			19 Oct 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: J. Modashia  
Received By: [Signature]  
Cooler ID(s): \_\_\_\_\_

Date/Time: 10/11/18 18:00  
Date/Time: 10/22/18 7:40  
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: 1828819  
 Date/Time of Receipt: 9:40 10/12/08 Number of Coolers Received: 1

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

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

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8821	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: [Signature] M Schmitt 10/12/08  
Signature Printed Name Date

**CLIENT-RELATED INFORMATION**

- |  |   |  |   |
|--|---|--|---|
| <input type="checkbox"/> Missing Cooler                  | <input type="checkbox"/> Missing Samples/Bottles          | <input type="checkbox"/> Incorrect Preservation    | <input type="checkbox"/> Insufficient Sample Volume |
| <input type="checkbox"/> Cooler Conditions               | <input type="checkbox"/> Broken/Leaking Samples           | <input type="checkbox"/> pH Criteria Not Met       | <input type="checkbox"/> Chain of Custody Problems  |
| <input type="checkbox"/> Missing Paperwork               | <input type="checkbox"/> Incorrect Bottle Type            | <input type="checkbox"/> Residual Chlorine Present | <input type="checkbox"/> Other:                     |
| <input type="checkbox"/> Missing/Incorrect Bottle Labels | <input type="checkbox"/> Cooler Temperatures Out of Range | <input type="checkbox"/> 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: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature



**Must Deliver Next Business Day  
Time and Temperature Sensitive!**

Part #: 159469-434 PRT2 EXP 07/98

ORIGIN ID: 9GRA (201) 530-5656  
SHIPPING DEPT  
ALS LABORATORY GROUP  
10450 STANCLIFF  
SUITE 210  
HOUSTON, TX 77099  
UNITED STATES US

SHIP DATE: 11OCT18  
ACTWGT: 23.35 LB  
CAD: 300130/CAFE3211  
DIMS: 19x16x13 IN

BILL THIRD PARTY

**TO SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
960 W. LEVOY DRIVE**

**SALT LAKE CITY UT 84123**

(801) 266-7700

REF: HS18100544/546/548/549 RJ



**FedEx  
Express**

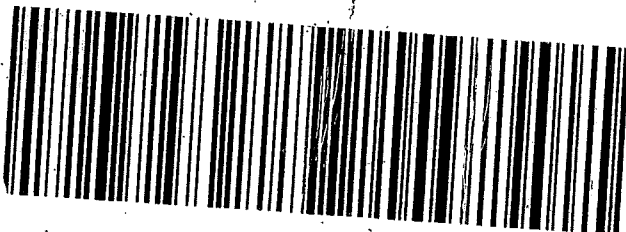


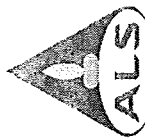
TRK# 4380 9533 5085  
0201

**FRI - 12 OCT 3:00P  
STANDARD OVERNIGHT**

**AX BTFA**

**84123  
UT-US SLC**





# Batch Worklist

HBN: 225255

Instrument:

Created: 10/19/2018 07:56



Status: WP

Analyst: T. Bosch

Batch: ELMS/2156

Rule: EPA 6850, DoD QSM Water

Workorder: 1828819 [ENV\_LVL4]

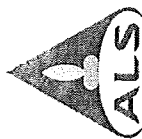
Workorder: 1828820 [ENV\_LVL4]

Workorder: 1828821 [ENV\_LVL4]

Workorder: 1828822 [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	623843	CCV for HBN 225255 [ELMS/2156]				CCV	3	E685041C3Q	5311		10/25/2018	10/25/2018
2	623844	LODV for HBN 225255 [ELMS/2156]				LODV	3	E6850.D3Q	5311		10/25/2018	10/25/2018
3	623845	ICS for HBN 225255 [ELMS/2156]				ICS	3	E6850.D3Q	5311		10/25/2018	10/25/2018
4	623846	LMB for HBN 225255 [ELMS/2156]				LMB	3	E6850Q413Q	5311		10/25/2018	10/25/2018
5	623847	LCS for HBN 225255 [ELMS/2156]				LCS	3	E6850Q413Q	5311		10/25/2018	10/25/2018
6	1828819001	LH18/24-SF650_101018_AIX				SAMPLE	3	1828819001-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
7	1828820001	LH18/24-SP650_101018_AIX				SAMPLE	3	1828820001-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
8	1828821001	LH18/24-SP140_101018				SAMPLE	3	1828821001-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
9	1828822001	16WW38-181010				SAMPLE	3	1828822001-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
10	1828822002	16WW44-181010				SAMPLE	3	1828822002-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
11	1828822003	16WW33-181010				SAMPLE	3	1828822003-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
12	1828822004	16WW37-181010				SAMPLE	3	1828822004-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
13	1828822005	16WW45-181010				SAMPLE	3	1828822005-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
14	1828822006	16WW14-181010				SAMPLE	3	1828822006-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
15	1828822007	16WW34-181010				SAMPLE	3	1828822007-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
16	623848	CCV for HBN 225255 [ELMS/2156]				CCV	3	E685041C3Q	5311		10/25/2018	10/25/2018
17	623849	LODV for HBN 225255 [ELMS/2156]				LODV	3	E6850.D3Q	5311		10/25/2018	10/25/2018
18	1828822008	16WW35-181010				SAMPLE	3	1828822008-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
19	1828822009	16WW16-181010				SAMPLE	3	1828822009-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
20	1828822010	16WW31-181010				SAMPLE	3	1828822010-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
21	1828822011	16WW31-181010MS				MS	3	1828822011-A E6850Q413Q	5480		10/25/2018	10/25/2018
22	1828822012	16WW31-181010MSD				MSD	3	1828822012-A E6850Q413Q	5480		10/25/2018	10/25/2018
23	1828822013	16WW31-181010-FD				FLDDUP	3	1828822013-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
24	1828822014	16WW22-181010				SAMPLE	3	1828822014-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
25	1828822015	16WW39-181010				SAMPLE	3	1828822015-A E6850Q41.3	5480	11/7/2018	10/25/2018	10/25/2018
26	623850	CCV for HBN 225255 [ELMS/2156]				CCV	3	E685041C3Q	5311		10/25/2018	10/25/2018

# Batch Worklist



Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
27	623851	LODY for HBN 225255 [ELMS/2156				LODY	3		E6850..D3Q	5311			10/25/2018





**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**

ALS Work Order #'s & Sample #'s: 1828819 (001); 1828820 (001); 1828821 (001); 1828822 (001-15)  
 ELMS Batch/HBN ID: 2155 (225024)  
 Prep Date: 10/17/2018 Analysis Date: 10/19/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\OCT\19OCT18D.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: 2 Injection Volume: 25µL  
 Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

**FLOW GRADIENT:**

Time (min.)	Flow (mL/min)
0	0.80
5.0	0.80
5.3	0.25
10.0	0.25
10.5	0.80
12.5	0.80

**QC DATA:** 5.0µL of QC Solution Horizon ID 41830 was used for LCS 623847; Target = 5.0µg/L. ASTM type II water was used for LMB 623846.

**MS/MSD:** MS/MSD was performed on samples 1828822011/12 (Client ID: 16WW31-181010). 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 sample 1828821001 was analyzed and reported from a 1:1,000 dilution. Field samples 1828822008/09/15 were analyzed and reported from a 1:10 dilutions. The reporting limits have been adjusted accordingly.
- 2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
- 3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\OCT\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- 4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\225255-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATA\REVIEW\HBN#

### 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.**

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
<u>Batch(es)/SDG: ELMS 2156 HBN, 225255</u>		
<u>Sample Set IDs if Applicable: 1828819/1828820/1828821/1828822</u>		
<u>Calibration standards analyzed and meets criteria</u>	TB	
<u>Standards traceability checked and meets criteria</u>	TB	
<u>Standard curve coefficients evaluated and meet criteria</u>	TB	
<u>ICVs analyzed and meet acceptance criteria</u>	TB	
<u>CCVs analyzed and meet acceptance criteria</u>	TB	
<u>Method Blanks analyzed and meet acceptance criteria</u>	TB	
<u>Retention Time Windows checked</u>	TB	
<u>For method 8081A, Endrin/DDT Breakdown is checked for compliance</u>	-	
<u>Surrogate recoveries checked and appropriately addressed</u>	-	
<u>Method Preparation Blanks analyzed and meet acceptance criteria</u>	TB	
<u>MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed</u>	TB	
<u>RLVS analyzed</u>	TB	
<u>Preparation and analysis hold times met</u>	TB	
<u>Preparation deviations and re-preparations noted when performed</u>	TB	
<u>Analysis deviations and re-analyses noted when performed</u>	TB	
<u>Sample dilution factors noted on reports</u>	TB	
<u>Electronic records in HBN transcription accuracy and completeness checked</u>	TB	
<u>Preparation and analysis calculations checked</u>	TB	
<u>NCRs are completed as necessary NC/CAR#</u>	-	
<u>Report forms are complete and accurate</u>	TB	
<u>Manual integrations checked</u>	TB	

TB 10-25-18



## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK			Description - 6850 WKG Std 100.ug/L		
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659		Created By: Thomas Bosch	
MFG: AccuStandard		Create Date: 09/17/2018 09:09AM	
MFG Lot: 218065075		Expires: 07/25/2020	
Part ID: IC-PER-10X-1		Usable: No	
		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK			Description - 6850 QC WKG STD 100ug/L		
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC WRK 100.ug/L	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	100 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019





## STANDARD REPORT

### Constituent

#### Working Standard - CLO4 QC INT

CLO4 QC INT		Description - 6850 QC Intrmdt Std-QC 10ug/mL			
Standard: 41830 MFG: ALS/SLC MFG Lot: TNB: 05/09/2018 Pipette ID: Not Provided		Created By: Thomas Bosch Create Date: 05/09/2018 10:05AM		Amount: 10 mL Expires: 05/09/2019 Usable: Yes Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided			Usable: Yes
Part ID: Not Provided			Lab Lot: LAB 109
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description - 6850 QC Stock STD 1,000ug/mL	
Standard: 36748		Created By: Thomas Bosch	Amount: 100 mL
MFG: Ultra Scientific		Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020
MFG Lot: CP-0860			Usable: Yes
Part ID: ICC-013			Lab Lot: CLO4 QC STOCK
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730	Created By: Thomas Bosch	Amount: 25 mL			
MFG: ALS/SLC	Create Date: 09/20/2018 09:09AM	Expires: 09/20/2019			
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes			
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK			
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock	
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL



# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

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

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

Solvent: water (low TOC, < 50 ppb)

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

**Traceability:**  
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCCL 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.

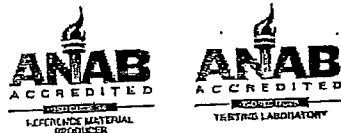
**Homogeneity:**  
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

**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.





# Certificate of Analysis

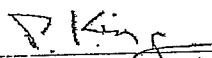


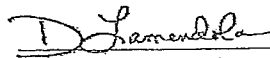
## ISO Guide 34 Reference Material

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

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

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

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

  
Daniel J. Lamendola  
Director of QA/RA



125 Market Street  
New Haven, CT 06513  
USA



AccuStandard®

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

# CERTIFICATE OF ANALYSIS



43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is  $\pm 0.24\%$ .

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  $\pm 0.5\%$  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





Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

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



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

## Product Information

Chemical Purity Specification:  $\geq 98\%$   
 Labeled CAS Number: NA  
 Unlabeled CAS Number: 7601-89-0  
 MW\*: 130.4  
 Chemical Formula:  $\text{NaClO}_4$   
 Storage: Store at room temperature away from light and moisture.  
 Stability: See storage and expiration date.

## Certification

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

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

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

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

Approved by: T. J. Eckersley

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

## Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



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

November 01, 2018

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

Work Order: **HS18100546**

Laboratory Results for: **Groundwater Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Oct 11, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval scribble.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 01-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18100546

**SAMPLE SUMMARY**

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Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18100546-01	LH18/24-SP650_101018	Water		10-Oct-2018 14:00	11-Oct-2018 09:05	<input type="checkbox"/>
HS18100546-02	LH18/24-SP650_101018_AIX	Water		10-Oct-2018 14:00	11-Oct-2018 09:05	<input type="checkbox"/>

---

**ALS Houston, US**

Date: 01-Nov-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:**

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**CASE NARRATIVE**

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**Work Order Comments**

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

**Work Order Comments**

- The analysis for TOC was subcontracted to ALS Environmental in Kelso WA. Final report attached.
- 

**WetChemistry by Method E365.3**

**Batch ID: R325541**

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

**WetChemistry by Method E350.3**

**Batch ID: R325460**

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

## ALS Houston, US

Date: 01-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_101018  
 Collection Date: 10-Oct-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18100546  
 Lab ID:HS18100546-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>AMMONIA AS N BY E350.3(ISE)</b>								Analyst: MZD
	Method:E350.3							
Nitrogen, Ammonia (As N)	19		0.20	0.20	0.20	mg/L	1	15-Oct-2018 10:35
<b>ORTHO PHOSPHATE (PO4) AS P BY E365.3</b>								Analyst: MZD
	Method:E365.3							
Phosphorus, Total Orthophosphate (As P)	0.480		0.100	0.250	0.250	mg/L	10	11-Oct-2018 15:00
<b>SUBCONTRACT ANALYSIS - TOC ANALYSIS</b>								Analyst: SUBK
	Method:NA							
Subcontract Analysis	See Attached		0	0			1	01-Nov-2018 11:28

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

## ALS Houston, US

Date: 01-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_101018\_AIX  
 Collection Date: 10-Oct-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18100546  
 Lab ID:HS18100546-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>		Analyst: SUB				
Subcontract Analysis	See Attached		0	0		NA	1	26-Oct-2018 10:05

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

ALS Houston, US

Date: 01-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100546

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R325460	<b>Test Name</b> : AMMONIA AS N BY E350.3(ISE)		<b>Matrix:</b> Water			
HS18100546-01	LH18/24-SP650_101018	10 Oct 2018 14:00			15 Oct 2018 10:35	1
<b>Batch ID</b> R325541	<b>Test Name</b> : ORTHO PHOSPHATE (PO4) AS P BY E365.3		<b>Matrix:</b> Water			
HS18100546-01	LH18/24-SP650_101018	10 Oct 2018 14:00			11 Oct 2018 15:00	10
<b>Batch ID</b> R326185	<b>Test Name</b> : SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18100546-02	LH18/24-SP650_101018_AIX	10 Oct 2018 14:00			26 Oct 2018 10:05	1
<b>Batch ID</b> R326589	<b>Test Name</b> : SUBCONTRACT ANALYSIS - TOC ANALYSIS		<b>Matrix:</b> Water			
HS18100546-01	LH18/24-SP650_101018	10 Oct 2018 14:00			01 Nov 2018 11:28	1

ALS Houston, US

Date: 01-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100546

**QC BATCH REPORT**

Batch ID:	R325460	Instrument:	WetChem_HS	Method:	E350.3					
<b>MBLK</b>	Sample ID: <b>MBLK-325460</b>	Units:	mg/L	Analysis Date:	15-Oct-2018 10:35					
Client ID:	Run ID: <b>WetChem_HS_325460</b>	SeqNo:	4773156	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.20	0.20								U
<b>LCS</b>	Sample ID: <b>LCS-325460</b>	Units:	mg/L	Analysis Date:	15-Oct-2018 10:35					
Client ID:	Run ID: <b>WetChem_HS_325460</b>	SeqNo:	4773157	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.739	0.20	10	0	97.4	80 - 120				
<b>MS</b>	Sample ID: <b>HS18100300-01MS</b>	Units:	mg/L	Analysis Date:	15-Oct-2018 10:35					
Client ID:	Run ID: <b>WetChem_HS_325460</b>	SeqNo:	4773159	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.146	0.20	10	0.4074	87.4	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18100300-01MSD</b>	Units:	mg/L	Analysis Date:	15-Oct-2018 10:35					
Client ID:	Run ID: <b>WetChem_HS_325460</b>	SeqNo:	4773160	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.15	0.20	10	0.4074	87.4	80 - 120	9.146	0.0437	20	

The following samples were analyzed in this batch: HS18100546-01



## ALS Houston, US

Date: 01-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100546

**QC BATCH REPORT**

Batch ID: R325541		Instrument: UV-2450		Method: E365.3						
<b>MBLK</b>	Sample ID: <b>MBLK-325541</b>	Units: <b>mg/L</b>		Analysis Date: <b>11-Oct-2018 15:00</b>						
Client ID:	Run ID: <b>UV-2450_325541</b>	SeqNo: <b>4774832</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.0250	0.0250								U
<b>LCS</b>	Sample ID: <b>LCS-325541</b>	Units: <b>mg/L</b>		Analysis Date: <b>11-Oct-2018 15:00</b>						
Client ID:	Run ID: <b>UV-2450_325541</b>	SeqNo: <b>4774833</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.232	0.0250	0.25	0	92.8	85 - 115				
<b>MS</b>	Sample ID: <b>HS18100546-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>11-Oct-2018 15:00</b>						
Client ID: <b>LH18/24-SP650_101018</b>	Run ID: <b>UV-2450_325541</b>	SeqNo: <b>4774835</b>	PrepDate:	DF: <b>10</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	2.89	0.250	2.5	0.48	96.4	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18100546-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>11-Oct-2018 15:00</b>						
Client ID: <b>LH18/24-SP650_101018</b>	Run ID: <b>UV-2450_325541</b>	SeqNo: <b>4774836</b>	PrepDate:	DF: <b>10</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	2.88	0.250	2.5	0.48	96.0	80 - 120	2.89	0.347	20	

The following samples were analyzed in this batch: HS18100546-01

**ALS Houston, US**

Date: 01-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100546

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**


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





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## Case Narrative

**Method:** 6850

**Analysis:** Perchlorate

**Analysis SOP:** LC-MS-CLO4

**ALS WO ID(s):** 1828819; 1828820; 1828821;  
1828822

**Client:** ALS Laboratories (Houston, TX)

**Matrix:** Water

**ELMS Batch (HBN):** 2156 (225255)

**General Set Information:** There were sixteen 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  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** Field sample 1828821001 was analyzed and reported from a 1:1,000 dilution. Field samples 1828822008/09/15 were analyzed and reported from a 1:10 dilutions. The reporting limits have been adjusted accordingly.

**Method QC data:** The method blank (LMB 623846) was less than 1/2 the CRDL. The recovery for the LCS (623847) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on samples 18288011/12 (Client ID: 16WW31-181010). 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 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

Thomas Bosch                      October 25, 2018  
Analyst    Date





# ANALYTICAL REPORT

Report Date: October 25, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1828820**

Project ID: HS18100546 101018

Purchase Order: HS18100546

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_101018_AIX	1828820001	10/10/18	10/12/18	



## ANALYTICAL REPORT

Workorder: 34-1828820

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP650_101018_AIX</b>	Sampling Site: NA	Collected: 10/10/2018				
Lab ID: 1828820001	Media: 125 mL Nalgene	Received: 10/12/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2156 (HBN: 225255) Analyzed: 10/19/2018 09:31	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
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 10/24/2018 13:21	/S/ Stephen Brose 10/25/2018 13:31

## Laboratory Contact Information

ALS Environmental  
960 W Levoy Drive  
Salt Lake City, Utah 84123Phone: (801) 266-7700  
Email: als@alst.com  
Web: www.alst.com



## ANALYTICAL REPORT

Workorder: 34-1828820

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

**General Lab Comments**

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

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

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

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

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

**Result Symbol Definitions**

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

**Qualifier Symbol Definitions**

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



# Quality Control Sample Batch Report

00921705

## Analysis Information

**Workorder:** 1828820

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2156 (HBN: 225255)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 623846 <b>Analyzed:</b> 10/19/2018 08:46  <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 623847 <b>Analyzed:</b> 10/19/2018 09:00 <b>Dilution:</b> 1 <b>Units:</b> ug/L					
Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.90	5.00	98.0	78.8	123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1828822010 <b>Analyzed:</b> 10/19/2018 12:35 <b>Dilution:</b> 1 <b>Units:</b> ug/L	<b>MS:</b> 1828822011 <b>Analyzed:</b> 10/19/2018 13:32 <b>Dilution:</b> 1 <b>Units:</b> ug/L	<b>MSD:</b> 1828822012 <b>Analyzed:</b> 10/19/2018 14:47 <b>Dilution:</b> 1 <b>Units:</b> ug/L									
Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	4.96	5	99.1	78.8	123.8	4.83	96.5	2.69	0.0	20.0

## Continuing Calibration Verification

<b>CCV:</b> 623843 <b>Analyzed:</b> 10/19/2018 08:02 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%	<b>CCV:</b> 623848 <b>Analyzed:</b> 10/19/2018 11:38 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%	<b>CCV:</b> 623850 <b>Analyzed:</b> 10/19/2018 15:03 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%							
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	24.4	25.0	97.8	24.7	25.0	98.6	24.4	25.0	97.6

## Interference Check Sample

<b>ICSA:</b> 623845 <b>Analyzed:</b> 10/19/2018 08:32 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	1.01	1.00	101

## Limit of Detection Verification

<b>LODV:</b> 623844 <b>Analyzed:</b> 10/19/2018 08:18 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%	<b>LODV:</b> 623849 <b>Analyzed:</b> 10/19/2018 11:52 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%	<b>LODV:</b> 623851 <b>Analyzed:</b> 10/19/2018 15:17 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%							
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.978	1.00	97.8	1.02	1.00	102	0.983	1.00	98.3



# Quality Control Sample Batch Report

00921706

## Analysis Information

**Workorder:** 1828820

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2156 (HBN: 225255)

**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 10/24/2018 13:21	/S/ Stephen Brose 10/25/2018 13:31

## Symbols and Definitions

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

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



18698/#2

ALS-1828820

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



### Chain of Custody

COC ID: 9992

1828820

#### SUBCONTRACT TO:

ALS Laboratory Group  
960 West LeVoy Drive  
Salt Lake City, UT 84123

Phone: +1 800 356 9135

#### 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:** HS18100546  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18100546-02	LH18/24-SP650_101018_AIX	Water	10 Oct 2018 14:00
SUB_Perch-6850			19 Oct 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: J. Mairani  
Received By: M. Schmidt  
Cooler ID(s): \_\_\_\_\_

Date/Time: 10/11/18 18:00  
Date/Time: 10/12/18 9:40  
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: 1825820  
 Date/Time of Receipt: 9:40 10/12/08 Number of Coolers Received: 1

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

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

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8821	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: [Signature] M Schmidt 10/12/08  
Signature Printed Name Date

CLIENT-RELATED INFORMATION

- |  |   |  |   |
|--|---|--|---|
| <input type="checkbox"/> Missing Cooler                  | <input type="checkbox"/> Missing Samples/Bottles          | <input type="checkbox"/> Incorrect Preservation    | <input type="checkbox"/> Insufficient Sample Volume |
| <input type="checkbox"/> Cooler Conditions               | <input type="checkbox"/> Broken/Leaking Samples           | <input type="checkbox"/> pH Criteria Not Met       | <input type="checkbox"/> Chain of Custody Problems  |
| <input type="checkbox"/> Missing Paperwork               | <input type="checkbox"/> Incorrect Bottle Type            | <input type="checkbox"/> Residual Chlorine Present | <input type="checkbox"/> Other:                     |
| <input type="checkbox"/> Missing/Incorrect Bottle Labels | <input type="checkbox"/> Cooler Temperatures Out of Range | <input type="checkbox"/> 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: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature





Must Deliver Next Business Day  
Time and Temperature Sensitive

Part #: 159469-434 RT2 EXP 07/19

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

SHIP DATE: 11OCT18  
ACTWT: 23.35 LB  
CAD: 300130/CAFE3211  
DIMS: 19x16x13 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123

(801) 266-7700

REF: HS18100544/546/548/549 RJ



FedEx  
Express



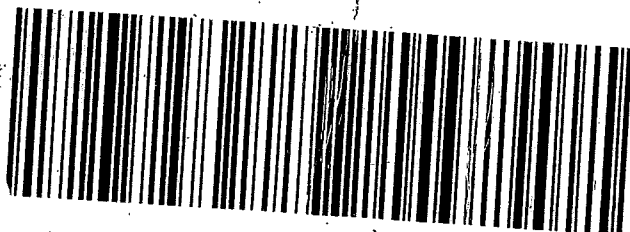
TRK# 4380 9533 5085  
0201

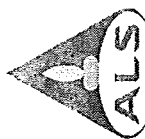
FRI - 12 OCT 3:00P  
STANDARD OVERNIGHT

AX BTFA

84123

UT-US SLC





# Batch Worklist

HBN: 225255

Instrument:

Created: 10/19/2018 07:56



Status: WP

Analyst: T. Bosch

Batch: ELMS/2156

Rule: EPA 6850, DoD QSM Water

Workorder: 1828819 [ENV\_LVL4]

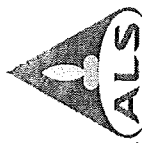
Workorder: 1828820 [ENV\_LVL4]

Workorder: 1828821 [ENV\_LVL4]

Workorder: 1828822 [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	623843	CCV for HBN 225255 [ELMS/2156]				CCV	3	E685041C3Q	5311		10/25/2018	
2	623844	LODV for HBN 225255 [ELMS/2156]				LODV	3	E6850.D3Q	5311		10/25/2018	
3	623845	ICS for HBN 225255 [ELMS/2156]				ICS	3	E6850.D3Q	5311		10/25/2018	
4	623846	LMB for HBN 225255 [ELMS/2156]				LMB	3	E6850Q413Q	5311		10/25/2018	
5	623847	LCS for HBN 225255 [ELMS/2156]				LCS	3	E6850Q413Q	5311		10/25/2018	
6	1828819001	LH18/24-SF650_101018_AIX				SAMPLE	3	1828819001-A E6850Q41.3	5480	11/7/2018	10/25/2018	
7	1828820001	LH18/24-SF650_101018_AIX				SAMPLE	3	1828820001-A E6850Q41.3	5480	11/7/2018	10/25/2018	
8	1828821001	LH18/24-SP140_101018				SAMPLE	3	1828821001-A E6850Q41.3	5480	11/7/2018	10/25/2018	
9	1828822001	16WW38-181010				SAMPLE	3	1828822001-A E6850Q41.3	5480	11/7/2018	10/25/2018	
10	1828822002	16WW44-181010				SAMPLE	3	1828822002-A E6850Q41.3	5480	11/7/2018	10/25/2018	
11	1828822003	16WW33-181010				SAMPLE	3	1828822003-A E6850Q41.3	5480	11/7/2018	10/25/2018	
12	1828822004	16WW37-181010				SAMPLE	3	1828822004-A E6850Q41.3	5480	11/7/2018	10/25/2018	
13	1828822005	16WW45-181010				SAMPLE	3	1828822005-A E6850Q41.3	5480	11/7/2018	10/25/2018	
14	1828822006	16WW14-181010				SAMPLE	3	1828822006-A E6850Q41.3	5480	11/7/2018	10/25/2018	
15	1828822007	16WW34-181010				SAMPLE	3	1828822007-A E6850Q41.3	5480	11/7/2018	10/25/2018	
16	623848	CCV for HBN 225255 [ELMS/2156]				CCV	3	E685041C3Q	5311		10/25/2018	
17	623849	LODV for HBN 225255 [ELMS/2156]				LODV	3	E6850.D3Q	5311		10/25/2018	
18	1828822008	16WW35-181010				SAMPLE	3	1828822008-A E6850Q41.3	5480	11/7/2018	10/25/2018	
19	1828822009	16WW16-181010				SAMPLE	3	1828822009-A E6850Q41.3	5480	11/7/2018	10/25/2018	
20	1828822010	16WW31-181010				SAMPLE	3	1828822010-A E6850Q41.3	5480	11/7/2018	10/25/2018	
21	1828822011	16WW31-181010MS				MS	3	1828822011-A E6850Q413Q	5480		10/25/2018	
22	1828822012	16WW31-181010MSD				MSD	3	1828822012-A E6850Q413Q	5480		10/25/2018	
23	1828822013	16WW31-181010-FD				FLDDUP	3	1828822013-A E6850Q41.3	5480	11/7/2018	10/25/2018	
24	1828822014	16WW22-181010				SAMPLE	3	1828822014-A E6850Q41.3	5480	11/7/2018	10/25/2018	
25	1828822015	16WW39-181010				SAMPLE	3	1828822015-A E6850Q41.3	5480	11/7/2018	10/25/2018	
26	623850	CCV for HBN 225255 [ELMS/2156]				CCV	3	E685041C3Q	5311		10/25/2018	

# Batch Worklist



Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
27	623851	LODY for HBN 225255 [ELMS/2156				LODY	3		E6850..D3Q	5311			10/25/2018



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**

ALS Work Order #'s & Sample #'s: 1828819 (001); 1828820 (001); 1828821 (001); 1828822 (001-15)  
 ELMS Batch/HBN ID: 2155 (225024)  
 Prep Date: 10/17/2018 Analysis Date: 10/19/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\OCT\19OCT18D.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: 2 Injection Volume: 25µL  
 Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

**FLOW GRADIENT:**

Time (min.)	Flow (mL/min)
0	0.80
5.0	0.80
5.3	0.25
10.0	0.25
10.5	0.80
12.5	0.80

**QC DATA:** 5.0µL of QC Solution Horizon ID 41830 was used for LCS 623847; Target = 5.0µg/L. ASTM type II water was used for LMB 623846.

**MS/MSD:** MS/MSD was performed on samples 1828822011/12 (Client ID: 16WW31-181010). 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 sample 1828821001 was analyzed and reported from a 1:1,000 dilution. Field samples 1828822008/09/15 were analyzed and reported from a 1:10 dilutions. The reporting limits have been adjusted accordingly.
- 2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
- 3) Sample data can be viewed at two directories within the ALS system: \\ALS\TWS013\LCMS\LCMS04\2018\OCT\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- 4) Notebook: \\ALS\TWS013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\225255-DOD-ALS-HSTN-LCMS4 or through \\ALS\TWS013\DATA\REVIEW\HBN#

### 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.**

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
<u>Batch(es)/SDG: ELMS 2156 HBN, 225255</u>		
<u>Sample Set IDs if Applicable: 1828819/1828820/1828821/1828822</u>		
<u>Calibration standards analyzed and meets criteria</u>	TB	
<u>Standards traceability checked and meets criteria</u>	TB	
<u>Standard curve coefficients evaluated and meet criteria</u>	TB	
<u>ICVs analyzed and meet acceptance criteria</u>	TB	
<u>CCVs analyzed and meet acceptance criteria</u>	TB	
<u>Method Blanks analyzed and meet acceptance criteria</u>	TB	
<u>Retention Time Windows checked</u>	TB	
<u>For method 8081A, Endrin/DDT Breakdown is checked for compliance</u>	-	
<u>Surrogate recoveries checked and appropriately addressed</u>	-	
<u>Method Preparation Blanks analyzed and meet acceptance criteria</u>	TB	
<u>MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed</u>	TB	
<u>RLVS analyzed</u>	TB	
<u>Preparation and analysis hold times met</u>	TB	
<u>Preparation deviations and re-preparations noted when performed</u>	TB	
<u>Analysis deviations and re-analyses noted when performed</u>	TB	
<u>Sample dilution factors noted on reports</u>	TB	
<u>Electronic records in HBN transcription accuracy and completeness checked</u>	TB	
<u>Preparation and analysis calculations checked</u>	TB	
<u>NCRs are completed as necessary NC/CAR#</u>	-	
<u>Report forms are complete and accurate</u>	TB	
<u>Manual integrations checked</u>	TB	

TB 10-25-18



## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK			Description - 6850 WKG Std 100.ug/L		
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL	
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020	
MFG Lot: 218065075		Usable: No	
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL





## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK			Description - 6850 QC WKG STD 100ug/L		
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC WRK 100.ug/L	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	100 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019



## STANDARD REPORT

### Constituent

#### Working Standard - CLO4 QC INT

CLO4 QC INT		Description - 6850 QC Intrmdt Std-QC 10ug/mL			
Standard: 41830 MFG: ALS/SLC MFG Lot: TNB: 05/09/2018 Pipette ID: Not Provided		Created By: Thomas Bosch Create Date: 05/09/2018 10:05AM		Amount: 10 mL Expires: 05/09/2019 Usable: Yes Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



## STANDARD REPORT

## Constituent

## Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided			Usable: Yes
Part ID: Not Provided			Lab Lot: LAB 109
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description - 6850 QC Stock STD 1,000ug/mL	
Standard: 36748		Created By: Thomas Bosch	Amount: 100 mL
MFG: Ultra Scientific		Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020
MFG Lot: CP-0860			Usable: Yes
Part ID: ICC-013			Lab Lot: CLO4 QC STOCK
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730	Created By: Thomas Bosch	Amount: 25 mL			
MFG: ALS/SLC	Create Date: 09/20/2018 09:09AM	Expires: 09/20/2019			
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes			
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK			
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock	
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL





# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

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

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

Solvent: water (low TOC, < 50 ppb)

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

**Traceability:**  
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCCL 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.

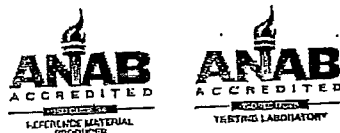
**Homogeneity:**  
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

**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.





# Certificate of Analysis

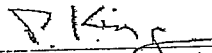


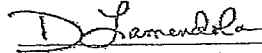
## ISO Guide 34 Reference Material

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

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

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

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

  
Daniel J. Lamendola  
Director of QA/RA



125 Market Street  
New Haven, CT 06513  
USA



AccuStandard®

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

# CERTIFICATE OF ANALYSIS



43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is  $\pm 0.24\%$ .

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  $\pm 0.5\%$  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



Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

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



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

## Product Information

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

## Certification

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

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

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

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

Approved by: T. J. Eckersley

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

## Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



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[www.alsglobal.com](http://www.alsglobal.com)

November 01, 2018

**Analytical Report for Service Request No: K1810023**

RJ Modashia  
ALS Laboratory Group  
10450 Stancliff Road  
Suite 210  
Houston, TX 77099-4338

**RE: HS18100546**

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory October 12, 2018  
For your reference, these analyses have been assigned our service request number **K1810023**.

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](http://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](mailto:Kelley.Lovejoy@alsglobal.com).

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

Kelley Lovejoy  
Project Manager



---

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## Table of Contents

Acronyms

Qualifiers

State Certifications, Accreditations, And Licenses

Case Narrative

Chain of Custody

General Chemistry

Raw Data

    General Chemistry

## 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**

<b>Agency</b>	<b>Web Site</b>	<b>Number</b>
Alaska DEH	<a href="http://dec.alaska.gov/eh/lab/cs/csapproval.htm">http://dec.alaska.gov/eh/lab/cs/csapproval.htm</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2795
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L16-58-R4
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Hawaii DOH	<a href="http://health.hawaii.gov/">http://health.hawaii.gov/</a>	-
ISO 17025	<a href="http://www.pjlabs.com/">http://www.pjlabs.com/</a>	L16-57
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	03016
Maine DHS	<a href="http://www.maine.gov/dhhs/">http://www.maine.gov/dhhs/</a>	WA01276
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-457
Nevada DEP	<a href="http://ndep.nv.gov/bsdw/labservice.htm">http://ndep.nv.gov/bsdw/labservice.htm</a>	WA01276
New Jersey DEP	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	WA005
New York - DOH	<a href="https://www.wadsworth.org/regulatory/elap">https://www.wadsworth.org/regulatory/elap</a>	12060
North Carolina DEQ	<a href="https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification">https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA100010
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/EnvironmentalLabCertification/">http://www.scdhec.gov/environment/EnvironmentalLabCertification/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704427
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C544
Wyoming (EPA Region 8)	<a href="https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water">https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water</a>	-
Kelso Laboratory Website	<a href="http://www.alsglobal.com">www.alsglobal.com</a>	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](http://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/analyte 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](http://www.alsglobal.com)



**Client:** ALS Environmental - US  
**Project:** HS18100546  
**Sample Matrix:** Water

**Service Request:** K1810023  
**Date Received:** 10/12/2018

#### CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

#### Sample Receipt:

One water sample was received for analysis at ALS Environmental on 10/12/2018. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

#### General Chemistry:

Method SM 5310 C, 10/30/2018: The Relative Percent Difference (RPD) criterion for the replicate analysis of Total Organic Carbon in sample LHI8/24-SP650\_101018 was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Approved by

Kelley Anzoy

Date

11/01/2018



## Chain of Custody

**ALS Environmental—Kelso Laboratory**  
1317 South 13th Avenue, Kelso, WA 98626  
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www.alsglobal.com

*1018010023*

### Subcontract Chain of Custody

**COC ID: 9993**

**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:** HS18100546  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18100546-01	LH18/24-SP650_101018	Water	10 Oct 2018 14:00
TOC Analysis for DOD Level IV			19 Oct 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: J. Winnings

Date/Time: 10/11/18 18:00

Received By: [Signature]

Date/Time: 10-12-18 10:30

Cooler ID(s): \_\_\_\_\_

Temperature(s): \_\_\_\_\_



### Cooler Receipt and Preservation Form

Client ALS - Houston Service Request K18  
 Received: 10-12-18 Opened: 10-12-18 By: ASP Unloaded: 10-12-18 By: ASP

1. Samples were received via?  USPS  Fed Ex  UPS  DHL  PDX  Courier  Hand Delivered
2. Samples were received in: (circle)  Cooler  Box  Envelope  Other \_\_\_\_\_ NA
3. Were custody seals on coolers? NA  Y  N If yes, how many and where? 2 TOP SEALS  
 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			NA	Filed
-0.2	0.0	10	1.2	+0.2	298	NA	4380	9533	5096		

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: \_\_\_\_\_

# RUSH



## General Chemistry

**ALS Environmental—Kelso Laboratory**  
1317 South 13th Avenue, Kelso, WA 98626  
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[www.alsglobal.com](http://www.alsglobal.com)

Analytical Report

**Client:** ALS Environmental - US  
**Project:** HS18100546  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:** K1810023  
**Date Collected:** 10/10/18  
**Date Received:** 10/12/18  
**Units:** mg/L  
**Basis:** NA

**Carbon, Total Organic**

Sample Name	Lab Code	Result	LOQ	LOD	MDL	Dil.	Date Analyzed	Q
LH18/24-SP650_101018	K1810023-001	242	50	20	7	100	10/30/18 19:04	
Method Blank	K1810023-MB4	ND U	0.50	0.20	0.07	1	10/30/18 11:21	



ALS Group USA, Corp.  
dba ALS Environmental

## QA/QC Report

**Client:** ALS Environmental - US  
**Project** HS18100546  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:**K1810023  
**Date Collected:**10/10/18  
**Date Received:**10/12/18

**Units:**mg/L  
**Basis:**NA

Replicate Sample Summary  
Carbon, Total Organic

Sample Name:	Lab Code:	MRL	LOQ	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
LH18/24-SP650_101018	K1810023-001DUP3	50	20	7	242	217	229	11 *	10	10/30/18

Results flagged with an asterisk (\*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.  
dba ALS Environmental

## QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100546  
**Sample Matrix:** Water

**Service Request:** K1810023  
**Date Collected:** 10/10/18  
**Date Received:** 10/12/18  
**Date Analyzed:** 10/30/18  
**Date Extracted:** NA

**Duplicate Matrix Spike Summary**  
**Carbon, Total Organic**

**Sample Name:** LH18/24-SP650\_101018  
**Lab Code:** K1810023-001  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA

Analyte Name	Sample Result	Result	Matrix Spike K1810023-001MS3		Duplicate Matrix Spike K1810023-001DMS3		% Rec Limits	RPD	RPD Limit	
			Spike Amount	% Rec	Result	Spike Amount				% Rec
Carbon, Total Organic	242	2930	2500	107	2820	2500	103	83-117	4	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.

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100546  
**Sample Matrix:** Water

**Service Request:** K1810023  
**Date Analyzed:** 10/30/18  
**Date Extracted:** NA

**Lab Control Sample Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA  
**Analysis Lot:** 613206

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K1810023-LCS4	19.8	21.9	91	83-117

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100546

**Service Request:** K1810023

### Continuing Calibration Verification (CCV) Summary

#### Carbon, Total Organic

**Analysis Method:** SM 5310 C

**Units:** mg/L

	Analysis		Date	True	Measured	Percent	Acceptance
	Lot	Lab Code	Analyzed	Value	Value	Recovery	Limits
CCV1	613206	KQ1815864-36	10/30/18 04:57	25.0	25.2	101	90-110
CCV2	613206	KQ1815864-37	10/30/18 10:48	25.0	24.7	99	90-110
CCV3	613206	KQ1815864-38	10/30/18 16:24	25.0	24.4	98	90-110
CCV4	613206	KQ1815864-39	10/30/18 22:45	25.0	24.8	99	90-110
CCV5	613206	KQ1815864-40	10/31/18 03:19	25.0	24.9	99	90-110
CCV6	613206	KQ1815864-41	10/31/18 09:08	25.0	24.6	98	90-110

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100546

**Service Request:** K1810023

**Continuing Calibration Blank (CCB) Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C

**Units:** mg/L

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>LOQ</b>	<b>LOD</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	613206	KQ1815864-42	10/30/18 05:14	0.50	0.20	0.07	ND	U
CCB2	613206	KQ1815864-43	10/30/18 11:04	0.50	0.20	0.07	ND	U
CCB3	613206	KQ1815864-44	10/30/18 16:40	0.50	0.20	0.07	ND	U
CCB4	613206	KQ1815864-45	10/30/18 23:01	0.50	0.20	0.07	ND	U
CCB5	613206	KQ1815864-46	10/31/18 03:35	0.50	0.20	0.07	ND	U
CCB6	613206	KQ1815864-47	10/31/18 09:25	0.50	0.20	0.07	ND	U



---

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

October 26, 2018

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

Work Order: **HS18100549**

Laboratory Results for: **Groundwater Treatment Plant Monthly Influent Samples**

Dear Marcia,

ALS Environmental received 1 sample(s) on Oct 11, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval scribble.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 26-Oct-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**Work Order:** HS18100549

---

**SAMPLE SUMMARY**

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18100549-01	LH18/24-SP140_101018	Water		10-Oct-2018 14:00	11-Oct-2018 09:05	<input type="checkbox"/>

---

**ALS Houston, US**

Date: 26-Oct-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**Work Order:**

---

**CASE NARRATIVE****Work Order Comments**

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

**Metals by Method SW6020****Batch ID: 133598****Sample ID: HS18100713-02MS**

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

**WetChemistry by Method SW7196****Batch ID: R325270****Sample ID: LH18/24-SP140\_101018 (HS18100549-01)**

- Sample Filtered
-



## ALS Houston, US

Date: 26-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Influent Samples  
 Sample ID: LH18/24-SP140\_101018  
 Collection Date: 10-Oct-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100549  
 Lab ID:HS18100549-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>ICP-MS METALS BY SW6020A</b>		<b>Method:SW6020</b>				Prep:SW3010A / 16-Oct-2018		Analyst: JC
Selenium	0.00200	U	0.00110	0.00200	0.00200	mg/L	1	17-Oct-2018 15:28
Silver	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	17-Oct-2018 15:28
<b>HEXAVALENT CHROMIUM BY SW7196A</b>		<b>Method:SW7196</b>				Prep:SW7196		Analyst: KVL
Chromium, Hexavalent	0.0100	U	0.00600	0.0100	0.0100	mg/L	1	11-Oct-2018 11:45
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	26-Oct-2018 10:05

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

**WEIGHT LOG**

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18100549

**Batch ID:** 133598      **Method:** ICP-MS METALS BY SW6020A      **Prep:** 3010A

SampleID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18100549-01	1	10	10 (mL)	1

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18100549

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> 133598	<b>Test Name :</b> ICP-MS METALS BY SW6020A		<b>Matrix:</b> Water			
HS18100549-01	LH18/24-SP140_101018	10 Oct 2018 14:00		16 Oct 2018 14:00	17 Oct 2018 15:28	1
<b>Batch ID</b> R325270	<b>Test Name :</b> HEXAVALENT CHROMIUM BY SW7196A		<b>Matrix:</b> Water			
HS18100549-01	LH18/24-SP140_101018	10 Oct 2018 14:00			11 Oct 2018 11:45	1
<b>Batch ID</b> R326185	<b>Test Name :</b> SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18100549-01	LH18/24-SP140_101018	10 Oct 2018 14:00			26 Oct 2018 10:05	1

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18100549

**QC BATCH REPORT**

Batch ID: 133598		Instrument: ICPMS04		Method: SW6020					
<b>MBLK</b>	Sample ID: <b>MBLK-133598</b>	Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 14:56</b>					
Client ID:	Run ID: <b>ICPMS04_325611</b>	SeqNo: <b>4777244</b>	PrepDate: <b>16-Oct-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit Qual
Selenium	0.00200	0.00200							U
Silver	0.00100	0.00200							U
<b>LCS</b>	Sample ID: <b>LCS-133598</b>	Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 14:59</b>					
Client ID:	Run ID: <b>ICPMS04_325611</b>	SeqNo: <b>4777245</b>	PrepDate: <b>16-Oct-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit Qual
Selenium	0.05619	0.00200	0.05	0	112	80 - 120			
Silver	0.05173	0.00200	0.05	0	103	80 - 120			
<b>MS</b>	Sample ID: <b>HS18100713-02MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 15:05</b>					
Client ID:	Run ID: <b>ICPMS04_325611</b>	SeqNo: <b>4777248</b>	PrepDate: <b>16-Oct-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit Qual
Selenium	0.0539	0.00200	0.05	0.00039	107	80 - 120			
Silver	0.05018	0.00200	0.05	0.000403	99.6	80 - 120			
<b>MSD</b>	Sample ID: <b>HS18100713-02MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 15:08</b>					
Client ID:	Run ID: <b>ICPMS04_325611</b>	SeqNo: <b>4777249</b>	PrepDate: <b>16-Oct-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit Qual
Selenium	0.05218	0.00200	0.05	0.00039	104	80 - 120	0.0539	3.25	20
Silver	0.04849	0.00200	0.05	0.000403	96.2	80 - 120	0.05018	3.42	20
<b>PDS</b>	Sample ID: <b>HS18100713-02PDS</b>	Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 15:10</b>					
Client ID:	Run ID: <b>ICPMS04_325611</b>	SeqNo: <b>4777250</b>	PrepDate: <b>16-Oct-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit Qual
Selenium	0.1083	0.00200	0.1	0.00039	108	75 - 125			
Silver	0.09282	0.00200	0.1	0.000403	92.4	75 - 125			

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18100549

**QC BATCH REPORT**

Batch ID: 133598		Instrument: ICPMS04		Method: SW6020						
<b>SD</b>	Sample ID: <b>HS18100713-02SD</b>	Units: <b>mg/L</b>		Analysis Date: <b>17-Oct-2018 15:03</b>						
Client ID:	Run ID: <b>ICPMS04_325611</b>	SeqNo: <b>4777247</b>		PrepDate: <b>16-Oct-2018</b>		DF: <b>5</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	Limit	Qual
Selenium	0.0100	0.0100					0.00039	0	10	U
Silver	0.00500	0.0100					0.000403	0	10	U

The following samples were analyzed in this batch:

ALS Houston, US

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18100549

**QC BATCH REPORT**

Batch ID: R325270		Instrument: UV-2450		Method: SW7196					
<b>MBLK</b>	Sample ID: <b>MBLK-R325270</b>	Units: <b>mg/L</b>		Analysis Date: <b>11-Oct-2018 11:45</b>					
Client ID:	Run ID: <b>UV-2450_325270</b>	SeqNo: <b>4769064</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.0100	0.0100						U	
<b>LCS</b>	Sample ID: <b>LCS-R325270</b>	Units: <b>mg/L</b>		Analysis Date: <b>11-Oct-2018 11:45</b>					
Client ID:	Run ID: <b>UV-2450_325270</b>	SeqNo: <b>4769063</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.251	0.0100	0.25	0	100	80 - 120			
<b>MS</b>	Sample ID: <b>HS18100549-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>11-Oct-2018 11:45</b>					
Client ID: <b>LH18/24-SP140_101018</b>	Run ID: <b>UV-2450_325270</b>	SeqNo: <b>4769066</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.259	0.0100	0.25	-0.004	105	75 - 125			
<b>MSD</b>	Sample ID: <b>HS18100549-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>11-Oct-2018 11:45</b>					
Client ID: <b>LH18/24-SP140_101018</b>	Run ID: <b>UV-2450_325270</b>	SeqNo: <b>4769065</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.255	0.0100	0.25	-0.004	104	75 - 125	0.259	1.56 20	

The following samples were analyzed in this batch: HS18100549-01

**ALS Houston, US**

Date: 26-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18100549

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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



**Sample Receipt Checklist**

Client Name: Bhate Environmental  
 Work Order: HS18100549

Date/Time Received: **11-Oct-2018 09:05**  
 Received by: **NDR**

Checklist completed by: Pablo Martinez 11-Oct-2018  
 eSignature Date  
 Reviewed by: RJ Modashia 11-Oct-2018  
 eSignature Date

Matrices: **WATER** Carrier name: **UPS**

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- TX1005 solids received in hermetically sealed vials? Yes  No  N/A
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No

Temperature(s)/Thermometer(s):	1.8C/1.4C UC/C	IR # 11
Cooler(s)/Kit(s):	43673	
Date/Time sample(s) sent to storage:	10/11/2018 11:10	
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/> No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted by:		

Login Notes:


Client Contacted: Date Contacted: Person Contacted:



Contacted By: Regarding:

Comments:

Corrective Action:



 <b>ALS</b> 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax. +1 281 530 5887	<b>CUSTODY SEAL</b>		By: <b>PM</b> Date: <b>10/11/18</b>	
	Date: <b>10/10/18</b>	Time: <b>4:30</b>		
	Name: <b>Scott BEASNEAD</b>			
	Company: <b>BHATE</b>			

 <b>UPS Next Day Air®</b> <b>UPS Worldwide Express®</b> Shipping Document	<input type="checkbox"/> WEIGHT <input type="checkbox"/> LTR <input type="checkbox"/> PAK <input type="checkbox"/> WEIGHT <input type="checkbox"/> DIMENSIONAL WEIGHT If Applicable <input type="checkbox"/> LARGE PACKAGE <input type="checkbox"/> SHIPPER RELEASE	EXPRESS (NF) <input type="checkbox"/> DOCUMENTS ONLY SATURDAY DELIVERY <input type="checkbox"/>	1 EXPORT 1 DELIVERY
	<b>43673</b> SHIPMENT FROM UPS ACCOUNT No. <b>27X7X2</b> REFERENCE NUMBER Scott Beasnead BHATE Environmental 1723 B. C. Grand Ave. P.M.B. 900 Humble, TX 75867 Telephone: 903 990-6700		
DELIVERY TO: Client Services ALS Laboratory Group 10450 STANCLIFF RD. SUITE 210 Houston, TX 77099 Telephone: 281 530-5656	UPS Next Day Air® J461 687 992 0  J461 687 992 0	DATE OF SHIPMENT <b>10/11/18</b>	



## Case Narrative

**Method:** 6850

**Analysis:** Perchlorate

**Analysis SOP:** LC-MS-CLO4

**ALS WO ID(s):** 1828819; 1828820; 1828821;  
1828822

**Client:** ALS Laboratories (Houston, TX)

**Matrix:** Water

**ELMS Batch (HBN):** 2156 (225255)

**General Set Information:** There were sixteen 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  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** Field sample 1828821001 was analyzed and reported from a 1:1,000 dilution. Field samples 1828822008/09/15 were analyzed and reported from a 1:10 dilutions. The reporting limits have been adjusted accordingly.

**Method QC data:** The method blank (LMB 623846) was less than 1/2 the CRDL. The recovery for the LCS (623847) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on samples 18288011/12 (Client ID: 16WW31-181010). 5.0 $\mu$ l of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. The spike target was 5. $\mu$ g/L. The 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  $\mu$ g/L. Results were calculated in  $\mu$ g/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve ( $\mu$ g/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

Thomas Bosch                      October 25, 2018  
Analyst    Date



# ANALYTICAL REPORT

Report Date: October 25, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1828821**

Project ID: HS18100549 101018

Purchase Order: HS18100549

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP140_101018	1828821001	10/10/18	10/12/18	



## ANALYTICAL REPORT

Workorder: 34-1828821

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP140_101018</b>	Sampling Site: NA	Collected: 10/10/2018				
Lab ID: 1828821001	Media: 125 mL Nalgene	Received: 10/12/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2156 (HBN: 225255) Analyzed: 10/19/2018 09:45	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
Perchlorate	7500	1000	2000	4000	1000	

## Comments

Workorder: 1828821

Field sample 1828821001 was analyzed and reported from a 1:1,000 dilution. The reporting limit has been adjusted accordingly.

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

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 10/24/2018 13:21	/S/ Stephen Brose 10/25/2018 13:31

## Laboratory Contact Information

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

Phone: (801) 266-7700  
Email: als@alst.com  
Web: www.alst.com



## ANALYTICAL REPORT

Workorder: 34-1828821

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

**General Lab Comments**

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

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

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

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

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

**Result Symbol Definitions**

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

**Qualifier Symbol Definitions**

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





# Quality Control Sample Batch Report

00921766

## Analysis Information

**Workorder:** 1828821

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2156 (HBN: 225255)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 623846 <b>Analyzed:</b> 10/19/2018 08:46  <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 623847 <b>Analyzed:</b> 10/19/2018 09:00 <b>Dilution:</b> 1 <b>Units:</b> ug/L					
Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.90	5.00	98.0	78.8	123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1828822010 <b>Analyzed:</b> 10/19/2018 12:35 <b>Dilution:</b> 1 <b>Units:</b> ug/L	<b>MS:</b> 1828822011 <b>Analyzed:</b> 10/19/2018 13:32 <b>Dilution:</b> 1 <b>Units:</b> ug/L	<b>MSD:</b> 1828822012 <b>Analyzed:</b> 10/19/2018 14:47 <b>Dilution:</b> 1 <b>Units:</b> ug/L									
Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	4.96	5	99.1	78.8	123.8	4.83	96.5	2.69	0.0	20.0

## Continuing Calibration Verification

<b>CCV:</b> 623843 <b>Analyzed:</b> 10/19/2018 08:02 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%	<b>CCV:</b> 623848 <b>Analyzed:</b> 10/19/2018 11:38 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%	<b>CCV:</b> 623850 <b>Analyzed:</b> 10/19/2018 15:03 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%							
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	24.4	25.0	97.8	24.7	25.0	98.6	24.4	25.0	97.6

## Interference Check Sample

<b>ICSA:</b> 623845 <b>Analyzed:</b> 10/19/2018 08:32 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	1.01	1.00	101

## Limit of Detection Verification

<b>LODV:</b> 623844 <b>Analyzed:</b> 10/19/2018 08:18 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%	<b>LODV:</b> 623849 <b>Analyzed:</b> 10/19/2018 11:52 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%	<b>LODV:</b> 623851 <b>Analyzed:</b> 10/19/2018 15:17 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%							
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.978	1.00	97.8	1.02	1.00	102	0.983	1.00	98.3



# Quality Control Sample Batch Report

00921767

## Analysis Information

**Workorder:** 1828821

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2156 (HBN: 225255)

**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 10/24/2018 13:21	/S/ Stephen Brose 10/25/2018 13:31

## Symbols and Definitions

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

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



18698/#2

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



1828821

### Contract Chain of Custody

COC ID: 9995

1828821

#### SUBCONTRACT TO:

ALS Laboratory Group  
960 West LeVoy Drive  
Salt Lake City, UT 84123

Phone: +1 800 356 9135

#### 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:** HS18100549  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18100549-01	LH18/24-SP140_101018	Water	10 Oct 2018 14:00
SUB_Perch-6850			19 Oct 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: S. MARIAN  
Received By: M. Schmidt  
Cooler ID(s): \_\_\_\_\_

Date/Time: 10/11/18 18:00  
Date/Time: 10/12/2018 9:40  
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: 1828821  
 Date/Time of Receipt: 9:40 10/12/08 Number of Coolers Received: 1

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

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

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8821	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: [Signature] M Schmitt 10/12/08  
Signature Printed Name Date

CLIENT-RELATED INFORMATION

- |  |   |  |   |
|--|---|--|---|
| <input type="checkbox"/> Missing Cooler                  | <input type="checkbox"/> Missing Samples/Bottles          | <input type="checkbox"/> Incorrect Preservation    | <input type="checkbox"/> Insufficient Sample Volume |
| <input type="checkbox"/> Cooler Conditions               | <input type="checkbox"/> Broken/Leaking Samples           | <input type="checkbox"/> pH Criteria Not Met       | <input type="checkbox"/> Chain of Custody Problems  |
| <input type="checkbox"/> Missing Paperwork               | <input type="checkbox"/> Incorrect Bottle Type            | <input type="checkbox"/> Residual Chlorine Present | <input type="checkbox"/> Other:                     |
| <input type="checkbox"/> Missing/Incorrect Bottle Labels | <input type="checkbox"/> Cooler Temperatures Out of Range | <input type="checkbox"/> 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: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature



**Must Deliver Next Business Day  
Time and Temperature Sensitive!**

ORIGIN ID: 6GRA (281) 530-5656  
SHIPPING DEPT  
ALS LABORATORY GROUP  
10450 STANCLIFF  
SUITE 210  
HOUSTON, TX 77099  
UNITED STATES US

SHIP DATE: 11OCT18  
ACTWTG: 23.35 LB  
CAD: 300130/CAFE3211  
DIMS: 19x16x13 IN

BILL THIRD PARTY

**TO SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
960 W. LEVOY DRIVE**

**SALT LAKE CITY UT 84123**

(801) 268-7700

REF: HS18100544/546/548/549 RJ



**FedEx  
Express**

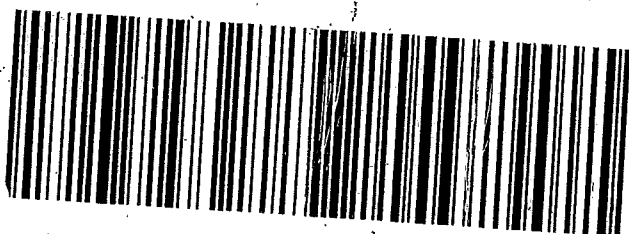


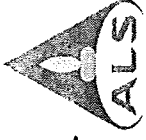
TRK# 4380 9533 5085  
0201

**FRI - 12 OCT 3:00P  
STANDARD OVERNIGHT**

**AX BTFA**

**84123  
UT-US SLC**





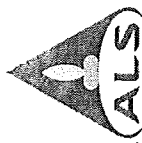
# Batch Worklist

Batch: ELMS/2156  
 Rule: EPA 6850, DoD QSM Water  
 Created: 10/19/2018 07:56  
 Analyst: T. Bosch  
 Instrument: WP  
 HBN: 225255  
 Status: WP

Workorder: 1828819 [ENV\_LVL4]  
 Workorder: 1828820 [ENV\_LVL4]  
 Workorder: 1828821 [ENV\_LVL4]  
 Workorder: 1828822 [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	623843	CCV for HBN 225255 [ELMS/2156]				CCV	3	E685041C3Q	5311		10/25/2018	
2	623844	LODV for HBN 225255 [ELMS/2156]				LODV	3	E6850.D3Q	5311		10/25/2018	
3	623845	ICS for HBN 225255 [ELMS/2156]				ICS	3	E6850.D3Q	5311		10/25/2018	
4	623846	LMB for HBN 225255 [ELMS/2156]				LMB	3	E6850Q413Q	5311		10/25/2018	
5	623847	LCS for HBN 225255 [ELMS/2156]				LCS	3	E6850Q413Q	5311		10/25/2018	
6	1828819001	LH18/24-SP650_101018_AIX				SAMPLE	3	1828819001-A E6850Q41.3	5480	11/7/2018	10/25/2018	
7	1828820001	LH18/24-SP650_101018_AIX				SAMPLE	3	1828820001-A E6850Q41.3	5480	11/7/2018	10/25/2018	
8	1828821001	LH18/24-SP140_101018				SAMPLE	3	1828821001-A E6850Q41.3	5480	11/7/2018	10/25/2018	
9	1828822001	16WW38-181010				SAMPLE	3	1828822001-A E6850Q41.3	5480	11/7/2018	10/25/2018	
10	1828822002	16WW44-181010				SAMPLE	3	1828822002-A E6850Q41.3	5480	11/7/2018	10/25/2018	
11	1828822003	16WW33-181010				SAMPLE	3	1828822003-A E6850Q41.3	5480	11/7/2018	10/25/2018	
12	1828822004	16WW37-181010				SAMPLE	3	1828822004-A E6850Q41.3	5480	11/7/2018	10/25/2018	
13	1828822005	16WW45-181010				SAMPLE	3	1828822005-A E6850Q41.3	5480	11/7/2018	10/25/2018	
14	1828822006	16WW14-181010				SAMPLE	3	1828822006-A E6850Q41.3	5480	11/7/2018	10/25/2018	
15	1828822007	16WW34-181010				SAMPLE	3	1828822007-A E6850Q41.3	5480	11/7/2018	10/25/2018	
16	623848	CCV for HBN 225255 [ELMS/2156]				CCV	3	E685041C3Q	5311		10/25/2018	
17	623849	LODV for HBN 225255 [ELMS/2156]				LODV	3	E6850.D3Q	5311		10/25/2018	
18	1828822008	16WW35-181010				SAMPLE	3	1828822008-A E6850Q41.3	5480	11/7/2018	10/25/2018	
19	1828822009	16WW16-181010				SAMPLE	3	1828822009-A E6850Q41.3	5480	11/7/2018	10/25/2018	
20	1828822010	16WW31-181010				SAMPLE	3	1828822010-A E6850Q41.3	5480	11/7/2018	10/25/2018	
21	1828822011	16WW31-181010MS				MS	3	1828822011-A E6850Q413Q	5480		10/25/2018	
22	1828822012	16WW31-181010MSD				MSD	3	1828822012-A E6850Q413Q	5480		10/25/2018	
23	1828822013	16WW31-181010-FD				FLDDUP	3	1828822013-A E6850Q41.3	5480	11/7/2018	10/25/2018	
24	1828822014	16WW22-181010				SAMPLE	3	1828822014-A E6850Q41.3	5480	11/7/2018	10/25/2018	
25	1828822015	16WW39-181010				SAMPLE	3	1828822015-A E6850Q41.3	5480	11/7/2018	10/25/2018	
26	623850	CCV for HBN 225255 [ELMS/2156]				CCV	3	E685041C3Q	5311		10/25/2018	

# Batch Worklist



Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
27	623851	LODY for HBN 225255 [ELMS/2156				LODY	3		E6850..D3Q	5311			10/25/2018





**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**

ALS Work Order #'s & Sample #'s: 1828819 (001); 1828820 (001); 1828821 (001); 1828822 (001-15)  
 ELMS Batch/HBN ID: 2155 (225024)  
 Prep Date: 10/17/2018 Analysis Date: 10/19/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\OCT\19OCT18D.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: 2 Injection Volume: 25µL  
 Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

**FLOW GRADIENT:**

Time (min.)	Flow (mL/min)
0	0.80
5.0	0.80
5.3	0.25
10.0	0.25
10.5	0.80
12.5	0.80

**QC DATA:** 5.0µL of QC Solution Horizon ID 41830 was used for LCS 623847; Target = 5.0µg/L. ASTM type II water was used for LMB 623846.

**MS/MSD:** MS/MSD was performed on samples 1828822011/12 (Client ID: 16WW31-181010). 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 sample 1828821001 was analyzed and reported from a 1:1,000 dilution. Field samples 1828822008/09/15 were analyzed and reported from a 1:10 dilutions. The reporting limits have been adjusted accordingly.
- 2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
- 3) Sample data can be viewed at two directories within the ALS system: \\ALS\TWS013\LCMS\LCMS04\2018\OCT\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- 4) Notebook: \\als\TWS013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\225255-DOD-ALS-HSTN-LCMS4 or through \\ALS\TWS013\DATA\REVIEW\HBN#

### 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.**

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
<u>Batch(es)/SDG: ELS 2156 HBN 225255</u>		
<u>Sample Set IDs if Applicable: 1828819/1828820/1828821/1828822</u>		
<u>Calibration standards analyzed and meets criteria</u>	TB	
<u>Standards traceability checked and meets criteria</u>	TB	
<u>Standard curve coefficients evaluated and meet criteria</u>	TB	
<u>ICVs analyzed and meet acceptance criteria</u>	TB	
<u>CCVs analyzed and meet acceptance criteria</u>	TB	
<u>Method Blanks analyzed and meet acceptance criteria</u>	TB	
<u>Retention Time Windows checked</u>	TB	
<u>For method 8081A, Endrin/DDT Breakdown is checked for compliance</u>	-	
<u>Surrogate recoveries checked and appropriately addressed</u>	-	
<u>Method Preparation Blanks analyzed and meet acceptance criteria</u>	TB	
<u>MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed</u>	TB	
<u>RLVS analyzed</u>	TB	
<u>Preparation and analysis hold times met</u>	TB	
<u>Preparation deviations and re-preparations noted when performed</u>	TB	
<u>Analysis deviations and re-analyses noted when performed</u>	TB	
<u>Sample dilution factors noted on reports</u>	TB	
<u>Electronic records in HBN transcription accuracy and completeness checked</u>	TB	
<u>Preparation and analysis calculations checked</u>	TB	
<u>NCRs are completed as necessary NC/CAR#</u>	-	
<u>Report forms are complete and accurate</u>	TB	
<u>Manual integrations checked</u>	TB	

TB 10-25-18



## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK			Description - 6850 WKG Std 100.ug/L		
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659		Created By: Thomas Bosch	
MFG: AccuStandard		Create Date: 09/17/2018 09:09AM	
MFG Lot: 218065075		Expires: 07/25/2020	
Part ID: IC-PER-10X-1		Usable: No	
		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK			Description - 6850 QC WKG STD 100ug/L		
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC WRK 100.ug/L	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	100 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019





## STANDARD REPORT

### Constituent

#### Working Standard - CLO4 QC INT

CLO4 QC INT		Description - 6850 QC Intrmdt Std-QC 10ug/mL			
Standard: 41830 MFG: ALS/SLC MFG Lot: TNB: 05/09/2018 Pipette ID: Not Provided		Created By: Thomas Bosch Create Date: 05/09/2018 10:05AM		Amount: 10 mL Expires: 05/09/2019 Usable: Yes Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109		Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House		Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided			Usable: Yes
Part ID: Not Provided			Lab Lot: LAB 109
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description - 6850 QC Stock STD 1,000ug/mL	
Standard: 36748		Created By: Thomas Bosch	Amount: 100 mL
MFG: Ultra Scientific		Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020
MFG Lot: CP-0860			Usable: Yes
Part ID: ICC-013			Lab Lot: CLO4 QC STOCK
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730	Created By: Thomas Bosch	Amount: 25 mL			
MFG: ALS/SLC	Create Date: 09/20/2018 09:09AM	Expires: 09/20/2019			
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes			
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK			
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock	
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL



# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

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

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

Solvent: water (low TOC, < 50 ppb)

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

**Traceability:**  
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCCL 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.





# Certificate of Analysis

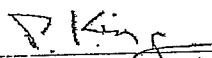


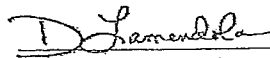
## ISO Guide 34 Reference Material

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

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

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

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

  
Daniel J. Lamendola  
Director of QA/RA



125 Market Street  
New Haven, CT 06513  
USA



AccuStandard®

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

# CERTIFICATE OF ANALYSIS



43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate ( $\text{ClO}_4$ )  
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)
$\text{ClO}_4$ Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is  $\pm 0.24\%$ .

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  $\pm 0.5\%$  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





Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

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



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

## Product Information

Chemical Purity Specification:  $\geq 98\%$   
Labeled CAS Number: NA  
Unlabeled CAS Number: 7601-89-0  
MW\*: 130.4  
Chemical Formula:  $\text{NaClO}_4$   
Storage: Store at room temperature away from light and moisture.  
Stability: See storage and expiration date.

## Certification

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

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

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

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

Approved by: T. J. Eckersley

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

## Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



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

November 01, 2018

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

Work Order: **HS18100975**

Laboratory Results for: **Groundwater Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Oct 18, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 01-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18100975

**SAMPLE SUMMARY**

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Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18100975-01	LH18/24-SP650_101718	Water		17-Oct-2018 14:00	18-Oct-2018 08:40	<input type="checkbox"/>
HS18100975-02	LH18/24-SP650_101718_BIX	Water		17-Oct-2018 14:00	18-Oct-2018 08:40	<input type="checkbox"/>

---

**ALS Houston, US**

Date: 01-Nov-18

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:**

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**CASE NARRATIVE**

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**Work Order Comments**

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

**Work Order Comments**

- The analysis for TOC was subcontracted to ALS Environmental in Kelso WA. Final report attached.
- 

**WetChemistry by Method E365.3**

**Batch ID: R326233**

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

**WetChemistry by Method E350.3**

**Batch ID: R325979**

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

## ALS Houston, US

Date: 01-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_101718  
 Collection Date: 17-Oct-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100975  
 Lab ID:HS18100975-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>AMMONIA AS N BY E350.3(ISE)</b>								Analyst: MZD
Nitrogen, Ammonia (As N)	8.8		0.20	0.20	0.20	mg/L	1	23-Oct-2018 13:30
<b>ORTHO PHOSPHATE (PO4) AS P BY E365.3</b>								Analyst: MZD
Phosphorus, Total Orthophosphate (As P)	1.92		0.100	0.250	0.250	mg/L	10	19-Oct-2018 12:39
<b>SUBCONTRACT ANALYSIS - TOC ANALYSIS</b>								Analyst: SUBK
Subcontract Analysis	See Attached		0	0			1	01-Nov-2018 11:28

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

## ALS Houston, US

Date: 01-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_101718\_BIX  
 Collection Date: 17-Oct-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18100975  
 Lab ID:HS18100975-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>						Analyst: SUB	
Subcontract Analysis	See Attached		0	0		NA	1	01-Nov-2018 14:57	

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

ALS Houston, US

Date: 01-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100975

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R325979	<b>Test Name</b> : AMMONIA AS N BY E350.3(ISE)		<b>Matrix:</b> Water			
HS18100975-01	LH18/24-SP650_101718	17 Oct 2018 14:00			23 Oct 2018 13:30	1
<b>Batch ID</b> R326233	<b>Test Name</b> : ORTHO PHOSPHATE (PO4) AS P BY E365.3		<b>Matrix:</b> Water			
HS18100975-01	LH18/24-SP650_101718	17 Oct 2018 14:00			19 Oct 2018 12:39	10
<b>Batch ID</b> R326589	<b>Test Name</b> : SUBCONTRACT ANALYSIS - TOC ANALYSIS		<b>Matrix:</b> Water			
HS18100975-01	LH18/24-SP650_101718	17 Oct 2018 14:00			01 Nov 2018 11:28	1
<b>Batch ID</b> R326624	<b>Test Name</b> : SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18100975-02	LH18/24-SP650_101718_BIX	17 Oct 2018 14:00			01 Nov 2018 14:57	1

ALS Houston, US

Date: 01-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100975

**QC BATCH REPORT**

Batch ID: R325979		Instrument: WetChem_HS		Method: E350.3	
<b>MBLK</b>	Sample ID: <b>MBLK-325979</b>	Units: <b>mg/L</b>		Analysis Date: <b>23-Oct-2018 13:30</b>	
Client ID:	Run ID: <b>WetChem_HS_325979</b>	SeqNo: <b>4785799</b>	PrepDate:	DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC Control Limit RPD Ref Value %RPD RPD Limit Qual
Nitrogen, Ammonia (As N)	0.20	0.20			U
<b>LCS</b>	Sample ID: <b>LCS-325979</b>	Units: <b>mg/L</b>		Analysis Date: <b>23-Oct-2018 13:30</b>	
Client ID:	Run ID: <b>WetChem_HS_325979</b>	SeqNo: <b>4785800</b>	PrepDate:	DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC Control Limit RPD Ref Value %RPD RPD Limit Qual
Nitrogen, Ammonia (As N)	10.09	0.20	10	0	101 80 - 120
<b>MS</b>	Sample ID: <b>HS18100792-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>23-Oct-2018 13:30</b>	
Client ID:	Run ID: <b>WetChem_HS_325979</b>	SeqNo: <b>4785802</b>	PrepDate:	DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC Control Limit RPD Ref Value %RPD RPD Limit Qual
Nitrogen, Ammonia (As N)	10.26	0.20	10	0.4029	98.6 80 - 120
<b>MSD</b>	Sample ID: <b>HS18100792-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>23-Oct-2018 13:30</b>	
Client ID:	Run ID: <b>WetChem_HS_325979</b>	SeqNo: <b>4785803</b>	PrepDate:	DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC Control Limit RPD Ref Value %RPD RPD Limit Qual
Nitrogen, Ammonia (As N)	10.3	0.20	10	0.4029	99.0 80 - 120 10.26 0.389 20

The following samples were analyzed in this batch: HS18100975-01



ALS Houston, US

Date: 01-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100975

**QC BATCH REPORT**

Batch ID: R326233		Instrument: UV-2450		Method: E365.3						
<b>MBLK</b>	Sample ID: <b>MBLK-326233</b>	Units: <b>mg/L</b>			Analysis Date: <b>19-Oct-2018 12:39</b>					
Client ID:	Run ID: <b>UV-2450_326233</b>	SeqNo: <b>4791747</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.0250	0.0250							U	
<b>LCS</b>	Sample ID: <b>LCS-326233</b>	Units: <b>mg/L</b>			Analysis Date: <b>19-Oct-2018 12:39</b>					
Client ID:	Run ID: <b>UV-2450_326233</b>	SeqNo: <b>4791748</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.241	0.0250	0.25	0	96.4	85 - 115				
<b>MS</b>	Sample ID: <b>HS18100975-01MS</b>	Units: <b>mg/L</b>			Analysis Date: <b>19-Oct-2018 12:39</b>					
Client ID: <b>LH18/24-SP650_101718</b>	Run ID: <b>UV-2450_326233</b>	SeqNo: <b>4791750</b>		PrepDate:			DF: <b>10</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	4.35	0.250	2.5	1.92	97.2	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18100975-01MSD</b>	Units: <b>mg/L</b>			Analysis Date: <b>19-Oct-2018 12:39</b>					
Client ID: <b>LH18/24-SP650_101718</b>	Run ID: <b>UV-2450_326233</b>	SeqNo: <b>4791751</b>		PrepDate:			DF: <b>10</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	4.36	0.250	2.5	1.92	97.6	80 - 120	4.35	0.23	20	

The following samples were analyzed in this batch: HS18100975-01

**ALS Houston, US**

Date: 01-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18100975

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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

**Sample Receipt Checklist**

Client Name: Bhate Environmental  
 Work Order: HS18100975

Date/Time Received: **18-Oct-2018 08:40**  
 Received by: **PMG**

Checklist completed by: Pablo Martinez 18-Oct-2018  
 eSignature Date

Reviewed by: RJ Modashia 18-Oct-2018  
 eSignature Date

Matrices: **WATER**

Carrier name: **FedEx Priority Overnight**

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- TX1005 solids received in hermetically sealed vials? Yes  No  N/A
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No

Temperature(s)/Thermometer(s): 0.8C/0.5C UC/C IR # 25  
 Cooler(s)/Kit(s): 5678  
 Date/Time sample(s) sent to storage: 10/18/2018 12:30

- Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted
- Water - pH acceptable upon receipt? Yes  No  N/A
- pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:

Client Contacted: Date Contacted: Person Contacted:


Contacted By: Regarding:


Comments:

Corrective Action:

**CHAIN OF CUSTODY**

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

<b>Project:</b> BHATE LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS			<b>Project No.</b> NWO1312.0150.0 16.0001		<b>Analyses</b>										<b>HS18100975</b> Bhate Environmental Associates, Inc. Groundwater Treatment Plant Weekly Samples												
<b>Job:</b> <b>GROUNDWATER TREATMENT PLANT                  WEEKLY SAMPLES</b>			<b>P.O. Number</b>																								
<b>Prepared By:</b> Scott Beesinger																											
<b>Field Sample I.D.</b>			<b>Sample Matrix</b>		<b>Date / Time</b>		<b>MS / MSD</b>	<b>No. OF CONTAINERS</b>	<b>AMMONIA-N</b>	<b>TOTAL ORGANIC CARBON</b>	<b>ORTHO-PHOSPHATE</b>	<b>PERCHLORATE</b>							<b>Remarks                  (Preservatives,                  etc.)</b>	<b>Lab I.D.#</b>							
LH18/24-SP650_101718			Water		10/17/18 / 14:00			2	X	X									H2SO4								
LH18/24-SP650_101718			Water		10/17/18 / 14:00			1			X								NONE								
LH18/24-SP650_101718_BIX			Water		10/17/18 / 14:00			1				X							NONE								
Additional Remarks: <b>Standard TAT on all parameters</b>																											
<b>Relinquished By:</b> <i>Scott Beesinger</i>			<b>Date</b> 10/17/18		<b>Time</b> 14:30		<b>Received By:</b> PS			<b>Date</b> 10/19/18		<b>Time</b> 08:40		<b>Relinquished By:</b>			<b>Date</b>		<b>Time</b>		<b>Received By:</b>			<b>Date</b>		<b>Time</b>	
<b>For Lab Use Only</b>																											
<b>Received At Lab By:</b> Carter			<b>Date</b> 10/18/18		<b>Time</b> 08:40		<b>Airbill No.</b> 4530 9531 4250			<b>Opened By:</b>			<b>Date</b>		<b>Time</b>		<b>Temp of Container</b> 41C		<b>Seal No.</b>		<b>Condition</b>						
<b>Remarks:</b> O-3 10/18/18 C/F-03																											

 <p><b>ALS</b> 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax. +1 281 530 5887</p>	<b>CUSTODY SEAL</b>		PM Date: 10/18/18	
	Date: 10/17/18	Time: 1430		
	Name: Scott Beesing	Company: SHUTE		

**FedEx**  
TRK# 0221 4380 9531 4250

THU - 18 OCT 10:30A  
PRIORITY OVERNIGHT

AB SGRA

5678

77099  
TX-US  
IAH



CTD 162785 17OCT18 666A 553C1/88F8/BC6A



## Case Narrative

**Method:** 6850

**Analysis:** Perchlorate

**Analysis SOP:** LC-MS-CLO4

**ALS WO ID(s):** 1829354; 1829356; 1829552

**Client:** ALS Laboratories (Houston, TX)

**Matrix:** Water

**ELMS Batch (HBN):** 2160 (225755)

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

**Method Summary:** Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at  $m/z$  83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of  $m/z$  83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the  $m/z$  83 peak area. An internal standard (ISTD) of  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** NA

**Method QC data:** The method blank (LMB 624690) was less than 1/2 the CRDL. The recovery for the LCS (624691) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on sample 1829354001 (Client ID: HBW7\_101718). 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 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  $(A) \times (B)$ ,

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

Thomas Bosch                      October 31, 2018  
Analyst    Date





## ANALYTICAL REPORT

Report Date: November 01, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1829356**

Project ID: HS18100975

Purchase Order: HS18100975

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_101718_BIX	1829356001	10/17/18	10/19/18	

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 268 9992

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Environmental 

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RIGHT SOLUTIONS RIGHT PARTNER

16 of 59



## ANALYTICAL REPORT

Workorder: 34-1829356

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP650_101718_BIX</b>	Sampling Site: NA	Collected: 10/17/2018				
Lab ID: 1829356001	Media: 125 mL Nalgene	Received: 10/19/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2160 (HBN: 225755) Analyzed: 10/25/2018 11:39	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
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 10/25/2018 16:34	/S/ Stephen Brose 11/01/2018 07:58

## Laboratory Contact Information

ALS Environmental  
960 W Levoy Drive  
Salt Lake City, Utah 84123Phone: (801) 266-7700  
Email: als@alst.com  
Web: www.alst.com



# ANALYTICAL REPORT

**Workorder:** 34-1829356

**Client:** ALS Environmental  
(Houston)

**Project Manager:** Kevin W. Griffiths

## General Lab Comments

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

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

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

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

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

## Result Symbol Definitions

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

## Qualifier Symbol Definitions

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



# Quality Control Sample Batch Report

00921809

## Analysis Information

**Workorder:** 1829356

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2160 (HBN: 225755)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 624690 <b>Analyzed:</b> 10/25/2018 09:02 <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 624691 <b>Analyzed:</b> 10/25/2018 09:18 <b>Dilution:</b> 1 <b>Units:</b> ug/L				
Analyte	Result	Target	% Rec	QC Limits
Perchlorate	4.89	5.00	97.7	78.8   123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1829354001 <b>Analyzed:</b> 10/25/2018 10:00 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MS:</b> 624692 <b>Analyzed:</b> 10/25/2018 10:14 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MSD:</b> 624693 <b>Analyzed:</b> 10/25/2018 10:28 <b>Dilution:</b> 1 <b>Units:</b> ug/L			
Analyte	Result	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Perchlorate	ND	4.83	5	96.6	78.8   123.8	5.03	101	4.09	0.0   20.0

## Continuing Calibration Verification

<b>CCV:</b> 624687 <b>Analyzed:</b> 10/25/2018 08:14 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%				<b>CCV:</b> 624694 <b>Analyzed:</b> 10/25/2018 12:10 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%		
Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	24.4	25.0	97.5	23.3	25.0	93.1

## Interference Check Sample

<b>ICSA:</b> 624689 <b>Analyzed:</b> 10/25/2018 08:48 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	1.01	1.00	101

## Limit of Detection Verification

<b>LODV:</b> 624688 <b>Analyzed:</b> 10/25/2018 08:34 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%				<b>LODV:</b> 624695 <b>Analyzed:</b> 10/25/2018 12:24 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%		
Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.02	1.00	102	0.996	1.00	99.6



# Quality Control Sample Batch Report

00921810

## Analysis Information

**Workorder:** 1829356

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2160 (HBN: 225755)

**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 10/25/2018 16:34	/S/ Stephen Brose 11/01/2018 07:58

## Symbols and Definitions

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

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



18698/#2



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

### Subcontract Chain of Custody

COC ID: 10046

**SUBCONTRACT TO:**

ALS Laboratory Group  
960 West LeVoy Drive  
Salt Lake City, UT 84123

Phone: +1 800 356 9135

**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:** HS18100975  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18100975-02	LH18/24-SP650_101718_BIX	Water	17 Oct 2018 14:00
SUB_Perch-6850			26 Oct 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: Paul Mains  
Received By: Alfred [Signature]  
Cooler ID(s): 6346

Date/Time: 10/18/18 18:00  
Date/Time: 10/19/18/1000  
Temperature(s): 2°



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

**COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)**

Client Name: <u>ALS Houston</u>		Project/Task/Site: _____							
Date/Time of Receipt: <u>10/19/18 1000</u>		Number of Coolers Received: <u>1</u>							
Condition of Coolers: <u>Acceptable/Unacceptable</u>	Temperature Control: <u>Present/Not Included</u>								
Cooler Custody Seals: <u>Present/Absent/NA</u>	Location Temp Taken: <u>Control/Between Samples</u>								
Container Custody Seals: <u>Present/Absent/NA</u>	Are all temperatures within project specific guidelines? <u>Yes/No/NA</u>								
Ice Present: <u>Yes/No/NA</u>	VOA Headspace Present? <u>Yes/No/NA</u>								
pH Check Performed:	Metals <u>Yes/No/NA</u>	Total Phenolics <u>Yes/No/NA</u>	NO3/NO2 <u>Yes/No/NA</u>						
	Cyanide <u>Yes/No/NA</u>	TPH - 418.1 <u>Yes/No/NA</u>	Oil & Grease <u>Yes/No/NA</u>						
	Sulfide <u>Yes/No/NA</u>	COD <u>Yes/No/NA</u>	Total Phosphorous <u>Yes/No/NA</u>						
	Ammonia <u>Yes/No/NA</u>	TKN <u>Yes/No/NA</u>	Gross A.B, Gamma Spec <u>Yes/No/NA</u>						
Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	
1	C18 <u>8848</u>	<u>2</u> °C	4	C18	°C	7	C18	°C	
2	C18	°C	5	C18	°C	8	C18	°C	
3	C18	°C	6	C18	°C	9	C18	°C	
Taken By: <u>Meredith Kemp</u>		Signature		<u>Meredith Kemp</u>		Printed Name		<u>10/19/18</u>	Date

**CLIENT-RELATED INFORMATION**

<input type="checkbox"/> Missing Cooler	<input type="checkbox"/> Missing Samples/Bottles	<input type="checkbox"/> Incorrect Preservation	<input type="checkbox"/> Insufficient Sample Volume
<input type="checkbox"/> Cooler Conditions	<input type="checkbox"/> Broken/Leaking Samples	<input type="checkbox"/> pH Criteria Not Met	<input type="checkbox"/> Chain of Custody Problems
<input type="checkbox"/> Missing Paperwork	<input type="checkbox"/> Incorrect Bottle Type	<input type="checkbox"/> Residual Chlorine Present	<input type="checkbox"/> Other:
<input type="checkbox"/> Missing/Incorrect Bottle Labels	<input type="checkbox"/> Cooler Temperatures Out of Range	<input type="checkbox"/> 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: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature



**Must Deliver Next Business Day  
Time and Tempature Sensitive!**



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

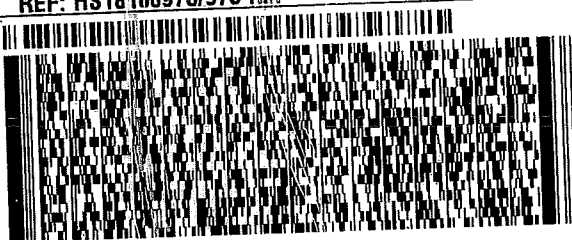
SHIP DATE: 18OCT18  
ACTWGT: 18.50 LB  
CAD: 300130/CAFE3211  
DIMS: 19x16x13 IN  
BILL THIRD PARTY

**TO SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
960 W. LEVOY DRIVE**

**SALT LAKE CITY UT 84123**

(801) 266-7700

REF: HS18100975/976 RM



**FedEx  
Express**



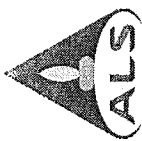
**FRI - 19 OCT 3:00P  
STANDARD OVERNIGHT**

TRK# 438019533 7217  
0201

**AX BTFA**

**84123  
UT-US SLC**





# Batch Worklist

Batch: ELMS/2160      Created: 10/25/2018 07:44  
 Rule: EPA 6850, DoD QSM Water      Analyst: T. Bosch

Instrument:      HBN: 225755  
 Status: WP      

Workorder: 1829354 [ENV\_LVL4]  
 Workorder: 1829356 [ENV\_LVL4]  
 Workorder: 1829552 [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	624687	CCV for HBN 225755 [ELMS/2160]				CCV	3	E685041C3Q	5311		11/1/2018	
2	624688	LODY for HBN 225755 [ELMS/2160]				LODY	3	E6850.D3Q	5311		11/1/2018	
3	624689	ICS for HBN 225755 [ELMS/2160]				ICS	3	E6850.D3Q	5311		11/1/2018	
4	624690	LMB for HBN 225755 [ELMS/2160]				LMB	3	E6850Q413Q	5311		11/1/2018	
5	624691	LCS for HBN 225755 [ELMS/2160]				LCS	3	E6850Q413Q	5311		11/1/2018	
6	1829354001	HBW7_101718				SAMPLE	3	1829354001-A E6850Q41.3	5480	11/14/2018	11/1/2018	
7	624692	HBW7_101718(1829354001MS)				MS	3	E6850Q413Q	5311		11/1/2018	
8	624693	HBW7_101718(1829354001MSD)				MSD	3	E6850Q413Q	5311		11/1/2018	
9	1829354002	HBW10_101718				SAMPLE	3	1829354002-A E6850Q41.3	5480	11/14/2018	11/1/2018	
10	1829354003	HBW1_101718				SAMPLE	3	1829354003-A E6850Q41.3	5480	11/14/2018	11/1/2018	
11	1829354004	GPW1_101718				SAMPLE	3	1829354004-A E6850Q41.3	5480	11/14/2018	11/1/2018	
12	1829354005	GPW3_101718				SAMPLE	3	1829354005-A E6850Q41.3	5480	11/14/2018	11/1/2018	
13	1829356001	LH18/24-SP650_101718_BIX				SAMPLE	3	1829356001-A E6850Q41.3	5480	11/14/2018	11/1/2018	
14	1829552001	16WW48-181018				SAMPLE	3	1829552001-A E6850Q41.3	5480	11/15/2018	11/1/2018	
15	624694	CCV for HBN 225755 [ELMS/2160]				CCV	3	E685041C3Q	5311		11/1/2018	
16	624695	LODY for HBN 225755 [ELMS/2160]				LODY	3	E6850.D3Q	5311		11/1/2018	



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

---

# **Analytical Documentation**

ALS Work Order #'s & Sample #( )'s: 1829354 (001-05); 1829356 (001); 1829552 (001)  
 ELMS Batch/HBN ID: 2160 (225755)  
 Prep Date: 10/24/2018 Analysis Date: 10/25/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\OCT\25OCT18D.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: 2 Injection Volume: 25µL  
 Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

**FLOW GRADIENT:**

Time (min.)	Flow (mL/min)
0	0.80
5.0	0.80
5.3	0.25
10.0	0.25
10.5	0.80
12.5	0.80

**QC DATA:** 5.0µL of QC Solution Horizon ID 41830 was used for LCS 624691; Target = 5.0µg/L. ASTM type II water was used for LMB 624690.

**MS/MSD:** MS/MSD was performed on sample 1829354001 (Client ID: HBW7\_101718). 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.
- 2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
- 3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\OCT\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- 4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\225755-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATA\REVIEW\HBN#

### 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.

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
Batch(es)/SDG: <u>ELMS 2160 HBN: 825755</u>		
Sample Set IDs if Applicable: <u>1829354   1829356   1829552</u>		
Calibration standards analyzed and meets criteria	TB	SB
Standards traceability checked and meets criteria	TB	SB
Standard curve coefficients evaluated and meet criteria	TB	SB
ICVs analyzed and meet acceptance criteria	TB	SB
CCVs analyzed and meet acceptance criteria	TB	SB
Method Blanks analyzed and meet acceptance criteria	TB	SB
Retention Time Windows checked	TB	SB
<u>For method 8081A, Endrin/DDT Breakdown is checked for compliance</u>	—	—
Surrogate recoveries checked and appropriately addressed	—	—
Method Preparation Blanks analyzed and meet acceptance criteria	TB	SB
MSS, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed	TB	SB
RLVS analyzed	TB	SB
Preparation and analysis hold times met	TB	SB
Preparation deviations and re-preparations noted when performed	TB	SB
Analysis deviations and re-analyses noted when performed	TB	SB
Sample dilution factors noted on reports	TB	SB
Electronic records in HBN transcription accuracy and completeness checked	TB	SB
Preparation and analysis calculations checked	TB	SB
NCRs are completed as necessary <u>NC/CAR#</u>	—	—
Report forms are complete and accurate	TB	SB
Manual integrations checked	TB	SB

TB 10/31/18

SB 11/1/18



## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK		Description - 6850 WKG Std 100.ug/L			
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

### Constituent

#### Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL	
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020	
MFG Lot: 218065075		Usable: No	
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



**STANDARD REPORT**

**Constituent**

**Solvent Standard - ASTM H2O**

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			





## STANDARD REPORT

### Constituent

#### Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

### Working Standard - CLO4 QC WRK

CLO4 QC WRK			Description - 6850 QC WKG STD 100ug/L		
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				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 Intrmdf Std-QC 10ug/mL		
Standard: 41830		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

### Constituent

#### Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description - 6850 QC Stock STD 1,000ug/mL	
Standard: 36748	Created By: Thomas Bosch	Amount: 100 mL	
MFG: Ultra Scientific	Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020	
MFG Lot: CP-0860		Usable: Yes	
Part ID: ICC-013		Lab Lot: CLO4 QC STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730		Created By: Thomas Bosch		Amount: 25 mL	
MFG: ALS/SLC		Create Date: 09/20/2018 09:09AM		Expires: 09/20/2019	
MFG Lot: TNB: 05/09/2018		Verified By: Thomas Bosch		Usable: Yes	
Pipette ID: Not Provided		Verify Date:		Lab Lot: CLO4ISTDWRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock	
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL



# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

### Description:

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

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

Solvent: water (low TOC, < 50 ppb)

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

### Traceability:

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

### Estimation of Uncertainties:

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

### Homogeneity:

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

### Intended Use:

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

### Instructions for Use:

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

### Hazards:

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

### Expiration of Certification:

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







# Certificate of Analysis



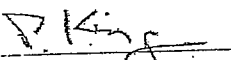
## ISO Guide 34 Reference Material

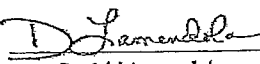
Product Number: ICC-013  
Lot Number: CP-0860

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. Larnendola  
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



43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> 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 1 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

Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

Quality Standards:

ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

Product Information

Chemical Purity Specification:  $\geq 98\%$

Labeled CAS Number: NA

Unlabeled CAS Number: 7601-89-0

MW\*: 130.4

Chemical Formula: NaCl\*O4

Storage: Store at room temperature away from light and moisture.

Stability: See storage and expiration date.

Certification

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

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

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

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

Approved by: T. J. Eckersley

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

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



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ALS Environmental  
ALS Group USA, Corp  
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F : +1 360 636 1068  
[www.alsglobal.com](http://www.alsglobal.com)

October 31, 2018

**Analytical Report for Service Request No: K1810242**

RJ Modashia  
ALS Laboratory Group  
10450 Stancliff Road  
Suite 210  
Houston, TX 77099-4338

**RE: HS18100975**

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory October 19, 2018  
For your reference, these analyses have been assigned our service request number **K1810242**.

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](http://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](mailto:Kelley.Lovejoy@alsglobal.com).

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

*Kelley Lovejoy*

Kelley Lovejoy  
Project Manager



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## Table of Contents

Acronyms

Qualifiers

State Certifications, Accreditations, And Licenses

Case Narrative

Chain of Custody

General Chemistry

Raw Data

    General Chemistry

## 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**

<b>Agency</b>	<b>Web Site</b>	<b>Number</b>
Alaska DEH	<a href="http://dec.alaska.gov/eh/lab/cs/csapproval.htm">http://dec.alaska.gov/eh/lab/cs/csapproval.htm</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2795
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L16-58-R4
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Hawaii DOH	<a href="http://health.hawaii.gov/">http://health.hawaii.gov/</a>	-
ISO 17025	<a href="http://www.pjlabs.com/">http://www.pjlabs.com/</a>	L16-57
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	03016
Maine DHS	<a href="http://www.maine.gov/dhhs/">http://www.maine.gov/dhhs/</a>	WA01276
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-457
Nevada DEP	<a href="http://ndep.nv.gov/bsdw/labservice.htm">http://ndep.nv.gov/bsdw/labservice.htm</a>	WA01276
New Jersey DEP	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	WA005
New York - DOH	<a href="https://www.wadsworth.org/regulatory/elap">https://www.wadsworth.org/regulatory/elap</a>	12060
North Carolina DEQ	<a href="https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification">https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA100010
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/EnvironmentalLabCertification/">http://www.scdhec.gov/environment/EnvironmentalLabCertification/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704427
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C544
Wyoming (EPA Region 8)	<a href="https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water">https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water</a>	-
Kelso Laboratory Website	<a href="http://www.alsglobal.com">www.alsglobal.com</a>	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](http://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/analyte 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](http://www.alsglobal.com)



**Client:** ALS Environmental - US  
**Project:** HS18100975  
**Sample Matrix:** Water

**Service Request:** K1810242  
**Date Received:** 10/19/2018

#### CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

#### Sample Receipt:

One water sample was received for analysis at ALS Environmental on 10/19/2018. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

#### General Chemistry:

No significant anomalies were noted with this analysis.

Approved by

Kelley Avejoy

Date

10/31/2018



## 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](http://www.alsglobal.com)



K1810242

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: 10045

**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:** HS18100975  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18100975-01	LH18/24-SP650_101718	Water	17 Oct 2018 14:00
TOC Analysis for DOD Level IV			26 Oct 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: Pats Mainer  
Received By: [Signature]  
Cooler ID(s): \_\_\_\_\_

Date/Time: 10-18-2018 18100  
Date/Time: 10-19-18 0930  
Temperature(s): \_\_\_\_\_



### Cooler Receipt and Preservation Form

Client ALS Houston Service Request K18 10242  
 Received: 10-19-18 Opened: 10-19-18 By: JSP Unloaded: 10-19-18 By: JSP

- 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 Top Front  
 If present, were custody seals intact?  **Y**  **N** If present, were they signed and dated?  **Y**  **N**

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
-0.1	0.0	1.2	1.3	10.1	349	10045	4380 9533 7191		

- Packing material: **Inserts**  **Baggies**  **Bubble Wrap**  **Gel Packs**  **Wet Ice**  **Dry Ice**  **Sleeves** \_\_\_\_\_
- Were custody papers properly filled out (ink, signed, etc.)?  **NA**  **Y**  **N**
- 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**
- Were all sample labels complete (i.e analysis, preservation, etc.)?  **NA**  **Y**  **N**
- Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.*  **NA**  **Y**  **N**
- Were appropriate bottles/containers and volumes received for the tests indicated?  **NA**  **Y**  **N**
- Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below*  **NA**  **Y**  **N**
- Were VOA vials received without headspace? *Indicate in the table below.*  **NA**  **Y**  **N**
- 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: \_\_\_\_\_

# SHORT HOLD TIME



## General Chemistry

**ALS Environmental—Kelso Laboratory**  
1317 South 13th Avenue, Kelso, WA 98626  
Phone (360)577-7222 Fax (360)636-1068  
[www.alsglobal.com](http://www.alsglobal.com)

Analytical Report

**Client:** ALS Environmental - US  
**Project:** HS18100975  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:** K1810242  
**Date Collected:** 10/17/18  
**Date Received:** 10/19/18  
**Units:** mg/L  
**Basis:** NA

**Carbon, Total Organic**

Sample Name	Lab Code	Result	LOQ	LOD	MDL	Dil.	Date Analyzed	Q
LH18/24-SP650_101718	K1810242-001	<b>10.6</b>	0.50	0.20	0.07	1	10/28/18 11:03	
Method Blank	K1810242-MB	ND U	0.50	0.20	0.07	1	10/28/18 03:50	

## ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100975  
**Sample Matrix:** Water

**Service Request:** K1810242  
**Date Collected:** 10/17/18  
**Date Received:** 10/19/18  
**Date Analyzed:** 10/28/18

**Replicate Sample Summary**  
**General Chemistry Parameters**

**Sample Name:** LH18/24-SP650\_101718  
**Lab Code:** K1810242-001

**Units:** mg/L  
**Basis:** NA

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>LOQ</u>	<u>LOD</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1810242-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Carbon, Total Organic	SM 5310 C	0.50	0.20	0.07	10.6	10.1	10.4	4	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.



ALS Group USA, Corp.  
dba ALS Environmental

## QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100975  
**Sample Matrix:** Water

**Service Request:** K1810242  
**Date Collected:** 10/17/18  
**Date Received:** 10/19/18  
**Date Analyzed:** 10/28/18  
**Date Extracted:** NA

**Matrix Spike Summary**  
**Carbon, Total Organic**

**Sample Name:** LH18/24-SP650\_101718  
**Lab Code:** K1810242-001  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA

**Matrix Spike**  
K1810242-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Carbon, Total Organic	10.6	38.2	25.0	111	83-117

Results flagged with an asterisk (\*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.  
dba ALS Environmental

## QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100975  
**Sample Matrix:** Water

**Service Request:** K1810242  
**Date Analyzed:** 10/28/18  
**Date Extracted:** NA

**Lab Control Sample Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA  
**Analysis Lot:** 612758

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K1810242-LCS	21.7	21.9	99	83-117

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100975

**Service Request:** K1810242

### Continuing Calibration Verification (CCV) Summary

#### Carbon, Total Organic

**Analysis Method:** SM 5310 C

**Units:** mg/L

	Analysis		Date	True	Measured	Percent	Acceptance
	Lot	Lab Code	Analyzed	Value	Value	Recovery	Limits
CCV1	612758	KQ1815799-14	10/28/18 03:17	25.0	24.7	99	90-110
CCV2	612758	KQ1815799-15	10/28/18 08:21	25.0	24.6	98	90-110
CCV3	612758	KQ1815799-16	10/28/18 12:23	25.0	24.5	98	90-110

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18100975

**Service Request:** K1810242

**Continuing Calibration Blank (CCB) Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C

**Units:** mg/L

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>LOQ</b>	<b>LOD</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	612758	KQ1815799-17	10/28/18 03:33	0.50	0.20	0.07	ND	U
CCB2	612758	KQ1815799-18	10/28/18 08:38	0.50	0.20	0.07	ND	U
CCB3	612758	KQ1815799-19	10/28/18 12:39	0.50	0.20	0.07	ND	U



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10450 Stancliff Rd. Suite 210  
Houston, TX 77099  
T: +1 281 530 5656  
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October 30, 2018

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

Work Order: **HS18100977**

Laboratory Results for: **Groundwater Treatment Plant Bi-Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Oct 18, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

## ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**Work Order:** HS18100977

**SAMPLE SUMMARY**

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Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18100977-01	LH18/24-SP650_101718	Water		17-Oct-2018 14:00	18-Oct-2018 08:40	<input type="checkbox"/>
HS18100977-02	Trip Blank	Water	ALS-071918-90	17-Oct-2018 00:00	18-Oct-2018 08:40	<input type="checkbox"/>

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**ALS Houston, US**

Date: 30-Oct-18

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**Work Order:** HS18100977

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**CASE NARRATIVE**

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**GCMS Volatiles by Method SW8260****Batch ID: R325954****Sample ID: CCV**

- Bromomethane exceeded %D limits on CCV. Samples ND.

**Sample ID: HS18101139-07MS**

- MS and MSD are for an unrelated sample
- 

**WetChemistry by Method SW9056****Batch ID: R326431****Sample ID: HS18101236-18MSD**

- MSD is for an unrelated sample (Sulfate)
-

## ALS Houston, US

Date: 30-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: LH18/24-SP650\_101718  
 Collection Date: 17-Oct-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100977  
 Lab ID:HS18100977-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>VOLATILES ORGANICS BY METHOD</b>		<b>Method:SW8260</b>						
<b>8260C</b>								Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 01:55
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	23-Oct-2018 01:55
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	23-Oct-2018 01:55
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 01:55
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	23-Oct-2018 01:55
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	23-Oct-2018 01:55
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 01:55
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 01:55
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 01:55
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	23-Oct-2018 01:55
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 01:55
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55

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



## ALS Houston, US

Date: 30-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: LH18/24-SP650\_101718  
 Collection Date: 17-Oct-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100977  
 Lab ID:HS18100977-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>						Analyst: AKP	
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
<b>cis-1,2-Dichloroethene</b>	<b>3.0</b>		<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>ug/L</b>	1	23-Oct-2018 01:55	
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	23-Oct-2018 01:55	
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	23-Oct-2018 01:55	
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Tetrachloroethene	1.0	U	0.30	1.0	1.0	ug/L	1	23-Oct-2018 01:55	
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 01:55	
<b>Vinyl chloride</b>	<b>1.7</b>		<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>ug/L</b>	1	23-Oct-2018 01:55	
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>94.4</i>			<b>0</b>	<i>81-118</i>	<b>%REC</b>	1	23-Oct-2018 01:55	
<i>Surr: 4-Bromofluorobenzene</i>	<i>98.7</i>			<b>0</b>	<i>85-114</i>	<b>%REC</b>	1	23-Oct-2018 01:55	
<i>Surr: Dibromofluoromethane</i>	<i>95.9</i>			<b>0</b>	<i>80-119</i>	<b>%REC</b>	1	23-Oct-2018 01:55	
<i>Surr: Toluene-d8</i>	<i>93.0</i>			<b>0</b>	<i>89-112</i>	<b>%REC</b>	1	23-Oct-2018 01:55	
<b>ANIONS BY SW9056A</b>		<b>Method:SW9056</b>						Analyst: KMU	
<b>Chloride</b>	<b>496</b>		<b>2.00</b>	<b>5.00</b>	<b>5.00</b>	<b>mg/L</b>	10	24-Oct-2018 20:20	
<b>Sulfate</b>	<b>34.6</b>		<b>2.00</b>	<b>5.00</b>	<b>5.00</b>	<b>mg/L</b>	10	24-Oct-2018 20:20	

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

## ALS Houston, US

Date: 30-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: Trip Blank  
 Collection Date: 17-Oct-2018 00:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100977  
 Lab ID:HS18100977-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>VOLATILES ORGANICS BY METHOD</b>		<b>Method:SW8260</b>						
<b>8260C</b>								Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 00:41
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	23-Oct-2018 00:41
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	23-Oct-2018 00:41
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 00:41
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	23-Oct-2018 00:41
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	23-Oct-2018 00:41
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 00:41
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 00:41
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 00:41
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	23-Oct-2018 00:41
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	23-Oct-2018 00:41
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41

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

## ALS Houston, US

Date: 30-Oct-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: Trip Blank  
 Collection Date: 17-Oct-2018 00:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18100977  
 Lab ID:HS18100977-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>						Analyst: AKP	
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	23-Oct-2018 00:41	
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	23-Oct-2018 00:41	
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Tetrachloroethene	1.0	U	0.30	1.0	1.0	ug/L	1	23-Oct-2018 00:41	
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	23-Oct-2018 00:41	
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>93.8</i>			<i>0</i>	<i>81-118</i>	<i>%REC</i>	<i>1</i>	<i>23-Oct-2018 00:41</i>	
<i>Surr: 4-Bromofluorobenzene</i>	<i>97.9</i>			<i>0</i>	<i>85-114</i>	<i>%REC</i>	<i>1</i>	<i>23-Oct-2018 00:41</i>	
<i>Surr: Dibromofluoromethane</i>	<i>95.5</i>			<i>0</i>	<i>80-119</i>	<i>%REC</i>	<i>1</i>	<i>23-Oct-2018 00:41</i>	
<i>Surr: Toluene-d8</i>	<i>92.1</i>			<i>0</i>	<i>89-112</i>	<i>%REC</i>	<i>1</i>	<i>23-Oct-2018 00:41</i>	

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

ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R325954	<b>Test Name :</b> VOLATILES ORGANICS BY METHOD 8260C		<b>Matrix:</b> Water			
HS18100977-01	LH18/24-SP650_101718	17 Oct 2018 14:00			23 Oct 2018 01:55	1
HS18100977-02	Trip Blank	17 Oct 2018 00:00			23 Oct 2018 00:41	1
<b>Batch ID</b> R326431	<b>Test Name :</b> ANIONS BY SW9056A		<b>Matrix:</b> Water			
HS18100977-01	LH18/24-SP650_101718	17 Oct 2018 14:00			24 Oct 2018 20:20	10

ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

**QC BATCH REPORT**

Batch ID: R325954		Instrument: VOA2		Method: SW8260						
MBLK	Sample ID: VBLKW-181022	Units: ug/L			Analysis Date: 22-Oct-2018 23:53					
Client ID:	Run ID: VOA2_325954	SeqNo: 4785358	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

## ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

## QC BATCH REPORT

Batch ID: R325954		Instrument: VOA2		Method: SW8260						
MBLK	Sample ID: VBLKW-181022	Units: ug/L			Analysis Date: 22-Oct-2018 23:53					
Client ID:	Run ID: VOA2_325954	SeqNo: 4785358	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	1.0	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	46.3	1.0	50	0	92.6	81 - 118				
Surr: 4-Bromofluorobenzene	49.52	1.0	50	0	99.0	85 - 114				
Surr: Dibromofluoromethane	49.27	1.0	50	0	98.5	80 - 119				
Surr: Toluene-d8	46.76	1.0	50	0	93.5	89 - 112				

## ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

## QC BATCH REPORT

Batch ID: R325954		Instrument: VOA2		Method: SW8260						
LCS	Sample ID: VLCSW-181022	Units: ug/L			Analysis Date: 22-Oct-2018 23:04					
Client ID:	Run ID: VOA2_325954	SeqNo: 4785357	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	20.98	1.0	20	0	105	78 - 124				
1,1,1-Trichloroethane	19.64	1.0	20	0	98.2	74 - 131				
1,1,2,2-Tetrachloroethane	17.96	1.0	20	0	89.8	71 - 121				
1,1,2-Trichloroethane	20.41	1.0	20	0	102	80 - 119				
1,1-Dichloroethane	20.53	1.0	20	0	103	77 - 125				
1,1-Dichloroethene	20.06	1.0	20	0	100	71 - 131				
1,1-Dichloropropene	22.5	1.0	20	0	112	78 - 125				
1,2,3-Trichlorobenzene	17.77	1.0	20	0	88.9	69 - 129				
1,2,3-Trichloropropane	17.7	1.0	20	0	88.5	73 - 122				
1,2,4-Trichlorobenzene	18.89	1.0	20	0	94.4	69 - 130				
1,2,4-Trimethylbenzene	21.53	1.0	20	0	108	76 - 124				
1,2-Dibromo-3-chloropropane	16.42	1.0	20	0	82.1	62 - 128				
1,2-Dibromoethane	20.99	1.0	20	0	105	77 - 121				
1,2-Dichlorobenzene	19.8	1.0	20	0	99.0	80 - 119				
1,2-Dichloroethane	22.4	1.0	20	0	112	73 - 128				
1,2-Dichloropropane	21.68	1.0	20	0	108	78 - 122				
1,3,5-Trimethylbenzene	19.63	1.0	20	0	98.1	75 - 124				
1,3-Dichlorobenzene	20.39	1.0	20	0	102	80 - 119				
1,3-Dichloropropane	20.76	1.0	20	0	104	80 - 119				
1,4-Dichlorobenzene	20.48	1.0	20	0	102	79 - 118				
2,2-Dichloropropane	21.26	1.0	20	0	106	60 - 139				
2-Butanone	37.26	2.0	40	0	93.1	56 - 143				
2-Chlorotoluene	21.74	1.0	20	0	109	79 - 122				
2-Hexanone	37.73	2.0	40	0	94.3	57 - 139				
4-Chlorotoluene	22.05	1.0	20	0	110	78 - 122				
4-Isopropyltoluene	18.57	1.0	20	0	92.9	77 - 127				
4-Methyl-2-pentanone	38.58	2.0	40	0	96.4	67 - 130				
Acetone	35.79	2.0	40	0	89.5	39 - 160				
Benzene	20.87	1.0	20	0	104	79 - 120				
Bromobenzene	20.17	1.0	20	0	101	80 - 120				
Bromochloromethane	21.03	1.0	20	0	105	78 - 123				
Bromodichloromethane	21.68	1.0	20	0	108	79 - 125				
Bromoform	20.1	1.0	20	0	100	66 - 130				
Bromomethane	24.27	1.0	20	0	121	53 - 141				

## ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

## QC BATCH REPORT

Batch ID: R325954		Instrument: VOA2		Method: SW8260						
LCS	Sample ID: VLCSW-181022	Units: ug/L			Analysis Date: 22-Oct-2018 23:04					
Client ID:	Run ID: VOA2_325954	SeqNo: 4785357	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	39	2.0	40	0	97.5	64 - 133				
Carbon tetrachloride	21.91	1.0	20	0	110	72 - 136				
Chlorobenzene	21.19	1.0	20	0	106	82 - 118				
Chloroethane	20.22	1.0	20	0	101	60 - 138				
Chloroform	19.9	1.0	20	0	99.5	79 - 124				
Chloromethane	17.84	1.0	20	0	89.2	50 - 139				
cis-1,2-Dichloroethene	20.75	1.0	20	0	104	78 - 123				
cis-1,3-Dichloropropene	22.35	1.0	20	0	112	75 - 124				
Dibromochloromethane	20.66	1.0	20	0	103	74 - 126				
Dibromomethane	21.73	1.0	20	0	109	79 - 123				
Dichlorodifluoromethane	14.06	1.0	20	0	70.3	32 - 152				
Ethylbenzene	22.66	1.0	20	0	113	79 - 121				
Hexachlorobutadiene	19.74	1.0	20	0	98.7	66 - 134				
Isopropylbenzene	20.29	1.0	20	0	101	72 - 131				
m,p-Xylene	45.44	2.0	40	0	114	80 - 121				
Methylene chloride	20.98	2.0	20	0	105	74 - 124				
Naphthalene	15.92	1.0	20	0	79.6	61 - 128				
n-Butylbenzene	20.72	1.0	20	0	104	75 - 128				
n-Propylbenzene	22.1	1.0	20	0	111	76 - 126				
o-Xylene	22.51	1.0	20	0	113	78 - 122				
sec-Butylbenzene	19.08	1.0	20	0	95.4	77 - 126				
Styrene	21.44	1.0	20	0	107	78 - 123				
tert-Butylbenzene	21.37	1.0	20	0	107	78 - 124				
Tetrachloroethene	20.51	1.0	20	0	103	74 - 129				
Toluene	20.48	1.0	20	0	102	80 - 121				
trans-1,2-Dichloroethene	21.45	1.0	20	0	107	75 - 124				
trans-1,3-Dichloropropene	22.37	1.0	20	0	112	73 - 127				
Trichloroethene	20.69	1.0	20	0	103	79 - 123				
Trichlorofluoromethane	20.23	1.0	20	0	101	65 - 141				
Vinyl chloride	19.59	1.0	20	0	98.0	58 - 137				
Surr: 1,2-Dichloroethane-d4	48.23	1.0	50	0	96.5	81 - 118				
Surr: 4-Bromofluorobenzene	50.84	1.0	50	0	102	85 - 114				
Surr: Dibromofluoromethane	47.26	1.0	50	0	94.5	80 - 119				
Surr: Toluene-d8	45.21	1.0	50	0	90.4	89 - 112				



ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

**QC BATCH REPORT**

Batch ID: R325954		Instrument: VOA2		Method: SW8260						
MS	Sample ID: HS18101139-07MS	Units: ug/L			Analysis Date: 23-Oct-2018 03:38					
Client ID:	Run ID: VOA2_325954	SeqNo: 4785362	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	19.41	1.0	20	0	97.0	78 - 124				
1,1,1-Trichloroethane	19.4	1.0	20	0	97.0	74 - 131				
1,1,2,2-Tetrachloroethane	17.37	1.0	20	0	86.9	71 - 121				
1,1,2-Trichloroethane	19.17	1.0	20	0	95.9	80 - 119				
1,1-Dichloroethane	19.29	1.0	20	0	96.5	77 - 125				
1,1-Dichloroethene	19.68	1.0	20	0	98.4	71 - 131				
1,1-Dichloropropene	21.95	1.0	20	0	110	78 - 125				
1,2,3-Trichlorobenzene	16.44	1.0	20	0	82.2	69 - 129				
1,2,3-Trichloropropane	17.16	1.0	20	0	85.8	73 - 122				
1,2,4-Trichlorobenzene	17.6	1.0	20	0	88.0	69 - 130				
1,2,4-Trimethylbenzene	61.55	1.0	20	43.59	89.8	76 - 124				
1,2-Dibromo-3-chloropropane	16.6	1.0	20	0	83.0	62 - 128				
1,2-Dibromoethane	19.67	1.0	20	0	98.3	77 - 121				
1,2-Dichlorobenzene	18.3	1.0	20	0	91.5	80 - 119				
1,2-Dichloroethane	20.17	1.0	20	0	101	73 - 128				
1,2-Dichloropropane	20.54	1.0	20	0	103	78 - 122				
1,3,5-Trimethylbenzene	30.62	1.0	20	12.44	90.9	75 - 124				
1,3-Dichlorobenzene	18.83	1.0	20	0	94.1	80 - 119				
1,3-Dichloropropane	19.02	1.0	20	0	95.1	80 - 119				
1,4-Dichlorobenzene	18.72	1.0	20	0	93.6	79 - 118				
2,2-Dichloropropane	20.55	1.0	20	0	103	60 - 139				
2-Butanone	38.86	2.0	40	0	97.1	56 - 143				
2-Chlorotoluene	23.52	1.0	20	0	118	79 - 122				
2-Hexanone	38.24	2.0	40	0	95.6	57 - 139				
4-Chlorotoluene	21.57	1.0	20	0	108	78 - 122				
4-Isopropyltoluene	18.47	1.0	20	0	92.3	77 - 127				
4-Methyl-2-pentanone	38.16	2.0	40	0	95.4	67 - 130				
Acetone	38.75	2.0	40	0	96.9	39 - 160				
Benzene	181	1.0	20	166.5	72.4	79 - 120				SO
Bromobenzene	18.48	1.0	20	0	92.4	80 - 120				
Bromochloromethane	20.63	1.0	20	0	103	78 - 123				
Bromodichloromethane	20.54	1.0	20	0	103	79 - 125				
Bromoform	18.6	1.0	20	0	93.0	66 - 130				
Bromomethane	20.17	1.0	20	0	101	53 - 141				

## ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

## QC BATCH REPORT

Batch ID: R325954		Instrument: VOA2		Method: SW8260						
MS	Sample ID: HS18101139-07MS	Units: ug/L			Analysis Date: 23-Oct-2018 03:38					
Client ID:	Run ID: VOA2_325954	SeqNo: 4785362	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	40.08	2.0	40	0	100	64 - 133				
Carbon tetrachloride	22.3	1.0	20	0	111	72 - 136				
Chlorobenzene	19.87	1.0	20	0	99.4	82 - 118				
Chloroethane	19.12	1.0	20	0	95.6	60 - 138				
Chloroform	19.62	1.0	20	0	98.1	79 - 124				
Chloromethane	15.44	1.0	20	0	77.2	50 - 139				
cis-1,2-Dichloroethene	20.24	1.0	20	0	101	78 - 123				
cis-1,3-Dichloropropene	20.64	1.0	20	0	103	75 - 124				
Dibromochloromethane	19.47	1.0	20	0	97.3	74 - 126				
Dibromomethane	20.21	1.0	20	0	101	79 - 123				
Dichlorodifluoromethane	14.4	1.0	20	0	72.0	32 - 152				
Ethylbenzene	75.37	1.0	20	55.91	97.3	79 - 121				
Hexachlorobutadiene	17.18	1.0	20	0	85.9	66 - 134				
Isopropylbenzene	25.53	1.0	20	6.06	97.3	72 - 131				
m,p-Xylene	248.5	2.0	40	210.2	95.9	80 - 121				O
Methylene chloride	18.9	2.0	20	0	94.5	74 - 124				
Naphthalene	26.9	1.0	20	5.256	108	61 - 128				
n-Butylbenzene	20.25	1.0	20	0	101	75 - 128				
n-Propylbenzene	26.25	1.0	20	2.169	120	76 - 126				
o-Xylene	123.6	1.0	20	102.9	104	78 - 122				O
sec-Butylbenzene	18.85	1.0	20	0.6856	90.8	77 - 126				
Styrene	21.79	1.0	20	0	109	78 - 123				
tert-Butylbenzene	20.62	1.0	20	0	103	78 - 124				
Tetrachloroethene	19.94	1.0	20	0	99.7	74 - 129				
Toluene	21.22	1.0	20	1.768	97.3	80 - 121				
trans-1,2-Dichloroethene	20.6	1.0	20	0	103	75 - 124				
trans-1,3-Dichloropropene	20.59	1.0	20	0	103	73 - 127				
Trichloroethene	26.83	1.0	20	0	134	79 - 123				S
Trichlorofluoromethane	20.86	1.0	20	0	104	65 - 141				
Vinyl chloride	19.93	1.0	20	0	99.7	58 - 137				
Surr: 1,2-Dichloroethane-d4	50.27	1.0	50	0	101	81 - 118				
Surr: 4-Bromofluorobenzene	50.87	1.0	50	0	102	85 - 114				
Surr: Dibromofluoromethane	47.55	1.0	50	0	95.1	80 - 119				
Surr: Toluene-d8	44.73	1.0	50	0	89.5	89 - 112				

ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

**QC BATCH REPORT**

Batch ID: R325954		Instrument: VOA2		Method: SW8260						
MSD	Sample ID: HS18101139-07MSD	Units: ug/L			Analysis Date: 23-Oct-2018 04:03					
Client ID:	Run ID: VOA2_325954	SeqNo: 4785363	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	19.51	1.0	20	0	97.6	78 - 124	19.41	0.545	20	
1,1,1-Trichloroethane	18.79	1.0	20	0	94.0	74 - 131	19.4	3.19	20	
1,1,2,2-Tetrachloroethane	17.04	1.0	20	0	85.2	71 - 121	17.37	1.92	20	
1,1,2-Trichloroethane	19.25	1.0	20	0	96.2	80 - 119	19.17	0.375	20	
1,1-Dichloroethane	19.05	1.0	20	0	95.3	77 - 125	19.29	1.27	20	
1,1-Dichloroethene	18.7	1.0	20	0	93.5	71 - 131	19.68	5.12	20	
1,1-Dichloropropene	21.31	1.0	20	0	107	78 - 125	21.95	2.97	20	
1,2,3-Trichlorobenzene	17.51	1.0	20	0	87.6	69 - 129	16.44	6.3	20	
1,2,3-Trichloropropane	16.89	1.0	20	0	84.4	73 - 122	17.16	1.61	20	
1,2,4-Trichlorobenzene	18.72	1.0	20	0	93.6	69 - 130	17.6	6.18	20	
1,2,4-Trimethylbenzene	61.24	1.0	20	43.59	88.2	76 - 124	61.55	0.505	20	
1,2-Dibromo-3-chloropropane	15.91	1.0	20	0	79.5	62 - 128	16.6	4.27	20	
1,2-Dibromoethane	20.02	1.0	20	0	100	77 - 121	19.67	1.78	20	
1,2-Dichlorobenzene	18.41	1.0	20	0	92.1	80 - 119	18.3	0.633	20	
1,2-Dichloroethane	20	1.0	20	0	100.0	73 - 128	20.17	0.868	20	
1,2-Dichloropropane	20.44	1.0	20	0	102	78 - 122	20.54	0.517	20	
1,3,5-Trimethylbenzene	29.85	1.0	20	12.44	87.1	75 - 124	30.62	2.53	20	
1,3-Dichlorobenzene	18.95	1.0	20	0	94.7	80 - 119	18.83	0.622	20	
1,3-Dichloropropane	19.72	1.0	20	0	98.6	80 - 119	19.02	3.59	20	
1,4-Dichlorobenzene	18.92	1.0	20	0	94.6	79 - 118	18.72	1.02	20	
2,2-Dichloropropane	19.62	1.0	20	0	98.1	60 - 139	20.55	4.62	20	
2-Butanone	38.43	2.0	40	0	96.1	56 - 143	38.86	1.1	20	
2-Chlorotoluene	23.1	1.0	20	0	116	79 - 122	23.52	1.78	20	
2-Hexanone	38.81	2.0	40	0	97.0	57 - 139	38.24	1.49	20	
4-Chlorotoluene	21.41	1.0	20	0	107	78 - 122	21.57	0.73	20	
4-Isopropyltoluene	18.2	1.0	20	0	91.0	77 - 127	18.47	1.48	20	
4-Methyl-2-pentanone	37.86	2.0	40	0	94.6	67 - 130	38.16	0.788	20	
Acetone	37.12	2.0	40	0	92.8	39 - 160	38.75	4.29	20	
Benzene	176.2	1.0	20	166.5	48.2	79 - 120	181	2.7	20	SO
Bromobenzene	18.46	1.0	20	0	92.3	80 - 120	18.48	0.0757	20	
Bromochloromethane	20.08	1.0	20	0	100	78 - 123	20.63	2.68	20	
Bromodichloromethane	20.57	1.0	20	0	103	79 - 125	20.54	0.16	20	
Bromoform	18.81	1.0	20	0	94.1	66 - 130	18.6	1.15	20	
Bromomethane	20.56	1.0	20	0	103	53 - 141	20.17	1.91	20	

## ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

## QC BATCH REPORT

Batch ID: R325954		Instrument: VOA2		Method: SW8260						
MSD	Sample ID: HS18101139-07MSD	Units: ug/L			Analysis Date: 23-Oct-2018 04:03					
Client ID:	Run ID: VOA2_325954	SeqNo: 4785363	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	37.77	2.0	40	0	94.4	64 - 133	40.08	5.93	20	
Carbon tetrachloride	20.71	1.0	20	0	104	72 - 136	22.3	7.36	20	
Chlorobenzene	20.38	1.0	20	0	102	82 - 118	19.87	2.51	20	
Chloroethane	20.74	1.0	20	0	104	60 - 138	19.12	8.11	20	
Chloroform	18.96	1.0	20	0	94.8	79 - 124	19.62	3.4	20	
Chloromethane	15.67	1.0	20	0	78.3	50 - 139	15.44	1.47	20	
cis-1,2-Dichloroethene	19.73	1.0	20	0	98.6	78 - 123	20.24	2.57	20	
cis-1,3-Dichloropropene	20.93	1.0	20	0	105	75 - 124	20.64	1.37	20	
Dibromochloromethane	19.42	1.0	20	0	97.1	74 - 126	19.47	0.244	20	
Dibromomethane	20.66	1.0	20	0	103	79 - 123	20.21	2.2	20	
Dichlorodifluoromethane	14.09	1.0	20	0	70.4	32 - 152	14.4	2.23	20	
Ethylbenzene	75.65	1.0	20	55.91	98.7	79 - 121	75.37	0.358	20	
Hexachlorobutadiene	16.59	1.0	20	0	83.0	66 - 134	17.18	3.49	20	
Isopropylbenzene	25.15	1.0	20	6.06	95.5	72 - 131	25.53	1.48	20	
m,p-Xylene	249	2.0	40	210.2	97.1	80 - 121	248.5	0.187	20	O
Methylene chloride	18.53	2.0	20	0	92.7	74 - 124	18.9	1.96	20	
Naphthalene	28.74	1.0	20	5.256	117	61 - 128	26.9	6.61	20	
n-Butylbenzene	19.84	1.0	20	0	99.2	75 - 128	20.25	2	20	
n-Propylbenzene	25.31	1.0	20	2.169	116	76 - 126	26.25	3.62	20	
o-Xylene	123.5	1.0	20	102.9	103	78 - 122	123.6	0.113	20	O
sec-Butylbenzene	18.22	1.0	20	0.6856	87.7	77 - 126	18.85	3.44	20	
Styrene	22.52	1.0	20	0	113	78 - 123	21.79	3.29	20	
tert-Butylbenzene	20.03	1.0	20	0	100	78 - 124	20.62	2.92	20	
Tetrachloroethene	19.39	1.0	20	0	96.9	74 - 129	19.94	2.83	20	
Toluene	21.02	1.0	20	1.768	96.3	80 - 121	21.22	0.942	20	
trans-1,2-Dichloroethene	19.86	1.0	20	0	99.3	75 - 124	20.6	3.63	20	
trans-1,3-Dichloropropene	21.55	1.0	20	0	108	73 - 127	20.59	4.54	20	
Trichloroethene	22.9	1.0	20	0	115	79 - 123	26.83	15.8	20	
Trichlorofluoromethane	19.67	1.0	20	0	98.3	65 - 141	20.86	5.91	20	
Vinyl chloride	18.77	1.0	20	0	93.9	58 - 137	19.93	5.98	20	
Surr: 1,2-Dichloroethane-d4	47.89	1.0	50	0	95.8	81 - 118	50.27	4.85	20	
Surr: 4-Bromofluorobenzene	52.06	1.0	50	0	104	85 - 114	50.87	2.32	20	
Surr: Dibromofluoromethane	47.8	1.0	50	0	95.6	80 - 119	47.55	0.523	20	
Surr: Toluene-d8	44.94	1.0	50	0	89.9	89 - 112	44.73	0.476	20	

ALS Houston, US

Date: 30-Oct-18

**Client:** Bhat Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

**QC BATCH REPORT**

**Batch ID:** R325954      **Instrument:** VOA2      **Method:** SW8260

The following samples were analyzed in this batch: HS18100977-01      HS18100977-02

ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

**QC BATCH REPORT**

Batch ID: R326431		Instrument: ICS2100		Method: SW9056						
<b>MBLK</b>	Sample ID: <b>WBLKW3-102318</b>	Units: <b>mg/L</b>			Analysis Date: <b>24-Oct-2018 18:09</b>					
Client ID:	Run ID: <b>ICS2100_326431</b>	SeqNo: <b>4796255</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	0.500	0.500							U	
Sulfate	0.500	0.500							U	
<b>LCS</b>	Sample ID: <b>WLCSW3-102318</b>	Units: <b>mg/L</b>			Analysis Date: <b>24-Oct-2018 18:23</b>					
Client ID:	Run ID: <b>ICS2100_326431</b>	SeqNo: <b>4796256</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	19.45	0.500	20	0	97.3	80 - 120				
Sulfate	19.27	0.500	20	0	96.4	80 - 120				
<b>LCSD</b>	Sample ID: <b>WLCSDW3-102318</b>	Units: <b>mg/L</b>			Analysis Date: <b>24-Oct-2018 18:38</b>					
Client ID:	Run ID: <b>ICS2100_326431</b>	SeqNo: <b>4796257</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	19.85	0.500	20	0	99.3	80 - 120	19.45	2.04	20	
Sulfate	19.79	0.500	20	0	99.0	80 - 120	19.27	2.66	20	
<b>MS</b>	Sample ID: <b>HS18101236-18MS</b>	Units: <b>mg/L</b>			Analysis Date: <b>24-Oct-2018 17:11</b>					
Client ID:	Run ID: <b>ICS2100_326431</b>	SeqNo: <b>4796251</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	21.88	0.500	10	11.83	100	80 - 120				
Sulfate	71.91	0.500	10	63.26	86.5	80 - 120			O	
<b>MS</b>	Sample ID: <b>HS18101179-04MS</b>	Units: <b>mg/L</b>			Analysis Date: <b>25-Oct-2018 01:54</b>					
Client ID:	Run ID: <b>ICS2100_326431</b>	SeqNo: <b>4796281</b>		PrepDate:			DF: <b>10</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	141.9	5.00	100	40.55	101	80 - 120				
Sulfate	290.7	5.00	100	191	99.7	80 - 120				

ALS Houston, US

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

**QC BATCH REPORT**

Batch ID: R326431		Instrument: ICS2100		Method: SW9056						
<b>MSD</b>	Sample ID: <b>HS18101236-18MSD</b>	Units: <b>mg/L</b>			Analysis Date: <b>24-Oct-2018 17:25</b>					
Client ID:	Run ID: <b>ICS2100_326431</b>	SeqNo: <b>4796252</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	21.53	0.500	10	11.83	97.0	80 - 120	21.88	1.58	20	
Sulfate	70.73	0.500	10	63.26	74.6	80 - 120	71.91	1.66	20 SO	
<b>MSD</b>	Sample ID: <b>HS18101179-04MSD</b>	Units: <b>mg/L</b>			Analysis Date: <b>25-Oct-2018 02:09</b>					
Client ID:	Run ID: <b>ICS2100_326431</b>	SeqNo: <b>4796282</b>		PrepDate:			DF: <b>10</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Chloride	142.8	5.00	100	40.55	102	80 - 120	141.9	0.654	20	
Sulfate	292.3	5.00	100	191	101	80 - 120	290.7	0.563	20	

The following samples were analyzed in this batch: HS18100977-01

**ALS Houston, US**

Date: 30-Oct-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18100977

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

<b>Unit Reported</b>	<b>Description</b>
mg/L	Milligrams per Liter



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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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

**Sample Receipt Checklist**

Client Name: Bhate Environmental  
 Work Order: HS18100977

Date/Time Received: **18-Oct-2018 08:40**  
 Received by: **PMG**

Checklist completed by: Pablo Martinez 18-Oct-2018  
 eSignature Date

Reviewed by: RJ Modashia 18-Oct-2018  
 eSignature Date

Matrices: **WATER**

Carrier name: **FedEx Priority Overnight**

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- TX1005 solids received in hermetically sealed vials? Yes  No  N/A
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No

Temperature(s)/Thermometer(s): 0.8C/0.5C UC/C IR # 25  
 Cooler(s)/Kit(s): 5678  
 Date/Time sample(s) sent to storage: 10/17/2018 13:00

- Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted
- Water - pH acceptable upon receipt? Yes  No  N/A
- pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:


Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:



 <b>ALS</b> 10450 Stancilff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax. +1 281 530 5887	<b>CUSTODY SEAL</b>		PM Date: 10/18/18
	Date: 10/17/18	Time: 1430	
<b>5678</b>	Name: Scott Boesinger Company: BUNGE		

<b>FedEx</b> TRK# 4380 9531 4250	THU - 18 OCT 10:30A PRIORITY OVERNIGHT
<b>AB SGRA</b>	<b>5678</b> 77099 TX-US IAH
	
<small>F10 162785 170C71B 66GA 953C1/89F8/8C8A</small>	



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

November 08, 2018

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

Work Order: **HS18101286**

Laboratory Results for: **Groundwater Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Oct 24, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval scribble.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 08-Nov-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18101286

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**SAMPLE SUMMARY**

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18101286-01	LH18/24-SP650_102318	Water		23-Oct-2018 14:00	24-Oct-2018 08:55	<input type="checkbox"/>
HS18101286-02	LH18/24-SP650_102318_BIX	Water		23-Oct-2018 14:00	24-Oct-2018 08:55	<input type="checkbox"/>

**ALS Houston, US**

Date: 08-Nov-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:**

**CASE NARRATIVE**

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**Work Order Comments**

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

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**Work Order Comments**

- The analysis for TOC was subcontracted to ALS Environmental in Kelso, WA. Final report attached.

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**WetChemistry by Method E365.3**

**Batch ID: R326260**

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

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**WetChemistry by Method E350.3**

**Batch ID: R326247**

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

## ALS Houston, US

Date: 08-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_102318  
 Collection Date: 23-Oct-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18101286  
 Lab ID:HS18101286-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>AMMONIA AS N BY E350.3(ISE)</b>								Analyst: MZD
	Method:E350.3							
Nitrogen, Ammonia (As N)	6.0		0.20	0.20	0.20	mg/L	1	26-Oct-2018 17:25
<b>ORTHO PHOSPHATE (PO4) AS P BY E365.3</b>								Analyst: MZD
	Method:E365.3							
Phosphorus, Total Orthophosphate (As P)	1.71		0.100	0.250	0.250	mg/L	10	25-Oct-2018 12:16
<b>SUBCONTRACT ANALYSIS - TOC ANALYSIS</b>								Analyst: SUBK
	Method:NA							
Subcontract Analysis	See Attached		0	0			1	01-Nov-2018 11:28

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



## ALS Houston, US

Date: 08-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_102318\_BIX  
 Collection Date: 23-Oct-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18101286  
 Lab ID:HS18101286-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>		Analyst: SUB				
Subcontract Analysis	See Attached		0	0		NA	1	08-Nov-2018 17:19

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

ALS Houston, US

Date: 08-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18101286

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R326247	<b>Test Name</b> : AMMONIA AS N BY E350.3(ISE)		<b>Matrix:</b> Water			
HS18101286-01	LH18/24-SP650_102318	23 Oct 2018 14:00			26 Oct 2018 17:25	1
<b>Batch ID</b> R326260	<b>Test Name</b> : ORTHO PHOSPHATE (PO4) AS P BY E365.3		<b>Matrix:</b> Water			
HS18101286-01	LH18/24-SP650_102318	23 Oct 2018 14:00			25 Oct 2018 12:16	10
<b>Batch ID</b> R326589	<b>Test Name</b> : SUBCONTRACT ANALYSIS - TOC ANALYSIS		<b>Matrix:</b> Water			
HS18101286-01	LH18/24-SP650_102318	23 Oct 2018 14:00			01 Nov 2018 11:28	1
<b>Batch ID</b> R327099	<b>Test Name</b> : SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18101286-02	LH18/24-SP650_102318_BIX	23 Oct 2018 14:00			08 Nov 2018 17:19	1

ALS Houston, US

Date: 08-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18101286

**QC BATCH REPORT**

Batch ID:	R326247	Instrument:	WetChem_HS	Method:	E350.3					
<b>MBLK</b>	Sample ID: <b>MBLK-326247</b>	Units:	mg/L	Analysis Date:	<b>26-Oct-2018 17:25</b>					
Client ID:	Run ID: <b>WetChem_HS_326247</b>	SeqNo:	<b>4792185</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.20	0.20								U
<b>LCS</b>	Sample ID: <b>LCS-326247</b>	Units:	mg/L	Analysis Date:	<b>26-Oct-2018 17:25</b>					
Client ID:	Run ID: <b>WetChem_HS_326247</b>	SeqNo:	<b>4792186</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.09	0.20	10	0	101	80 - 120				
<b>MS</b>	Sample ID: <b>HS18101324-01MS</b>	Units:	mg/L	Analysis Date:	<b>26-Oct-2018 17:25</b>					
Client ID:	Run ID: <b>WetChem_HS_326247</b>	SeqNo:	<b>4792188</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.984	0.20	10	0.1789	98.1	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18101324-01MSD</b>	Units:	mg/L	Analysis Date:	<b>26-Oct-2018 17:25</b>					
Client ID:	Run ID: <b>WetChem_HS_326247</b>	SeqNo:	<b>4792189</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.985	0.20	10	0.1789	98.1	80 - 120	9.984	0.01	20	

The following samples were analyzed in this batch: HS18101286-01

## ALS Houston, US

Date: 08-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18101286

**QC BATCH REPORT**

Batch ID: R326260		Instrument: UV-2450		Method: E365.3						
<b>MBLK</b>	Sample ID: <b>MBLK-326260</b>	Units: <b>mg/L</b>		Analysis Date: <b>25-Oct-2018 12:16</b>						
Client ID:	Run ID: <b>UV-2450_326260</b>	SeqNo: <b>4792463</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.0250	0.0250							U	
<b>LCS</b>	Sample ID: <b>LCS-326260</b>	Units: <b>mg/L</b>		Analysis Date: <b>25-Oct-2018 12:16</b>						
Client ID:	Run ID: <b>UV-2450_326260</b>	SeqNo: <b>4792464</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.229	0.0250	0.25	0	91.6	85 - 115				
<b>MS</b>	Sample ID: <b>HS18101286-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>25-Oct-2018 12:16</b>						
Client ID: <b>LH18/24-SP650_102318</b>	Run ID: <b>UV-2450_326260</b>	SeqNo: <b>4792465</b>		PrepDate:			DF: <b>10</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	4.05	0.250	2.5	1.71	93.6	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18101286-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>25-Oct-2018 12:16</b>						
Client ID: <b>LH18/24-SP650_102318</b>	Run ID: <b>UV-2450_326260</b>	SeqNo: <b>4792466</b>		PrepDate:			DF: <b>10</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	4.06	0.250	2.5	1.71	94.0	80 - 120	4.05	0.247	20	

The following samples were analyzed in this batch: HS18101286-01

**ALS Houston, US**

Date: 08-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18101286

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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

ALS Houston, US

Date: 08-Nov-18

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18101286

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**SAMPLE TRACKING**

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Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18101286-01	LH18/24-SP650_102318	Login	10/24/2018 11:35:30 AM	JRM	WET142
HS18101286-01	LH18/24-SP650_102318	Login	10/24/2018 11:35:30 AM	JRM	WET142
HS18101286-01	LH18/24-SP650_102318	Login	10/24/2018 11:35:30 AM	JRM	Sub
HS18101286-02	LH18/24-SP650_102318_BIX	Login	10/24/2018 11:35:30 AM	JRM	Sub

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

**CUSTODY**  
 Date: 10/23/18 Time:  
 Name: Scott Dees  
 Company: E. HATE

**SEAL**  
 Seal Broken By: JM  
 Date: 10/24/18

**FedEx**  
 TRK# 4380 9528 4920  
 0221

WED - 24 OCT 10:30A  
 PRIORITY OVERNIGHT

**AB SGRA**

77099  
 TX-US  
 IAH



FED 162785 230CT18 606A 553C1/0816/0CBA



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[www.alsglobal.com](http://www.alsglobal.com)

October 31, 2018

**Analytical Report for Service Request No: K1810457**

RJ Modashia  
ALS Laboratory Group  
10450 Stancliff Road  
Suite 210  
Houston, TX 77099-4338

**RE: ALS Houston DOD TOC / HS18101286**

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory October 25, 2018  
For your reference, these analyses have been assigned our service request number **K1810457**.

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](http://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](mailto:Kelley.Lovejoy@alsglobal.com).

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

Kelley Lovejoy  
Project Manager



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## Table of Contents

Acronyms

Qualifiers

State Certifications, Accreditations, And Licenses

Case Narrative

Chain of Custody

General Chemistry

Raw Data

    General Chemistry

## 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**

<b>Agency</b>	<b>Web Site</b>	<b>Number</b>
Alaska DEH	<a href="http://dec.alaska.gov/eh/lab/cs/csapproval.htm">http://dec.alaska.gov/eh/lab/cs/csapproval.htm</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2795
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L16-58-R4
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Hawaii DOH	<a href="http://health.hawaii.gov/">http://health.hawaii.gov/</a>	-
ISO 17025	<a href="http://www.pjllabs.com/">http://www.pjllabs.com/</a>	L16-57
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	03016
Maine DHS	<a href="http://www.maine.gov/dhhs/">http://www.maine.gov/dhhs/</a>	WA01276
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-457
Nevada DEP	<a href="http://ndep.nv.gov/bsdw/labservice.htm">http://ndep.nv.gov/bsdw/labservice.htm</a>	WA01276
New Jersey DEP	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	WA005
New York - DOH	<a href="https://www.wadsworth.org/regulatory/elap">https://www.wadsworth.org/regulatory/elap</a>	12060
North Carolina DEQ	<a href="https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification">https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA100010
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/EnvironmentalLabCertification/">http://www.scdhec.gov/environment/EnvironmentalLabCertification/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704427
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C544
Wyoming (EPA Region 8)	<a href="https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water">https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water</a>	-
Kelso Laboratory Website	<a href="http://www.alsglobal.com">www.alsglobal.com</a>	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](http://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/analyte 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](http://www.alsglobal.com)





**Client:** ALS Environmental - US  
**Project:** ALS Houston DOD TOC  
**Sample Matrix:** Water

**Service Request:** K1810457  
**Date Received:** 10/25/2018

#### CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

#### Sample Receipt:

One water sample was received for analysis at ALS Environmental on 10/25/2018. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

#### General Chemistry:

No significant anomalies were noted with this analysis.

Approved by

Kelley Avejoy

Date

10/31/2018



## 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](http://www.alsglobal.com)

K1810457



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**F:** +1 281 530 5887  
**www.alsglobal.com**

### Subcontract Chain of Custody

**COC ID: 10094**

**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:** HS18101286  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18101286-01	LH18/24-SP650_102318	Water	23 Oct 2018 14:00
TOC Analysis for DOD Level IV			01 Nov 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: Patsy M... [Signature]  
 Received By: [Signature]  
 Cooler ID(s): \_\_\_\_\_

Date/Time: 10-24-18 18:00  
 Date/Time: 10-25-18 0940  
 Temperature(s): \_\_\_\_\_



PC KL

**Cooler Receipt and Preservation Form**

Client ALS - Houston Service Request K18 10457  
 Received: 10-25-18 Opened: JSP By: 10-25-18 Unloaded: 10-25-18 By: JSP

1. Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered  
 2. Samples were received in: (circle) Cooler Box Envelope Other NA  
 3. Were custody seals on coolers? NA Y N If yes, how many and where? 2 Top Front  
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	NA	Tracking Number			NA	Filed
-0.3	-0.3	1.2	1.2	0.0	386	10094		4380	9533	9047		

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	Out of	Head-	Broke	pH	Reagent	Volume	Reagent Lot	Initials	Time
	Bottle Type	Temp	space				added	Number		

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](http://www.alsglobal.com)

Analytical Report

**Client:** ALS Environmental - US  
**Project:** ALS Houston DOD TOC/HS18101286  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:** K1810457  
**Date Collected:** 10/23/18  
**Date Received:** 10/25/18  
**Units:** mg/L  
**Basis:** NA

**Carbon, Total Organic**

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
LH18/24-SP650_102318	K1810457-001	<b>7.90</b>	0.50	0.07	1	10/30/18 23:51	
Method Blank	K1810457-MB	ND U	0.50	0.07	1	10/30/18 11:21	

ALS Group USA, Corp.  
dba ALS Environmental

## QA/QC Report

**Client:** ALS Environmental - US  
**Project:** ALS Houston DOD TOC/HS18101286  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:** K1810457  
**Date Collected:** 10/23/18  
**Date Received:** 10/25/18

**Units:** mg/L  
**Basis:** NA

Replicate Sample Summary  
Carbon, Total Organic

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
LH18/24-SP650_102318	K1810457-001DUP	0.50	0.07	7.90	7.42	7.66	6	10	10/30/18

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.

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** ALS Houston DOD TOC/HS18101286  
**Sample Matrix:** Water

**Service Request:** K1810457  
**Date Collected:** N/A  
**Date Received:** N/A  
**Date Analyzed:** 10/30/18  
**Date Extracted:** NA

**Duplicate Matrix Spike Summary**  
**Carbon, Total Organic**

**Sample Name:** Batch QC **Units:** mg/L  
**Lab Code:** K1810023-001 **Basis:** NA  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

Analyte Name	Sample Result	Result	Matrix Spike K1810023-001MS		Duplicate Matrix Spike K1810023-001DMS		% Rec Limits	RPD	RPD Limit	
			Spike Amount	% Rec	Result	Spike Amount				% Rec
Carbon, Total Organic	242	2930	2500	107	2820	2500	103	83-117	4	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.



ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** ALS Houston DOD TOC/HS18101286  
**Sample Matrix:** Water

**Service Request:** K1810457  
**Date Analyzed:** 10/30/18  
**Date Extracted:** NA

**Lab Control Sample Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA  
**Analysis Lot:** 613206

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K1810457-LCS	19.8	21.9	91	83-117

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** ALS Houston DOD TOC/HS18101286

**Service Request:** K1810457

### Continuing Calibration Verification (CCV) Summary

#### Carbon, Total Organic

**Analysis Method:** SM 5310 C

**Units:** mg/L

	Analysis		Date	True	Measured	Percent	Acceptance
	Lot	Lab Code	Analyzed	Value	Value	Recovery	Limits
CCV1	613206	KQ1815864-36	10/30/18 04:57	25.0	25.2	101	90-110
CCV2	613206	KQ1815864-37	10/30/18 10:48	25.0	24.7	99	90-110
CCV3	613206	KQ1815864-38	10/30/18 16:24	25.0	24.4	98	90-110
CCV4	613206	KQ1815864-39	10/30/18 22:45	25.0	24.8	99	90-110
CCV5	613206	KQ1815864-40	10/31/18 03:19	25.0	24.9	99	90-110
CCV6	613206	KQ1815864-41	10/31/18 09:08	25.0	24.6	98	90-110

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** ALS Houston DOD TOC/HS18101286

**Service Request:**K1810457

**Continuing Calibration Blank (CCB) Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C

**Units:**mg/L

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>MRL</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	613206	KQ1815864-42	10/30/18 05:14	0.50	0.07	ND	U
CCB2	613206	KQ1815864-43	10/30/18 11:04	0.50	0.07	ND	U
CCB3	613206	KQ1815864-44	10/30/18 16:40	0.50	0.07	ND	U
CCB4	613206	KQ1815864-45	10/30/18 23:01	0.50	0.07	ND	U
CCB5	613206	KQ1815864-46	10/31/18 03:35	0.50	0.07	ND	U
CCB6	613206	KQ1815864-47	10/31/18 09:25	0.50	0.07	ND	U



## Case Narrative

**Method:** 6850  
**Analysis:** Perchlorate  
**Analysis SOP:** LC-MS-CLO4  
**ALS WO ID(s):** 1830016; 1830526

**Client:** ALS Laboratories (Houston, TX)  
**Matrix:** Water  
**ELMS Batch (HBN):** 2167 (226651)

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

**Method Summary:** Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at  $m/z$  83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of  $m/z$  83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the  $m/z$  83 peak area. An internal standard (ISTD) of  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** NA

**Method QC data:** The method blank (LMB 626322) was less than 1/2 the CRDL. The recovery for the LCS (626323) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on samples 1830543002/03 of Work Order 1830543. 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 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  $(A) \times (B)$ ,

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

Thomas Bosch                      November 07, 2018  
Analyst    Date



## ANALYTICAL REPORT

Report Date: November 07, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1830016**

Project ID: HS18101286

Purchase Order: HS18101286

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_102318_BIX	1830016001	10/23/18	10/26/18	

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34 of 60



## ANALYTICAL REPORT

Workorder: 34-1830016

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP650_102318_BIX</b>	Sampling Site: NA	Collected: 10/23/2018				
Lab ID: 1830016001	Media: 125 mL Nalgene	Received: 10/26/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2167 (HBN: 226651) Analyzed: 11/06/2018 09:21	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
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 11/06/2018 14:25	/S/ Stephen Brose 11/07/2018 13:10

## Laboratory Contact Information

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

Phone: (801) 266-7700  
Email: als@alst.com  
Web: www.alst.com



## ANALYTICAL REPORT

Workorder: 34-1830016

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

**General Lab Comments**

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

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

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

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

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

**Result Symbol Definitions**

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

**Qualifier Symbol Definitions**

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





# Quality Control Sample Batch Report

00921910

## Analysis Information

**Workorder:** 1830016

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2167 (HBN: 226651)  
**Analyzed By:** Thomas Bosch

## Blank

**LMB:** 626322  
**Analyzed:** 11/06/2018 08:49  
**Units:** ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

**LCS:** 626323  
**Analyzed:** 11/06/2018 09:03  
**Dilution:** 1  
**Units:** ug/L

Analyte	Result	Target	% Rec	QC Limits
Perchlorate	4.88	5.00	97.6	78.8   123.8

## Matrix Spike - Matrix Spike Duplicate

**Sample:** 1830453001  
**Analyzed:** 11/06/2018 09:48  
**Dilution:** 1  
**Units:** ug/L

**MS:** 1830453002  
**Analyzed:** 11/06/2018 10:02  
**Dilution:** 1  
**Units:** ug/L

**MSD:** 1830453003  
**Analyzed:** 11/06/2018 10:15  
**Dilution:** 1  
**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Perchlorate	ND	4.98	5	99.5	78.8   123.8	5.03	101	1.09	0.0   20.0

## Continuing Calibration Verification

**CCV:** 626319  
**Analyzed:** 11/06/2018 08:05  
**Units:** ug/L  
**Criteria:** ± 15%

**CCV:** 626324  
**Analyzed:** 11/06/2018 11:59  
**Units:** ug/L  
**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	26.2	25.0	105	26.3	25.0	105

## Interference Check Sample

**ICSA:** 626321  
**Analyzed:** 11/06/2018 08:35  
**Units:** ug/L  
**Criteria:** ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.968	1.00	96.8

## Limit of Detection Verification

**LODV:** 626320  
**Analyzed:** 11/06/2018 08:22  
**Units:** ug/L  
**Criteria:** ± 50%

**LODV:** 626325  
**Analyzed:** 11/06/2018 12:13  
**Units:** ug/L  
**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.15	1.00	115	1.04	1.00	104



# Quality Control Sample Batch Report

00921911

## Analysis Information

**Workorder:** 1830016

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2167 (HBN: 226651)

**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 11/06/2018 14:38	/S/ Stephen Brose 11/07/2018 13:09

## Symbols and Definitions

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

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



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18698/#

### Subcontract Chain of Custody

COC ID: 10095

#### SUBCONTRACT TO:

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

Phone: +1 801 266 7700

1830016

#### 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:** HS18101286  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18101286-02	LH18/24-SP650_102318_BIX	Water	23 Oct 2018 14:00
SUB_Perch-6850			01 Nov 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: J. Winnings  
Received By: Danielle Winnings  
Cooler ID(s): \_\_\_\_\_

Date/Time: 10/25/18 18:00  
Date/Time: 10-26-18 10:00  
Temperature(s): \_\_\_\_\_

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

**COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)**

Client Name: <u>ALS Houston</u>		Project/Task/Site: <u>1830016</u>							
Date/Time of Receipt: <u>10-26-18 10:00</u>		Number of Coolers Received: <u>1</u>							
Condition of Coolers: <u>Acceptable/Unacceptable</u>		Temperature Control: <u>Present/Not Included</u>							
Cooler Custody Seals: <u>Present/Absent/NA</u>		Location Temp Taken: <u>Control/Between Samples</u>							
Container Custody Seals: <u>Present/Absent/NA</u>		Are all temperatures within project specific guidelines? <u>Yes/No/NA</u>							
Ice Present: <u>Yes/No/NA</u>		VOA Headspace Present? <u>Yes/No/NA</u>							
pH Check Performed:	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA			
	Cyanide	Yes/No/NA	TPH - 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA			
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA			
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA			
Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	
1	C18 <u>8870</u>	<u>2</u> °C	4	C18	°C	7	C18	°C	
2	C18	°C	5	C18	°C	8	C18	°C	
3	C18	°C	6	C18	°C	9	C18	°C	
Taken By: <u>Jamie M. Jassell</u>		Signature: <u>Jamie M. Jassell</u>		Printed Name: <u>Jamie M. Jassell</u>		Date: <u>10-26-18</u>			

**CLIENT-RELATED INFORMATION**

- |   |  |   |  |
|---|--|---|--|
| <input type="checkbox"/> Missing Cooler<br><input type="checkbox"/> Cooler Conditions<br><input type="checkbox"/> Missing Paperwork<br><input type="checkbox"/> Missing/Incorrect Bottle Labels | <input type="checkbox"/> Missing Samples/Bottles<br><input type="checkbox"/> Broken/Leaking Samples<br><input type="checkbox"/> Incorrect Bottle Type<br><input type="checkbox"/> Cooler Temperatures Out of Range | <input type="checkbox"/> Incorrect Preservation<br><input type="checkbox"/> pH Criteria Not Met<br><input type="checkbox"/> Residual Chlorine Present<br><input type="checkbox"/> Head Space in Bottles | <input type="checkbox"/> Insufficient Sample Volume<br><input type="checkbox"/> Chain of Custody Problems<br><input type="checkbox"/> Other: |
|---|--|---|--|

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES  NO

**Response Required Within 24 Hours**

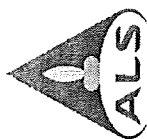
**PROJECT MANAGEMENT**

PROJECT MANAGER COMMENTS:

ALS Project Manager: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature







# Batch Worklist

HBN: 226651



Created: 11/5/2018 11:47

Batch: ELMS/2167

Instrument: WP

Analyst: T. Bosch

Rule: EPA 6850, DoD QSM Water

Workorder: 1830016 [ENV\_LVL4]

Workorder: 1830453 [ENV\_LVL4]

Workorder: 1830526 [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	626319	CCV for HBN 226651 [ELMS/2167]				CCV	3		E685041C3Q	5311		11/8/2018	
2	626320	LODV for HBN 226651 [ELMS/2167]				LODV	3		E6850..D3Q	5311		11/8/2018	
3	626321	ICS for HBN 226651 [ELMS/2167]				ICS	3		E6850..D3Q	5311		11/8/2018	
4	626322	LMB for HBN 226651 [ELMS/2167]				LMB	3		E6850Q413Q	5311		11/8/2018	
5	626323	LCS for HBN 226651 [ELMS/2167]				LCS	3		E6850Q413Q	5311		11/8/2018	
6	1830016001	LH18/24-SP650_102318_BIX				SAMPLE	3	1830016001-A	E6850Q41.3	5480	11/20/2018	11/8/2018	
7	1830526001	LH18/24-SP650_103018_BIX				SAMPLE	3	1830526001-A	E6850Q41.3	5480	11/27/2018	11/14/2018	
8	1830453001	43MW01				SAMPLE	3	1830453001-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
9	1830453002	43MW01MS				MS	3	1830453002-A	E6850Q413Q	5480		11/8/2018	
10	1830453003	43MW01MSD				MSD	3	1830453003-A	E6850Q413Q	5480		11/8/2018	
11	1830453004	43MW03				SAMPLE	3	1830453004-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
12	1830453005	43MW04				SAMPLE	3	1830453005-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
13	1830453006	43MW05				SAMPLE	3	1830453006-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
14	1830453007	43MW06				SAMPLE	3	1830453007-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
15	1830453008	43MWDUP				FLDDUP	3	1830453008-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
16	1830453009	43EB102218				SAMPLE	3	1830453009-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
17	626324	CCV for HBN 226651 [ELMS/2167]				CCV	3		E685041C3Q	5311		11/8/2018	
18	626325	LODV for HBN 226651 [ELMS/2167]				LODV	3		E6850..D3Q	5311		11/8/2018	



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**



ALS Work Order #'s & Sample #( )'s: 1830016 (001); 1830526 (001); 1830453 (001-09)  
 ELMS Batch/HBN ID: 2167 (226651)  
 Prep Date: 11/05/2018 Analysis Date: 11/06/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\NOV\06NOV18D.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: 2 Injection Volume: 25µL  
 Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

**FLOW GRADIENT:**

Time (min.)	Flow (mL/min)
0	0.80
5.0	0.80
5.3	0.25
10.0	0.25
10.5	0.80
12.5	0.80

**QC DATA:** 5.0µL of QC Solution Horizon ID 41830 was used for LCS 626323; Target = 5.0µg/L. ASTM type II water was used for LMB 626322.

**MS/MSD:** MS/MSD was performed on samples 1830453002/03 (Client ID: 43MW01). 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.
- 2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
- 3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\NOV\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- 4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\226651-DoD-ALS-Hstn-Shealy-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

### 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.**

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
<u>Batch(es)/SDG: ELMS: 2167 HBN: 226651</u>		
<u>Sample Set IDs if Applicable: 1830016   1830526   1830453</u>		
<u>Calibration standards analyzed and meets criteria</u>	TB	SB
<u>Standards traceability checked and meets criteria</u>	TB	SB
<u>Standard curve coefficients evaluated and meet criteria</u>	TB	SB
<u>ICVs analyzed and meet acceptance criteria</u>	TB	SB
<u>CCVs analyzed and meet acceptance criteria</u>	TB	SB
<u>Method Blanks analyzed and meet acceptance criteria</u>	TB	SB
<u>Retention Time Windows checked</u>	TB	SB
<u>For method 8081A, Endrin/DDT Breakdown is checked for compliance</u>	—	—
<u>Surrogate recoveries checked and appropriately addressed</u>	—	—
<u>Method Preparation Blanks analyzed and meet acceptance criteria</u>	TB	SB
<u>MSS, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed</u>	TB	SB
<u>RLVS analyzed</u>	TB	SB
<u>Preparation and analysis hold times met</u>	TB	SB
<u>Preparation deviations and re-preparations noted when performed</u>	TB	SB
<u>Analysis deviations and re-analyses noted when performed</u>	TB	SB
<u>Sample dilution factors noted on reports</u>	TB	SB
<u>Electronic records in HBN transcription accuracy and completeness checked</u>	TB	SB
<u>Preparation and analysis calculations checked</u>	TB	SB
<u>NCRs are completed as necessary NC/CAR#</u>	—	—
<u>Report forms are complete and accurate</u>	TB	SB
<u>Manual integrations checked</u>	TB	SB

TB 11.7.18



## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK		Description - 6850 WKG Std 100.ug/L			
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL	
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020	
MFG Lot: 218065075		Usable: No	
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

### Constituent

#### Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK		Description - 6850 QC WKG STD 100ug/L			
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				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		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020





## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description - 6850 QC Stock STD 1,000ug/mL	
Standard: 36748		Created By: Thomas Bosch	Amount: 100 mL
MFG: Ultra Scientific		Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020
MFG Lot: CP-0860			Usable: Yes
Part ID: ICC-013			Lab Lot: CLO4 QC STOCK
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730	Created By: Thomas Bosch	Amount: 25 mL			
MFG: ALS/SLC	Create Date: 09/20/2018 09:09AM	Expires: 09/20/2019			
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes			
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK			
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock	
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL



# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

### Description:

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

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

Solvent: water (low TOC, < 50 ppb)

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

### Traceability:

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

### Estimation of Uncertainties:

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

### Homogeneity:

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

### Intended Use:

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

### Instructions for Use:

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

### Hazards:

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

### Expiration of Certification:

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





# Certificate of Analysis



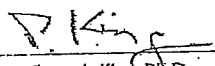
## ISO Guide 34 Reference Material

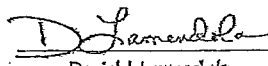
Product Number: ICC-013  
Lot Number: CP-0860

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

### Maintenance of Certification:

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

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

  
Daniel J. Lamendola  
Director of QA/RA



125 Market Street  
New Haven, CT 06513  
USA



AccuStandard®

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

# CERTIFICATE OF ANALYSIS



43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> 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, Inorganic QC Manager



Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

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



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

## Product Information

Chemical Purity Specification:  $\geq 98\%$

Labeled CAS Number: NA

Unlabeled CAS Number: 7601-89-0

MW\*: 130.4

Chemical Formula: NaCl\*O4

Storage: Store at room temperature away from light and moisture.

Stability: See storage and expiration date.

## Certification

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

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

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

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

Approved by: T. J. Eckersley

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

## Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)





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

November 15, 2018

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

Work Order: **HS18101687**

Laboratory Results for: **Groundwater Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Oct 31, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval scribble.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 15-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18101687

**SAMPLE SUMMARY**

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Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18101687-01	LH18/24-SP650_103018	Water		30-Oct-2018 14:00	31-Oct-2018 09:20	<input type="checkbox"/>
HS18101687-02	LH18/24-SP650_103018_BIX	Water		30-Oct-2018 14:00	31-Oct-2018 09:20	<input type="checkbox"/>

---

**ALS Houston, US**

Date: 15-Nov-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:**

---

**CASE NARRATIVE**

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**Work Order Comments**

- The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.
  - The analysis for TOC was subcontracted to ALS Environmental in Kelso, WA. Final report attached.
- 

**WetChemistry by Method E365.3****Batch ID: R326886**

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

**WetChemistry by Method E350.3****Batch ID: R326794**

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

## ALS Houston, US

Date: 15-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_103018  
 Collection Date: 30-Oct-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18101687  
 Lab ID:HS18101687-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>AMMONIA AS N BY E350.3(ISE)</b>								Analyst: MZD
	<b>Method:E350.3</b>							
Nitrogen, Ammonia (As N)	11		0.20	0.50	0.20	mg/L	1	02-Nov-2018 11:35
<b>ORTHO PHOSPHATE (PO4) AS P BY E365.3</b>								Analyst: MZD
	<b>Method:E365.3</b>							
Phosphorus, Total Orthophosphate (As P)	2.50		0.100	0.400	0.250	mg/L	10	31-Oct-2018 17:45
<b>SUBCONTRACT ANALYSIS - TOC ANALYSIS</b>								Analyst: SUBK
	<b>Method:NA</b>							
Subcontract Analysis	See Attached		0	0			1	14-Nov-2018 09:09

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

## ALS Houston, US

Date: 15-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_103018\_BIX  
 Collection Date: 30-Oct-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18101687  
 Lab ID:HS18101687-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>		Analyst: SUB				
Subcontract Analysis	See Attached		0	0		NA	1	08-Nov-2018 17:19

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

ALS Houston, US

Date: 15-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18101687

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R326794	<b>Test Name</b> : AMMONIA AS N BY E350.3(ISE)		<b>Matrix:</b> Water			
HS18101687-01	LH18/24-SP650_103018	30 Oct 2018 14:00			02 Nov 2018 11:35	1
<b>Batch ID</b> R326886	<b>Test Name</b> : ORTHO PHOSPHATE (PO4) AS P BY E365.3		<b>Matrix:</b> Water			
HS18101687-01	LH18/24-SP650_103018	30 Oct 2018 14:00			31 Oct 2018 17:45	10
<b>Batch ID</b> R327099	<b>Test Name</b> : SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18101687-02	LH18/24-SP650_103018_BIX	30 Oct 2018 14:00			08 Nov 2018 17:19	1
<b>Batch ID</b> R327399	<b>Test Name</b> : SUBCONTRACT ANALYSIS - TOC ANALYSIS		<b>Matrix:</b> Water			
HS18101687-01	LH18/24-SP650_103018	30 Oct 2018 14:00			14 Nov 2018 09:09	1

ALS Houston, US

Date: 15-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18101687

**QC BATCH REPORT**

Batch ID:	R326794	Instrument:	WetChem_HS	Method:	E350.3					
<b>MBLK</b>	Sample ID: <b>MBLK-326794</b>	Units:	mg/L	Analysis Date:	<b>02-Nov-2018 11:35</b>					
Client ID:	Run ID: <b>WetChem_HS_326794</b>	SeqNo:	<b>4804082</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.50	0.20								U
<b>LCS</b>	Sample ID: <b>LCS-326794</b>	Units:	mg/L	Analysis Date:	<b>02-Nov-2018 11:35</b>					
Client ID:	Run ID: <b>WetChem_HS_326794</b>	SeqNo:	<b>4804083</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.27	0.20	10	0	103	80 - 120				
<b>MS</b>	Sample ID: <b>HS18101612-01MS</b>	Units:	mg/L	Analysis Date:	<b>02-Nov-2018 11:35</b>					
Client ID:	Run ID: <b>WetChem_HS_326794</b>	SeqNo:	<b>4804085</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.671	0.20	10	0.9666	87.0	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18101612-01MSD</b>	Units:	mg/L	Analysis Date:	<b>02-Nov-2018 11:35</b>					
Client ID:	Run ID: <b>WetChem_HS_326794</b>	SeqNo:	<b>4804086</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.678	0.20	10	0.9666	87.1	80 - 120	9.671	0.0724	20	

The following samples were analyzed in this batch: HS18101687-01

ALS Houston, US

Date: 15-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18101687

**QC BATCH REPORT**

Batch ID: R326886		Instrument: UV-2450		Method: E365.3					
<b>MBLK</b>	Sample ID: <b>MBLK-326886</b>	Units: <b>mg/L</b>		Analysis Date: <b>31-Oct-2018 17:45</b>					
Client ID:	Run ID: <b>UV-2450_326886</b>	SeqNo: <b>4806220</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit Qual
Phosphorus, Total Orthophosphate (As P)	0.0400	0.0250							U
<b>LCS</b>	Sample ID: <b>LCS-326886</b>	Units: <b>mg/L</b>		Analysis Date: <b>31-Oct-2018 17:45</b>					
Client ID:	Run ID: <b>UV-2450_326886</b>	SeqNo: <b>4806221</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit Qual
Phosphorus, Total Orthophosphate (As P)	0.245	0.0250	0.25	0	98.0	85 - 115			
<b>MS</b>	Sample ID: <b>HS18101607-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>31-Oct-2018 17:45</b>					
Client ID:	Run ID: <b>UV-2450_326886</b>	SeqNo: <b>4806224</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit Qual
Phosphorus, Total Orthophosphate (As P)	0.258	0.0250	0.25	0.016	96.8	80 - 120			
<b>MSD</b>	Sample ID: <b>HS18101607-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>31-Oct-2018 17:45</b>					
Client ID:	Run ID: <b>UV-2450_326886</b>	SeqNo: <b>4806225</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit Qual
Phosphorus, Total Orthophosphate (As P)	0.257	0.0250	0.25	0.016	96.4	80 - 120	0.258	0.388	20

The following samples were analyzed in this batch: HS18101687-01



**ALS Houston, US**

Date: 15-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18101687

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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

ALS Houston, US

Date: 15-Nov-18

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18101687

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**SAMPLE TRACKING**

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Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18101687-01	LH18/24-SP650_103018	Login	10/31/2018 12:32:28 PM	JRM	WET118
HS18101687-01	LH18/24-SP650_103018	Login	10/31/2018 12:32:28 PM	JRM	WET118
HS18101687-01	LH18/24-SP650_103018	Login	10/31/2018 12:32:28 PM	JRM	Sub
HS18101687-02	LH18/24-SP650_103018_BIX	Login	10/31/2018 12:32:28 PM	JRM	Sub

---

**Sample Receipt Checklist**

Client Name: Bhate Environmental  
 Work Order: HS18101687

Date/Time Received: **31-Oct-2018 09:20**  
 Received by: **RPG**

Checklist completed by: Jared R. Makan 31-Oct-2018  
 eSignature Date

Reviewed by: RJ Modashia 31-Oct-2018  
 eSignature Date

Matrices: **Water**

Carrier name: **FedEx Priority Overnight**

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- TX1005 solids received in hermetically sealed vials? Yes  No  N/A
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No

Temperature(s)/Thermometer(s): 3.1c/2.8c UC/C IR25  
 Cooler(s)/Kit(s): 43913  
 Date/Time sample(s) sent to storage: 10/31/2018 12:35

- Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted
- Water - pH acceptable upon receipt? Yes  No  N/A
- pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:



FedEx  
TRK#  
0221 4380 9528 4860

WED - 31 OCT 10:30A  
PRIORITY OVERNIGHT

AB SGRA

77099  
TX-US  
IAH



FID 162785 380CT18 666A 553C1/38ET/RCBA

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

**CUST**  
Date: 10/30/18  
Name: Scott F  
Company: BHA

**ODY SEAL**  
Time: 1430  
RESINGAR

Seal Broken By: JM  
Date: 10/30/18



## Case Narrative

**Method:** 6850  
**Analysis:** Perchlorate  
**Analysis SOP:** LC-MS-CLO4  
**ALS WO ID(s):** 1830016; 1830526

**Client:** ALS Laboratories (Houston, TX)  
**Matrix:** Water  
**ELMS Batch (HBN):** 2167 (226651)

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

**Method Summary:** Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at  $m/z$  83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of  $m/z$  83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the  $m/z$  83 peak area. An internal standard (ISTD) of  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** NA

**Method QC data:** The method blank (LMB 626322) was less than 1/2 the CRDL. The recovery for the LCS (626323) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on samples 1830543002/03 of Work Order 1830543. 5.0 $\mu$ l of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. The spike target was 5. $\mu$ g/L. The 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  $\mu$ g/L. Results were calculated in  $\mu$ g/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve ( $\mu$ g/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

Thomas Bosch                      November 07, 2018  
Analyst    Date





## ANALYTICAL REPORT

Report Date: November 07, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1830526**

Project ID: HS18101687

Purchase Order: HS18101687

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_103018_BIX	1830526001	10/30/18	11/01/18	

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 268 9992

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17 of 99



## ANALYTICAL REPORT

Workorder: 34-1830526

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP650_103018_BIX</b>	Sampling Site: NA	Collected: 10/30/2018				
Lab ID: 1830526001	Media: 125 mL Nalgene	Received: 11/01/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2167 (HBN: 226651) Analyzed: 11/06/2018 09:34	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
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 11/06/2018 14:25	/S/ Stephen Brose 11/07/2018 13:10

## Laboratory Contact Information

ALS Environmental  
960 W Levoy Drive  
Salt Lake City, Utah 84123Phone: (801) 266-7700  
Email: als@alst.com  
Web: www.alst.com



## ANALYTICAL REPORT

Workorder: 34-1830526

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

**General Lab Comments**

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

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

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

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

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

**Result Symbol Definitions**

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

**Qualifier Symbol Definitions**

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



# Quality Control Sample Batch Report

00921953

## Analysis Information

**Workorder:** 1830526

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2167 (HBN: 226651)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 626322 <b>Analyzed:</b> 11/06/2018 08:49 <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 626323 <b>Analyzed:</b> 11/06/2018 09:03 <b>Dilution:</b> 1 <b>Units:</b> ug/L				
Analyte	Result	Target	% Rec	QC Limits
Perchlorate	4.88	5.00	97.6	78.8   123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1830453001 <b>Analyzed:</b> 11/06/2018 09:48 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MS:</b> 1830453002 <b>Analyzed:</b> 11/06/2018 10:02 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MSD:</b> 1830453003 <b>Analyzed:</b> 11/06/2018 10:15 <b>Dilution:</b> 1 <b>Units:</b> ug/L			
Analyte	Result	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Perchlorate	ND	4.98	5	99.5	78.8   123.8	5.03	101	1.09	0.0   20.0

## Continuing Calibration Verification

<b>CCV:</b> 626319 <b>Analyzed:</b> 11/06/2018 08:05 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%				<b>CCV:</b> 626324 <b>Analyzed:</b> 11/06/2018 11:59 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%		
Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	26.2	25.0	105	26.3	25.0	105

## Interference Check Sample

<b>ICSA:</b> 626321 <b>Analyzed:</b> 11/06/2018 08:35 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	0.968	1.00	96.8

## Limit of Detection Verification

<b>LODV:</b> 626320 <b>Analyzed:</b> 11/06/2018 08:22 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%				<b>LODV:</b> 626325 <b>Analyzed:</b> 11/06/2018 12:13 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%		
Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.15	1.00	115	1.04	1.00	104



# Quality Control Sample Batch Report

00921954

## Analysis Information

**Workorder:** 1830526

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2167 (HBN: 226651)

**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 11/06/2018 14:38	/S/ Stephen Brose 11/07/2018 13:09

## Symbols and Definitions

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

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



18698/#2

10450 Stancliff Rd, Ste 210  
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T: +1 281 530 5656  
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www.alsglobal.com

### Subcontract Chain of Custody

COC ID: 10137

1830526

**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:** HS18101687  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18101687-02	LH18/24-SP650_103018_BIX	Water	30 Oct 2018 14:00
SUB_Perch-6850			08 Nov 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: S. [Signature]  
Received By: [Signature]  
Cooler ID(s): \_\_\_\_\_

Date/Time: 10/31/18 18:00  
Date/Time: 11-01-18 9:45  
Temperature(s): \_\_\_\_\_

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

**COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)**

Client Name: <u>ALS Houston</u>		Project/Task/Site: <u>1830526</u>						
Date/Time of Receipt: <u>11-1-18 9:45</u>		Number of Coolers Received: <u>1</u>						
Condition of Coolers: <u>Acceptable</u> /Unacceptable		Temperature Control: <u>Present</u> /Not Included						
Cooler Custody Seals: <u>Present</u> /Absent/NA		Location Temp Taken: <u>Control</u> /Between Samples						
Container Custody Seals: <u>Present</u> /Absent/NA		Are all temperatures within project specific guidelines? <u>Yes</u> /No/NA						
Ice Present: <u>Yes</u> /No/NA		VOA Headspace Present? <u>Yes</u> /No/NA						
pH Check Performed:	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA		
	Cyanide	Yes/No/NA	TPH - 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA		
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA		
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA		
Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 <u>8891</u>	<u>3</u> °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C
Taken By: <u>Jamila Jasser</u>		Signature		<u>Tami Van Tassel</u>		Printed Name		<u>11-1-18</u>
								Date

**CLIENT-RELATED INFORMATION**

- |  |   |  |   |
|--|---|--|---|
| <input type="checkbox"/> Missing Cooler                  | <input type="checkbox"/> Missing Samples/Bottles          | <input type="checkbox"/> Incorrect Preservation    | <input type="checkbox"/> Insufficient Sample Volume |
| <input type="checkbox"/> Cooler Conditions               | <input type="checkbox"/> Broken/Leaking Samples           | <input type="checkbox"/> pH Criteria Not Met       | <input type="checkbox"/> Chain of Custody Problems  |
| <input type="checkbox"/> Missing Paperwork               | <input type="checkbox"/> Incorrect Bottle Type            | <input type="checkbox"/> Residual Chlorine Present | <input type="checkbox"/> Other:                     |
| <input type="checkbox"/> Missing/Incorrect Bottle Labels | <input type="checkbox"/> Cooler Temperatures Out of Range | <input type="checkbox"/> 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: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature

Part # 159463-434 R1T2 Exp 07/79

Must Deliver Next Business Day  
Time and Temperature Sensitive!



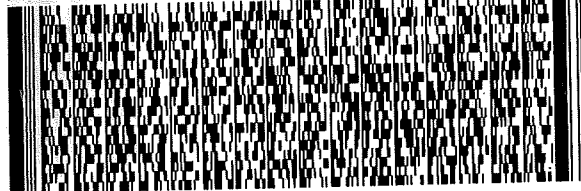
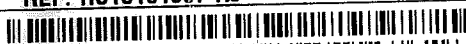
ORIGIN ID:SGRA (281) 530-5656  
CLIENT SERVICES  
ALS LABORATORY GROUP  
10450 STANCLIFF ROAD  
SUITE 210  
HOUSTON, TX 77099  
UNITED STATES US

SHIP DATE: 31OCT18  
ACTWGT: 8.00 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) 268-7700  
REF: HS18101607 RJ



**FedEx**  
Express



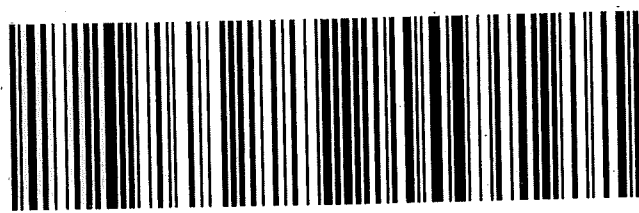
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**THU - 01 NOV 3:00P**  
**STANDARD OVERNIGHT**

TRK# 4380 9534 1757  
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**AX BTFA**

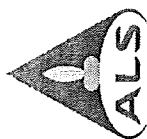
**84123**  
UT-US **SLC**



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







# Batch Worklist

HBN: 226651



Created: 11/5/2018 11:47

Instrument: WP

Batch: ELMS/2167

Analyst: T. Bosch

Rule: EPA 6850, DoD QSM Water

Workorder: 1830016 [ENV\_LVL4]

Workorder: 1830453 [ENV\_LVL4]

Workorder: 1830526 [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	626319	CCV for HBN 226651 [ELMS/2167]				CCV	3		E685041C3Q	5311		11/8/2018	
2	626320	LODV for HBN 226651 [ELMS/2167]				LODV	3		E6850..D3Q	5311		11/8/2018	
3	626321	ICS for HBN 226651 [ELMS/2167]				ICS	3		E6850..D3Q	5311		11/8/2018	
4	626322	LMB for HBN 226651 [ELMS/2167]				LMB	3		E6850Q413Q	5311		11/8/2018	
5	626323	LCS for HBN 226651 [ELMS/2167]				LCS	3		E6850Q413Q	5311		11/8/2018	
6	1830016001	LH18/24-SP650_102318_BIX				SAMPLE	3	1830016001-A	E6850Q41.3	5480	11/20/2018	11/8/2018	
7	1830526001	LH18/24-SP650_103018_BIX				SAMPLE	3	1830526001-A	E6850Q41.3	5480	11/27/2018	11/14/2018	
8	1830453001	43MW01				SAMPLE	3	1830453001-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
9	1830453002	43MW01MS				MS	3	1830453002-A	E6850Q413Q	5480		11/8/2018	
10	1830453003	43MW01MSD				MSD	3	1830453003-A	E6850Q413Q	5480		11/8/2018	
11	1830453004	43MW03				SAMPLE	3	1830453004-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
12	1830453005	43MW04				SAMPLE	3	1830453005-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
13	1830453006	43MW05				SAMPLE	3	1830453006-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
14	1830453007	43MW06				SAMPLE	3	1830453007-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
15	1830453008	43MWDUP				FLDDUP	3	1830453008-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
16	1830453009	43EB102218				SAMPLE	3	1830453009-A	E6850Q41.3	5480	11/19/2018	11/13/2018	
17	626324	CCV for HBN 226651 [ELMS/2167]				CCV	3		E685041C3Q	5311		11/8/2018	
18	626325	LODV for HBN 226651 [ELMS/2167]				LODV	3		E6850..D3Q	5311		11/8/2018	



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**

ALS Work Order #'s & Sample #( )'s: 1830016 (001); 1830526 (001); 1830453 (001-09)  
 ELMS Batch/HBN ID: 2167 (226651)  
 Prep Date: 11/05/2018 Analysis Date: 11/06/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\NOV\06NOV18D.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: 2 Injection Volume: 25µL  
 Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

**FLOW GRADIENT:**

Time (min.)	Flow (mL/min)
0	0.80
5.0	0.80
5.3	0.25
10.0	0.25
10.5	0.80
12.5	0.80

**QC DATA:** 5.0µL of QC Solution Horizon ID 41830 was used for LCS 626323; Target = 5.0µg/L. ASTM type II water was used for LMB 626322.

**MS/MSD:** MS/MSD was performed on samples 1830453002/03 (Client ID: 43MW01). 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.
- 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: \\ALS\TWS013\LCMS\LCMS04\2018\NOV\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- 4) Notebook: \\als\TWS013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\226651-DoD-ALS-Hstn-Shealy-LCMS4 or through \\ALS\TWS013\DATAREVIEW\HBN#

### 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.**

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
<u>Batch(es)/SDG: ELMS: 2167 HBN: 226651</u>		
<u>Sample Set IDs if Applicable: 1830016   1830526   1830453</u>		
<u>Calibration standards analyzed and meets criteria</u>	TB	SB
<u>Standards traceability checked and meets criteria</u>	TB	SB
<u>Standard curve coefficients evaluated and meet criteria</u>	TB	SB
<u>ICVs analyzed and meet acceptance criteria</u>	TB	SB
<u>CCVs analyzed and meet acceptance criteria</u>	TB	SB
<u>Method Blanks analyzed and meet acceptance criteria</u>	TB	SB
<u>Retention Time Windows checked</u>	TB	SB
<u>For method 8081A, Endrin/DDT Breakdown is checked for compliance</u>	—	—
<u>Surrogate recoveries checked and appropriately addressed</u>	—	—
<u>Method Preparation Blanks analyzed and meet acceptance criteria</u>	TB	SB
<u>MSS, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed</u>	TB	SB
<u>RLVS analyzed</u>	TB	SB
<u>Preparation and analysis hold times met</u>	TB	SB
<u>Preparation deviations and re-preparations noted when performed</u>	TB	SB
<u>Analysis deviations and re-analyses noted when performed</u>	TB	SB
<u>Sample dilution factors noted on reports</u>	TB	SB
<u>Electronic records in HBN transcription accuracy and completeness checked</u>	TB	SB
<u>Preparation and analysis calculations checked</u>	TB	SB
<u>NCRs are completed as necessary NC/CAR#</u>	—	—
<u>Report forms are complete and accurate</u>	TB	SB
<u>Manual integrations checked</u>	TB	SB

TB 11.7.18



## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK		Description - 6850 WKG Std 100.ug/L			
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL	
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020	
MFG Lot: 218065075		Usable: No	
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			





## STANDARD REPORT

### Constituent

#### Working Standard - CLO4 INT

<b>CLO4 INT</b>		<b>Description - 6850 Intermdt AccStd 10.ug/mL</b>			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
<b>Composition</b>					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK		Description - 6850 QC WKG STD 100ug/L			
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				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		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description - 6850 QC Stock STD 1,000ug/mL	
Standard: 36748		Created By: Thomas Bosch	Amount: 100 mL
MFG: Ultra Scientific		Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020
MFG Lot: CP-0860			Usable: Yes
Part ID: ICC-013			Lab Lot: CLO4 QC STOCK
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730	Created By: Thomas Bosch	Amount: 25 mL			
MFG: ALS/SLC	Create Date: 09/20/2018 09:09AM	Expires: 09/20/2019			
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes			
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK			
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock	
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL



# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

### Description:

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

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

Solvent: water (low TOC, < 50 ppb)

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

### Traceability:

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

### Estimation of Uncertainties:

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

### Homogeneity:

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

### Intended Use:

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

### Instructions for Use:

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

### Hazards:

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

### Expiration of Certification:

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







# Certificate of Analysis



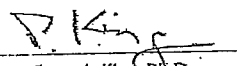
## ISO Guide 34 Reference Material

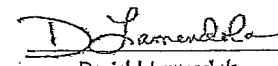
Product Number: ICC-013  
Lot Number: CP-0860

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

### Maintenance of Certification:

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

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

  
Daniel J. Lamendola  
Director of QA/RA



125 Market Street  
New Haven, CT 06513  
USA



AccuStandard®

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

# CERTIFICATE OF ANALYSIS



AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> 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



Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

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



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

## Product Information

Chemical Purity Specification:  $\geq 98\%$

Labeled CAS Number: NA

Unlabeled CAS Number: 7601-89-0

MW\*: 130.4

Chemical Formula:  $\text{NaCl}^{\text{O}}\text{O}_4$

Storage: Store at room temperature away from light and moisture.

Stability: See storage and expiration date.

## Certification

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

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

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

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

Approved by: T. J. Eckersley

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

## Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



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F : +1 360 636 1068  
[www.alsglobal.com](http://www.alsglobal.com)

November 13, 2018

**Analytical Report for Service Request No: K1810657**

RJ Modashia  
ALS Laboratory Group  
10450 Stancliff Road  
Suite 210  
Houston, TX 77099-4338

**RE: HS18101687 / HS18101687**

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory November 01, 2018. For your reference, these analyses have been assigned our service request number **K1810657**.

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](http://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](mailto:Kelley.Lovejoy@alsglobal.com).

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

Kelley Lovejoy  
Project Manager



---

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## Table of Contents

Acronyms

Qualifiers

State Certifications, Accreditations, And Licenses

Case Narrative

Chain of Custody

General Chemistry

Raw Data

    General Chemistry

## 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**

<b>Agency</b>	<b>Web Site</b>	<b>Number</b>
Alaska DEH	<a href="http://dec.alaska.gov/eh/lab/cs/csapproval.htm">http://dec.alaska.gov/eh/lab/cs/csapproval.htm</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2795
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L16-58-R4
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Hawaii DOH	<a href="http://health.hawaii.gov/">http://health.hawaii.gov/</a>	-
ISO 17025	<a href="http://www.pjlabs.com/">http://www.pjlabs.com/</a>	L16-57
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	03016
Maine DHS	<a href="http://www.maine.gov/dhhs/">http://www.maine.gov/dhhs/</a>	WA01276
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-457
Nevada DEP	<a href="http://ndep.nv.gov/bsdw/labservice.htm">http://ndep.nv.gov/bsdw/labservice.htm</a>	WA01276
New Jersey DEP	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	WA005
New York - DOH	<a href="https://www.wadsworth.org/regulatory/elap">https://www.wadsworth.org/regulatory/elap</a>	12060
North Carolina DEQ	<a href="https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification">https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA100010
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/EnvironmentalLabCertification/">http://www.scdhec.gov/environment/EnvironmentalLabCertification/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704427
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C544
Wyoming (EPA Region 8)	<a href="https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water">https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water</a>	-
Kelso Laboratory Website	<a href="http://www.alsglobal.com">www.alsglobal.com</a>	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](http://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/analyte 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](http://www.alsglobal.com)



**Client:** ALS Environmental - US  
**Project:** HS18101687  
**Sample Matrix:** Water

**Service Request:** K1810657  
**Date Received:** 11/01/2018

#### CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

#### Sample Receipt:

One water sample was received for analysis at ALS Environmental on 11/01/2018. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

#### General Chemistry:

No significant anomalies were noted with this analysis.

Approved by

Kelsey Ancey

Date

11/13/2018



## Chain of Custody

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### Cooler Receipt and Preservation Form

Client ALS / Houston Service Request K18 10657

Received: 11/1/18 Opened: 11/1/18 By: [Signature] Unloaded: 11/1/18 By: [Signature]

- 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	NA	Filed
-0.1	-0.3	1.5	1.3	-0.2	322	10136	4380 9534 1746		

- 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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Analytical Report

**Client:** ALS Environmental - US  
**Project:** HS18101687/HS18101687  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:** K1810657  
**Date Collected:** 10/30/18  
**Date Received:** 11/1/18

**Units:** mg/L  
**Basis:** NA

**Carbon, Total Organic**

Sample Name	Lab Code	Result	LOQ	LOD	MDL	Dil.	Date Analyzed	Q
LH18/24-SP650_103018	K1810657-001	<b>6.32</b>	0.50	0.20	0.07	1	11/08/18 23:57	
Method Blank	K1810657-MB1	ND U	0.50	0.20	0.07	1	11/08/18 19:56	
Method Blank	K1810657-MB2	ND U	0.50	0.20	0.07	1	11/09/18 04:47	

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project** HS18101687/HS18101687  
**Sample Matrix:** Water

**Service Request:**K1810657  
**Date Collected:**10/30/18  
**Date Received:**11/01/18

**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:**mg/L  
**Basis:**NA

Replicate Sample Summary  
Carbon, Total Organic

Sample Name:	Lab Code:	MRL	LOQ	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
LH18/24-SP650_103018	K1810657-001DUP	0.50	0.20	0.07	6.32	6.32	6.32	<1	10	11/08/18

Results flagged with an asterisk (\*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



ALS Group USA, Corp.  
dba ALS Environmental

## QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18101687/HS18101687  
**Sample Matrix:** Water

**Service Request:** K1810657  
**Date Collected:** 10/30/18  
**Date Received:** 11/01/18  
**Date Analyzed:** 11/9/18  
**Date Extracted:** NA

**Matrix Spike Summary**  
**Carbon, Total Organic**

**Sample Name:** LH18/24-SP650\_103018  
**Lab Code:** K1810657-001  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA

**Matrix Spike**  
K1810657-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	6.32	33.4	25.0	108	83-117

Results flagged with an asterisk (\*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.  
dba ALS Environmental

## QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18101687/HS18101687  
**Sample Matrix:** Water

**Service Request:** K1810657  
**Date Analyzed:** 11/08/18  
**Date Extracted:** NA

**Lab Control Sample Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA  
**Analysis Lot:** 614671

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1810657-LCS1	22.2	21.9	101	83-117
Lab Control Sample	K1810657-LCS2	22.3	21.9	102	83-117

**Client:** ALS Environmental - US  
**Project:** HS18101687/HS18101687

**Service Request:** K1810657

**Continuing Calibration Verification (CCV) Summary**

**Carbon, Total Organic**

**Analysis Method:** SM 5310 C

**Units:** mg/L

	<b>Analysis</b>		<b>Date</b>	<b>True</b>	<b>Measured</b>	<b>Percent</b>	<b>Acceptance Limits</b>
	<b>Lot</b>	<b>Lab Code</b>	<b>Analyzed</b>	<b>Value</b>	<b>Value</b>	<b>Recovery</b>	
CCV1	614671	KQ1816576-33	11/08/18 19:23	25.0	25.7	103	90-110
CCV2	614671	KQ1816576-34	11/08/18 23:24	25.0	25.8	103	90-110
CCV3	614671	KQ1816576-35	11/09/18 04:14	25.0	25.8	103	90-110
CCV4	614671	KQ1816576-36	11/09/18 09:03	25.0	25.9	104	90-110
CCV5	614671	KQ1816576-37	11/09/18 14:23	25.0	25.9	103	90-110

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18101687/HS18101687

**Service Request:**K1810657

**Continuing Calibration Blank (CCB) Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C**Units:**mg/L

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>LOQ</b>	<b>LOD</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	614671	KQ1816576-38	11/08/18 19:39	0.50	0.20	0.07	ND	U
CCB2	614671	KQ1816576-39	11/08/18 23:41	0.50	0.20	0.07	ND	U
CCB3	614671	KQ1816576-40	11/09/18 04:30	0.50	0.20	0.07	ND	U
CCB4	614671	KQ1816576-41	11/09/18 09:19	0.50	0.20	0.07	ND	U
CCB5	614671	KQ1816576-42	11/09/18 14:39	0.50	0.20	0.07	ND	U



## Raw Data

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## General Chemistry

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Work Request # (Original) K1810611, 0657, 0165, 0821, 0355, 0308, 0244, 0364, 0321,  
 Tier: IV IV IV IV II II IV II IV  
 Date Analyzed: 11/8/18 0356, 0576  
 Analyst: CES/ Run # 614671,  
 Analysis: TOC 614672,  
614673

**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  $\geq 0.995$ ? 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:**

0308-4, 0308-8, 0244-1, 0364-6, 7, 0321-3, 4 RPD not within acceptance limits. The sample results are less than 5x the MRL.  
 RA 0165-6, 0821-1 MS % R not within acceptance limits.  
 RA 0308-2, 0576-7 RPD not within acceptance limits.

Final Approved by: Freeper Date: 11/13/18  
 DQREPORT

RA 0356-1 - over diluted.



# Analytical Results Summary

Instrument Name: K-TOC-03

Analyst: BDITZLER

Analysis Lot: 614671

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
K1810165-006	Carbon, Total Organic	N/A		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 01:02	N	IV
1810308-001	Carbon, Total Organic	N/A		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 09:36	N	II
1810308-002	Carbon, Total Organic	N/A		Water	2.94 mg/L	10 ml	2.94 mg/L	1	0.07	0.50			11/9/18 10:41	N	II
1810308-003	Carbon, Total Organic	N/A		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 11:12	N	II
1810308-004	Carbon, Total Organic	N/A		Water	0.67 mg/L	10 ml	0.67 mg/L	1	0.07	0.50			11/9/18 11:44	N	II
1810308-005	Carbon, Total Organic	N/A		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 12:16	N	II
K1810308-006	Carbon, Total Organic	N/A		Water	0.12 mg/L	10 ml	0.12 mg/L J	1	0.07	0.50			11/9/18 12:47	N	II
1810308-007	Carbon, Total Organic	N/A		Water	1.00 mg/L	10 ml	1.00 mg/L	1	0.07	0.50			11/9/18 13:19	N	II
1810355-001	Carbon, Total Organic	N/A		Water	4.20 mg/L	10 ml	4.20 mg/L	1	0.07	0.50			11/9/18 03:42	N	II
1810355-002	Carbon, Total Organic	N/A		Water	7.18 mg/L	10 ml	7.18 mg/L	1	0.07	0.50			11/9/18 05:53	N	II
1810355-003	Carbon, Total Organic	N/A		Water	3.48 mg/L	10 ml	3.48 mg/L	1	0.07	0.50			11/9/18 06:25	N	II
1810355-004	Carbon, Total Organic	N/A		Water	6.50 mg/L	10 ml	6.50 mg/L	1	0.07	0.50			11/9/18 06:56	N	II
1810355-005	Carbon, Total Organic	N/A		Water	3.49 mg/L	10 ml	3.49 mg/L	1	0.07	0.50			11/9/18 07:28	N	II
1810355-006	Carbon, Total Organic	N/A		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 08:00	N	II
1810355-007	Carbon, Total Organic	N/A		Water	8.36 mg/L	10 ml	16.7 mg/L	2	0.2	1.0			11/9/18 08:31	N	II
1810611-001	Carbon, Total Organic	N/A		Water	3.41 mg/L	10 ml	3.41 mg/L	1	0.07	0.50			11/8/18 20:45	Y	IV
1810611-002	Carbon, Total Organic	N/A		Water	8.38 mg/L	10 ml	33.5 mg/L	4	0.3	2.0			11/8/18 21:49	N	IV
K1810611-003	Carbon, Total Organic	N/A		Water	8.84 mg/L	10 ml	35.4 mg/L	4	0.3	2.0			11/8/18 22:21	N	IV
K1810657-001	Carbon, Total Organic	N/A		Water	6.32 mg/L	10 ml	6.32 mg/L	1	0.07	0.50			11/8/18 23:57	N	IV
1810821-001	Carbon, Total Organic	N/A		Water	1.04 mg/L	10 ml	1.04 mg/L	1	0.07	0.50			11/9/18 02:07	N	IV
KQ1816576-01	Carbon, Total Organic	MS	K1810611-001	Water	30.33 mg/L	10 ml	30.3 mg/L	1	0.07	0.50	108		11/8/18 21:17	N	IV
KQ1816576-02	Carbon, Total Organic	DUP	K1810611-001	Water	3.21 mg/L	10 ml	3.21 mg/L	1	0.07	0.50		6	11/8/18 20:45	N	IV
KQ1816576-03	Carbon, Total Organic	DUP	K1810611-002	Water	8.19 mg/L	10 ml	32.7 mg/L	4	0.3	2.0		2	11/8/18 21:49	N	IV
Q1816576-04	Carbon, Total Organic	DUP	K1810611-003	Water	8.45 mg/L	10 ml	33.8 mg/L	4	0.3	2.0		4	11/8/18 22:21	N	IV
Q1816576-05	Carbon, Total Organic	MS	K1810657-001	Water	33.41 mg/L	10 ml	33.4 mg/L	1	0.07	0.50	108		11/9/18 00:29	N	IV
Q1816576-06	Carbon, Total Organic	DUP	K1810657-001	Water	6.32 mg/L	10 ml	6.32 mg/L	1	0.07	0.50		<1	11/8/18 23:57	N	IV
Q1816576-07	Carbon, Total Organic	MS	K1810165-006	Water	29.64 mg/L	10 ml	29.6 mg/L	1	0.07	0.50	119*		11/9/18 01:34	N	IV
KQ1816576-08	Carbon, Total Organic	DUP	K1810165-006	Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	11/9/18 01:02	N	IV
KQ1816576-09	Carbon, Total Organic	MS	K1810821-001	Water	0.60 mg/L	10 ml	0.60 mg/L	1	0.07	0.50	-2*		11/9/18 03:09	N	IV
KQ1816576-10	Carbon, Total Organic	DUP	K1810821-001	Water	0.97 mg/L	10 ml	0.97 mg/L	1	0.07	0.50		7	11/9/18 02:07	N	IV
KQ1816576-11	Carbon, Total Organic	TRP	K1810821-001	Water	0.87 mg/L	10 ml	0.87 mg/L	1	0.07	0.50		9	11/9/18 02:07	N	IV
KQ1816576-12	Carbon, Total Organic	QUAD	K1810821-001	Water	0.89 mg/L	10 ml	0.89 mg/L	1	0.07	0.50		8	11/9/18 02:07	N	IV
KQ1816576-13	Carbon, Total Organic	MS	K1810355-001	Water	31.65 mg/L	10 ml	31.6 mg/L	1	0.07	0.50	110		11/9/18 05:20	N	II
KQ1816576-14	Carbon, Total Organic	DUP	K1810355-001	Water	3.96 mg/L	10 ml	3.96 mg/L	1	0.07	0.50		6	11/9/18 03:42	N	II
KQ1816576-15	Carbon, Total Organic	DUP	K1810355-002	Water	7.10 mg/L	10 ml	7.10 mg/L	1	0.07	0.50		1	11/9/18 05:53	N	II
KQ1816576-16	Carbon, Total Organic	DUP	K1810355-003	Water	3.15 mg/L	10 ml	3.15 mg/L	1	0.07	0.50		10	11/9/18 06:25	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

*11/13/18  
Honey*

*CES*

*11/12/18*



## Analytical Results Summary

Instrument Name: K-TOC-03

Analyst: BDITZLER

Analysis Lot: 614671

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
KQ1816576-17	Carbon, Total Organic	DUP	K1810355-004	Water	5.88 mg/L	10 ml	5.88 mg/L	1	0.07	0.50		10	11/9/18 06:56	N	II
KQ1816576-18	Carbon, Total Organic	DUP	K1810355-005	Water	3.15 mg/L	10 ml	3.15 mg/L	1	0.07	0.50		10	11/9/18 07:28	N	II
KQ1816576-19	Carbon, Total Organic	DUP	K1810355-006	Water	0.06 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	11/9/18 08:00	N	II
KQ1816576-20	Carbon, Total Organic	DUP	K1810355-007	Water	8.05 mg/L	10 ml	16.1 mg/L	2	0.2	1.0		4	11/9/18 08:31	N	II
KQ1816576-21	Carbon, Total Organic	MS	K1810308-001	Water	27.16 mg/L	10 ml	27.2 mg/L	1	0.07	0.50	109		11/9/18 10:08	N	II
KQ1816576-22	Carbon, Total Organic	DUP	K1810308-001	Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	11/9/18 09:36	N	II
KQ1816576-23	Carbon, Total Organic	DUP	K1810308-002	Water	2.46 mg/L	10 ml	2.46 mg/L	1	0.07	0.50		18*	11/9/18 10:41	N	II
KQ1816576-24	Carbon, Total Organic	DUP	K1810308-003	Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	11/9/18 11:12	N	II
KQ1816576-25	Carbon, Total Organic	DUP	K1810308-004	Water	0.29 mg/L	10 ml	0.29 mg/L J	1	0.07	0.50		79*	11/9/18 11:44	N	II
KQ1816576-26	Carbon, Total Organic	DUP	K1810308-005	Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	11/9/18 12:16	N	II
KQ1816576-27	Carbon, Total Organic	DUP	K1810308-006	Water	0.05 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	11/9/18 12:47	N	II
KQ1816576-28	Carbon, Total Organic	DUP	K1810308-007	Water	0.94 mg/L	10 ml	0.94 mg/L	1	0.07	0.50		6	11/9/18 13:19	N	II
KQ1816576-29	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/8/18 19:56	N	IV
KQ1816576-29	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/8/18 19:56	N	IV
KQ1816576-30	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 04:47	N	IV
KQ1816576-30	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 04:47	N	IV
KQ1816576-31	Carbon, Total Organic	LCS		Water	22.15 mg/L	10 ml	22.2 mg/L	1	0.07	0.50	101		11/8/18 20:12	N	IV
KQ1816576-31	Carbon, Total Organic	LCS		Water	22.15 mg/L	10 ml	22.2 mg/L	1	0.07	0.50	101		11/8/18 20:12	N	IV
KQ1816576-32	Carbon, Total Organic	LCS		Water	22.29 mg/L	10 ml	22.3 mg/L	1	0.07	0.50	102		11/9/18 05:03	N	IV
KQ1816576-32	Carbon, Total Organic	LCS		Water	22.29 mg/L	10 ml	22.3 mg/L	1	0.07	0.50	102		11/9/18 05:03	N	IV
KQ1816576-33	Carbon, Total Organic	CCV		Water	25.72 mg/L	10 ml	25.7 mg/L	1					11/8/18 19:23	N	IV
KQ1816576-33	Carbon, Total Organic	CCV		Water	25.72 mg/L	10 ml	25.7 mg/L	1					11/8/18 19:23	N	IV
KQ1816576-34	Carbon, Total Organic	CCV		Water	25.80 mg/L	10 ml	25.8 mg/L	1					11/8/18 23:24	N	IV
KQ1816576-34	Carbon, Total Organic	CCV		Water	25.80 mg/L	10 ml	25.8 mg/L	1					11/8/18 23:24	N	IV
KQ1816576-35	Carbon, Total Organic	CCV		Water	25.83 mg/L	10 ml	25.8 mg/L	1					11/9/18 04:14	N	IV
KQ1816576-35	Carbon, Total Organic	CCV		Water	25.83 mg/L	10 ml	25.8 mg/L	1					11/9/18 04:14	N	IV
KQ1816576-36	Carbon, Total Organic	CCV		Water	25.89 mg/L	10 ml	25.9 mg/L	1					11/9/18 09:03	N	IV
KQ1816576-36	Carbon, Total Organic	CCV		Water	25.89 mg/L	10 ml	25.9 mg/L	1					11/9/18 09:03	N	IV
KQ1816576-37	Carbon, Total Organic	CCV		Water	25.86 mg/L	10 ml	25.9 mg/L	1					11/9/18 14:23	N	IV
KQ1816576-37	Carbon, Total Organic	CCV		Water	25.86 mg/L	10 ml	25.9 mg/L	1					11/9/18 14:23	N	IV
KQ1816576-38	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/8/18 19:39	N	IV
Q1816576-38	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/8/18 19:39	N	IV
Q1816576-39	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/8/18 23:41	N	IV
KQ1816576-39	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/8/18 23:41	N	IV
KQ1816576-40	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 04:30	N	IV
KQ1816576-40	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 04:30	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: 614671 Method/Testcode: 9060/TOC T

<u>Lab Code</u>	<u>Target Analytes</u>	<u>QC</u>	<u>Parent Sample</u>	<u>Matrix</u>	<u>Raw Result</u>	<u>Sample Amt.</u>	<u>Final Result</u>	<u>Dil</u>	<u>MDL</u>	<u>PQL</u>	<u>% Rec</u>	<u>% RSD</u>	<u>Date Analyzed</u>	<u>QC?</u>	<u>Tier</u>
KQ1816576-41	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 09:19	N	IV
KQ1816576-41	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 09:19	N	IV
KQ1816576-42	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 14:39	N	IV
KQ1816576-42	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/9/18 14:39	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: 614672

Method/Testcode: SM 5310 C/TOC T

b Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
1810244-001	Carbon, Total Organic	N/A		Ground Water	1.43 mg/L	10 ml	1.43 mg/L	1	0.07	0.50			11/9/18 15:28	N	IV
1810244-002	Carbon, Total Organic	N/A		Ground Water	2.29 mg/L	10 ml	2.29 mg/L	1	0.07	0.50			11/9/18 16:00	Y	IV
1810308-008	Carbon, Total Organic	N/A		Water	1.55 mg/L	10 ml	1.55 mg/L	1	0.07	0.50			11/9/18 13:51	N	II
1810321-001	Carbon, Total Organic	N/A		Ground Water	0.29 mg/L	10 ml	0.29 mg/L J	1	0.07	0.50			11/9/18 22:09	N	IV
1810321-002	Carbon, Total Organic	N/A		Ground Water	1.10 mg/L	10 ml	1.10 mg/L	1	0.07	0.50			11/9/18 23:13	N	IV
1810321-003	Carbon, Total Organic	N/A		Ground Water	1.33 mg/L	10 ml	1.33 mg/L	1	0.07	0.50			11/10/18 00:51	N	IV
1810321-004	Carbon, Total Organic	N/A		Ground Water	1.03 mg/L	10 ml	1.03 mg/L	1	0.07	0.50			11/10/18 01:23	N	IV
1810356-001	Carbon, Total Organic	N/A		Water	0.46 mg/L	10 ml	10 mg/L U	20	2	10			11/10/18 01:55	N	II
1810356-002	Carbon, Total Organic	N/A		Water	0.61 mg/L	10 ml	0.61 mg/L	1	0.07	0.50			11/10/18 02:26	N	II
1810364-001	Carbon, Total Organic	N/A		Water	4.08 mg/L	10 ml	4.08 mg/L	1	0.07	0.50			11/9/18 17:05	N	II
1810364-002	Carbon, Total Organic	N/A		Water	9.11 mg/L	10 ml	9.11 mg/L	1	0.07	0.50			11/9/18 18:09	N	II
1810364-003	Carbon, Total Organic	N/A		Water	3.37 mg/L	10 ml	3.37 mg/L	1	0.07	0.50			11/9/18 19:14	N	II
1810364-004	Carbon, Total Organic	N/A		Water	6.91 mg/L	10 ml	6.91 mg/L	1	0.07	0.50			11/9/18 19:46	N	II
1810364-005	Carbon, Total Organic	N/A		Water	3.83 mg/L	10 ml	3.83 mg/L	1	0.07	0.50			11/9/18 20:18	N	II
1810364-006	Carbon, Total Organic	N/A		Water	0.93 mg/L	10 ml	0.93 mg/L	1	0.07	0.50			11/9/18 20:49	N	II
1810364-007	Carbon, Total Organic	N/A		Water	0.99 mg/L	10 ml	15.8 mg/L	16	1.2	8.0			11/9/18 21:21	N	II
1810576-001	Carbon, Total Organic	N/A		Water	3.80 mg/L	10 ml	3.80 mg/L	1	0.07	0.50			11/10/18 03:31	N	II
1810576-002	Carbon, Total Organic	N/A		Water	7.00 mg/L	10 ml	7.00 mg/L	1	0.07	0.50			11/10/18 04:52	N	II
1810576-003	Carbon, Total Organic	N/A		Water	3.29 mg/L	10 ml	3.29 mg/L	1	0.07	0.50			11/10/18 05:24	N	II
1810576-004	Carbon, Total Organic	N/A		Water	5.03 mg/L	10 ml	5.03 mg/L	1	0.07	0.50			11/10/18 05:55	N	II
Q1816579-01	Carbon, Total Organic	DUP	K1810308-008	Water	1.33 mg/L	10 ml	1.33 mg/L	1	0.07	0.50		15*	11/9/18 13:51	N	II
Q1816579-02	Carbon, Total Organic	DUP	K1810244-001	Ground Water	1.00 mg/L	10 ml	1.00 mg/L	1	0.07	0.50		36*	11/9/18 15:28	N	IV
Q1816579-03	Carbon, Total Organic	MS	K1810244-002	Ground Water	30.08 mg/L	10 ml	30.1 mg/L	1	0.07	0.50	111		11/9/18 16:32	N	IV
Q1816579-04	Carbon, Total Organic	DUP	K1810244-002	Ground Water	2.23 mg/L	10 ml	2.23 mg/L	1	0.07	0.50		3	11/9/18 16:00	N	IV
Q1816579-05	Carbon, Total Organic	MS	K1810364-001	Water	31.67 mg/L	10 ml	31.7 mg/L	1	0.07	0.50	110		11/9/18 17:36	N	II
Q1816579-06	Carbon, Total Organic	DUP	K1810364-001	Water	3.95 mg/L	10 ml	3.95 mg/L	1	0.07	0.50		3	11/9/18 17:05	N	II
Q1816579-07	Carbon, Total Organic	DUP	K1810364-002	Water	8.73 mg/L	10 ml	8.73 mg/L	1	0.07	0.50		4	11/9/18 18:09	N	II
Q1816579-08	Carbon, Total Organic	DUP	K1810364-003	Water	3.19 mg/L	10 ml	3.19 mg/L	1	0.07	0.50		5	11/9/18 19:14	N	II
Q1816579-09	Carbon, Total Organic	DUP	K1810364-004	Water	7.09 mg/L	10 ml	7.09 mg/L	1	0.07	0.50		3	11/9/18 19:46	N	II
Q1816579-10	Carbon, Total Organic	DUP	K1810364-005	Water	3.86 mg/L	10 ml	3.86 mg/L	1	0.07	0.50		<1	11/9/18 20:18	N	II
Q1816579-11	Carbon, Total Organic	DUP	K1810364-006	Water	0.54 mg/L	10 ml	0.54 mg/L	1	0.07	0.50		54*	11/9/18 20:49	N	II

\* indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

*Handwritten:* 11/13/18  
*Signature:* [Handwritten Signature]  
*Text:* CES 11/12/18



## Analytical Results Summary

Instrument Name: K-TOC-03

Analyst: BDITZLER

Analysis Lot: 614672

Method/Testcode: SM 5310 C/TOC T

Lab Cod	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1816579-12	Carbon, Total Organic	DUP	K1810364-007	Water	0.81 mg/L	10 ml	13.0 mg/L	16	1.2	8.0		19*	11/9/18 21:21	N	II
KQ1816579-13	Carbon, Total Organic	MS	K1810321-001	Ground Water	28.73 mg/L	10 ml	28.7 mg/L	1	0.07	0.50	114		11/9/18 22:41	N	IV
KQ1816579-14	Carbon, Total Organic	DUP	K1810321-001	Ground Water	0.30 mg/L	10 ml	0.30 mg/L	J 1	0.07	0.50		4	11/9/18 22:09	N	IV
KQ1816579-15	Carbon, Total Organic	DUP	K1810321-002	Ground Water	1.10 mg/L	10 ml	1.10 mg/L	1	0.07	0.50		<1	11/9/18 23:13	N	IV
KQ1816579-16	Carbon, Total Organic	DUP	K1810321-003	Ground Water	1.10 mg/L	10 ml	1.10 mg/L	1	0.07	0.50		19*	11/10/18 00:51	N	IV
KQ1816579-17	Carbon, Total Organic	DUP	K1810321-004	Ground Water	0.78 mg/L	10 ml	0.78 mg/L	1	0.07	0.50		27*	11/10/18 01:23	N	IV
KQ1816579-18	Carbon, Total Organic	DUP	K1810356-001	Water	0.49 mg/L	10 ml	10 mg/L	J 20	2	10		NC	11/10/18 01:55	N	II
KQ1816579-19	Carbon, Total Organic	MS	K1810356-002	Water	27.75 mg/L	10 ml	27.8 mg/L	1	0.07	0.50	109		11/10/18 02:58	N	II
Q1816579-20	Carbon, Total Organic	DUP	K1810356-002	Water	0.58 mg/L	10 ml	0.58 mg/L	1	0.07	0.50		6	11/10/18 02:26	N	II
Q1816579-21	Carbon, Total Organic	MS	K1810576-001	Water	30.76 mg/L	10 ml	30.8 mg/L	1	0.07	0.50	108		11/10/18 04:02	N	II
Q1816579-22	Carbon, Total Organic	DUP	K1810576-001	Water	3.61 mg/L	10 ml	3.61 mg/L	1	0.07	0.50		5	11/10/18 03:31	N	II
Q1816579-23	Carbon, Total Organic	DUP	K1810576-002	Water	6.56 mg/L	10 ml	6.56 mg/L	1	0.07	0.50		6	11/10/18 04:52	N	II
Q1816579-24	Carbon, Total Organic	DUP	K1810576-003	Water	2.99 mg/L	10 ml	2.99 mg/L	1	0.07	0.50		10	11/10/18 05:24	N	II
Q1816579-25	Carbon, Total Organic	DUP	K1810576-004	Water	5.02 mg/L	10 ml	5.02 mg/L	1	0.07	0.50		<1	11/10/18 05:55	N	II
Q1816579-26	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			11/9/18 14:55	N	II
Q1816579-27	Carbon, Total Organic	LCS		Water	23.69 mg/L	10 ml	23.7 mg/L	1	0.07	0.50	108		11/9/18 15:12	N	II
Q1816579-28	Carbon, Total Organic	CCV		Water	25.89 mg/L	10 ml	25.9 mg/L	1			104		11/9/18 09:03	N	II
Q1816579-29	Carbon, Total Organic	CCV		Water	25.86 mg/L	10 ml	25.9 mg/L	1			104		11/9/18 14:23	N	II
Q1816579-30	Carbon, Total Organic	CCV		Water	26.09 mg/L	10 ml	26.1 mg/L	1			104		11/9/18 18:41	N	II
Q1816579-31	Carbon, Total Organic	CCV		Water	25.14 mg/L	10 ml	25.1 mg/L	1			100		11/9/18 23:45	N	II
Q1816579-32	Carbon, Total Organic	CCV		Water	25.25 mg/L	10 ml	25.3 mg/L	1			101		11/10/18 04:19	N	II
Q1816579-33	Carbon, Total Organic	CCV		Water	25.37 mg/L	10 ml	25.4 mg/L	1			102		11/10/18 08:02	N	II
Q1816579-34	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			11/9/18 09:19	N	II
Q1816579-35	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			11/9/18 14:39	N	II
Q1816579-36	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			11/9/18 18:57	N	II
Q1816579-37	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			11/10/18 00:02	N	II
Q1816579-38	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			11/10/18 04:35	N	II
Q1816579-39	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			11/10/18 08:19	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: 614673 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
K1810576-005	Carbon, Total Organic	N/A		Water	3.38 mg/L	10 ml	3.38 mg/L	1	0.07	0.50			11/10/18 06:27	N	II
K1810576-006	Carbon, Total Organic	N/A		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/10/18 06:59	N	II
K1810576-007	Carbon, Total Organic	N/A		Water	2.02 mg/L	10 ml	20.2 mg/L	10	0.7	5.0			11/10/18 07:31	N	II
KQ1816580-01	Carbon, Total Organic	DUP	K1810576-005	Water	3.07 mg/L	10 ml	3.07 mg/L	1	0.07	0.50		9	11/10/18 06:27	N	II
KQ1816580-02	Carbon, Total Organic	DUP	K1810576-006	Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	11/10/18 06:59	N	II
KQ1816580-03	Carbon, Total Organic	DUP	K1810576-007	Water	1.57 mg/L	10 ml	15.7 mg/L	10	0.7	5.0		25*	11/10/18 07:31	N	II
KQ1816580-04	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/10/18 00:18	N	II
KQ1816580-05	Carbon, Total Organic	LCS		Water	21.87 mg/L	10 ml	21.9 mg/L	1	0.07	0.50	100		11/10/18 00:35	N	II
KQ1816580-08	Carbon, Total Organic	CCV		Water	25.14 mg/L	10 ml	25.1 mg/L	1			100		11/9/18 23:45	N	II
KQ1816580-09	Carbon, Total Organic	CCV		Water	25.25 mg/L	10 ml	25.3 mg/L	1			101		11/10/18 04:19	N	II
KQ1816580-10	Carbon, Total Organic	CCV		Water	25.37 mg/L	10 ml	25.4 mg/L	1			102		11/10/18 08:02	N	II
KQ1816580-11	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/10/18 00:02	N	II
KQ1816580-12	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/10/18 04:35	N	II
KQ1816580-13	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			11/10/18 08:19	N	II

CES 11/12/18

11/13/18



# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.



TOC: 614671,  
614672,  
614673

## Schedule: 11082018

Version: 6

Instrument: Fusion1

Last Saved by: Fusion1 (Fusion1)

Last Saved on: 2018/11/08 18:33 - Thursday

11/13/18  
Fusion1

Position	Sample Type	Sample ID	Method ID (Calibration ID)	Reps
(Clean)	Clean	Clean		1
(Clean)	Clean	Clean		1
(Clean)	Clean	Clean		1
(Blank)	Blank	Reagent/Acid Blank		1
D	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
1	Sample	MB1	Extended Reaction 021711 (Extended Reaction 021711)	1
2	Check Standard	[TOC] LCS ER [21.9 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
3	Sample	ICS	Extended Reaction 021711 (Extended Reaction 021711)	1
4	Sample	K1810611-001.06	Extended Reaction 021711 (Extended Reaction 021711)	2
5	Sample	K1810611-001.06 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
6	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
7	Sample	K1810611-002.01 4x	Extended Reaction 021711 (Extended Reaction 021711)	2
8	Sample	K1810611-003.01 4x	Extended Reaction 021711 (Extended Reaction 021711)	2
9	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
10	Sample	K1810657-001.01	Extended Reaction 021711 (Extended Reaction 021711)	2
11	Sample	K1810657-001.01 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
12	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
13	Sample	K1810165-006.06	Extended Reaction 021711 (Extended Reaction 021711)	2
14	Sample	K1810165-006.06 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
15	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
16	Sample	K1810821-001.04	Extended Reaction 021711 (Extended Reaction 021711)	4
17	Sample	K1810821-001.04 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
18	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
19	Sample	K1810355-001.17	Extended Reaction 021711 (Extended Reaction 021711)	2
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
20	Sample	MB2	Extended Reaction 021711 (Extended Reaction 021711)	1
2	Check Standard	[TOC] LCS ER [21.9 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
21	Sample	K1810355-001.17 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
22	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
23	Sample	K1810355-002.17	Extended Reaction 021711 (Extended Reaction 021711)	2
24	Sample	K1810355-003.17	Extended Reaction 021711 (Extended Reaction 021711)	2
25	Sample	K1810355-004.17	Extended Reaction 021711 (Extended Reaction 021711)	2
26	Sample	K1810355-005.17	Extended Reaction 021711 (Extended Reaction 021711)	2
27	Sample	K1810355-006.17	Extended Reaction 021711 (Extended Reaction 021711)	2
28	Sample	K1810355-007.17 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
29	Sample	K1810308-001.04	Extended Reaction 021711 (Extended Reaction 021711)	2
30	Sample	K1810308-001.04 MS	Extended Reaction 021711 (Extended Reaction 021711)	1
31	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
32	Sample	K1810308-002.04	Extended Reaction 021711 (Extended Reaction 021711)	2
33	Sample	K1810308-003.04	Extended Reaction 021711 (Extended Reaction 021711)	2
34	Sample	K1810308-004.04	Extended Reaction 021711 (Extended Reaction 021711)	2
35	Sample	K1810308-005.04	Extended Reaction 021711 (Extended Reaction 021711)	2
36	Sample	K1810308-006.04	Extended Reaction 021711 (Extended Reaction 021711)	2
37	Sample	K1810308-007.04	Extended Reaction 021711 (Extended Reaction 021711)	2
38	Sample	K1810308-008.04	Extended Reaction 021711 (Extended Reaction 021711)	2
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1

Printed on: November 10, 2018 17:33:11

Page 1

## Schedule: 11082018

Position	Sample Type	Sample ID	Method ID (Calibration ID)	Reps
39	Sample	MB3	Extended Reaction 021711 (Extended Reaction 021711)	1
	Check Standard	[TOC] LCS ER [21.9 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
40	Sample	K1810244-001.02	Extended Reaction 021711 (Extended Reaction 021711)	2
41	Sample	K1810244-002.02	Extended Reaction 021711 (Extended Reaction 021711)	2
42	Sample	K1810244-002.02 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
43	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
44	Sample	K1810364-001.17	Extended Reaction 021711 (Extended Reaction 021711)	2
45	Sample	K1810364-001.17 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
46	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
47	Sample	K1810364-002.17	Extended Reaction 021711 (Extended Reaction 021711)	2
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
48	Sample	K1810364-003.17	Extended Reaction 021711 (Extended Reaction 021711)	2
49	Sample	K1810364-004.17	Extended Reaction 021711 (Extended Reaction 021711)	2
50	Sample	K1810364-005.17	Extended Reaction 021711 (Extended Reaction 021711)	2
51	Sample	K1810364-006.17	Extended Reaction 021711 (Extended Reaction 021711)	2
52	Sample	K1810364-007.17 16x	Extended Reaction 021711 (Extended Reaction 021711)	2
53	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
54	Sample	K1810321-001.02	Extended Reaction 021711 (Extended Reaction 021711)	2
55	Sample	K1810321-001.02 MS	Extended Reaction 021711 (Extended Reaction 021711)	1
56	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
57	Sample	K1810321-002.02	Extended Reaction 021711 (Extended Reaction 021711)	2
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
58	Sample	MB4	Extended Reaction 021711 (Extended Reaction 021711)	1
2	Check Standard	[TOC] LCS ER [21.9 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
59	Sample	K1810321-003.02	Extended Reaction 021711 (Extended Reaction 021711)	2
60	Sample	K1810321-004.02	Extended Reaction 021711 (Extended Reaction 021711)	2
61	Sample	K1810356-001.01 20x	Extended Reaction 021711 (Extended Reaction 021711)	2
62	Sample	K1810356-002.01	Extended Reaction 021711 (Extended Reaction 021711)	2
63	Sample	K1810356-002.01 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
64	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
65	Sample	K1810576-001.11	Extended Reaction 021711 (Extended Reaction 021711)	2
66	Sample	K1810576-001.11 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
67	Sample	K1810576-002.11	Extended Reaction 021711 (Extended Reaction 021711)	2
68	Sample	K1810576-003.11	Extended Reaction 021711 (Extended Reaction 021711)	2
69	Sample	K1810576-004.11	Extended Reaction 021711 (Extended Reaction 021711)	2
70	Sample	K1810576-005.11	Extended Reaction 021711 (Extended Reaction 021711)	2
71	Sample	K1810576-006.11	Extended Reaction 021711 (Extended Reaction 021711)	2
72	Sample	K1810576-007.11 10x	Extended Reaction 021711 (Extended Reaction 021711)	2
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
C	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1



## Fusion Report - 11082018

### Thursday, November 08, 2018 05:18 PM

(View - Repts, Unused Repts, Meta-Data, Signature, History)  
 Printed on 2018/11/10 10:15 - Saturday

### Report Summary Information

Company Location: Gen Chem Lab  
 Schedule Name: 11082018  
 Instrument Name: Fusion1  
 Report Version: 1 of 1  
 Report Creation by Operators (schedule version): Fusion1 (Fusion1) (v2)  
 Fusion1 (Fusion1) (v4)  
 Fusion1 (Fusion1) (v5)  
 Fusion1 (Fusion1) (v6)  
 Comment:

Engine Version: 1.1.5.1  
 Firmware Version: 1.2.0696  
 Connection: RS232 COM1

### Report Results

*11/13/18*  
*Heip*

Sample Type: Clean							From Schedule Version 2
Pos	Analysis Type	Sample ID			Start Time		
◆ (clean)		Clean			2018/11/08 17:19		
Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	IC Clean	10.96	14.62	3.66	49.41	05:21	
2	TC Clean	5.97	8.42	2.45	50.03	04:02	
3	TC Clean	1.88	4.49	2.61	50.24	03:50	
4	TC Clean	1.75	4.32	2.57	50.21	03:57	

Sample Type: Clean							From Schedule Version 4
Pos	Analysis Type	Sample ID			Start Time		
◆ (clean)		Clean			2018/11/08 17:41		
Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	IC Clean	10.63	13.14	2.51	49.29	05:24	
2	TC Clean	5.05	7.58	2.53	50.18	04:04	
3	TC Clean	1.74	4.52	2.78	50.15	03:49	



4	TC Clean	1.98	4.65	2.67	50.18	03:56
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**Sample Type:** Clean From Schedule Version 5

Pos	Analysis Type	Sample ID			Start Time	
♦ (clean)		Clean			2018/11/08 18:05	

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	10.77	13.29	2.51	49.51	05:24
2	TC Clean	4.83	7.47	2.65	50.12	04:03
3	TC Clean	2.36	5.02	2.66	50.16	03:46
4	TC Clean	1.89	4.53	2.64	50.10	03:44

**Sample Type:** Blank (Creating v1179) From Schedule Version 6

Pos	Analysis Type	Sample ID			Start Time	
♦ (blank)		Reagent/Acid Blank			2018/11/08 18:33	

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	10.93	13.29	2.36	49.46	05:13
2	TC Clean	5.32	7.91	2.59	50.04	04:00
3	TC Clean	2.08	4.72	2.64	50.25	03:47
4	TC Clean	1.70	4.37	2.67	50.09	03:47
5	Reagent Blank	7.23	9.93	2.70	50.16	05:07
6	Acid Blank	1.36	3.77	2.41	49.42	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	1.5478 ppm	0.0000 ppm	0.0000%	2018/11/08 19:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.5478	15.4778	35.25	38.32	3.07	50.29	12:33

<b>Dilution</b>	<b>Blank Contribution</b>	<b>Method</b>	<b>Calibration</b>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Sample Type: Check Standard --&gt; CCV 021711

From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity ( NA / NA )	25.7173 ppm (PASS)	0.0000 ppm	0%	2018/11/08 19:23

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.7173	257.1733	205.57	208.50	2.93	50.30	12:30

<u>Completion State</u>	<u>Success Action</u>	<u>Method</u>	<u>Calibration</u>	<u>STD Conc - Pos B</u>
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)	50 ppmC

Sample Type: Check Standard --&gt; CCB 021711

From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/11/08 19:39

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	23.54	26.39	2.85	50.26	12:32

<u>Completion State</u>	<u>Success Action</u>	<u>Method</u>	<u>Calibration</u>	<u>STD Conc - Pos D</u>
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)	0 ppmC

Sample Type: Sample

From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◊ 1	TOC	MB1	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/08 19:56

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	21.83	24.73	2.90	50.27	12:29

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Sample Type: Check Standard --&gt; LCS ER

From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ 2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity ( NA / NA )	22.1518 ppm (PASS)	0.0000 ppm	0%	2018/11/08 20:12

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
2	TOC	21.9 ppm	1	22.1518	221.5177	180.76	183.57	2.81	50.30	12:30

**Completion State** Success - Criteria met.  
**Success Action** Do Nothing  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)  
**STD Conc - Pos 2** 21.9 µmC

**Sample Type:** Sample From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
3	TOC	ICS	0.2460 ppm	0.0000 ppm	0.0000%	2018/11/08 20:29

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2460	2.4598	26.19	28.97	2.78	50.33	12:30

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
4	TOC	K1810611-001.06	3.3109 ppm	0.1396 ppm	4.2200%	2018/11/08 20:45

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.4096	34.0962	48.20	51.00	2.80	50.33	12:25
2	TOC	3.2123	32.1225	46.83	49.62	2.80	50.33	12:23

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
5	TOC	K1810611-001.06 ms	30.3333 ppm	0.0000 ppm	0.0000%	2018/11/08 21:17

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	30.3333	303.3330	235.50	238.23	2.74	50.32	12:29

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
6	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/08 21:33

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	23.44	26.28	2.83	50.33	12:34

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC)  
**Method** Extended Reaction  
**Calibration** Extended Reaction

(v1179) 021711 (v3) 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
7	TOC	K1810611-002.01 4x	8.2837 ppm	0.1392 ppm	1.6800%	2018/11/08 21:49

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	8.3821	83.8206	82.79	85.49	2.70	50.29	12:26
2	TOC	8.1853	81.8526	81.42	84.18	2.76	50.28	12:27

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
8	TOC	K1810611-003.01 4x	8.6438 ppm	0.2745 ppm	3.1800%	2018/11/08 22:21

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	8.8379	88.3788	85.96	88.75	2.79	50.26	12:29
2	TOC	8.4496	84.4962	83.26	86.18	2.92	50.23	12:27

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
9	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/08 22:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	23.83	26.54	2.72	50.20	12:25
2	TOC	0.0000	0.0000	23.35	26.19	2.84	50.20	12:27

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

**Sample Type:** Check Standard --> CCV 021711

From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	25.7987 ppm (PASS)	0.0000 ppm	0%	2018/11/08 23:24

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.7987	257.9869	206.13	208.91	2.77	50.16	12:32

**Completion State** Success - Criteria met.  
**Success Action** Do Nothing  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)  
**STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/11/08 23:41

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	24.08	26.88	2.80	50.14	12:31

<b>Completion State</b>	<b>Success Action</b>	<b>Method</b>	<b>Calibration</b>	<b>STD Conc - Pos D</b>
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)	0 ppmC

**Sample Type:** Sample From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◊ 10	TOC	K1810657-001.01	6.3173 ppm	0.0009 ppm	0.0100%	2018/11/08 23:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.3180	63.1796	68.43	71.31	2.88	50.15	12:28
2	TOC	6.3167	63.1666	68.42	71.29	2.87	50.16	12:27

<b>Dilution</b>	<b>Blank Contribution</b>	<b>Method</b>	<b>Calibration</b>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◊ 11	TOC	K1810657-001.01 ms	33.4140 ppm	0.0000 ppm	0.0000%	2018/11/09 00:29

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	33.4140	334.1400	256.93	259.73	2.80	50.15	12:32

<b>Dilution</b>	<b>Blank Contribution</b>	<b>Method</b>	<b>Calibration</b>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◊ 12	TOC	RB	0.3298 ppm	0.0000 ppm	0.0000%	2018/11/09 00:46

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3298	3.2979	26.77	29.79	3.01	50.10	12:33

<b>Dilution</b>	<b>Blank Contribution</b>	<b>Method</b>	<b>Calibration</b>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time

13	TOC	K1810165-006.06	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 01:02
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Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	24.22	27.04	2.81	50.14	12:27
2	TOC	0.0000	0.0000	23.84	26.66	2.82	50.12	12:27

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
14	TOC	K1810165-006.06 ms	29.6399 ppm	0.0000 ppm	0.0000%	2018/11/09 01:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	29.6399	296.3986	230.67	233.51	2.84	50.11	12:32

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
15	TOC	RB	0.0992 ppm	0.0000 ppm	0.0000%	2018/11/09 01:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0992	0.9922	25.17	27.85	2.68	50.11	12:31

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
16	TOC	K1810821-001.04	0.9439 ppm	0.0795 ppm	8.4200%	2018/11/09 02:07

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0444	10.4437	31.74	34.51	2.76	50.11	12:25
2	TOC	0.9696	9.6962	31.22	34.09	2.86	50.10	12:25
3	TOC	0.8700	8.7000	30.53	33.36	2.83	50.10	12:22
4	TOC	0.8916	8.9156	30.68	33.47	2.79	50.11	12:28

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
17	TOC	K1810821-001.04 ms	0.6003 ppm	0.0000 ppm	0.0000%	2018/11/09 03:09

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6003	6.0033	28.66	31.51	2.86	50.10	12:31

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
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1:10 (TC) 24.4798 (IC) (v1179) Extended Reaction 021711 (v3) Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
18	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 03:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	23.78	26.85	3.07	50.10	12:29

Dilution 1:10 Blank Contribution (TC) 24.4798 (IC) (v1179) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
19	TOC	K1810355-001.17	4.0794 ppm	0.1719 ppm	4.2100%	2018/11/09 03:42

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.2010	42.0096	53.70	56.66	2.95	50.09	12:28
2	TOC	3.9579	39.5788	52.01	54.85	2.84	50.08	12:26

Dilution 1:10 Blank Contribution (TC) 24.4798 (IC) (v1179) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19)

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity ( NA / NA )	25.8273 ppm (PASS)	0.0000 ppm	0%	2018/11/09 04:14

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.8273	258.2730	206.33	209.21	2.88	50.09	12:32

Completion State Success - Criteria met. Success Action Do Nothing Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19) STD Conc - Pos B 50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/11/09 04:30

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	24.10	26.99	2.89	50.11	12:30

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v19)	<b>STD Conc - Pos D</b> 0 ppmC
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Sample Type: Sample From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
20	TOC	MB2	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 04:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	22.71	25.65	2.94	50.09	12:29

<b>Dilution</b> 1:10	<b>Blank Contribution</b> (TC) 24.4798 (IC) (v1179)	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v19)
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Sample Type: Check Standard --> LCS ER From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev. (ppm)	RSD	Start Time
2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity (NA / NA)	22.2898 ppm (PASS)	0.0000 ppm	0%	2018/11/09 05:03

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
2	TOC	21.9 ppm	1	22.2898	222.8977	181.72	184.73	3.01	50.07	12:31

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v19)	<b>STD Conc - Pos 2</b> 21.9 ppmC
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Sample Type: Sample From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
21	TOC	K1810355-001.17 ms	31.6489 ppm	0.0000 ppm	0.0000%	2018/11/09 05:20

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	31.6489	316.4890	244.65	247.52	2.87	50.08	12:31

<b>Dilution</b> 1:10	<b>Blank Contribution</b> (TC) 24.4798 (IC) (v1179)	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v19)
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Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
22	TOC	RB	0.5147 ppm	0.0000 ppm	0.0000%	2018/11/09 05:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time



1	TOC	0.5147	5.1465	28.06	30.99	2.93	50.09	12:28
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**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
23	TOC	K1810355-002.17	7.1430 ppm	0.0576 ppm	0.8100%	2018/11/09 05:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.1838	71.8376	74.45	77.32	2.87	50.07	12:27
2	TOC	7.1023	71.0225	73.89	76.94	3.05	50.07	12:27

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
24	TOC	K1810355-003.17	3.3163 ppm	0.2351 ppm	7.0900%	2018/11/09 06:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.4825	34.8250	48.71	51.66	2.96	50.08	12:25
2	TOC	3.1500	31.5001	46.39	49.47	3.08	50.09	12:27

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
25	TOC	K1810355-004.17	6.1883 ppm	0.4346 ppm	7.0200%	2018/11/09 06:56

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.4956	64.9563	69.67	72.73	3.06	50.06	12:28
2	TOC	5.8810	58.8096	65.39	68.26	2.87	50.09	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
26	TOC	K1810355-005.17	3.3198 ppm	0.2412 ppm	7.2700%	2018/11/09 07:28

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.4904	34.9041	48.76	51.89	3.13	50.06	12:27
2	TOC	3.1493	31.4929	46.39	49.31	2.92	50.08	12:27

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
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♦ 27	TOC	K1810355-006.17	0.0303 ppm	0.0428 ppm	141.4200%	2018/11/09 08:00
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Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	24.38	27.37	2.99	50.11	12:28
2	TOC	0.0605	0.6055	24.90	27.49	2.59	50.05	12:26

**Dilution** 1:10      **Blank Contribution** (TC) 24.4798 (IC) (v1179)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
♦ 28	TOC	K1810355-007.17 2x	8.2053 ppm	0.2136 ppm	2.6000%	2018/11/09 08:31

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	8.3563	83.5632	82.61	85.21	2.60	49.94	12:26
2	TOC	8.0543	80.5431	80.51	83.19	2.68	50.00	12:29

**Dilution** 1:10      **Blank Contribution** (TC) 24.4798 (IC) (v1179)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v19)

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
♦ B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	25.8855 ppm (PASS)	0.0000 ppm	0%	2018/11/09 09:03

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.8855	258.8551	206.74	209.48	2.75	50.14	12:28

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v19)      **STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
♦ D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/11/09 09:19

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	23.09	25.80	2.71	50.13	12:32

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v19)      **STD Conc - Pos D** 0 ppmC

Sample Type: Sample

From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
29	TOC	K1810308-001.04	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 09:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	23.89	26.55	2.66	50.13	12:26
2	TOC	0.0000	0.0000	23.77	26.58	2.81	50.13	12:28

Dilution 1:10      Blank Contribution (TC) 24.4798 (IC) (v1179)      Method Extended Reaction 021711 (v3)      Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
30	TOC	K1810308-001.04	27.1585 ppm	0.0000 ppm	0.0000%	2018/11/09 10:08

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	27.1585	271.5845	213.41	216.18	2.77	50.12	12:30

Dilution 1:10      Blank Contribution (TC) 24.4798 (IC) (v1179)      Method Extended Reaction 021711 (v3)      Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
31	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 10:24

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	23.83	26.63	2.80	50.13	12:33

Dilution 1:10      Blank Contribution (TC) 24.4798 (IC) (v1179)      Method Extended Reaction 021711 (v3)      Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
32	TOC	K1810308-002.04	2.7017 ppm	0.3404 ppm	12.6000%	2018/11/09 10:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.9424	29.4244	44.95	47.57	2.62	50.10	12:25
2	TOC	2.4610	24.6102	41.60	44.40	2.80	50.10	12:29

Dilution 1:10      Blank Contribution (TC) 24.4798 (IC) (v1179)      Method Extended Reaction 021711 (v3)      Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
33	TOC	K1810308-003.04	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 11:12

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	22.14	24.93	2.79	50.09	12:25

2	TOC	0.0000	0.0000	22.89	25.68	2.79	50.11	12:26
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**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
34	TOC	K1810308-004.04	0.4779 ppm	0.2660 ppm	55.6600%	2018/11/09 11:44

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6660	6.6602	29.11	31.95	2.84	50.14	12:27
2	TOC	0.2898	2.8983	26.50	29.26	2.76	50.20	12:25

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
35	TOC	K1810308-005.04	0.0024 ppm	0.0034 ppm	141.4200%	2018/11/09 12:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0048	0.0477	24.51	27.39	2.88	50.19	12:25
2	TOC	0.0000	0.0000	23.34	26.14	2.80	50.18	12:28

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
36	TOC	K1810308-006.04	0.0868 ppm	0.0471 ppm	54.2300%	2018/11/09 12:47

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1201	1.2006	25.32	28.04	2.72	50.21	12:24
2	TOC	0.0535	0.5350	24.85	27.72	2.87	50.21	12:25

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
37	TOC	K1810308-007.04	0.9727 ppm	0.0406 ppm	4.1700%	2018/11/09 13:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0014	10.0139	31.45	34.31	2.87	50.23	12:27
2	TOC	0.9440	9.4403	31.05	33.91	2.86	50.18	12:24

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
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38	TOC	K1810308-008.04	1.4399 ppm	0.1542 ppm	10.7100%	2018/11/09 13:51
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Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.5489	15.4893	35.25	38.14	2.88	50.12	12:27
2	TOC	1.3309	13.3086	33.74	36.49	2.75	50.09	12:24

**Dilution** 1:10      **Blank Contribution** (TC) 24.4798 (IC) (v1179)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v19)

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	25.8582 ppm (PASS)	0.0000 ppm	0%	2018/11/09 14:23

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.8582	258.5820	206.55	209.27	2.73	50.05	12:32

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v19)      **STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/11/09 14:39

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	23.98	26.80	2.82	50.04	12:34

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v19)      **STD Conc - Pos D** 0 ppmC

**Sample Type:** Sample From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
39	TOC	MB3	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 14:55

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	23.47	26.31	2.84	50.02	12:29

**Dilution**      **Blank Contribution**      **Method**      **Calibration**



1:10 (TC) 24.4798 (IC) (v1179) Extended Reaction 021711 (v3) Extended Reaction 021711 (v19)

**Sample Type:** Check Standard --> LCS ER From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity (NA / NA)	23.6907 ppm (PASS)	0.0000 ppm	0%	2018/11/09 15:12

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
2	TOC	21.9 ppm	1	23.6907	236.9075	191.47	194.42	2.95	49.99	12:28

**Completion State** Success - Criteria met. **Success Action** Do Nothing **Method** Extended Reaction 021711 (v3) **Calibration** Extended Reaction 021711 (v19) **STD Conc - Pos 2** 21.9 ppmC

**Sample Type:** Sample From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
40	TOC	K1810244-001.02	1.2123 ppm	0.3067 ppm	25.3000%	2018/11/09 15:28

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.4292	14.2919	34.42	37.29	2.87	49.99	12:27
2	TOC	0.9955	9.9549	31.40	34.21	2.80	49.99	12:25

**Dilution** 1:10 **Blank Contribution** (TC) 24.4798 (IC) (v1179) **Method** Extended Reaction 021711 (v3) **Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
41	TOC	K1810244-002.02	2.2615 ppm	0.0451 ppm	2.0000%	2018/11/09 16:00

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.2934	22.9341	40.43	43.21	2.77	49.95	12:28
2	TOC	2.2296	22.2958	39.99	42.70	2.71	50.00	12:25

**Dilution** 1:10 **Blank Contribution** (TC) 24.4798 (IC) (v1179) **Method** Extended Reaction 021711 (v3) **Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
42	TOC	K1810244-002.02 ms	30.0767 ppm	0.0000 ppm	0.0000%	2018/11/09 16:32

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	30.0767	300.7671	233.71	236.58	2.87	49.96	12:34

**Dilution** **Blank Contribution** **Method** **Calibration**

1:10 (TC) 24.4798 (IC) (v1179) Extended Reaction 021711 (v3) Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
43	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 16:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	24.04	27.04	3.00	50.00	12:31

Dilution 1:10 Blank Contribution (TC) 24.4798 (IC) (v1179) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
44	TOC	K1810364-001.17	4.0156 ppm	0.0977 ppm	2.4300%	2018/11/09 17:05

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.0847	40.8467	52.90	55.76	2.86	49.97	12:24
2	TOC	3.9465	39.4652	51.93	54.79	2.86	50.00	12:27

Dilution 1:10 Blank Contribution (TC) 24.4798 (IC) (v1179) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
45	TOC	K1810364-001.17 ms	31.6680 ppm	0.0000 ppm	0.0000%	2018/11/09 17:36

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	31.6680	316.6802	244.78	247.75	2.97	50.00	12:31

Dilution 1:10 Blank Contribution (TC) 24.4798 (IC) (v1179) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
46	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 17:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	24.46	27.51	3.05	50.00	12:33

Dilution 1:10 Blank Contribution (TC) 24.4798 (IC) (v1179) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
47	TOC	K1810364-002.17	8.9197 ppm	0.2636 ppm	2.9500%	2018/11/09 18:09

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	9.1061	91.0612	87.83	90.81	2.98	49.97	12:29
2	TOC	8.7334	87.3338	85.23	87.96	2.73	49.93	12:25

<b>Dilution</b> 1:10	<b>Blank Contribution</b> (TC) 24.4798 (IC) (v1179)	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v19)
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**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
* B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	26.0871 ppm (PASS)	0.0000 ppm	0%	2018/11/09 18:41

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	26.0871	260.8705	208.14	210.93	2.79	49.93	12:31

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v19)	<b>STD Conc - Pos B</b> 50 ppmC
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**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
* D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/11/09 18:57

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	22.90	25.69	2.79	50.00	12:31

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v19)	<b>STD Conc - Pos D</b> 0 ppmC
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**Sample Type:** Sample From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
* 48	TOC	K1810364-003.17	3.2773 ppm	0.1247 ppm	3.8100%	2018/11/09 19:14

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.3655	33.6549	47.89	50.71	2.82	50.10	12:24
2	TOC	3.1891	31.8911	46.66	49.45	2.79	50.09	12:25

<b>Dilution</b> 1:10	<b>Blank Contribution</b> (TC) 24.4798 (IC) (v1179)	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v19)
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Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time



49	TOC	K1810364-004.17	6.9988 ppm	0.1260 ppm	1.8000%	2018/11/09 19:46
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Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.9096	69.0963	72.55	75.44	2.89	50.15	12:27
2	TOC	7.0879	70.8788	73.79	76.61	2.83	50.17	12:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
50	TOC	K1810364-005.17	3.8466 ppm	0.0218 ppm	0.5700%	2018/11/09 20:18

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.8312	38.3124	51.13	53.98	2.85	50.16	12:27
2	TOC	3.8620	38.6200	51.35	54.11	2.76	50.15	12:29

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
51	TOC	K1810364-006.17	0.7352 ppm	0.2796 ppm	38.0300%	2018/11/09 20:49

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.9330	9.3296	30.97	33.90	2.93	50.12	12:29
2	TOC	0.5375	5.3751	28.22	31.20	2.98	50.13	12:25

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
52	TOC	K1810364-007.17 16x	0.9001 ppm	0.1235 ppm	13.7200%	2018/11/09 21:21

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.9874	9.8744	31.35	34.23	2.88	50.14	12:27
2	TOC	0.8128	8.1279	30.13	33.03	2.90	50.14	12:28

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
53	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 21:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	21.72	24.71	2.99	50.12	12:27

Dilution	Blank Contribution	Method	Calibration
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1:10 (TC) 24.4798 (IC) (v1179) Extended Reaction 021711 (v3) Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
54	TOC	K1810321-001.02	0.2970 ppm	0.0087 ppm	2.9400%	2018/11/09 22:09

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.2908	2.9083	26.50	29.29	2.79	50.11	12:29
2	TOC	0.3032	3.0320	26.59	29.40	2.81	50.12	12:26

Dilution 1:10 Blank Contribution (TC) 24.4798 (IC) (v1179) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19)

*CES 11/12/18*

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
55	TOC	K1810321-001.02	28.7311 ppm	0.0000 ppm	0.0000%	2018/11/09 22:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	28.7311	287.3107	224.35	227.12	2.78	50.10	12:31

Dilution 1:10 Blank Contribution (TC) 24.4798 (IC) (v1179) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
56	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/09 22:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	22.55	25.41	2.86	50.10	12:31

Dilution 1:10 Blank Contribution (TC) 24.4798 (IC) (v1179) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
57	TOC	K1810321-002.02	1.1024 ppm	0.0002 ppm	0.0200%	2018/11/09 23:13

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.1026	11.0259	32.15	35.08	2.93	50.11	12:27
2	TOC	1.1023	11.0230	32.15	34.89	2.75	50.11	12:24

Dilution 1:10 Blank Contribution (TC) 24.4798 (IC) (v1179) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v19)

Sample Type: Check Standard --> CCV 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV	0 / infinity	25.1372	0.0000	0%	2018/11/09 23:45

				021711 [25 ppm]	( NA / NA )	ppm (PASS)	ppm			
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Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	25.1372	251.3716	201.53	204.48	2.95	50.11	12:35

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v19)      **STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711      From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev. (ppm)	RSD	Start Time
◊ D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/11/10 00:02

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	23.06	25.78	2.72	50.11	12:32

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v19)      **STD Conc - Pos D** 0 ppmC

**Sample Type:** Sample      From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◊ 58	TOC	MB4	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/10 00:18

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	21.29	24.11	2.82	50.11	12:33

**Dilution** 1:10      **Blank Contribution** (TC) 24.4798 (IC) (v1179)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v19)

**Sample Type:** Check Standard --> LCS ER      From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev. (ppm)	RSD	Start Time
◊ 2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity ( NA / NA )	21.8693 ppm (PASS)	0.0000 ppm	0%	2018/11/10 00:35

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
2	TOC	21.9 ppm	1	21.8693	218.6930	178.80	181.75	2.95	50.11	12:29

<u>Completion State</u>	<u>Success Action</u>	<u>Method</u>	<u>Calibration</u>	<u>STD Conc - Pos 2</u>
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)	21.9 ppmC

Sample Type: Sample

From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
59	TOC	K1810321-003.02	1.2133 ppm	0.1617 ppm	13.3300%	2018/11/10 00:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.3277	13.2770	33.72	36.59	2.87	50.13	12:27
2	TOC	1.0990	10.9899	32.12	34.94	2.82	50.11	12:26

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
60	TOC	K1810321-004.02	0.9082 ppm	0.1763 ppm	19.4100%	2018/11/10 01:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0329	10.3287	31.67	34.38	2.71	50.12	12:27
2	TOC	0.7836	7.8361	29.93	32.83	2.90	50.11	12:28

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
61	TOC	K1810356-001.01 20x	0.4746 ppm	0.0249 ppm	5.2500%	2018/11/10 01:55

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.4570	4.5701	27.66	30.52	2.86	50.09	12:25
2	TOC	0.4922	4.9223	27.90	30.75	2.84	50.11	12:24

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
62	TOC	K1810356-002.01	0.5935 ppm	0.0233 ppm	3.9200%	2018/11/10 02:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.6100	6.0996	28.72	31.58	2.85	50.12	12:26
2	TOC	0.5770	5.7704	28.49	31.24	2.75	50.12	12:27

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
1:10	(TC) 24.4798 (IC) (v1179)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
* 63	TOC	K1810356-002.01 ms	27.7544 ppm	0.0000 ppm	0.0000%	2018/11/10 02:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	27.7544	277.5444	217.56	220.21	2.65	50.09	12:30

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
* 64	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/10 03:14

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	22.86	25.62	2.76	50.09	12:35

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
* 65	TOC	K1810576-001.11	3.7011 ppm	0.1336 ppm	3.6100%	2018/11/10 03:31

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.7956	37.9559	50.88	53.72	2.83	50.09	12:26
2	TOC	3.6067	36.0670	49.57	52.38	2.81	50.11	12:27

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
* 66	TOC	K1810576-001.11 ms	30.7565 ppm	0.0000 ppm	0.0000%	2018/11/10 04:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	30.7565	307.5650	238.44	241.25	2.81	50.09	12:28

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

**Sample Type:** Check Standard --> CCV 021711

From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
* B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	25.2507 ppm (PASS)	0.0000 ppm	0%	2018/11/10 04:19

Pos	Base Analysis	ID	Rep	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run
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	Type		#							Time
B	TOC	25 ppm	1	25.2507	252.5072	202.32	205.18	2.86	50.09	12:33

**Completion State** Success - Criteria met.  
**Success Action** Do Nothing  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)  
**STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/11/10 04:35

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	21.22	24.12	2.90	50.08	12:31

**Completion State** Success - Criteria met.  
**Success Action** Do Nothing  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)  
**STD Conc - Pos D** 0 ppmC

**Sample Type:** Sample From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◊ 67	TOC	K1810576-002.11	6.7772 ppm	0.3106 ppm	4.5800%	2018/11/10 04:52

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.9969	69.9689	73.15	75.95	2.79	50.08	12:27
2	TOC	6.5576	65.5759	70.10	72.87	2.77	50.12	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◊ 68	TOC	K1810576-003.11	3.1429 ppm	0.2123 ppm	6.7600%	2018/11/10 05:24

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.2930	32.9304	47.39	50.25	2.87	50.10	12:23
2	TOC	2.9927	29.9275	45.30	48.24	2.94	50.10	12:27

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) (v1179)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◊ 69	TOC	K1810576-004.11	5.0231 ppm	0.0047 ppm	0.0900%	2018/11/10 05:55

Rep	Base		Adjusted	Baseline	Pressure	Run
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#	Analysis Type	ppm	µg	(Abs)	NDIR (Abs)	(Abs)	(psig)	Time
1	TOC	5.0264	50.2637	59.45	62.18	2.73	50.10	12:29
2	TOC	5.0198	50.1976	59.40	62.20	2.80	50.12	12:29

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) v1179  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
70	TOC	K1810576-005.11	3.2250 ppm	0.2139 ppm	6.6300%	2018/11/10 06:27

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	3.3763	33.7627	47.97	50.84	2.87	50.13	12:26
2	TOC	3.0738	30.7382	45.86	48.76	2.89	50.14	12:27

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) v1179  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
71	TOC	K1810576-006.11	0.0000 ppm	0.0000 ppm	0.0000%	2018/11/10 06:59

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	21.89	24.64	2.75	50.14	12:23
2	TOC	0.0000	0.0000	21.04	23.79	2.75	50.11	12:24

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) v1179  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
72	TOC	K1810576-007.11 10x	1.7932 ppm	0.3197 ppm	17.8300%	2018/11/10 07:31

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.0193	20.1928	38.53	41.47	2.95	50.12	12:28
2	TOC	1.5672	15.6719	35.38	38.17	2.78	50.13	12:25

**Dilution** 1:10  
**Blank Contribution** (TC) 24.4798 (IC) v1179  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v19)

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 6

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	25.3746 ppm (PASS)	0.0000 ppm	0%	2018/11/10 08:02

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time

B	TOC	25 ppm	1	25.3746	253.7463	203.18	206.03	2.84	50.13	12:34
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos B</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v19)		50 ppmC		

<b>Sample Type:</b> Check Standard --> CCB 021711										From Schedule Version 6	
Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time		
C	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/11/10 08:19		
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time	
C	TOC	0.0 ppm	1	0.0000	0.0000	21.73	24.36	2.63	50.11	12:30	
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos C</b>			
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v19)		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
v1178	3.9490	1.0520	0.0000	0.0000	0.0000	2018/11/07 17:34	Fusion1 (Fusion1)
v1179	2.4107	1.3600	0.0000	0.0000	0.0000	2018/11/08 19:06	Fusion1 (Fusion1)

#### Calibrations

##### Name: Extended Reaction 021711 (TOC)

Version: v19 Calibration curve formula: TOC:  $y = 6.957x + 26.664$

Ver Creation: 2018/11/02 21:13  $r^2$  value: TOC:  $r^2 = 0.99860$

Comment:

Operator: Fusion1 (Fusion1)

Basic Analysis Type: TOC

##### Basic Analysis Type: TOC

Sample ID	Y Raw Value	X Expected	Message	End Time
0.0 ppm	30.6200	0.0000		2018/11/02 19:35
0.50 ppm	29.8930	0.5000		2018/11/02 19:52



1.00 ppm	31.0960	1.0000	2018/11/02 20:07
5.00 ppm	57.3100	5.0000	2018/11/02 20:23
10.0 ppm	103.4310	10.0000	2018/11/02 20:40
25.0 ppm	194.0320	25.0000	2018/11/02 20:56
50.0 ppm	376.7910	50.0000	2018/11/02 21:12

**Methods****Name: Extended Reaction 021711 (TOC)**

Version: v3

Operator: Gen Chem Lab (Fusion1)

Ver Creation: 2013/02/04 11:44

Comment:

Parameter	Value	Advanced Parameter	Value
SampleVolume	10.0 mL	NeedleRinseVolume	5.0 ml
Dilution	1:10	VialPrimeVolume	2.0 ml
AcidVolume	0.5 ml	ICSamplePrimeVolume	2.0 ml
ReagentVolume	2.0 ml	ICSpargeRinseVolume	12.0 ml
UVReactorPrerinse	Off	BaselineStabilizeTime	0.70 min
UVReactorPrerinseVolume	5.0	DetectorPressureFlow	150 ml/min
NumberOfUVReactorPrerinses	1	SyringeSpeedWaste	10
ICSpargeTime	1.00 mins	SyringeSpeedAcid	7
DetectorSweepFlow	500 ml/min	SyringeSpeedReagent	7
PreSpargeTime	4.00 mins	SyringeSpeedDIWater	7
SystemFlow	500 ml/min	NDIRPressurization	60 psig
		SyringeSpeedSampleDispense	5
		SyringeSpeedSampleAspirate	4
		SyringeSpeedUVDispense	7
		SyringeSpeedUVAspirate	5
		SyringeSpeedICDispense	7
		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
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### Report History

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#### Report History

Report Version	User Name	System Reason	User Reason	Date
1	Fusion1 (Fusion1)	Schedule completed	Schedule completed	2018/11/10 08:39

StarLIMS Run: 614671, 614672, 614673  
 Analysis: TOC  
 Method: SM 5310 C, 9060

CCV: 11-GEN-05-71A 50 ppm      LCS: 11-GEN-05-69N 21.9 ppm

ICAL Date: 11/2/18

ICAL ID: 11-GEN-05-71E

ICS ID: 11-GEN-05-67D

ICS TV: 25.0 ppm

ICS % R <1

Spike ID: 11-GEN-05-700      0.05 ml of 5000 ppm stock ---> 10.0 ml = 25.0 ppm x dilution factor

Sodium Persulfate: 11-GEN-05-71K

21 % H3PO4: 11-GEN-05-71L

Equipment ID: K-TOC-03

PIPETTE ID: 124276B, Marge

FILTER ID: NA

Analyzed By: <i>ces/</i>	Date Analyzed: <i>11/8/18</i>
Reviewed By: <i>Humpu</i>	Date Reviewed: <i>11/13/18</i>



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November 12, 2018

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

Work Order: **HS18101733**

Laboratory Results for: **Groundwater Treatment Plant Bi-Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Oct 31, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval scribble.

Generated By: DAYNA.FISHER  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**Work Order:** HS18101733

**SAMPLE SUMMARY**

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Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18101733-01	LH18/24-SP650_103018	Water		30-Oct-2018 14:00	31-Oct-2018 08:55	<input type="checkbox"/>
HS18101733-02	Trip Blank	Water	ALS 071918-91	30-Oct-2018 00:00	31-Oct-2018 08:55	<input type="checkbox"/>

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**ALS Houston, US**

Date: 12-Nov-18

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**Work Order:** HS18101733

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**CASE NARRATIVE**

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**GCMS Volatiles by Method SW8260****Batch ID: R326971**

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

**WetChemistry by Method SW9056****Batch ID: R327169****Sample ID: HS18101499-01MS**

- MS is for an unrelated sample (Sulfate)
-

## ALS Houston, US

Date: 12-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: LH18/24-SP650\_103018  
 Collection Date: 30-Oct-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18101733  
 Lab ID:HS18101733-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>VOLATILES ORGANICS BY METHOD</b>		<b>Method:SW8260</b>						
<b>8260C</b>								Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:47
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47
2-Butanone	1.0	U	0.50	1.0	2.0	UG/L	1	07-Nov-2018 15:47
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47
2-Hexanone	1.0	U	1.0	1.0	2.0	UG/L	1	07-Nov-2018 15:47
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:47
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	UG/L	1	07-Nov-2018 15:47
Acetone	1.0	U	0.40	1.0	2.0	UG/L	1	07-Nov-2018 15:47
Benzene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47
Bromobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:47
Bromochloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47
Bromodichloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47
Bromoform	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:47
Bromomethane	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:47
Carbon disulfide	1.0	U	0.60	1.0	2.0	UG/L	1	07-Nov-2018 15:47
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:47
Chlorobenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47
Chloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47
Chloroform	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47

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

## ALS Houston, US

Date: 12-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: LH18/24-SP650\_103018  
 Collection Date: 30-Oct-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18101733  
 Lab ID:HS18101733-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>						Analyst: AKP	
Chloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
<b>cis-1,2-Dichloroethene</b>	<b>2.5</b>		<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>UG/L</b>	1	07-Nov-2018 15:47	
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Dibromochloromethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Dibromomethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Ethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Isopropylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
m,p-Xylene	1.0	U	0.50	1.0	2.0	UG/L	1	07-Nov-2018 15:47	
Methylene chloride	1.0	U	0.40	1.0	2.0	UG/L	1	07-Nov-2018 15:47	
n-Butylbenzene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
n-Propylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Naphthalene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
o-Xylene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Styrene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Tetrachloroethene	1.0	U	0.30	1.0	1.0	UG/L	1	07-Nov-2018 15:47	
Toluene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Trichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
Vinyl chloride	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:47	
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>108</i>			<b>0</b>	<i>81-118</i>	<b>%REC</b>	<i>1</i>	<i>07-Nov-2018 15:47</i>	
<i>Surr: 4-Bromofluorobenzene</i>	<i>100</i>			<b>0</b>	<i>85-114</i>	<b>%REC</b>	<i>1</i>	<i>07-Nov-2018 15:47</i>	
<i>Surr: Dibromofluoromethane</i>	<i>97.2</i>			<b>0</b>	<i>80-119</i>	<b>%REC</b>	<i>1</i>	<i>07-Nov-2018 15:47</i>	
<i>Surr: Toluene-d8</i>	<i>92.3</i>			<b>0</b>	<i>89-112</i>	<b>%REC</b>	<i>1</i>	<i>07-Nov-2018 15:47</i>	
<b>ANIONS BY SW9056A</b>		<b>Method:SW9056</b>						Analyst: KMU	
<b>Chloride</b>	<b>524</b>		<b>2.00</b>	<b>5.00</b>	<b>5.00</b>	<b>mg/L</b>	10	08-Nov-2018 14:48	
<b>Sulfate</b>	<b>124</b>		<b>2.00</b>	<b>5.00</b>	<b>5.00</b>	<b>mg/L</b>	10	08-Nov-2018 14:48	

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



## ALS Houston, US

Date: 12-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: Trip Blank  
 Collection Date: 30-Oct-2018 00:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18101733  
 Lab ID:HS18101733-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>VOLATILES ORGANICS BY METHOD</b>		<b>Method:SW8260</b>						
<b>8260C</b>								Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:23
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
2-Butanone	1.0	U	0.50	1.0	2.0	UG/L	1	07-Nov-2018 15:23
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
2-Hexanone	1.0	U	1.0	1.0	2.0	UG/L	1	07-Nov-2018 15:23
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:23
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	UG/L	1	07-Nov-2018 15:23
Acetone	1.0	U	0.40	1.0	2.0	UG/L	1	07-Nov-2018 15:23
Benzene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Bromobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Bromochloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Bromodichloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Bromoform	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Bromomethane	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Carbon disulfide	1.0	U	0.60	1.0	2.0	UG/L	1	07-Nov-2018 15:23
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Chlorobenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Chloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Chloroform	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23

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

## ALS Houston, US

Date: 12-Nov-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Bi-Weekly Samples  
 Sample ID: Trip Blank  
 Collection Date: 30-Oct-2018 00:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18101733  
 Lab ID:HS18101733-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>VOLATILES ORGANICS BY METHOD</b>		<b>Method:SW8260</b>						
<b>8260C</b>								Analyst: AKP
Chloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Dibromochloromethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Dibromomethane	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Ethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Isopropylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
m,p-Xylene	1.0	U	0.50	1.0	2.0	UG/L	1	07-Nov-2018 15:23
Methylene chloride	1.0	U	0.40	1.0	2.0	UG/L	1	07-Nov-2018 15:23
n-Butylbenzene	0.50	U	0.40	0.50	1.0	UG/L	1	07-Nov-2018 15:23
n-Propylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Naphthalene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
o-Xylene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Styrene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Tetrachloroethene	1.0	U	0.30	1.0	1.0	UG/L	1	07-Nov-2018 15:23
Toluene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Trichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	07-Nov-2018 15:23
Vinyl chloride	0.50	U	0.20	0.50	1.0	UG/L	1	07-Nov-2018 15:23
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>106</i>			<i>0</i>	<i>81-118</i>	<i>%REC</i>	<i>1</i>	<i>07-Nov-2018 15:23</i>
<i>Surr: 4-Bromofluorobenzene</i>	<i>100</i>			<i>0</i>	<i>85-114</i>	<i>%REC</i>	<i>1</i>	<i>07-Nov-2018 15:23</i>
<i>Surr: Dibromofluoromethane</i>	<i>98.2</i>			<i>0</i>	<i>80-119</i>	<i>%REC</i>	<i>1</i>	<i>07-Nov-2018 15:23</i>
<i>Surr: Toluene-d8</i>	<i>92.8</i>			<i>0</i>	<i>89-112</i>	<i>%REC</i>	<i>1</i>	<i>07-Nov-2018 15:23</i>

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

ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R326971		<b>Test Name :</b> VOLATILES ORGANICS BY METHOD 8260C		<b>Matrix:</b> Water		
HS18101733-01	LH18/24-SP650_103018	30 Oct 2018 14:00			07 Nov 2018 15:47	1
HS18101733-02	Trip Blank	30 Oct 2018 00:00			07 Nov 2018 15:23	1
<b>Batch ID</b> R327169		<b>Test Name :</b> ANIONS BY SW9056A		<b>Matrix:</b> Water		
HS18101733-01	LH18/24-SP650_103018	30 Oct 2018 14:00			08 Nov 2018 14:48	10



## ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

## QC BATCH REPORT

Batch ID: R326971		Instrument: VOA2		Method: SW8260						
MBLK	Sample ID: VBLKW-181107	Units: ug/L			Analysis Date: 07-Nov-2018 12:55					
Client ID:	Run ID: VOA2_326971	SeqNo: 4808017		PrepDate:		DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	1.0	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	53.01	1.0	50	0	106	81 - 118				
Surr: 4-Bromofluorobenzene	49.94	1.0	50	0	99.9	85 - 114				
Surr: Dibromofluoromethane	47.89	1.0	50	0	95.8	80 - 119				
Surr: Toluene-d8	46.68	1.0	50	0	93.4	89 - 112				

ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

**QC BATCH REPORT**

Batch ID: R326971		Instrument: VOA2		Method: SW8260						
LCS	Sample ID: VLCSW-181107	Units: ug/L			Analysis Date: 07-Nov-2018 12:05					
Client ID:	Run ID: VOA2_326971	SeqNo: 4808015	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	20.44	1.0	20	0	102	78 - 124				
1,1,1-Trichloroethane	19.72	1.0	20	0	98.6	74 - 131				
1,1,2,2-Tetrachloroethane	18.65	1.0	20	0	93.3	71 - 121				
1,1,2-Trichloroethane	19.3	1.0	20	0	96.5	80 - 119				
1,1-Dichloroethane	18.96	1.0	20	0	94.8	77 - 125				
1,1-Dichloroethene	18.76	1.0	20	0	93.8	71 - 131				
1,1-Dichloropropene	21.31	1.0	20	0	107	78 - 125				
1,2,3-Trichlorobenzene	18.57	1.0	20	0	92.8	69 - 129				
1,2,3-Trichloropropane	19.54	1.0	20	0	97.7	73 - 122				
1,2,4-Trichlorobenzene	18.81	1.0	20	0	94.1	69 - 130				
1,2,4-Trimethylbenzene	19.34	1.0	20	0	96.7	76 - 124				
1,2-Dibromo-3-chloropropane	21.21	1.0	20	0	106	62 - 128				
1,2-Dibromoethane	21.11	1.0	20	0	106	77 - 121				
1,2-Dichlorobenzene	18.45	1.0	20	0	92.2	80 - 119				
1,2-Dichloroethane	22.7	1.0	20	0	114	73 - 128				
1,2-Dichloropropane	20.38	1.0	20	0	102	78 - 122				
1,3,5-Trimethylbenzene	18.22	1.0	20	0	91.1	75 - 124				
1,3-Dichlorobenzene	18.88	1.0	20	0	94.4	80 - 119				
1,3-Dichloropropane	20.29	1.0	20	0	101	80 - 119				
1,4-Dichlorobenzene	18.63	1.0	20	0	93.2	79 - 118				
2,2-Dichloropropane	23	1.0	20	0	115	60 - 139				
2-Butanone	46.03	2.0	40	0	115	56 - 143				
2-Chlorotoluene	20.01	1.0	20	0	100	79 - 122				
2-Hexanone	49.74	2.0	40	0	124	57 - 139				
4-Chlorotoluene	20.25	1.0	20	0	101	78 - 122				
4-Isopropyltoluene	17.76	1.0	20	0	88.8	77 - 127				
4-Methyl-2-pentanone	47.65	2.0	40	0	119	67 - 130				
Acetone	44.91	2.0	40	0	112	39 - 160				
Benzene	18.57	1.0	20	0	92.9	79 - 120				
Bromobenzene	18.75	1.0	20	0	93.7	80 - 120				
Bromochloromethane	19.01	1.0	20	0	95.0	78 - 123				
Bromodichloromethane	21.08	1.0	20	0	105	79 - 125				
Bromoform	21.65	1.0	20	0	108	66 - 130				
Bromomethane	20.47	1.0	20	0	102	53 - 141				

## ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

## QC BATCH REPORT

Batch ID: R326971		Instrument: VOA2		Method: SW8260						
LCS	Sample ID: VLCSW-181107	Units: ug/L			Analysis Date: 07-Nov-2018 12:05					
Client ID:	Run ID: VOA2_326971	SeqNo: 4808015		PrepDate:		DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	35.8	2.0	40	0	89.5	64 - 133				
Carbon tetrachloride	22.56	1.0	20	0	113	72 - 136				
Chlorobenzene	19.78	1.0	20	0	98.9	82 - 118				
Chloroethane	18.58	1.0	20	0	92.9	60 - 138				
Chloroform	19.05	1.0	20	0	95.2	79 - 124				
Chloromethane	18.24	1.0	20	0	91.2	50 - 139				
cis-1,2-Dichloroethene	18.66	1.0	20	0	93.3	78 - 123				
cis-1,3-Dichloropropene	21.22	1.0	20	0	106	75 - 124				
Dibromochloromethane	20.76	1.0	20	0	104	74 - 126				
Dibromomethane	21.2	1.0	20	0	106	79 - 123				
Dichlorodifluoromethane	17.4	1.0	20	0	87.0	32 - 152				
Ethylbenzene	21.07	1.0	20	0	105	79 - 121				
Hexachlorobutadiene	20.17	1.0	20	0	101	66 - 134				
Isopropylbenzene	19.41	1.0	20	0	97.1	72 - 131				
m,p-Xylene	41.85	2.0	40	0	105	80 - 121				
Methylene chloride	18.48	2.0	20	0	92.4	74 - 124				
Naphthalene	18.42	1.0	20	0	92.1	61 - 128				
n-Butylbenzene	19.29	1.0	20	0	96.4	75 - 128				
n-Propylbenzene	20.23	1.0	20	0	101	76 - 126				
o-Xylene	20.33	1.0	20	0	102	78 - 122				
sec-Butylbenzene	17.76	1.0	20	0	88.8	77 - 126				
Styrene	19.72	1.0	20	0	98.6	78 - 123				
tert-Butylbenzene	20.19	1.0	20	0	101	78 - 124				
Tetrachloroethene	19.78	1.0	20	0	98.9	74 - 129				
Toluene	18.48	1.0	20	0	92.4	80 - 121				
trans-1,2-Dichloroethene	18.32	1.0	20	0	91.6	75 - 124				
trans-1,3-Dichloropropene	23.59	1.0	20	0	118	73 - 127				
Trichloroethene	19.43	1.0	20	0	97.2	79 - 123				
Trichlorofluoromethane	21.32	1.0	20	0	107	65 - 141				
Vinyl chloride	19.67	1.0	20	0	98.3	58 - 137				
Surr: 1,2-Dichloroethane-d4	54.71	1.0	50	0	109	81 - 118				
Surr: 4-Bromofluorobenzene	52.69	1.0	50	0	105	85 - 114				
Surr: Dibromofluoromethane	48.52	1.0	50	0	97.0	80 - 119				
Surr: Toluene-d8	45.27	1.0	50	0	90.5	89 - 112				

ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

**QC BATCH REPORT**

Batch ID: R326971		Instrument: VOA2		Method: SW8260						
MS	Sample ID: HS18110305-01MS	Units: ug/L			Analysis Date: 07-Nov-2018 14:09					
Client ID:	Run ID: VOA2_326971	SeqNo: 4808019	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	19.12	1.0	20	0	95.6	78 - 124				
1,1,1-Trichloroethane	19.61	1.0	20	0	98.1	74 - 131				
1,1,2,2-Tetrachloroethane	16.83	1.0	20	0	84.2	71 - 121				
1,1,2-Trichloroethane	18.03	1.0	20	0	90.2	80 - 119				
1,1-Dichloroethane	18.36	1.0	20	0	91.8	77 - 125				
1,1-Dichloroethene	18.5	1.0	20	0	92.5	71 - 131				
1,1-Dichloropropene	22.27	1.0	20	0	111	78 - 125				
1,2,3-Trichlorobenzene	17.6	1.0	20	0	88.0	69 - 129				
1,2,3-Trichloropropane	18.29	1.0	20	0	91.4	73 - 122				
1,2,4-Trichlorobenzene	17.47	1.0	20	0	87.3	69 - 130				
1,2,4-Trimethylbenzene	18.6	1.0	20	0	93.0	76 - 124				
1,2-Dibromo-3-chloropropane	19.26	1.0	20	0	96.3	62 - 128				
1,2-Dibromoethane	19.71	1.0	20	0	98.6	77 - 121				
1,2-Dichlorobenzene	17.46	1.0	20	0	87.3	80 - 119				
1,2-Dichloroethane	21.98	1.0	20	0	110	73 - 128				
1,2-Dichloropropane	19.26	1.0	20	0	96.3	78 - 122				
1,3,5-Trimethylbenzene	17.09	1.0	20	0	85.5	75 - 124				
1,3-Dichlorobenzene	17.44	1.0	20	0	87.2	80 - 119				
1,3-Dichloropropane	18.82	1.0	20	0	94.1	80 - 119				
1,4-Dichlorobenzene	17.65	1.0	20	0	88.3	79 - 118				
2,2-Dichloropropane	22.93	1.0	20	0	115	60 - 139				
2-Butanone	43.52	2.0	40	0	109	56 - 143				
2-Chlorotoluene	19.34	1.0	20	0	96.7	79 - 122				
2-Hexanone	45.59	2.0	40	0	114	57 - 139				
4-Chlorotoluene	19.23	1.0	20	0	96.1	78 - 122				
4-Isopropyltoluene	16.94	1.0	20	0	84.7	77 - 127				
4-Methyl-2-pentanone	44.46	2.0	40	0	111	67 - 130				
Acetone	44.08	2.0	40	0	110	39 - 160				
Benzene	18.36	1.0	20	0	91.8	79 - 120				
Bromobenzene	17.75	1.0	20	0	88.7	80 - 120				
Bromochloromethane	18.2	1.0	20	0	91.0	78 - 123				
Bromodichloromethane	20.05	1.0	20	0	100	79 - 125				
Bromoform	19.91	1.0	20	1.872	90.2	66 - 130				
Bromomethane	20.57	1.0	20	0	103	53 - 141				



## ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

## QC BATCH REPORT

Batch ID: R326971		Instrument: VOA2		Method: SW8260						
MS	Sample ID: HS18110305-01MS	Units: ug/L			Analysis Date: 07-Nov-2018 14:09					
Client ID:	Run ID: VOA2_326971	SeqNo: 4808019		PrepDate:		DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	34.9	2.0	40	0	87.2	64 - 133				
Carbon tetrachloride	23.46	1.0	20	0	117	72 - 136				
Chlorobenzene	18.55	1.0	20	0	92.7	82 - 118				
Chloroethane	18.11	1.0	20	0	90.6	60 - 138				
Chloroform	17.99	1.0	20	0	90.0	79 - 124				
Chloromethane	18.15	1.0	20	0	90.8	50 - 139				
cis-1,2-Dichloroethene	17.99	1.0	20	0	89.9	78 - 123				
cis-1,3-Dichloropropene	20.55	1.0	20	0	103	75 - 124				
Dibromochloromethane	19.36	1.0	20	1.203	90.8	74 - 126				
Dibromomethane	20.63	1.0	20	0	103	79 - 123				
Dichlorodifluoromethane	18.62	1.0	20	0	93.1	32 - 152				
Ethylbenzene	20.37	1.0	20	0	102	79 - 121				
Hexachlorobutadiene	19.01	1.0	20	0	95.1	66 - 134				
Isopropylbenzene	19.06	1.0	20	0	95.3	72 - 131				
m,p-Xylene	40.4	2.0	40	0	101	80 - 121				
Methylene chloride	16.65	2.0	20	0	83.2	74 - 124				
Naphthalene	16.61	1.0	20	0	83.0	61 - 128				
n-Butylbenzene	18.81	1.0	20	0	94.0	75 - 128				
n-Propylbenzene	19.53	1.0	20	0	97.7	76 - 126				
o-Xylene	19.55	1.0	20	0	97.8	78 - 122				
sec-Butylbenzene	17.56	1.0	20	0	87.8	77 - 126				
Styrene	18.52	1.0	20	0	92.6	78 - 123				
tert-Butylbenzene	19.61	1.0	20	0	98.1	78 - 124				
Tetrachloroethene	19.54	1.0	20	0	97.7	74 - 129				
Toluene	18.14	1.0	20	0	90.7	80 - 121				
trans-1,2-Dichloroethene	17.82	1.0	20	0	89.1	75 - 124				
trans-1,3-Dichloropropene	21.7	1.0	20	0	109	73 - 127				
Trichloroethene	19.27	1.0	20	0	96.4	79 - 123				
Trichlorofluoromethane	22.24	1.0	20	0	111	65 - 141				
Vinyl chloride	20.11	1.0	20	0	101	58 - 137				
Surr: 1,2-Dichloroethane-d4	54.48	1.0	50	0	109	81 - 118				
Surr: 4-Bromofluorobenzene	52.46	1.0	50	0	105	85 - 114				
Surr: Dibromofluoromethane	47.41	1.0	50	0	94.8	80 - 119				
Surr: Toluene-d8	44.8	1.0	50	0	89.6	89 - 112				

ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

**QC BATCH REPORT**

Batch ID: R326971		Instrument: VOA2		Method: SW8260						
MSD	Sample ID: HS18110305-01MSD	Units: ug/L			Analysis Date: 07-Nov-2018 14:33					
Client ID:	Run ID: VOA2_326971	SeqNo: 4808110		PrepDate:		DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	18.82	1.0	20	0	94.1	78 - 124	19.12	1.63	20	
1,1,1-Trichloroethane	17.81	1.0	20	0	89.1	74 - 131	19.61	9.64	20	
1,1,2,2-Tetrachloroethane	16.6	1.0	20	0	83.0	71 - 121	16.83	1.38	20	
1,1,2-Trichloroethane	17.93	1.0	20	0	89.6	80 - 119	18.03	0.597	20	
1,1-Dichloroethane	17.44	1.0	20	0	87.2	77 - 125	18.36	5.16	20	
1,1-Dichloroethene	16.71	1.0	20	0	83.5	71 - 131	18.5	10.2	20	
1,1-Dichloropropene	19.48	1.0	20	0	97.4	78 - 125	22.27	13.4	20	
1,2,3-Trichlorobenzene	16.84	1.0	20	0	84.2	69 - 129	17.6	4.4	20	
1,2,3-Trichloropropane	17.64	1.0	20	0	88.2	73 - 122	18.29	3.58	20	
1,2,4-Trichlorobenzene	16.83	1.0	20	0	84.2	69 - 130	17.47	3.7	20	
1,2,4-Trimethylbenzene	17.46	1.0	20	0	87.3	76 - 124	18.6	6.28	20	
1,2-Dibromo-3-chloropropane	19.12	1.0	20	0	95.6	62 - 128	19.26	0.764	20	
1,2-Dibromoethane	19.13	1.0	20	0	95.6	77 - 121	19.71	3.02	20	
1,2-Dichlorobenzene	16.76	1.0	20	0	83.8	80 - 119	17.46	4.09	20	
1,2-Dichloroethane	22.72	1.0	20	0	114	73 - 128	21.98	3.31	20	
1,2-Dichloropropane	18.83	1.0	20	0	94.1	78 - 122	19.26	2.27	20	
1,3,5-Trimethylbenzene	16.19	1.0	20	0	81.0	75 - 124	17.09	5.41	20	
1,3-Dichlorobenzene	16.94	1.0	20	0	84.7	80 - 119	17.44	2.92	20	
1,3-Dichloropropane	18.35	1.0	20	0	91.7	80 - 119	18.82	2.57	20	
1,4-Dichlorobenzene	16.83	1.0	20	0	84.2	79 - 118	17.65	4.74	20	
2,2-Dichloropropane	20.65	1.0	20	0	103	60 - 139	22.93	10.5	20	
2-Butanone	41.98	2.0	40	0	105	56 - 143	43.52	3.59	20	
2-Chlorotoluene	17.7	1.0	20	0	88.5	79 - 122	19.34	8.87	20	
2-Hexanone	45.27	2.0	40	0	113	57 - 139	45.59	0.687	20	
4-Chlorotoluene	18.3	1.0	20	0	91.5	78 - 122	19.23	4.95	20	
4-Isopropyltoluene	15.65	1.0	20	0	78.3	77 - 127	16.94	7.91	20	
4-Methyl-2-pentanone	44.09	2.0	40	0	110	67 - 130	44.46	0.844	20	
Acetone	43.29	2.0	40	0	108	39 - 160	44.08	1.82	20	
Benzene	17.39	1.0	20	0	87.0	79 - 120	18.36	5.4	20	
Bromobenzene	17.13	1.0	20	0	85.6	80 - 120	17.75	3.54	20	
Bromochloromethane	18.09	1.0	20	0	90.4	78 - 123	18.2	0.622	20	
Bromodichloromethane	19.57	1.0	20	0	97.9	79 - 125	20.05	2.44	20	
Bromoform	19.88	1.0	20	1.872	90.0	66 - 130	19.91	0.187	20	
Bromomethane	17.02	1.0	20	0	85.1	53 - 141	20.57	18.9	20	

## ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

## QC BATCH REPORT

Batch ID: R326971		Instrument: VOA2		Method: SW8260						
MSD	Sample ID: HS18110305-01MSD	Units: ug/L			Analysis Date: 07-Nov-2018 14:33					
Client ID:	Run ID: VOA2_326971	SeqNo: 4808110		PrepDate:		DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	31.74	2.0	40	0	79.4	64 - 133	34.9	9.47	20	
Carbon tetrachloride	21.12	1.0	20	0	106	72 - 136	23.46	10.5	20	
Chlorobenzene	17.83	1.0	20	0	89.2	82 - 118	18.55	3.94	20	
Chloroethane	16.36	1.0	20	0	81.8	60 - 138	18.11	10.1	20	
Chloroform	17.21	1.0	20	0	86.0	79 - 124	17.99	4.47	20	
Chloromethane	17.24	1.0	20	0	86.2	50 - 139	18.15	5.16	20	
cis-1,2-Dichloroethene	17.02	1.0	20	0	85.1	78 - 123	17.99	5.53	20	
cis-1,3-Dichloropropene	19.8	1.0	20	0	99.0	75 - 124	20.55	3.68	20	
Dibromochloromethane	19.02	1.0	20	1.203	89.1	74 - 126	19.36	1.79	20	
Dibromomethane	19.96	1.0	20	0	99.8	79 - 123	20.63	3.33	20	
Dichlorodifluoromethane	16.08	1.0	20	0	80.4	32 - 152	18.62	14.6	20	
Ethylbenzene	18.8	1.0	20	0	94.0	79 - 121	20.37	7.98	20	
Hexachlorobutadiene	17.42	1.0	20	0	87.1	66 - 134	19.01	8.72	20	
Isopropylbenzene	17.94	1.0	20	0	89.7	72 - 131	19.06	6.02	20	
m,p-Xylene	38.03	2.0	40	0	95.1	80 - 121	40.4	6.03	20	
Methylene chloride	15.93	2.0	20	0	79.7	74 - 124	16.65	4.38	20	
Naphthalene	16.6	1.0	20	0	83.0	61 - 128	16.61	0.0541	20	
n-Butylbenzene	17.18	1.0	20	0	85.9	75 - 128	18.81	9.06	20	
n-Propylbenzene	17.69	1.0	20	0	88.5	76 - 126	19.53	9.9	20	
o-Xylene	18.44	1.0	20	0	92.2	78 - 122	19.55	5.87	20	
sec-Butylbenzene	15.91	1.0	20	0	79.5	77 - 126	17.56	9.84	20	
Styrene	18.05	1.0	20	0	90.3	78 - 123	18.52	2.59	20	
tert-Butylbenzene	17.57	1.0	20	0	87.8	78 - 124	19.61	11	20	
Tetrachloroethene	18.14	1.0	20	0	90.7	74 - 129	19.54	7.4	20	
Toluene	17.29	1.0	20	0	86.4	80 - 121	18.14	4.82	20	
trans-1,2-Dichloroethene	16.7	1.0	20	0	83.5	75 - 124	17.82	6.49	20	
trans-1,3-Dichloropropene	21	1.0	20	0	105	73 - 127	21.7	3.3	20	
Trichloroethene	17.81	1.0	20	0	89.0	79 - 123	19.27	7.91	20	
Trichlorofluoromethane	20.01	1.0	20	0	100	65 - 141	22.24	10.6	20	
Vinyl chloride	17.53	1.0	20	0	87.6	58 - 137	20.11	13.7	20	
Surr: 1,2-Dichloroethane-d4	53.86	1.0	50	0	108	81 - 118	54.48	1.15	20	
Surr: 4-Bromofluorobenzene	52.66	1.0	50	0	105	85 - 114	52.46	0.389	20	
Surr: Dibromofluoromethane	47.86	1.0	50	0	95.7	80 - 119	47.41	0.928	20	
Surr: Toluene-d8	45.59	1.0	50	0	91.2	89 - 112	44.8	1.73	20	

ALS Houston, US

Date: 12-Nov-18

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

**QC BATCH REPORT****Batch ID:** R326971**Instrument:** VOA2**Method:** SW8260

The following samples were analyzed in this batch: 

HS18101733-01	HS18101733-02
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ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

**QC BATCH REPORT**

Batch ID: R327169		Instrument: ICS2100		Method: SW9056					
<b>MBLK</b>	Sample ID: <b>WBLKW1-110818</b>	Units: <b>mg/L</b>		Analysis Date: <b>08-Nov-2018 13:50</b>					
Client ID:	Run ID: <b>ICS2100_327169</b>	SeqNo: <b>4812294</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Chloride	0.500	0.500							U
Sulfate	0.500	0.500							U
<b>LCS</b>	Sample ID: <b>WLCSW1-110818</b>	Units: <b>mg/L</b>		Analysis Date: <b>08-Nov-2018 14:04</b>					
Client ID:	Run ID: <b>ICS2100_327169</b>	SeqNo: <b>4812295</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Chloride	20	0.500	20	0	100	80 - 120			
Sulfate	19.97	0.500	20	0	99.8	80 - 120			
<b>LCSD</b>	Sample ID: <b>WLCSDW1-110818</b>	Units: <b>mg/L</b>		Analysis Date: <b>08-Nov-2018 14:19</b>					
Client ID:	Run ID: <b>ICS2100_327169</b>	SeqNo: <b>4812296</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Chloride	19.42	0.500	20	0	97.1	80 - 120	20	2.96	20
Sulfate	19.49	0.500	20	0	97.5	80 - 120	19.97	2.41	20
<b>MS</b>	Sample ID: <b>HS18101499-16MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>08-Nov-2018 21:51</b>					
Client ID:	Run ID: <b>ICS2100_327169</b>	SeqNo: <b>4812331</b>		PrepDate:		DF: <b>20</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Chloride	1013	10.0	200	818	97.4	80 - 120			O
Sulfate	271.8	10.0	200	69.8	101	80 - 120			
<b>MS</b>	Sample ID: <b>HS18101499-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>08-Nov-2018 15:17</b>					
Client ID:	Run ID: <b>ICS2100_327169</b>	SeqNo: <b>4812300</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Chloride	17.89	0.500	10	8.946	89.4	80 - 120			
Sulfate	62.28	0.500	10	55.08	72.0	80 - 120			SO

ALS Houston, US

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

**QC BATCH REPORT**

Batch ID: R327169		Instrument: ICS2100		Method: SW9056						
<b>MSD</b>	Sample ID: <b>HS18101499-16MSD</b>	Units: <b>mg/L</b>			Analysis Date: <b>08-Nov-2018 22:06</b>					
Client ID:	Run ID: <b>ICS2100_327169</b>	SeqNo: <b>4812332</b>		PrepDate:			DF: <b>20</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	985.2	10.0	200	818	83.6	80 - 120	1013	2.76	20	O
Sulfate	265.3	10.0	200	69.8	97.8	80 - 120	271.8	2.42	20	
<b>MSD</b>	Sample ID: <b>HS18101499-01MSD</b>	Units: <b>mg/L</b>			Analysis Date: <b>08-Nov-2018 15:32</b>					
Client ID:	Run ID: <b>ICS2100_327169</b>	SeqNo: <b>4812301</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.24	0.500	10	8.946	103	80 - 120	17.89	7.3	20	
Sulfate	66.64	0.500	10	55.08	116	80 - 120	62.28	6.75	20	O

The following samples were analyzed in this batch: HS18101733-01

**ALS Houston, US**

Date: 12-Nov-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**WorkOrder:** HS18101733

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

<b>Unit Reported</b>	<b>Description</b>
mg/L	Milligrams per Liter

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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

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ALS Houston, US

Date: 12-Nov-18

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Bi-Weekly Samples  
**Work Order:** HS18101733

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**SAMPLE TRACKING**

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Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18101733-01	LH18/24-SP650_103018	Login	10/31/2018 7:48:04 PM	JRM	WET240
HS18101733-01	LH18/24-SP650_103018	Login	10/31/2018 7:48:04 PM	JRM	VOA159
HS18101733-02	Trip Blank	Login	10/31/2018 7:48:04 PM	JRM	VOA159

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**Sample Receipt Checklist**

Client Name: Bhate Environmental  
 Work Order: HS18101733

Date/Time Received: **31-Oct-2018 08:55**  
 Received by: **RPG**

Checklist completed by: Jared R. Makan 31-Oct-2018  
 eSignature Date

Reviewed by: RJ Modashia 1-Nov-2018  
 eSignature Date

Matrices: **Water**

Carrier name: **FedEx Priority Overnight**

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- TX1005 solids received in hermetically sealed vials? Yes  No  N/A
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No

Temperature(s)/Thermometer(s): 3.1c/2.8c UC/C IR25  
 Cooler(s)/Kit(s): 43913  
 Date/Time sample(s) sent to storage: 10/31/2018 19:50

- 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:




**FedEx**  
 TRK# 4380 9528 4860  
 0221

WED - 31 OCT 10:30A  
 PRIORITY OVERNIGHT

**AB SGRA**

77099  
 TX-US  
 IAH



FID 162795 380C18 666A 553C1/3BE78C8A

**ALS**  
 10450 Stanciff Rr., Suite 210  
 Houston, Texas 77099  
 Tel. +1 281 530 5 56  
 Fax. +1 281 530 887

**CUST**  
 Date: 10/30/18  
 Name: Scott P  
 Company: BHA

**ODY SEAL**

Seal Broken By: JM  
 Time: 1430  
 Name: Passenger  
 Date: 10/30/18



---

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

January 08, 2019

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

Work Order: **HS18120299**

Laboratory Results for: **Groundwater Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Dec 05, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval scribble.

Generated By: COREY.GRANDITS  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 08-Jan-19

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18120299

**SAMPLE SUMMARY**

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120299-01	LH18/24-SP650_113018	Water		30-Nov-2018 16:00	05-Dec-2018 10:13	<input type="checkbox"/>
HS18120299-02	LH18/24-SP650_113018_BIX	Water		30-Nov-2018 16:00	05-Dec-2018 10:13	<input type="checkbox"/>

**ALS Houston, US**

Date: 08-Jan-19

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:**

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**CASE NARRATIVE**

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**Work Order Comments**

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

**Work Order Comments**

- The analysis for TOC was subcontracted to ALS Kelso, WA. Final report attached.
- 

**WetChemistry by Method E350.3****Batch ID: R328981**

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

**WetChemistry by Method E365.3****Batch ID: R328961****Sample ID: LH18/24-SP650\_113018 (HS18120299-01)**

- Sample holding time expired prior to sample receipt. It was analyzed at the request of the client. Results should be considered estimated.
-

## ALS Houston, US

Date: 08-Jan-19

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_113018  
 Collection Date: 30-Nov-2018 16:00

**ANALYTICAL REPORT**

WorkOrder:HS18120299  
 Lab ID:HS18120299-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>AMMONIA AS N BY E350.3(ISE)</b>								Analyst: MZD
	<b>Method:E350.3</b>							
Nitrogen, Ammonia (As N)	81		2.0	5.0	2.0	mg/L	10	11-Dec-2018 13:50
<b>ORTHO PHOSPHATE (PO4) AS P BY E365.3</b>								Analyst: MZD
	<b>Method:E365.3</b>							
Phosphorus, Total Orthophosphate (As P)	2.55	H	0.100	0.400	0.250	mg/L	10	07-Dec-2018 11:22
<b>SUBCONTRACT ANALYSIS - TOC ANALYSIS</b>								Analyst: SUBK
	<b>Method:NA</b>							
Subcontract Analysis	See Attached		0	0		NA	1	27-Dec-2018 16:04

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



## ALS Houston, US

Date: 08-Jan-19

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_113018\_BIX  
 Collection Date: 30-Nov-2018 16:00

**ANALYTICAL REPORT**

WorkOrder:HS18120299  
 Lab ID:HS18120299-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>		Analyst: SUB				
Subcontract Analysis	See Attached		0	0		NA	1	17-Dec-2018 16:38

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

ALS Houston, US

Date: 08-Jan-19

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120299

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R328961	<b>Test Name :</b> ORTHO PHOSPHATE (PO4) AS P BY E365.3		<b>Matrix:</b> Water			
HS18120299-01	LH18/24-SP650_113018	30 Nov 2018 16:00			07 Dec 2018 11:22	10
<b>Batch ID</b> R328981	<b>Test Name :</b> AMMONIA AS N BY E350.3(ISE)		<b>Matrix:</b> Water			
HS18120299-01	LH18/24-SP650_113018	30 Nov 2018 16:00			11 Dec 2018 13:50	10
<b>Batch ID</b> R329401	<b>Test Name :</b> SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18120299-02	LH18/24-SP650_113018_BIX	30 Nov 2018 16:00			17 Dec 2018 16:38	1
<b>Batch ID</b> R330042	<b>Test Name :</b> SUBCONTRACT ANALYSIS - TOC ANALYSIS		<b>Matrix:</b> Water			
HS18120299-01	LH18/24-SP650_113018	30 Nov 2018 16:00			27 Dec 2018 16:04	1

ALS Houston, US

Date: 08-Jan-19

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120299

**QC BATCH REPORT**

Batch ID:	R328961	Instrument:	UV-2450	Method:	E365.3					
<b>MBLK</b>	Sample ID: <b>MBLK-328961</b>	Units:	mg/L	Analysis Date:	07-Dec-2018 11:22					
Client ID:	Run ID: <b>UV-2450_328961</b>	SeqNo:	4858172	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.0400	0.0250								U
<b>LCS</b>	Sample ID: <b>LCS-328961</b>	Units:	mg/L	Analysis Date:	07-Dec-2018 11:22					
Client ID:	Run ID: <b>UV-2450_328961</b>	SeqNo:	4858173	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.244	0.0250	0.25	0	97.6	85 - 115				
<b>MS</b>	Sample ID: <b>HS18120299-01MS</b>	Units:	mg/L	Analysis Date:	07-Dec-2018 11:22					
Client ID: <b>LH18/24-SP650_113018</b>	Run ID: <b>UV-2450_328961</b>	SeqNo:	4858175	PrepDate:	DF: 10					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	4.69	0.250	2.5	2.55	85.6	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18120299-01MSD</b>	Units:	mg/L	Analysis Date:	07-Dec-2018 11:22					
Client ID: <b>LH18/24-SP650_113018</b>	Run ID: <b>UV-2450_328961</b>	SeqNo:	4858176	PrepDate:	DF: 10					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	4.74	0.250	2.5	2.55	87.6	80 - 120	4.69	1.06	20	

The following samples were analyzed in this batch: HS18120299-01

ALS Houston, US

Date: 08-Jan-19

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120299

**QC BATCH REPORT**

Batch ID:	R328981	Instrument:	WetChem_HS	Method:	E350.3					
<b>MBLK</b>	Sample ID: <b>MBLK-328981</b>	Units:	mg/L	Analysis Date:	11-Dec-2018 13:50					
Client ID:	Run ID: <b>WetChem_HS_328981</b>	SeqNo:	4858554	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.50	0.20								U
<b>LCS</b>	Sample ID: <b>LCS-328981</b>	Units:	mg/L	Analysis Date:	11-Dec-2018 13:50					
Client ID:	Run ID: <b>WetChem_HS_328981</b>	SeqNo:	4858555	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.879	0.20	10	0	98.8	80 - 120				
<b>MS</b>	Sample ID: <b>HS18120098-01MS</b>	Units:	mg/L	Analysis Date:	11-Dec-2018 13:50					
Client ID:	Run ID: <b>WetChem_HS_328981</b>	SeqNo:	4858557	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.526	0.20	10	0.8531	86.7	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18120098-01MSD</b>	Units:	mg/L	Analysis Date:	11-Dec-2018 13:50					
Client ID:	Run ID: <b>WetChem_HS_328981</b>	SeqNo:	4858558	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.53	0.20	10	0.8531	86.8	80 - 120	9.526	0.042	20	

The following samples were analyzed in this batch: HS18120299-01

## ALS Houston, US

Date: 08-Jan-19

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120299

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

<b>Agency</b>	<b>Number</b>	<b>Expire Date</b>
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
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18120299

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**SAMPLE TRACKING**

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Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18120299-01	LH18/24-SP650_113018	Login	12/6/2018 5:26:04 PM	NDR	WET331
HS18120299-01	LH18/24-SP650_113018	Login	12/6/2018 5:26:04 PM	NDR	WET331
HS18120299-01	LH18/24-SP650_113018	Login	12/6/2018 5:26:04 PM	NDR	Sub
HS18120299-02	LH18/24-SP650_113018_BIX	Login	12/6/2018 5:26:04 PM	NDR	Sub

---

**Sample Receipt Checklist**

Client Name: Bhate Environmental  
 Work Order: HS18120299

Date/Time Received: **05-Dec-2018 10:13**  
 Received by: **SBM**

Checklist completed by: Nilesh D. Ranchod 6-Dec-2018 Reviewed by: Sonia West 10-Dec-2018  
 eSignature Date eSignature Date

Matrices: **Water** Carrier name: **UPS**

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- TX1005 solids received in hermetically sealed vials? Yes  No  N/A
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No

Temperature(s)/Thermometer(s): 17.2C/17.5C UC/C IR # 25  
 Cooler(s)/Kit(s): 43030  
 Date/Time sample(s) sent to storage: 12/05/2018 18:00

- Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted
- Water - pH acceptable upon receipt? Yes  No  N/A
- pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:

Client Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_ Person Contacted: \_\_\_\_\_


Contacted By: \_\_\_\_\_ Regarding: \_\_\_\_\_

Comments:

Corrective Action:





 <b>ALS</b> 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax. +1 281 530 5887	<b>CUSTOMER SEAL</b>		Seal Broken By: <i>JM</i>
	Date: <i>12/05/18</i>	Time: <i>1630</i>	Date: <i>12/05/18</i>
	Name: <i>Scott Beesinger</i>		
	Company: <i>SLIATY</i>		

43030 DEC 05 2018



WEIGHT	TR 1	PAK	WEIGHT	DIS	SERIAL WEIGHT	DATE	SHIPPER RELEASE
	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>

EXPRESS (INITIALS)  
 DOCUMENTS ONLY  
 SATURDAY DELIVERY

When shipping, please use the correct label and correct postage. If you are shipping multiple items, please use the correct label for each item. If you are shipping multiple items, please use the correct label for each item.

SHIPMENT FROM

UPS ACCOUNT NO. *277782*

REFERENCE NUMBER

TELEPHONE

*S.P. WASHINGTON 409-73-444*

*2104 S. FURNACE ST*

*7301 East Grand Ave. Suite 205*

*Springville, TN 38676*



DELIVERY TO

TELEPHONE

*Client Services 707-530-1156*

*315 Lincoln Ave*

*1450 Stephens Pk. Suite 110*

*Lawrence, TX 77004*



010191120 6/14 RRD United Parcel Service, Louisville, KY



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[www.alsglobal.com](http://www.alsglobal.com)

December 27, 2018

**Analytical Report for Service Request No: K1812001**

RJ Modashia  
ALS Laboratory Group  
10450 Stancliff Road  
Suite 210  
Houston, TX 77099-4338

**RE: HS18120299 / HS18120299**

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory December 07, 2018  
For your reference, these analyses have been assigned our service request number **K1812001**.

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](http://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](mailto:Kelley.Lovejoy@alsglobal.com).

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

for Kelley Lovejoy  
Project Manager



---

ALS Environmental  
ALS Group USA, Corp  
1317 South 13th Avenue  
Kelso, WA 98626  
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## Table of Contents

Acronyms

Qualifiers

State Certifications, Accreditations, And Licenses

Case Narrative

Chain of Custody

General Chemistry

Raw Data

    General Chemistry

## 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**

<b>Agency</b>	<b>Web Site</b>	<b>Number</b>
Alaska DEH	<a href="http://dec.alaska.gov/eh/lab/cs/csapproval.htm">http://dec.alaska.gov/eh/lab/cs/csapproval.htm</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2795
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L16-58-R4
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Hawaii DOH	<a href="http://health.hawaii.gov/">http://health.hawaii.gov/</a>	-
ISO 17025	<a href="http://www.pjlabs.com/">http://www.pjlabs.com/</a>	L16-57
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	03016
Maine DHS	<a href="http://www.maine.gov/dhhs/">http://www.maine.gov/dhhs/</a>	WA01276
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-457
Nevada DEP	<a href="http://ndep.nv.gov/bsdw/labservice.htm">http://ndep.nv.gov/bsdw/labservice.htm</a>	WA01276
New Jersey DEP	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	WA005
New York - DOH	<a href="https://www.wadsworth.org/regulatory/elap">https://www.wadsworth.org/regulatory/elap</a>	12060
North Carolina DEQ	<a href="https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification">https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA100010
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/EnvironmentalLabCertification/">http://www.scdhec.gov/environment/EnvironmentalLabCertification/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704427
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C544
Wyoming (EPA Region 8)	<a href="https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water">https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water</a>	-
Kelso Laboratory Website	<a href="http://www.alsglobal.com">www.alsglobal.com</a>	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](http://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/analyte 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](http://www.alsglobal.com)





**Client:** ALS Environmental - US  
**Project:** HS18120299  
**Sample Matrix:** Water

**Service Request:** K1812001  
**Date Received:** 12/07/2018

#### CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

#### Sample Receipt:

One water sample was received for analysis at ALS Environmental on 12/07/2018. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

#### General Chemistry:

No significant anomalies were noted with this analysis.

Approved by

*Noel D. Dora*

Date

12/27/2018



## Chain of Custody

**ALS Environmental—Kelso Laboratory**  
1317 South 13th Avenue, Kelso, WA 98626  
Phone (360)577-7222 Fax (360)636-1068  
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*R1812001*



10450 Stancliff Rd, Ste 210  
Houston, TX 77099  
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www.alsglobal.com

### Subcontract Chain of Custody

**COC ID: 10378**

**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:** HS18120299  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18120299-01	LH18/24-SP650_113018	Water	30 Nov 2018 16:00
TOC Analysis for DOD Level IV			21 Dec 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: NA  
Received By: *Claudia*  
Cooler ID(s): \_\_\_\_\_

Date/Time: 12.6.18 18:20  
Date/Time: 12/7/18 1020  
Temperature(s): \_\_\_\_\_

RIGHT SOLUTIONS | RIGHT PARTNER



### Cooler Receipt and Preservation Form

Client ALS Houston Service Request K18 12001  
 Received: 12/7/18 Opened: 12/7/18 By: CG Unloaded: 12/7/18 By: CG

- 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	Tracking Number	NA	Filed
-0.1	-0.3	0.5	0.3	-0.2	374	10378 <sup>NA</sup> <sub>12/7</sub>	4380 9535 4014		

- Packing material:  Inserts  Baggies  Bubble Wrap  Gel Packs  Wet Ice  Dry Ice  Sleeves
- Were custody papers properly filled out (ink, signed, etc.)? NA  Y  N
- 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
- Were all sample labels complete (i.e analysis, preservation, etc.)? NA  Y  N
- Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA  Y  N
- Were appropriate bottles/containers and volumes received for the tests indicated? NA  Y  N
- Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below*  NA  Y  N
- Were VOA vials received without headspace? *Indicate in the table below.*  NA  Y  N
- Was C12/Res negative?  NA  Y  N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Out of	Head-	Broke	pH	Reagent	Volume	Reagent Lot	Initials	Time
	Bottle Type	Temp	space				added	Number		

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](http://www.alsglobal.com)

Analytical Report

**Client:** ALS Environmental - US  
**Project:** HS18120299/HS18120299  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:** K1812001  
**Date Collected:** 11/30/18  
**Date Received:** 12/7/18  
**Units:** mg/L  
**Basis:** NA

**Carbon, Total Organic**

Sample Name	Lab Code	Result	LOQ	LOD	MDL	Dil.	Date Analyzed	Q
LH18/24-SP650_113018	K1812001-001	<b>69.4</b>	5.0	2.0	0.7	10	12/20/18 14:54	
Method Blank	K1812001-MB2	ND U	0.50	0.20	0.07	1	12/20/18 12:29	
Method Blank	K1812001-MB3	ND U	0.50	0.20	0.07	1	12/20/18 22:06	

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18120299/HS18120299  
**Sample Matrix:** Water

**Service Request:** K1812001  
**Date Analyzed:** 12/19/18  
**Date Extracted:** NA

**Lab Control Sample Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA  
**Analysis Lot:** 619306

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K1812001-LCS1	20.5	21.9	94	83-117

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18120299/HS18120299  
**Sample Matrix:** Water

**Service Request:** K1812001  
**Date Analyzed:** 12/20/18  
**Date Extracted:** NA

**Lab Control Sample Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA  
**Analysis Lot:** 619808

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1812001-LCS2	20.6	21.9	94	83-117
Lab Control Sample	K1812001-LCS3	20.6	21.9	94	83-117



ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18120299/HS18120299

**Service Request:** K1812001

### Continuing Calibration Verification (CCV) Summary

#### Carbon, Total Organic

**Analysis Method:** SM 5310 C

**Units:** mg/L

	Analysis		Date	True	Measured	Percent	Acceptance
	Lot	Lab Code	Analyzed	Value	Value	Recovery	Limits
CCV1	619306	KQ1818481-28	12/18/18 21:23	25.0	24.0	96	90-110
CCV2	619306	KQ1818481-29	12/19/18 02:13	25.0	24.1	96	90-110
CCV3	619306	KQ1818481-30	12/19/18 07:17	25.0	23.9	95	90-110
CCV4	619306	KQ1818481-31	12/19/18 14:41	25.0	24.4	98	90-110
CCV5	619808	KQ1818705-41	12/20/18 11:56	25.0	24.1	96	90-110
CCV6	619808	KQ1818705-42	12/20/18 15:58	25.0	24.0	96	90-110
CCV7	619808	KQ1818705-43	12/20/18 21:33	25.0	24.1	96	90-110
CCV8	619808	KQ1818705-44	12/21/18 05:13	25.0	24.3	97	90-110
CCV9	619808	KQ1818705-45	12/21/18 10:33	25.0	24.0	96	90-110

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18120299/HS18120299

**Service Request:**K1812001

**Continuing Calibration Blank (CCB) Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C**Units:**mg/L

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>LOQ</b>	<b>LOD</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	619306	KQ1818481-32	12/18/18 21:40	0.50	0.20	0.07	ND	U
CCB2	619306	KQ1818481-33	12/19/18 02:29	0.50	0.20	0.07	ND	U
CCB3	619306	KQ1818481-34	12/19/18 07:33	0.50	0.20	0.07	ND	U
CCB4	619306	KQ1818481-35	12/19/18 14:58	0.50	0.20	0.07	ND	U
CCB5	619808	KQ1818705-46	12/20/18 12:13	0.50	0.20	0.07	ND	U
CCB6	619808	KQ1818705-47	12/20/18 16:14	0.50	0.20	0.07	ND	U
CCB7	619808	KQ1818705-48	12/20/18 21:50	0.50	0.20	0.07	ND	U
CCB8	619808	KQ1818705-49	12/21/18 05:30	0.50	0.20	0.07	ND	U
CCB9	619808	KQ1818705-50	12/21/18 10:49	0.50	0.20	0.07	ND	U



## Case Narrative

**Method:** 6850  
**Analysis:** Perchlorate  
**Analysis SOP:** LC-MS-CLO4  
**ALS WO ID(s):** 1834170; 1834873

**Client:** ALS Laboratories (Houston, TX)  
**Matrix:** Water  
**ELMS Batch (HBN):** 2183 (229499)

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

**Method Summary:** Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of <sup>18</sup>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 <sup>18</sup>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 sample 1834873005 were re-analyzed and reported from 1:10 dilution. The reporting limit has been adjusted accordingly.

**Method QC data:** The method blank (LMB 632669) was less than 1/2 the CRDL. The recovery for the LCS (632670) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on sample 1834873001 (Client ID: 04HP09-181228). 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 Matrix Spike and duplicate (MS/MSD – 632671/72) failed QC acceptance criteria for percent recovery, biased high. This is due to the fact that the unspiked sample result of 2.045µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected. The relative percent difference (RPD) 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  $(A) \times (B)$ ,

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.

Thomas Bosch                      December 17, 2018  
Analyst                                      Date



# ANALYTICAL REPORT

Report Date: December 17, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: 34-1834170

Project ID: HS18120299

Purchase Order: HS18120299

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_113018_BIX	1834170001	11/30/18	12/07/18	



## ANALYTICAL REPORT

Workorder: 34-1834170

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: LH18/24-SP650_113018_BIX	Sampling Site: NA	Collected: 11/30/2018				
Lab ID: 1834170001	Media: 125 mL Nalgene	Received: 12/07/2018				
Matrix: Water	Sampling Parameter: NA					
Analysis Method - EPA 6850, DoD QSM						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water	Instrument ID: LCMS04				
	Batch: ELMS/2183 (HBN: 229499)	Percent Solid: NA				
	Analyzed: 12/16/2018 14:59	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

## Comments

Quality Control: EPA 6850, DoD QSM - (HBN: 229499)

Field sample 1834873005 were re-analyzed and reported from 1:10 dilution. The reporting limit has been adjusted accordingly.

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

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 12/17/2018 12:59	/S/ Stephen Brose 12/17/2018 13:53

## Laboratory Contact Information

ALS Environmental  
960 W Levoy Drive  
Salt Lake City, Utah 84123Phone: (801) 266-7700  
Email: alsst.lab@ALSGlobal.com  
Web: www.alsslc.com



# ANALYTICAL REPORT

Workorder: 34-1834170

Client: ALS Environmental (Houston)

Project Manager: Kevin W. Griffiths

## General Lab Comments

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

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

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

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

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

## Result Symbol Definitions

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

## Qualifier Symbol Definitions

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



Quality Control Sample  
Batch Report

00922093

Analysis Information

Workorder: 1834170	Preparation: NA	Analysis: EPA 6850, DoD QSM
Limits: Client SOW/Contract Specified	Batch: NA	Batch: ELMS/2183 (HBN: 229499)
Basis: DoD QSM	Prepared By: NA	Analyzed By: Thomas Bosch

Blank

LMB: 632669			
Analyzed: 12/16/2018 12:26			
Units: ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 632670				
Analyzed: 12/16/2018 13:07				
Dilution: 1				
Units: ug/L				
Analyte	Result	Target	% Rec	QC Limits
Perchlorate	5.61	5.00	112	78.8   123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1834873001	MS: 632671	MSD: 632672							
Analyzed: 12/16/2018 12:53	Analyzed: 12/16/2018 13:22	Analyzed: 12/16/2018 13:36							
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	2.00	7.93	5 #	159	78.8   123.8	8.12 #	162	2.26	0.0   20.0

Continuing Calibration Verification

CCV: 632666	CCV: 632673	CCV: 632823							
Analyzed: 12/16/2018 11:44	Analyzed: 12/16/2018 15:26	Analyzed: 12/17/2018 09:35							
Units: ug/L	Units: ug/L	Units: ug/L							
Criteria: ± 15%	Criteria: ± 15%	Criteria: ± 15%							
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	25.7	25.0	103	25.8	25.0	103	24.8	25.0	99.2

CCV: 632824			
Analyzed: 12/17/2018 11:21			
Units: ug/L			
Criteria: ± 15%			
Analyte	Result	Target	% Rec.
Perchlorate	25.9	25.0	104

Interference Check Sample

ICSA: 632668			
Analyzed: 12/16/2018 12:12			
Units: ug/L			
Criteria: ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	0.997	1.00	99.7





Quality Control Sample  
Batch Report

00922094

Analysis Information

Workorder: 1834170			
Limits: Client SOW/Contract Specified	Preparation: NA	Analysis: EPA 6850, DoD QSM	
Basis: DoD QSM	Batch: NA	Batch: ELMS/2183 (HBN: 229499)	
	Prepared By: NA	Analyzed By: Thomas Bosch	

Limit of Detection Verification

LODV: 632667 Analyzed: 12/16/2018 11:58 Units: ug/L Criteria: ± 50%	LODV: 632674 Analyzed: 12/16/2018 15:40 Units: ug/L Criteria: ± 50%					
Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.07	1.00	107	1.05	1.00	105

Comments

Field sample 1834873005 were re-analyzed and reported from 1:10 dilution. The reporting limit has been adjusted accordingly.

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

Analyst	Peer Review
/S/ Thomas Bosch 12/17/2018 13:03	/S/ Stephen Brose 12/17/2018 13:53

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



1834170

18698/2

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### Subcontract Chain of Custody

COC ID: 10379

#### SUBCONTRACT TO:

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

Phone: +1 801 266 7700

1834170

#### CUSTOMER INFORMATION:

**Company:** ALS Houston  
**Contact:** RJ Modashia  
**Address:** 10450 Standliff 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 Standliff Rd, Ste 210  
**Phone:** +1 281 530 5656  
**Reference:** HS18120299  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18120299-02	LH18/24-SP650_113018_BIX	Water	30 Nov 2018 16:00
SUB_Perch-6850			21 Dec 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: M  
Received By: M. Schult  
Cooler ID(s): \_\_\_\_\_

Date/Time: 12-6-18 18:20  
Date/Time: 12/08/18 10:00  
Temperature(s): \_\_\_\_\_

RIGHT SOLUTIONS | RIGHT PARTNER

06 Dec 2018

10:00 AM



Must Deliver Next Business Day  
Time and Tempature Sensitive!



Post # 150469-424 RITZ EXP AVA 9

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

SHIP DATE: 06DEC18  
ACTWGT: 20.25 LB  
CAD: 300130/CAFE3211  
DIMS: 19x16x13 IN

BILL THIRD PARTY

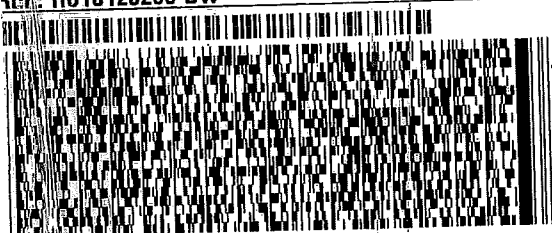
**SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
960 W. LEVOY DRIVE**

**SALT LAKE CITY UT 84123**

801) 266-7700

REF: HS18120280 DW

551C1/FIFE/104C



**FedEx  
Express**



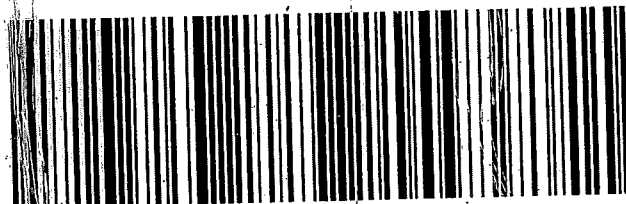
J181118080501 W

RK# 4380 9535 3978  
201

**FRI - 07 DEC 3:00P  
STANDARD OVERNIGHT**

**AX BTFA**

**84123  
UT-US SLC**





# ALS Environmental CHAIN-OF-CUSTODY

Project / Job / Task: HS18120299		Split:		Workorder ID: 1834170		Level: ENV_LVL4		Requested Analysis	
Client: ALS Environmental (Houston)		Account: 8101				Type: 125Poly			
Comments:						Preservatives			
						COOL			
						Containers			
						ID(s)			
						Count			
						Matrix			
						QC			
						Lab ID			
						Sample ID			
						Collect Date/Time			
						Matrix			
						Count			
						ID(s)			
						Count			
						Matrix			
						QC			
						Lab ID			
						Sample ID			
						Collect Date/Time			
						Matrix			
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						Matrix			
						QC			
						Lab ID			



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

December 26, 2018

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

Work Order: **HS18120375**

Laboratory Results for: **Groundwater Treatment Plant Monthly Effluent Samples**

Dear Marcia,

ALS Environmental received 3 sample(s) on Dec 07, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval scribble.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**Work Order:** HS18120375

**SAMPLE SUMMARY**

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Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120375-01	LH18/24-SP650_120618	Water		06-Dec-2018 14:00	07-Dec-2018 10:05	<input type="checkbox"/>
HS18120375-02	LH18/24-SP650_120618_BIX	Water		06-Dec-2018 14:00	07-Dec-2018 10:05	<input type="checkbox"/>
HS18120375-03	Trip Blank	Water	VBLKW- 112818-16	06-Dec-2018 00:00	07-Dec-2018 10:05	<input type="checkbox"/>

---

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**Work Order:**

**CASE NARRATIVE**

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**Work Order Comments**

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

---

**GCMS Semivolatiles by Method SW8270SIM****Batch ID: 135492****Sample ID: LCSD-135492**

- LCSD RPD was above the control limits. The individual recoveries were in control.

**Sample ID: LH18/24-SP650\_120618 (HS18120375-01)**

- The GCMS semi-volatile extract of this sample was run at a dilution due to a high level of matrix interference.

Surrogates were double spiked, all recoveries were within limits

---

**GCMS Volatiles by Method SW8260****Batch ID: R329536****Sample ID: VSTD050**

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

**Sample ID: HS18120278-03MS**

- MS and MSD are performed on unrelated sample

---

**Metals by Method SW6020****Batch ID: 135381**

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

---

**WetChemistry by Method SW7196****Batch ID: R328845**

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



## ALS Houston, US

Date: 26-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: LH18/24-SP650\_120618  
 Collection Date: 06-Dec-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18120375  
 Lab ID:HS18120375-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>VOLATILES ORGANICS BY METHOD</b>		<b>Method:SW8260</b>						
<b>8260C</b>								Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,2-Dibromo-3-chloropropane	0	U	0.20	0	1.0	UG/L	1	18-Dec-2018 16:51
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 16:51
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51
2-Butanone	1.0	U	0.50	1.0	2.0	UG/L	1	18-Dec-2018 16:51
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51
2-Hexanone	1.0	U	1.0	1.0	2.0	UG/L	1	18-Dec-2018 16:51
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 16:51
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	UG/L	1	18-Dec-2018 16:51
Acetone	2.0	U	0.40	2.0	2.0	UG/L	1	18-Dec-2018 16:51
Benzene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51
Bromobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 16:51
Bromochloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51
Bromodichloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51
Bromoform	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 16:51
Bromomethane	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 16:51
Carbon disulfide	1.0	U	0.60	1.0	2.0	UG/L	1	18-Dec-2018 16:51
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 16:51
Chlorobenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51
Chloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51
Chloroform	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51

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

## ALS Houston, US

Date: 26-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: LH18/24-SP650\_120618  
 Collection Date: 06-Dec-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18120375  
 Lab ID:HS18120375-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>						Analyst: PC	
Chloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
<b>cis-1,2-Dichloroethene</b>	<b>2.6</b>		<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>UG/L</b>	1	18-Dec-2018 16:51	
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
Dibromochloromethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
Dibromomethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
Ethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	UG/L	1	18-Dec-2018 16:51	
Isopropylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
m,p-Xylene	1.0	U	0.50	1.0	2.0	UG/L	1	18-Dec-2018 16:51	
Methylene chloride	0.50	U	0.40	0.50	2.0	UG/L	1	18-Dec-2018 16:51	
n-Butylbenzene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
n-Propylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
Naphthalene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
o-Xylene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
Styrene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
Tetrachloroethene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
Toluene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
<b>Trichloroethene</b>	<b>0.89</b>	<b>J</b>	<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>UG/L</b>	1	18-Dec-2018 16:51	
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
Vinyl chloride	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 16:51	
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>90.0</i>			<b>0</b>	<i>81-118</i>	<b>%REC</b>	<i>1</i>	<i>18-Dec-2018 16:51</i>	
<i>Surr: 4-Bromofluorobenzene</i>	<i>97.6</i>			<b>0</b>	<i>85-114</i>	<b>%REC</b>	<i>1</i>	<i>18-Dec-2018 16:51</i>	
<i>Surr: Dibromofluoromethane</i>	<i>89.6</i>			<b>0</b>	<i>80-119</i>	<b>%REC</b>	<i>1</i>	<i>18-Dec-2018 16:51</i>	
<i>Surr: Toluene-d8</i>	<i>103</i>			<b>0</b>	<i>89-112</i>	<b>%REC</b>	<i>1</i>	<i>18-Dec-2018 16:51</i>	
<b>SEMIVOLATILES SIM</b>		<b>Method:SW8270SIM</b>				Prep:SW3510 / 12-Dec-2018		Analyst: ACN	
<b>1,4-Dioxane</b>	<b>3.4</b>		<b>0.10</b>	<b>0.10</b>	<b>0.10</b>	<b>ug/L</b>	10	20-Dec-2018 15:51	
<i>Surr: 2-Fluorobiphenyl</i>	<i>95.3</i>			<b>0</b>	<i>40-140</i>	<b>%REC</b>	<i>10</i>	<i>20-Dec-2018 15:51</i>	
<i>Surr: 4-Terphenyl-d14</i>	<i>68.4</i>			<b>0</b>	<i>40-140</i>	<b>%REC</b>	<i>10</i>	<i>20-Dec-2018 15:51</i>	
<i>Surr: Nitrobenzene-d5</i>	<i>46.6</i>			<b>0</b>	<i>40-140</i>	<b>%REC</b>	<i>10</i>	<i>20-Dec-2018 15:51</i>	
<b>ICP-MS METALS BY SW6020A</b>		<b>Method:SW6020</b>				Prep:SW3010A / 10-Dec-2018		Analyst: JCJ	
<b>Barium</b>	<b>0.227</b>		<b>0.00190</b>	<b>0.00250</b>	<b>0.00400</b>	<b>mg/L</b>	1	13-Dec-2018 20:19	
Lead	0.00100	U	0.000600	0.00100	0.00200	mg/L	1	13-Dec-2018 20:19	
Selenium	0.00200	U	0.00110	0.00200	0.00200	mg/L	1	14-Dec-2018 13:34	
Silver	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	13-Dec-2018 20:19	

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

## ALS Houston, US

Date: 26-Dec-18

Client: Bhat Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: LH18/24-SP650\_120618  
 Collection Date: 06-Dec-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18120375  
 Lab ID:HS18120375-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>HEXAVALENT CHROMIUM BY SW7196A</b>	<b>Method:SW7196</b>					Prep:SW7196		Analyst: KVL
Chromium, Hexavalent	0.0100	U	0.00600	0.0100	0.0100	mg/L	1	07-Dec-2018 13:57

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

## ALS Houston, US

Date: 26-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: LH18/24-SP650\_120618\_BIX  
 Collection Date: 06-Dec-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18120375  
 Lab ID:HS18120375-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>		Analyst: SUB				
Subcontract Analysis	See Attached		0	0		NA	1	26-Dec-2018 12:21

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

## ALS Houston, US

Date: 26-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: Trip Blank  
 Collection Date: 06-Dec-2018 00:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18120375  
 Lab ID:HS18120375-03  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,2-Dibromo-3-chloropropane	0	U	0.20	0	1.0	UG/L	1	18-Dec-2018 17:16	
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
2-Butanone	1.0	U	0.50	1.0	2.0	UG/L	1	18-Dec-2018 17:16	
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
2-Hexanone	1.0	U	1.0	1.0	2.0	UG/L	1	18-Dec-2018 17:16	
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	UG/L	1	18-Dec-2018 17:16	
<b>Acetone</b>	<b>2.4</b>		<b>0.40</b>	<b>2.0</b>	<b>2.0</b>	<b>UG/L</b>	1	18-Dec-2018 17:16	
Benzene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
Bromobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
Bromochloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
Bromodichloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
Bromoform	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
Bromomethane	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
Carbon disulfide	1.0	U	0.60	1.0	2.0	UG/L	1	18-Dec-2018 17:16	
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
Chlorobenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
Chloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16	
Chloroform	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16	

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

## ALS Houston, US

Date: 26-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Effluent Samples  
 Sample ID: Trip Blank  
 Collection Date: 06-Dec-2018 00:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18120375  
 Lab ID:HS18120375-03  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>VOLATILES ORGANICS BY METHOD</b>		<b>Method:SW8260</b>						
<b>8260C</b>								Analyst: PC
Chloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Dibromochloromethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Dibromomethane	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Ethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	UG/L	1	18-Dec-2018 17:16
Isopropylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
m,p-Xylene	1.0	U	0.50	1.0	2.0	UG/L	1	18-Dec-2018 17:16
Methylene chloride	0.50	U	0.40	0.50	2.0	UG/L	1	18-Dec-2018 17:16
n-Butylbenzene	0.50	U	0.40	0.50	1.0	UG/L	1	18-Dec-2018 17:16
n-Propylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Naphthalene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
o-Xylene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Styrene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Tetrachloroethene	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Toluene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Trichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	18-Dec-2018 17:16
Vinyl chloride	0.50	U	0.20	0.50	1.0	UG/L	1	18-Dec-2018 17:16
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>91.9</i>			<b>0</b>	<i>81-118</i>	<i>%REC</i>	<i>1</i>	<i>18-Dec-2018 17:16</i>
<i>Surr: 4-Bromofluorobenzene</i>	<i>96.8</i>			<b>0</b>	<i>85-114</i>	<i>%REC</i>	<i>1</i>	<i>18-Dec-2018 17:16</i>
<i>Surr: Dibromofluoromethane</i>	<i>90.0</i>			<b>0</b>	<i>80-119</i>	<i>%REC</i>	<i>1</i>	<i>18-Dec-2018 17:16</i>
<i>Surr: Toluene-d8</i>	<i>104</i>			<b>0</b>	<i>89-112</i>	<i>%REC</i>	<i>1</i>	<i>18-Dec-2018 17:16</i>

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

**WEIGHT LOG**

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**Batch ID:** 135381      **Method:** ICP-MS METALS BY SW6020A      **Prep:** 3010A

SamplID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18120375-01	1	10	10 (mL)	1

**Batch ID:** 135492      **Method:** SEMIVOLATILES SIM      **Prep:** 3510\_B\_SIM

SamplID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18120375-01	1	980	1 (mL)	0.00102

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> 135381	<b>Test Name :</b> ICP-MS METALS BY SW6020A		<b>Matrix:</b> Water			
HS18120375-01	LH18/24-SP650_120618	06 Dec 2018 14:00		10 Dec 2018 09:30	14 Dec 2018 13:34	1
HS18120375-01	LH18/24-SP650_120618	06 Dec 2018 14:00		10 Dec 2018 09:30	13 Dec 2018 20:19	1
<b>Batch ID</b> 135492	<b>Test Name :</b> SEMIVOLATILES SIM		<b>Matrix:</b> Water			
HS18120375-01	LH18/24-SP650_120618	06 Dec 2018 14:00		12 Dec 2018 07:55	20 Dec 2018 15:51	10
<b>Batch ID</b> R328845	<b>Test Name :</b> HEXAVALENT CHROMIUM BY SW7196A		<b>Matrix:</b> Water			
HS18120375-01	LH18/24-SP650_120618	06 Dec 2018 14:00			07 Dec 2018 13:57	1
<b>Batch ID</b> R329536	<b>Test Name :</b> VOLATILES ORGANICS BY METHOD 8260C		<b>Matrix:</b> Water			
HS18120375-01	LH18/24-SP650_120618	06 Dec 2018 14:00			18 Dec 2018 16:51	1
HS18120375-03	Trip Blank	06 Dec 2018 00:00			18 Dec 2018 17:16	1
<b>Batch ID</b> R329912	<b>Test Name :</b> SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18120375-02	LH18/24-SP650_120618_BIX	06 Dec 2018 14:00			26 Dec 2018 12:21	1



ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**QC BATCH REPORT**

Batch ID: 135381		Instrument: ICPMS04		Method: SW6020						
<b>MBLK</b>	Sample ID: <b>MBLK-135381</b>	Units: <b>mg/L</b>			Analysis Date: <b>13-Dec-2018 18:52</b>					
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4863889</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Barium	0.00250	0.00400							U	
Lead	0.00100	0.00200							U	
Selenium	0.00200	0.00200							U	
Silver	0.00100	0.00200							U	
<b>LCS</b>	Sample ID: <b>LCS-135381</b>	Units: <b>mg/L</b>			Analysis Date: <b>13-Dec-2018 18:54</b>					
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4863890</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Barium	0.04383	0.00400	0.05	0	87.7	80 - 120				
Lead	0.04535	0.00200	0.05	0	90.7	80 - 120				
Selenium	0.04523	0.00200	0.05	0	90.5	80 - 120				
Silver	0.04791	0.00200	0.05	0	95.8	80 - 120				
<b>MS</b>	Sample ID: <b>HS18111538-04MS</b>	Units: <b>mg/L</b>			Analysis Date: <b>13-Dec-2018 19:34</b>					
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4864136</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Barium	0.1439	0.00400	0.05	0.09355	101	80 - 120				
Lead	0.04712	0.00200	0.05	0.000037	94.2	80 - 120				
Silver	0.04813	0.00200	0.05	0.000209	95.8	80 - 120				
<b>MS</b>	Sample ID: <b>HS18111538-04MS</b>	Units: <b>mg/L</b>			Analysis Date: <b>14-Dec-2018 13:26</b>					
Client ID:	Run ID: <b>ICPMS04_329261</b>	SeqNo: <b>4865342</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Selenium	0.05252	0.00200	0.05	0.001578	102	80 - 120				

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**QC BATCH REPORT**

Batch ID: 135381		Instrument: ICPMS04			Method: SW6020					
<b>MSD</b>	Sample ID: <b>HS18111538-04MSD</b>	Units: <b>mg/L</b>			Analysis Date: <b>13-Dec-2018 19:36</b>					
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4864137</b>		PrepDate: <b>10-Dec-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.1382	0.00400	0.05	0.09355	89.3	80 - 120	0.1439	4.03	20	
Lead	0.04571	0.00200	0.05	0.000037	91.3	80 - 120	0.04712	3.03	20	
Silver	0.04794	0.00200	0.05	0.000209	95.5	80 - 120	0.04813	0.385	20	
<b>MSD</b>	Sample ID: <b>HS18111538-04MSD</b>	Units: <b>mg/L</b>			Analysis Date: <b>14-Dec-2018 13:28</b>					
Client ID:	Run ID: <b>ICPMS04_329261</b>	SeqNo: <b>4865343</b>		PrepDate: <b>10-Dec-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.05209	0.00200	0.05	0.001578	101	80 - 120	0.05252	0.822	20	
<b>PDS</b>	Sample ID: <b>HS18111538-04PDS</b>	Units: <b>mg/L</b>			Analysis Date: <b>13-Dec-2018 19:38</b>					
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4864138</b>		PrepDate: <b>10-Dec-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.1808	0.00400	0.1	0.09355	87.3	75 - 125				
Lead	0.09342	0.00200	0.1	0.000037	93.4	75 - 125				
Silver	0.09484	0.00200	0.1	0.000209	94.6	75 - 125				
<b>PDS</b>	Sample ID: <b>HS18111538-04PDS</b>	Units: <b>mg/L</b>			Analysis Date: <b>14-Dec-2018 13:30</b>					
Client ID:	Run ID: <b>ICPMS04_329261</b>	SeqNo: <b>4865344</b>		PrepDate: <b>10-Dec-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.1046	0.00200	0.1	0.001578	103	75 - 125				
<b>SD</b>	Sample ID: <b>HS18111538-04SD</b>	Units: <b>mg/L</b>			Analysis Date: <b>13-Dec-2018 19:31</b>					
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4864135</b>		PrepDate: <b>10-Dec-2018</b>		DF: <b>5</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Barium	0.09594	0.0200					0.09355	2.55	10	
Lead	0.00500	0.0100					0.000037	0	10	U
Silver	0.00500	0.0100					0.000209	0	10	U

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**QC BATCH REPORT**

Batch ID: 135381		Instrument: ICPMS04		Method: SW6020						
<b>SD</b>	Sample ID: <b>HS18111538-04SD</b>	Units: <b>mg/L</b>		Analysis Date: <b>14-Dec-2018 13:23</b>						
Client ID:	Run ID: <b>ICPMS04_329261</b>	SeqNo: <b>4865341</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>5</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	Limit	Qual
Selenium	0.0100	0.0100					0.001578	0	10	U

The following samples were analyzed in this batch:

## ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

## QC BATCH REPORT

Batch ID: 135492		Instrument: SV-5		Method: SW8270SIM						
<b>MBLK</b>	Sample ID: <b>MBLK-135492</b>	Units: <b>ug/L</b>			Analysis Date: <b>20-Dec-2018 16:12</b>					
Client ID:	Run ID: <b>SV-5_329772</b>	SeqNo: <b>4878475</b>		PrepDate: <b>12-Dec-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
1,4-Dioxane	0.010	0.010							U	
Surr: 2-Fluorobiphenyl	0.1115	0	0.08	0	139	40 - 140				
Surr: 4-Terphenyl-d14	0.06966	0	0.08	0	87.1	40 - 140				
Surr: Nitrobenzene-d5	0.07582	0	0.08	0	94.8	40 - 140				
<b>LCS</b>	Sample ID: <b>LCS-135492</b>	Units: <b>ug/L</b>			Analysis Date: <b>20-Dec-2018 14:20</b>					
Client ID:	Run ID: <b>SV-5_329772</b>	SeqNo: <b>4878473</b>		PrepDate: <b>12-Dec-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
1,4-Dioxane	0.06317	0.010	0.08	0	79.0	40 - 140				
Surr: 2-Fluorobiphenyl	0.104	0	0.08	0	130	40 - 140				
Surr: 4-Terphenyl-d14	0.05966	0	0.08	0	74.6	40 - 140				
Surr: Nitrobenzene-d5	0.04341	0	0.08	0	54.3	40 - 140				
<b>LCSD</b>	Sample ID: <b>LCSD-135492</b>	Units: <b>ug/L</b>			Analysis Date: <b>20-Dec-2018 16:36</b>					
Client ID:	Run ID: <b>SV-5_329772</b>	SeqNo: <b>4878476</b>		PrepDate: <b>12-Dec-2018</b>		DF: <b>1</b>				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
1,4-Dioxane	0.06363	0.010	0.08	0	79.5	40 - 140	0.06317	0.711	20	
Surr: 2-Fluorobiphenyl	0.09975	0	0.08	0	125	40 - 140	0.104	4.19	20	
Surr: 4-Terphenyl-d14	0.08996	0	0.08	0	112	40 - 140	0.05966	40.5	20 R	
Surr: Nitrobenzene-d5	0.04931	0	0.08	0	61.6	40 - 140	0.04341	12.7	20	

The following samples were analyzed in this batch: HS18120375-01

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**QC BATCH REPORT**

Batch ID: R329536		Instrument: VOA9		Method: SW8260						
MBLK	Sample ID: VBLKW-181218	Units: UG/L			Analysis Date: 18-Dec-2018 13:34					
Client ID:	Run ID: VOA9_329536	SeqNo: 4872179	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	2.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

## ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

## QC BATCH REPORT

Batch ID: R329536		Instrument: VOA9		Method: SW8260						
MBLK	Sample ID: VBLKW-181218	Units: UG/L			Analysis Date: 18-Dec-2018 13:34					
Client ID:	Run ID: VOA9_329536	SeqNo: 4872179	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	1.0	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	0.50	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>45.19</i>	<i>1.0</i>	<i>50</i>	<i>0</i>	<i>90.4</i>	<i>81 - 118</i>				
<i>Surr: 4-Bromofluorobenzene</i>	<i>48.92</i>	<i>1.0</i>	<i>50</i>	<i>0</i>	<i>97.8</i>	<i>85 - 114</i>				
<i>Surr: Dibromofluoromethane</i>	<i>43.69</i>	<i>1.0</i>	<i>50</i>	<i>0</i>	<i>87.4</i>	<i>80 - 119</i>				
<i>Surr: Toluene-d8</i>	<i>52.1</i>	<i>1.0</i>	<i>50</i>	<i>0</i>	<i>104</i>	<i>89 - 112</i>				

## ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

## QC BATCH REPORT

Batch ID: R329536		Instrument: VOA9		Method: SW8260						
LCS	Sample ID: VLCSW-1812018	Units: UG/L			Analysis Date: 18-Dec-2018 13:58					
Client ID:	Run ID: VOA9_329536	SeqNo: 4872180	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	21.7	1.0	20	0	109	78 - 124				
1,1,1-Trichloroethane	20.06	1.0	20	0	100	74 - 131				
1,1,2,2-Tetrachloroethane	21.61	1.0	20	0	108	71 - 121				
1,1,2-Trichloroethane	21.9	1.0	20	0	109	80 - 119				
1,1-Dichloroethane	20.96	1.0	20	0	105	77 - 125				
1,1-Dichloroethene	20.63	1.0	20	0	103	71 - 131				
1,1-Dichloropropene	22.62	1.0	20	0	113	78 - 125				
1,2,3-Trichlorobenzene	22.19	1.0	20	0	111	69 - 129				
1,2,3-Trichloropropane	21.99	1.0	20	0	110	73 - 122				
1,2,4-Trichlorobenzene	21.92	1.0	20	0	110	69 - 130				
1,2,4-Trimethylbenzene	23.08	1.0	20	0	115	76 - 124				
1,2-Dibromo-3-chloropropane	19.69	1.0	20	0	98.4	62 - 128				
1,2-Dibromoethane	22.19	1.0	20	0	111	77 - 121				
1,2-Dichlorobenzene	21.19	1.0	20	0	106	80 - 119				
1,2-Dichloroethane	20.79	1.0	20	0	104	73 - 128				
1,2-Dichloropropane	23.16	1.0	20	0	116	78 - 122				
1,3,5-Trimethylbenzene	23.2	1.0	20	0	116	75 - 124				
1,3-Dichlorobenzene	21.7	1.0	20	0	109	80 - 119				
1,3-Dichloropropane	22.28	1.0	20	0	111	80 - 119				
1,4-Dichlorobenzene	22.92	1.0	20	0	115	79 - 118				
2,2-Dichloropropane	21.28	1.0	20	0	106	60 - 139				
2-Butanone	42.42	2.0	40	0	106	56 - 143				
2-Chlorotoluene	22.49	1.0	20	0	112	79 - 122				
2-Hexanone	46.58	2.0	40	0	116	57 - 139				
4-Chlorotoluene	22.67	1.0	20	0	113	78 - 122				
4-Isopropyltoluene	23.85	1.0	20	0	119	77 - 127				
4-Methyl-2-pentanone	46.52	2.0	40	0	116	67 - 130				
Acetone	42.82	2.0	40	0	107	39 - 160				
Benzene	22.64	1.0	20	0	113	79 - 120				
Bromobenzene	21.59	1.0	20	0	108	80 - 120				
Bromochloromethane	22.21	1.0	20	0	111	78 - 123				
Bromodichloromethane	20.86	1.0	20	0	104	79 - 125				
Bromoform	19.3	1.0	20	0	96.5	66 - 130				
Bromomethane	23.28	1.0	20	0	116	53 - 141				

## ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

## QC BATCH REPORT

Batch ID: R329536		Instrument: VOA9		Method: SW8260						
LCS	Sample ID: VLCSW-1812018	Units: UG/L			Analysis Date: 18-Dec-2018 13:58					
Client ID:	Run ID: VOA9_329536	SeqNo: 4872180	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	43.3	2.0	40	0	108	64 - 133				
Carbon tetrachloride	21.74	1.0	20	0	109	72 - 136				
Chlorobenzene	21.78	1.0	20	0	109	82 - 118				
Chloroethane	23.06	1.0	20	0	115	60 - 138				
Chloroform	20	1.0	20	0	100	79 - 124				
Chloromethane	24.03	1.0	20	0	120	50 - 139				
cis-1,2-Dichloroethene	20.82	1.0	20	0	104	78 - 123				
cis-1,3-Dichloropropene	22.79	1.0	20	0	114	75 - 124				
Dibromochloromethane	21.85	1.0	20	0	109	74 - 126				
Dibromomethane	21.43	1.0	20	0	107	79 - 123				
Dichlorodifluoromethane	21.72	1.0	20	0	109	32 - 152				
Ethylbenzene	22.49	1.0	20	0	112	79 - 121				
Hexachlorobutadiene	26.61	1.0	20	0	133	66 - 134				
Isopropylbenzene	23.13	1.0	20	0	116	72 - 131				
m,p-Xylene	45.63	2.0	40	0	114	80 - 121				
Methylene chloride	22.57	2.0	20	0	113	74 - 124				
Naphthalene	22.83	1.0	20	0	114	61 - 128				
n-Butylbenzene	24.18	1.0	20	0	121	75 - 128				
n-Propylbenzene	23.41	1.0	20	0	117	76 - 126				
o-Xylene	22.9	1.0	20	0	114	78 - 122				
sec-Butylbenzene	23.6	1.0	20	0	118	77 - 126				
Styrene	23.39	1.0	20	0	117	78 - 123				
tert-Butylbenzene	23.13	1.0	20	0	116	78 - 124				
Tetrachloroethene	22.36	1.0	20	0	112	74 - 129				
Toluene	22.56	1.0	20	0	113	80 - 121				
trans-1,2-Dichloroethene	20.73	1.0	20	0	104	75 - 124				
trans-1,3-Dichloropropene	19.97	1.0	20	0	99.9	73 - 127				
Trichloroethene	21.82	1.0	20	0	109	79 - 123				
Trichlorofluoromethane	20.41	1.0	20	0	102	65 - 141				
Vinyl chloride	23.07	1.0	20	0	115	58 - 137				
Surr: 1,2-Dichloroethane-d4	44.22	1.0	50	0	88.4	81 - 118				
Surr: 4-Bromofluorobenzene	51.18	1.0	50	0	102	85 - 114				
Surr: Dibromofluoromethane	44.56	1.0	50	0	89.1	80 - 119				
Surr: Toluene-d8	52.7	1.0	50	0	105	89 - 112				



ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**QC BATCH REPORT**

Batch ID: R329536		Instrument: VOA9		Method: SW8260						
MS	Sample ID: HS18120278-03MS	Units: UG/L			Analysis Date: 18-Dec-2018 17:41					
Client ID:	Run ID: VOA9_329536	SeqNo: 4872184	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	23.88	1.0	20	0	119	78 - 124				
1,1,1-Trichloroethane	22.68	1.0	20	0	113	74 - 131				
1,1,2,2-Tetrachloroethane	23.94	1.0	20	0	120	71 - 121				
1,1,2-Trichloroethane	24.23	1.0	20	0	121	80 - 119				S
1,1-Dichloroethane	23.28	1.0	20	0	116	77 - 125				
1,1-Dichloroethene	23.18	1.0	20	0.7106	112	71 - 131				
1,1-Dichloropropene	25.8	1.0	20	0	129	78 - 125				S
1,2,3-Trichlorobenzene	24.51	1.0	20	0	123	69 - 129				
1,2,3-Trichloropropane	23.25	1.0	20	0	116	73 - 122				
1,2,4-Trichlorobenzene	23.82	1.0	20	0	119	69 - 130				
1,2,4-Trimethylbenzene	25.68	1.0	20	0	128	76 - 124				S
1,2-Dibromo-3-chloropropane	21.8	1.0	20	0	109	62 - 128				
1,2-Dibromoethane	24.17	1.0	20	0	121	77 - 121				
1,2-Dichlorobenzene	23.25	1.0	20	0	116	80 - 119				
1,2-Dichloroethane	22.65	1.0	20	0	113	73 - 128				
1,2-Dichloropropane	25.31	1.0	20	0	127	78 - 122				S
1,3,5-Trimethylbenzene	25.78	1.0	20	0	129	75 - 124				S
1,3-Dichlorobenzene	23.52	1.0	20	0	118	80 - 119				
1,3-Dichloropropane	24.4	1.0	20	0	122	80 - 119				S
1,4-Dichlorobenzene	25.75	1.0	20	0	129	79 - 118				S
2,2-Dichloropropane	21.93	1.0	20	0	110	60 - 139				
2-Butanone	45.49	2.0	40	0	114	56 - 143				
2-Chlorotoluene	24.73	1.0	20	0	124	79 - 122				S
2-Hexanone	51.07	2.0	40	0	128	57 - 139				
4-Chlorotoluene	25.15	1.0	20	0	126	78 - 122				S
4-Isopropyltoluene	26.9	1.0	20	0	134	77 - 127				S
4-Methyl-2-pentanone	50.44	2.0	40	0	126	67 - 130				
Acetone	46	2.0	40	0	115	39 - 160				
Benzene	25.3	1.0	20	0	126	79 - 120				S
Bromobenzene	23.78	1.0	20	0	119	80 - 120				
Bromochloromethane	24.54	1.0	20	0	123	78 - 123				
Bromodichloromethane	22.91	1.0	20	0	115	79 - 125				
Bromoform	20.79	1.0	20	0	104	66 - 130				
Bromomethane	12.09	1.0	20	0	60.5	53 - 141				

## ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

## QC BATCH REPORT

Batch ID: R329536		Instrument: VOA9		Method: SW8260						
MS	Sample ID: HS18120278-03MS	Units: UG/L			Analysis Date: 18-Dec-2018 17:41					
Client ID:	Run ID: VOA9_329536	SeqNo: 4872184	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	44.81	2.0	40	0	112	64 - 133				
Carbon tetrachloride	24.05	1.0	20	0	120	72 - 136				
Chlorobenzene	25.62	1.0	20	1.542	120	82 - 118				S
Chloroethane	24.72	1.0	20	0	124	60 - 138				
Chloroform	22.07	1.0	20	0	110	79 - 124				
Chloromethane	15.68	1.0	20	0	78.4	50 - 139				
cis-1,2-Dichloroethene	44.9	1.0	20	21.65	116	78 - 123				
cis-1,3-Dichloropropene	24.3	1.0	20	0	121	75 - 124				
Dibromochloromethane	23.74	1.0	20	0	119	74 - 126				
Dibromomethane	22.87	1.0	20	0	114	79 - 123				
Dichlorodifluoromethane	10.42	1.0	20	0	52.1	32 - 152				
Ethylbenzene	25.15	1.0	20	0	126	79 - 121				S
Hexachlorobutadiene	28.15	1.0	20	0	141	66 - 134				S
Isopropylbenzene	26.04	1.0	20	0	130	72 - 131				
m,p-Xylene	50.97	2.0	40	0	127	80 - 121				S
Methylene chloride	24.38	2.0	20	0	122	74 - 124				
Naphthalene	25.37	1.0	20	0	127	61 - 128				
n-Butylbenzene	26.87	1.0	20	0	134	75 - 128				S
n-Propylbenzene	26.34	1.0	20	0	132	76 - 126				S
o-Xylene	25.44	1.0	20	0	127	78 - 122				S
sec-Butylbenzene	26.76	1.0	20	0	134	77 - 126				S
Styrene	25.73	1.0	20	0	129	78 - 123				S
tert-Butylbenzene	26.06	1.0	20	0	130	78 - 124				S
Tetrachloroethene	25.53	1.0	20	0	128	74 - 129				
Toluene	25.16	1.0	20	0	126	80 - 121				S
trans-1,2-Dichloroethene	23.47	1.0	20	0	117	75 - 124				
trans-1,3-Dichloropropene	21.37	1.0	20	0	107	73 - 127				
Trichloroethene	72.45	1.0	20	47.56	124	79 - 123				S
Trichlorofluoromethane	20.92	1.0	20	0	105	65 - 141				
Vinyl chloride	20.18	1.0	20	0	101	58 - 137				
Surr: 1,2-Dichloroethane-d4	44.17	1.0	50	0	88.3	81 - 118				
Surr: 4-Bromofluorobenzene	51.45	1.0	50	0	103	85 - 114				
Surr: Dibromofluoromethane	45.03	1.0	50	0	90.1	80 - 119				
Surr: Toluene-d8	53.03	1.0	50	0	106	89 - 112				

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**QC BATCH REPORT**

Batch ID: R329536		Instrument: VOA9		Method: SW8260						
MSD	Sample ID: HS18120278-03MSD	Units: UG/L			Analysis Date: 18-Dec-2018 18:06					
Client ID:	Run ID: VOA9_329536	SeqNo: 4872185	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	22.94	1.0	20	0	115	78 - 124	23.88	3.99	20	
1,1,1-Trichloroethane	21.46	1.0	20	0	107	74 - 131	22.68	5.56	20	
1,1,2,2-Tetrachloroethane	23.01	1.0	20	0	115	71 - 121	23.94	3.93	20	
1,1,2-Trichloroethane	23.16	1.0	20	0	116	80 - 119	24.23	4.52	20	
1,1-Dichloroethane	22.19	1.0	20	0	111	77 - 125	23.28	4.8	20	
1,1-Dichloroethene	21.54	1.0	20	0.7106	104	71 - 131	23.18	7.34	20	
1,1-Dichloropropene	24.29	1.0	20	0	121	78 - 125	25.8	6.04	20	
1,2,3-Trichlorobenzene	22.99	1.0	20	0	115	69 - 129	24.51	6.4	20	
1,2,3-Trichloropropane	21.98	1.0	20	0	110	73 - 122	23.25	5.62	20	
1,2,4-Trichlorobenzene	22.88	1.0	20	0	114	69 - 130	23.82	4.03	20	
1,2,4-Trimethylbenzene	24.38	1.0	20	0	122	76 - 124	25.68	5.16	20	
1,2-Dibromo-3-chloropropane	20.49	1.0	20	0	102	62 - 128	21.8	6.15	20	
1,2-Dibromoethane	23.25	1.0	20	0	116	77 - 121	24.17	3.85	20	
1,2-Dichlorobenzene	22.08	1.0	20	0	110	80 - 119	23.25	5.16	20	
1,2-Dichloroethane	21.98	1.0	20	0	110	73 - 128	22.65	3	20	
1,2-Dichloropropane	24.76	1.0	20	0	124	78 - 122	25.31	2.19	20	S
1,3,5-Trimethylbenzene	24.4	1.0	20	0	122	75 - 124	25.78	5.52	20	
1,3-Dichlorobenzene	22.5	1.0	20	0	112	80 - 119	23.52	4.46	20	
1,3-Dichloropropane	23.35	1.0	20	0	117	80 - 119	24.4	4.39	20	
1,4-Dichlorobenzene	24.57	1.0	20	0	123	79 - 118	25.75	4.7	20	S
2,2-Dichloropropane	20.71	1.0	20	0	104	60 - 139	21.93	5.72	20	
2-Butanone	45.19	2.0	40	0	113	56 - 143	45.49	0.66	20	
2-Chlorotoluene	23.65	1.0	20	0	118	79 - 122	24.73	4.47	20	
2-Hexanone	49.4	2.0	40	0	124	57 - 139	51.07	3.32	20	
4-Chlorotoluene	23.94	1.0	20	0	120	78 - 122	25.15	4.92	20	
4-Isopropyltoluene	25.24	1.0	20	0	126	77 - 127	26.9	6.37	20	
4-Methyl-2-pentanone	48.64	2.0	40	0	122	67 - 130	50.44	3.64	20	
Acetone	43.54	2.0	40	0	109	39 - 160	46	5.49	20	
Benzene	24.46	1.0	20	0	122	79 - 120	25.3	3.38	20	S
Bromobenzene	22.37	1.0	20	0	112	80 - 120	23.78	6.13	20	
Bromochloromethane	23.65	1.0	20	0	118	78 - 123	24.54	3.69	20	
Bromodichloromethane	22.31	1.0	20	0	112	79 - 125	22.91	2.64	20	
Bromoform	20.15	1.0	20	0	101	66 - 130	20.79	3.11	20	
Bromomethane	13.33	1.0	20	0	66.6	53 - 141	12.09	9.71	20	

## ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

## QC BATCH REPORT

Batch ID: R329536		Instrument: VOA9		Method: SW8260						
MSD	Sample ID: HS18120278-03MSD	Units: UG/L			Analysis Date: 18-Dec-2018 18:06					
Client ID:	Run ID: VOA9_329536	SeqNo: 4872185	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	42.21	2.0	40	0	106	64 - 133	44.81	5.98	20	
Carbon tetrachloride	23.31	1.0	20	0	117	72 - 136	24.05	3.09	20	
Chlorobenzene	24.33	1.0	20	1.542	114	82 - 118	25.62	5.14	20	
Chloroethane	20.67	1.0	20	0	103	60 - 138	24.72	17.8	20	
Chloroform	21.16	1.0	20	0	106	79 - 124	22.07	4.18	20	
Chloromethane	14.94	1.0	20	0	74.7	50 - 139	15.68	4.84	20	
cis-1,2-Dichloroethene	42.81	1.0	20	21.65	106	78 - 123	44.9	4.77	20	
cis-1,3-Dichloropropene	23.85	1.0	20	0	119	75 - 124	24.3	1.86	20	
Dibromochloromethane	23.1	1.0	20	0	115	74 - 126	23.74	2.73	20	
Dibromomethane	22.89	1.0	20	0	114	79 - 123	22.87	0.084	20	
Dichlorodifluoromethane	9.87	1.0	20	0	49.3	32 - 152	10.42	5.41	20	
Ethylbenzene	23.86	1.0	20	0	119	79 - 121	25.15	5.24	20	
Hexachlorobutadiene	26.61	1.0	20	0	133	66 - 134	28.15	5.63	20	
Isopropylbenzene	24.62	1.0	20	0	123	72 - 131	26.04	5.58	20	
m,p-Xylene	48.45	2.0	40	0	121	80 - 121	50.97	5.06	20	S
Methylene chloride	22.91	2.0	20	0	115	74 - 124	24.38	6.23	20	
Naphthalene	24.2	1.0	20	0	121	61 - 128	25.37	4.71	20	
n-Butylbenzene	25.57	1.0	20	0	128	75 - 128	26.87	4.97	20	
n-Propylbenzene	24.76	1.0	20	0	124	76 - 126	26.34	6.18	20	
o-Xylene	24	1.0	20	0	120	78 - 122	25.44	5.82	20	
sec-Butylbenzene	25.1	1.0	20	0	125	77 - 126	26.76	6.41	20	
Styrene	24.44	1.0	20	0	122	78 - 123	25.73	5.15	20	
tert-Butylbenzene	24.73	1.0	20	0	124	78 - 124	26.06	5.27	20	
Tetrachloroethene	24.06	1.0	20	0	120	74 - 129	25.53	5.9	20	
Toluene	23.77	1.0	20	0	119	80 - 121	25.16	5.68	20	
trans-1,2-Dichloroethene	21.99	1.0	20	0	110	75 - 124	23.47	6.52	20	
trans-1,3-Dichloropropene	20.89	1.0	20	0	104	73 - 127	21.37	2.3	20	
Trichloroethene	68.98	1.0	20	47.56	107	79 - 123	72.45	4.9	20	
Trichlorofluoromethane	19.31	1.0	20	0	96.6	65 - 141	20.92	8.01	20	
Vinyl chloride	18.76	1.0	20	0	93.8	58 - 137	20.18	7.31	20	
Surr: 1,2-Dichloroethane-d4	43.56	1.0	50	0	87.1	81 - 118	44.17	1.38	20	
Surr: 4-Bromofluorobenzene	51.09	1.0	50	0	102	85 - 114	51.45	0.704	20	
Surr: Dibromofluoromethane	44.93	1.0	50	0	89.9	80 - 119	45.03	0.218	20	
Surr: Toluene-d8	52.59	1.0	50	0	105	89 - 112	53.03	0.822	20	

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhat Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**QC BATCH REPORT**

**Batch ID:** R329536      **Instrument:** VOA9      **Method:** SW8260

The following samples were analyzed in this batch: HS18120375-01      HS18120375-03

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**QC BATCH REPORT**

Batch ID: R328845		Instrument: UV-2450		Method: SW7196					
<b>MBLK</b>	Sample ID: <b>MBLK-R328845</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 13:57</b>					
Client ID:	Run ID: <b>UV-2450_328845</b>	SeqNo: <b>4855018</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.0100	0.0100						U	
<b>LCS</b>	Sample ID: <b>LCS-R328845</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 13:57</b>					
Client ID:	Run ID: <b>UV-2450_328845</b>	SeqNo: <b>4855017</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.277	0.0100	0.25	0	111	80 - 120			
<b>MS</b>	Sample ID: <b>HS18120375-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 13:57</b>					
Client ID: <b>LH18/24-SP650_120618</b>	Run ID: <b>UV-2450_328845</b>	SeqNo: <b>4855020</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.265	0.0100	0.25	-0.001	106	75 - 125			
<b>MSD</b>	Sample ID: <b>HS18120375-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 13:57</b>					
Client ID: <b>LH18/24-SP650_120618</b>	Run ID: <b>UV-2450_328845</b>	SeqNo: <b>4855019</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.265	0.0100	0.25	-0.001	106	75 - 125	0.265	0 20	

The following samples were analyzed in this batch: HS18120375-01

**ALS Houston, US**

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**WorkOrder:** HS18120375

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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



ALS Houston, US

Date: 26-Dec-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Effluent Samples  
**Work Order:** HS18120375

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**SAMPLE TRACKING**

---

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18120375-01	LH18/24-SP650_120618	Login	12/7/2018 12:04:25 PM	JRM	Disposed
HS18120375-01	LH18/24-SP650_120618	Login	12/7/2018 12:04:25 PM	JRM	WET270
HS18120375-01	LH18/24-SP650_120618	Login	12/7/2018 12:04:25 PM	JRM	MET049
HS18120375-01	LH18/24-SP650_120618	Login	12/7/2018 12:04:25 PM	JRM	VOA183
HS18120375-02	LH18/24-SP650_120618_BIX	Login	12/7/2018 12:04:25 PM	JRM	Sub
HS18120375-03	Trip Blank	Login	12/7/2018 12:04:25 PM	JRM	VOA183

---

**Sample Receipt Checklist**

Client Name: Bhate Environmental  
 Work Order: HS18120375

Date/Time Received: **07-Dec-2018 10:05**  
 Received by: **JRM**

Checklist completed by: Jared R. Makan | 7-Dec-2018 | Reviewed by: \_\_\_\_\_ | \_\_\_\_\_  
 eSignature | Date | eSignature | Date

Matrices: **Water** | Carrier name: **UPS**

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- TX1005 solids received in hermetically sealed vials? Yes  No  N/A
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No

Temperature(s)/Thermometer(s): 3.0c/3.3c UC/C | IR25  
 Cooler(s)/Kit(s): 44423  
 Date/Time sample(s) sent to storage: 12/07/2018 12:10

- Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted
- Water - pH acceptable upon receipt? Yes  No  N/A
- pH adjusted? Yes  No  N/A

pH adjusted by: \_\_\_\_\_

Login Notes:

Client Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_ Person Contacted: \_\_\_\_\_

Contacted By: \_\_\_\_\_ Regarding: \_\_\_\_\_

Comments: \_\_\_\_\_

Corrective Action: \_\_\_\_\_

**CHAIN OF CUSTODY**

Name Of Lab Shipping To: ALS 10450 Stancliff Rd., Suite 210 Houston, TX 77099 (281) 530 - 5656 ATTN: RJ Modashia

Project: BHATE LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS			Project No. NWO1312.0150.0 16.0001		Analyses										Remarks (Preservatives, etc.)	Lab I.D.#			
Job: <b>GROUNDWATER TREATMENT PLANT MONTHLY EFFLUENT SAMPLES</b>			P.O. Number		MS / MSD	No. OF CONTAINERS	VOLATILES	SILVER, SELENIUM, LEAD, BARIUM	HEXAVALENT CHROMIUM	1, 4 - DIOXANE	PERCHLORATE								
Prepared By:	Field Sample I.D.		Sample Matrix	Date / Time															
Scott Beesinger	LH18/24-SP650_120618		Water	12/06/18 / 14:00	3	X												HCL	
	LH18/24-SP650_120618		Water	12/06/18 / 14:00	2			X	X									NONE	
	LH18/24-SP650_120618_BIX		Water	12/06/18 / 14:00	1					X								NONE	
	LH18/24-SP650_120618		Water	12/06/18 / 14:00	1		X											HNO3	
	Trip Blank		Water	12/06/18	2	X												HCL	

Additional Remarks: **STANDARD TURN AROUND TIME**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
<i>Scott Beesinger</i>	12/06/18	14:30									


For Lab Use Only										
Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition	
<i>J. W. WALKER</i>	<i>12/7/18</i>	<i>10:05</i>								
Remarks: <i>Coder 44423 10225 Temp 30 CF03</i>										

**HS18120375**

Bhate Environmental Associates, Inc.  
Groundwater Treatment Plant Monthly Effluent Samples



(Word) S:\1-ccs\Forms\Chain of Custody - BiWeekly

 <b>ALS</b> 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax. +1 281 530 5687	<b>CUSTODY SEAL</b>		Seal Broken By:
	Date: 12/6/18	Time: 1430	SM
	Name: Scott H. Beckwith	Company: State	Date: 12/5/18

44423

DEC 07 2018

DS2N  
 02-21  
 7749P  
 STAFFORD  
 AAD9537UPS



J4616880061



## Case Narrative

**Method:** 6850

**Analysis:** Perchlorate

**Analysis SOP:** LC-MS-CLO4

**ALS WO ID(s):** 1834583; 1834584; 1834586;  
1834591; 1834871

**Client:** ALS Laboratories (Houston, TX)

**Matrix:** Water

**ELMS Batch (HBN):** 2187 (229705)

**General Set Information:** There were fourteen 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  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** Field samples 1834584001/1834591003 were analyzed and reported from 1:1,000 dilutions. Field samples 1834591006/07 were analyzed and reported from 1:10 dilutions. Field samples 1834591008-10 were analyzed and reported from 1:100 dilutions. The reporting limits have been adjusted accordingly.

**Method QC data:** The method blank (LMB 633241) was less than 1/2 the CRDL. The recovery for the LCS (633242) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on sample 1834583001 (Client ID: LH18/24-SP650\_120618\_BIX). 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 Matrix Spike (MS – 633243) failed QC acceptance criteria for percent recovery, biased high. This is due to the fact that the unspiked sample result of 2.028µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected. The relative percent difference (RPD) 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  $(A) \times (B)$ ,

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.

Thomas Bosch                      December 21, 2018  
Analyst    Date



## ANALYTICAL REPORT

Report Date: December 21, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1834583**

Project ID: HS18120375

Purchase Order: HS18120375

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_120618_BIX	1834583001	12/06/18	12/11/18	

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 268 9992

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Environmental 

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34 of 142



## ANALYTICAL REPORT

Workorder: 34-1834583

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP650_120618_BIX</b>	Sampling Site: NA	Collected: 12/06/2018				
Lab ID: 1834583001	Media: 125 mL Nalgene	Received: 12/11/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2187 (HBN: 229705) Analyzed: 12/19/2018 09:37	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
Perchlorate	2.0	1.0	2.0	4.0	1	J

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

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 12/20/2018 13:51	/S/ Stephen Brose 12/21/2018 13:13

## Laboratory Contact Information

ALS Environmental  
960 W Levoy Drive  
Salt Lake City, Utah 84123Phone: (801) 266-7700  
Email: als@alst.com  
Web: www.alst.com





## ANALYTICAL REPORT

**Workorder:** 34-1834583

**Client:** ALS Environmental  
(Houston)

**Project Manager:** Kevin W. Griffiths

### General Lab Comments

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

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

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

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

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

### Result Symbol Definitions

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

### Qualifier Symbol Definitions

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



# Quality Control Sample Batch Report

00922135

## Analysis Information

**Workorder:** 1834583

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2187 (HBN: 229705)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 633241 <b>Analyzed:</b> 12/19/2018 09:08  <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 633242 <b>Analyzed:</b> 12/19/2018 09:22 <b>Dilution:</b> 1 <b>Units:</b> ug/L					
Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.68	5.00	93.6	78.8	123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1834583001 <b>Analyzed:</b> 12/19/2018 09:37 <b>Dilution:</b> 1 <b>Units:</b> ug/L	<b>MS:</b> 633243 <b>Analyzed:</b> 12/19/2018 09:50 <b>Dilution:</b> 1 <b>Units:</b> ug/L	<b>MSD:</b> 633244 <b>Analyzed:</b> 12/19/2018 10:04 <b>Dilution:</b> 1 <b>Units:</b> ug/L									
Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	2.00	6.21	5 #	124	78.8	123.8	6.16	123	0.884	0.0	20.0

## Continuing Calibration Verification

<b>CCV:</b> 633238 <b>Analyzed:</b> 12/19/2018 08:25 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%	<b>CCV:</b> 633245 <b>Analyzed:</b> 12/19/2018 11:54 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%	<b>CCV:</b> 633247 <b>Analyzed:</b> 12/19/2018 14:26 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%							
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	25.5	25.0	102	26.1	25.0	104	26.2	25.0	105

## Interference Check Sample

<b>ICSA:</b> 633240 <b>Analyzed:</b> 12/19/2018 08:54 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	1.08	1.00	108

## Limit of Detection Verification

<b>LODV:</b> 633239 <b>Analyzed:</b> 12/19/2018 08:40 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%	<b>LODV:</b> 633246 <b>Analyzed:</b> 12/19/2018 12:08 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%	<b>LODV:</b> 633248 <b>Analyzed:</b> 12/19/2018 14:40 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%							
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.08	1.00	108	1.07	1.00	107	1.06	1.00	106



# Quality Control Sample Batch Report

00922136

## Analysis Information

**Workorder:** 1834583

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2187 (HBN: 229705)

**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 12/20/2018 13:51	/S/ Stephen Brose 12/21/2018 13:13

## Symbols and Definitions

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

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



1834583

18698/2

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: 10385

1834583

**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:** HS18120375  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18120375-02	LH18/24-SP650_120618_BIX	Water	06 Dec 2018 14:00
SUB_Perch-6850			24 Dec 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By:   
Received By:   
Cooler ID(s): \_\_\_\_\_

Date/Time: 12/10/18 1800  
Date/Time: 12-11-18 8:48  
Temperature(s): \_\_\_\_\_

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

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: <u>ALS Houston</u>		Project/Task/Site: <u>1834583</u>							
Date/Time of Receipt: <u>12-11-18 8:45</u>		Number of Coolers Received: <u>1</u>							
Condition of Coolers: <u>Acceptable/Unacceptable</u>		Temperature Control: <u>Present/Not Included</u>							
Cooler Custody Seals: <u>Present/Absent/NA</u>		Location Temp Taken: <u>Control/Between Samples</u>							
Container Custody Seals: <u>Present/Absent/NA</u>		Are all temperatures within project specific guidelines? <u>Yes/No/NA</u>							
Ice Present: <u>Yes/No/NA</u>		VOA Headspace Present? <u>Yes/No/NA</u>							
pH Check Performed:	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA			
	Cyanide	Yes/No/NA	TPH - 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA			
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA			
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA			
Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	
	1	C18 <u>9018</u>	<u>1</u> °C	4	C18	°C	7	C18	°C
	2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C	
Taken By: <u>Jammyn Russell</u>		Signature		<u>Tamara A Sell</u>		Printed Name		<u>12-11-18</u>	Date

CLIENT-RELATED INFORMATION

- |  |   |  |   |
|--|---|--|---|
| <input type="checkbox"/> Missing Cooler                  | <input type="checkbox"/> Missing Samples/Bottles          | <input type="checkbox"/> Incorrect Preservation    | <input type="checkbox"/> Insufficient Sample Volume |
| <input type="checkbox"/> Cooler Conditions               | <input type="checkbox"/> Broken/Leaking Samples           | <input type="checkbox"/> pH Criteria Not Met       | <input type="checkbox"/> Chain of Custody Problems  |
| <input type="checkbox"/> Missing Paperwork               | <input type="checkbox"/> Incorrect Bottle Type            | <input type="checkbox"/> Residual Chlorine Present | <input type="checkbox"/> Other:                     |
| <input type="checkbox"/> Missing/Incorrect Bottle Labels | <input type="checkbox"/> Cooler Temperatures Out of Range | <input type="checkbox"/> 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: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature





**ALS Environmental**  
**CHAIN-OF-CUSTODY**

Project / Job / Task: HS18120375		Split:	Workorder ID: 1834583	Level: ENV_LVL4	Requested Analysis	
Client: ALS Environmental (Houston)		Account: 8101		Type: 125Poly		
Comments:						
Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	
1	12/06/2018 14:00	LH18/24-SP650_120618_BIX	1834583001		Water	
2						
3						
4						
5						
6						
7						
8						
9						
10						

Preservatives

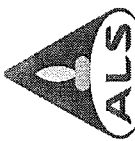
1000	
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Containers

ID(s)	Count
A	1

EPA 8950, DxD GSM

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY							SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY						
Relinquished By: (Signature)							Sample Prep / Analysis for: _____ Lab Notebook No.: _____						
Date / Time							Prepared / Analyzed by: _____ Date / Time: _____						
Received By: (Signature)							Received By: (Signature)						
Date / Time							Date / Time						
Reason for Transfer / Storage Location							Reason for Transfer / Storage Location						
Sample Login													
ALS Sample Receiving													
146													
T.B. Wood													
12/11/2018 08:48													
12/18/17:25													
12/18/16:00													
12/18/13:25													
12/11/2018 08:48													
ALS Sample Receiving													
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# Batch Worklist

HBN: 229705

Instrument:

Created: 12/18/2018 15:40



Status: WP

Analyst: T. Bosch

Batch: ELMS/ 2187  
 Rule: EPA 6850, DoD QSM Water

- Workorder: 1834583 [ENV\_LVL4]
- Workorder: 1834584 [ENV\_LVL4]
- Workorder: 1834586 [ENV\_LVL4]
- Workorder: 1834591 [ENV\_LVL4]
- Workorder: 1834871 [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	633238	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
2	633239	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	
3	633240	ICS for HBN 229705 [ELMS/2187]				ICS	3		E6850..D3Q	5311		12/26/2018	
4	633241	LMB for HBN 229705 [ELMS/2187]				LMB	3		E6850Q413Q	5311		12/26/2018	
5	633242	LCS for HBN 229705 [ELMS/2187]				LCS	3		E6850Q413Q	5311		12/26/2018	
6	1834583001	LH18/24-SP650_120618_BIX				SAMPLE	3	1834583001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
7	633243	LH18/24-SP650...(1834583001MS)				MS	3		E6850Q413Q	5311		12/26/2018	
8	633244	LH18/24-SP65...(1834583001MSD)				MSD	3		E6850Q413Q	5311		12/26/2018	
9	1834584001	LH18/24-SP140_120618				SAMPLE	3	1834584001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
10	1834586001	LH18/24-SP650_120618_BIX				SAMPLE	3	1834586001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
11	1834591001	MW-25-12062018				SAMPLE	3	1834591001-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
12	1834591002	MW-28-12062018				SAMPLE	3	1834591002-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
13	1834591003	MW-26-12062018				SAMPLE	3	1834591003-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
14	1834591004	MW-20-12062018				SAMPLE	3	1834591004-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
15	1834591005	MW-5-12062018				SAMPLE	3	1834591005-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
16	633245	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
17	633246	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	
18	1834591006	MW-19-12062018				SAMPLE	3	1834591006-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
19	1834591007	MW-8-12062018				SAMPLE	3	1834591007-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
20	1834591008	MW-6-12062018				SAMPLE	3	1834591008-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
21	1834591009	MW-12-12062018				SAMPLE	3	1834591009-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
22	1834591010	DUP-1A-12062018				FLDDUP	3	1834591010-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
23	1834871001	LH18/24-SP650_121218				SAMPLE	3	1834871001-A	E6850Q41.3	5480	1/9/2019	12/31/2018	
24	633247	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
25	633248	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	





**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**

ALS Work Order #'s & Sample #('): 1834583 (001); 1834584(001); 1834586(001);1834591(001-10);1834871 (001)  
 ELMS Batch/HBN ID: 2187 (229705)  
 Prep Date: 12/18/2018 Analysis Date: 12/19/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\DEC\19DEC18D.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 633242; Target = 5.0µg/L. ASTM type II water was used for LMB 633241.

**MS/MSD:** MS/MSD was performed on sample 1834483001 (Client ID: LH18/24-SP650\_120618\_BIX). 5.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

**COMMENTS:**

- Results reported in µg/L. Field samples 1834584001/1834591003 were analyzed and reported from 1:1,000 dilutions. Field samples 1834591006/07 were analyzed and reported from 1:10 dilutions. Field samples 1834591008-10 were analyzed and reported from 1:100 dilutions. The reporting limits have been adjusted accordingly. Sample 1834591005 failed the 50-150% method requirement for ISTD recovery. The sample was re-prepped, re-analyzed and reported.
- All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike (MS - 633243) failed QC acceptance criteria for percent recovery, biased high. This is due to the fact that the unspiked sample result of 2.028µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.
- Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\DEC\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\229705-DoD-ALS-Hstn LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

### 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.**

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
Batch(es)/SDG: ELMS: 2187 HBN: 229705		
Sample Set IDs if Applicable: 1834591 / 1834871 1834583 / 1834584 / 1834586		
<u>Calibration standards analyzed and meets criteria</u>	TB	SB
<u>Standards traceability checked and meets criteria</u>	TB	SB
<u>Standard curve coefficients evaluated and meet criteria</u>	TB	SB
<u>ICVs analyzed and meet acceptance criteria</u>	TB	SB
<u>CCVs analyzed and meet acceptance criteria</u>	TB	SB
<u>Method Blanks analyzed and meet acceptance criteria</u>	TB	SB
<u>Retention Time Windows checked</u>	TB	SB
<u>For method 8081A, Endrin/DDT Breakdown is checked for compliance</u>	—	—
<u>Surrogate recoveries checked and appropriately addressed</u>	—	—
<u>Method Preparation Blanks analyzed and meet acceptance criteria</u>	TB	SB
<u>MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed</u>	TB	SB
<u>RLVS analyzed</u>	TB	SB
<u>Preparation and analysis hold times met</u>	TB	SB
<u>Preparation deviations and re-preparations noted when performed</u>	TB	SB
<u>Analysis deviations and re-analyses noted when performed</u>	TB	SB
<u>Sample dilution factors noted on reports</u>	TB	SB
<u>Electronic records in HBN transcription accuracy and completeness checked</u>	TB	SB
<u>Preparation and analysis calculations checked</u>	TB	SB
<u>NCRs are completed as necessary NC/CAR#</u>	—	—
<u>Report forms are complete and accurate</u>	TB	SB
<u>Manual integrations checked</u>	TB	SB



## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK			Description - 6850 WKG Std 100.ug/L		
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

### Constituent

#### Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL	
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020	
MFG Lot: 218065075		Usable: No	
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Constituent

## Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK			Description - 6850 QC WKG STD 100ug/L		
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				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		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



**STANDARD REPORT**  
**Constituent**

**Solvent Standard - ASTM H2O**

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description: 6850 QC Stock STD 1,000ug/mL	
Standard: 36748	Created By: Thomas Bosch	Amount: 100 mL	
MFG: Ultra Scientific	Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020	
MFG Lot: CP-0860		Usable: Yes	
Part ID: ICC-013		Lab Lot: CLO4 QC STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730	Created By: Thomas Bosch	Amount: 25 mL			
MFG: ALS/SLC	Create Date: 09/20/2018 09:09AM	Expires: 09/20/2019			
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes			
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK			
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK			Description - Perchlorate ISTD Stock
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL



# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

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

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

Solvent: water (low TOC, < 50 ppb)

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

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

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

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

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

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

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

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





# Certificate of Analysis



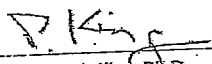
## ISO Guide 34 Reference Material

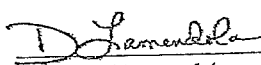
Product Number: ICC-013  
Lot Number: CP-0860

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. Lattendola  
Director of QA/RA



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New Haven, CT 06513  
USA



AccuStandard®

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

# CERTIFICATE OF ANALYSIS



43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> 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





Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

Quality Standards:

ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

## Product Information

Chemical Purity Specification:  $\geq 98\%$

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/NCSL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

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

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

Approved by: T. J. Eckersley

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

## Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LCMS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# Raw Data

Batch Report: C:\HPCHEM\1\DATA\19DEC18D\19DEC18S.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	
*	633238	C	Vial 71	1	Control	1	3.23209e6	8.395	25.48210
*	633239	L	Vial 72	1	Control	2	1.11008e5	8.452	1.07645
*	633240	I	Vial 73	1	Control	3	8.52191e4	8.388	1.07598
*	633241	L	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	633242	Q	Vial 75	1	Control	5	6.02025e5	8.424	4.68168
*	1834583001		Vial 76	1	Sample	6	1.30682e5	8.299	2.02766
*	633243	3	Vial 77	1	Sample	7	4.18728e5	8.304	6.21365
*	633244	3	Vial 78	1	Sample	8	4.70343e5	8.301	6.15892
*	1834584001		Vial 79	1	Sample	9	7.55206e5	8.404	4863.44428
*	1834586001		Vial 80	1	Sample	10	1.47417e5	8.281	2.22125
*	1834591001		Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1834591002		Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1834591003		Vial 83	1	Sample	13	1.37283e6	8.422	9673.99580
*	1834591004		Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1834591005		Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	633245	C	Vial 71	1	Control	16	3.35351e6	8.368	26.12216
*	633246	L	Vial 72	1	Control	17	1.20917e5	8.389	1.07141
*	1834591006		Vial 86	1	Sample	18	4.86119e6	8.226	77.31931
*	1834591007		Vial 87	1	Sample	19	5.52738e5	8.384	390.11734
*	1834591008		Vial 88	1	Sample	20	1.22594e6	8.392	833.53348
*	1834591009		Vial 89	1	Sample	21	1.62460e6	8.383	1220.27143
*	1834591010		Vial 90	1	Sample	22	1.23659e6	8.394	941.30723
*	1834871001		Vial 91	1	Sample	23	1.62193e5	8.278	2.59996
*	1834591006		Vial 92	1	Sample	24	6.48996e5	8.319	66.51942
*	1834591007		Vial 93	1	Sample	25	5.68899e6	8.359	441.44711
*	1834591005		Vial 94	1	Sample	26	0.00000	0.000	0.00000
*	633247	C	Vial 71	1	Control	27	3.38788e6	8.356	26.21078
*	633248	L	Vial 72	1	Control	28	1.23908e5	8.361	1.05635

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount	
*	633238	C	Vial 71	1	Control	1	9.46861e5	8.411	24.76143
*	633239	L	Vial 72	1	Control	2	3.54461e4	8.472	1.02337
*	633240	I	Vial 73	1	Control	3	3.57771e4	8.394	1.31699
*	633241	L	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	633242	Q	Vial 75	1	Control	5	1.83470e5	8.442	4.68584
*	1834583001		Vial 76	1	Sample	6	4.76828e4	8.315	2.32808
*	633243	3	Vial 77	1	Sample	7	1.49048e5	8.323	7.27217
*	633244	3	Vial 78	1	Sample	8	1.68272e5	8.319	7.24272
*	1834584001		Vial 79	1	Sample	9	2.32386e5	8.423	4917.98483
*	1834586001		Vial 80	1	Sample	10	6.04057e4	8.295	2.86912
*	1834591001		Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1834591002		Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1834591003		Vial 83	1	Sample	13	4.08001e5	8.439	9548.26549
*	1834591004		Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1834591005		Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	633245	C	Vial 71	1	Control	16	9.69700e5	8.384	25.06771
*	633246	L	Vial 72	1	Control	17	4.07711e4	8.401	1.06998
*	1834591006		Vial 86	1	Sample	18	1.46824e6	8.243	75.52262
*	1834591007		Vial 87	1	Sample	19	1.68775e5	8.403	389.27218
*	1834591008		Vial 88	1	Sample	20	3.59153e5	8.407	810.38358
*	1834591009		Vial 89	1	Sample	21	4.78620e5	8.399	1195.44501
*	1834591010		Vial 90	1	Sample	22	3.63480e5	8.413	919.03518
*	1834871001		Vial 91	1	Sample	23	6.37608e4	8.286	3.25760
*	1834591006		Vial 92	1	Sample	24	1.99622e5	8.332	67.62522
*	1834591007		Vial 93	1	Sample	25	1.66211e6	8.375	424.57193
*	1834591005		Vial 94	1	Sample	26	0.00000	0.000	0.00000
*	633247	C	Vial 71	1	Control	27	9.85047e5	8.371	25.28254
*	633248	L	Vial 72	1	Control	28	4.31054e4	8.381	1.08344

Batch Report: C:\HPCHEM\1\DATA\19DEC18D\19DEC18S.B

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	633238	C	Vial 71	1	Control	1	3.78208e5	5.00000
*	633239	L	Vial 72	1	Control	2	3.94820e5	5.00000
*	633240	I	Vial 73	1	Control	3	3.03262e5	5.00000
*	633241	L	Vial 74	1	Control	4	4.07686e5	5.00000
*	633242	Q	Vial 75	1	Control	5	4.12803e5	5.00000
*	1834583001		Vial 76	1	Sample	6	2.21386e5	5.00000
*	633243	3	Vial 77	1	Sample	7	2.13289e5	5.00000
*	633244	3	Vial 78	1	Sample	8	2.41807e5	5.00000
*	1834584001		Vial 79	1	Sample	9	4.97457e5	5000.00000
*	1834586001		Vial 80	1	Sample	10	2.25638e5	5.00000
*	1834591001		Vial 81	1	Sample	11	1.98333e5	5.00000
*	1834591002		Vial 82	1	Sample	12	1.94131e5	5.00000
*	1834591003		Vial 83	1	Sample	13	4.40927e5	5000.00000
*	1834591004		Vial 84	1	Sample	14	2.66698e5	5.00000
*	1834591005		Vial 85	1	Sample	15	1.76359e5	5.00000
*	633245	C	Vial 71	1	Control	16	3.82304e5	5.00000
*	633246	L	Vial 72	1	Control	17	4.32578e5	5.00000
*	1834591006		Vial 86	1	Sample	18	1.71171e5	5.00000
*	1834591007		Vial 87	1	Sample	19	4.59757e5	500.00000
*	1834591008		Vial 88	1	Sample	20	4.59696e5	500.00000
*	1834591009		Vial 89	1	Sample	21	4.09950e5	500.00000
*	1834591010		Vial 90	1	Sample	22	4.08616e5	500.00000
*	1834871001		Vial 91	1	Sample	23	2.08799e5	5.00000
*	1834591006		Vial 92	1	Sample	24	3.07855e5	50.00000
*	1834591007		Vial 93	1	Sample	25	3.71021e5	50.00000
*	1834591005		Vial 94	1	Sample	26	2.29204e5	5.00000
*	633247	C	Vial 71	1	Control	27	3.84847e5	5.00000
*	633248	L	Vial 72	1	Control	28	4.51163e5	5.00000

\*\*\* End of Report \*\*\*

equence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\DEC\19DEC18D.S

Sequence Table:

Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
====	=====	=====	=====	===	=====	=====	=====
1	Vial 71	633238	CCV@25	CLO4-AQN	1		Ctrl Samp
2	Vial 72	633239	LODV@1.	CLO4-AQN	1		Ctrl Samp
3	Vial 73	633240	ICS@1.0	CLO4-AQN	1		Ctrl Samp
4	Vial 74	633241	LMB	CLO4-AQN	1		Ctrl Samp
5	Vial 75	633242	QC@5.0	CLO4-AQN	1		Ctrl Samp
6	Vial 76	1834583001		CLO4-AQN	1		Sample
7	Vial 77	633243	345831S	CLO4-AQN	1		Sample
8	Vial 78	633244	345831D	CLO4-AQN	1		Sample
9	Vial 79	1834584001	1K	CLO4-AQN	1		Sample
10	Vial 80	1834586001		CLO4-AQN	1		Sample
11	Vial 81	1834591001		CLO4-AQN	1		Sample
12	Vial 82	1834591002		CLO4-AQN	1		Sample
13	Vial 83	1834591003	1K	CLO4-AQN	1		Sample
14	Vial 84	1834591004		CLO4-AQN	1		Sample
15	Vial 85	1834591005		CLO4-AQN	1		Sample
16	Vial 71	633245	CCV@25	CLO4-AQN	1		Ctrl Samp
17	Vial 72	633246	LODV@1.	CLO4-AQN	1		Ctrl Samp
18	Vial 86	1834591006		CLO4-AQN	1		Sample
19	Vial 87	1834591007	100	CLO4-AQN	1		Sample
20	Vial 88	1834591008	100	CLO4-AQN	1		Sample
21	Vial 89	1834591009	100	CLO4-AQN	1		Sample
22	Vial 90	1834591010	100	CLO4-AQN	1		Sample
23	Vial 91	1834871001		CLO4-AQN	1		Sample
24	Vial 92	1834591006	10X	CLO4-AQN	1		Sample
25	Vial 93	1834591007	10X	CLO4-AQN	1		Sample
26	Vial 94	1834591005	RE	CLO4-AQN	1		Sample
27	Vial 71	633247	CCV@25	CLO4-AQN	1		Ctrl Samp
28	Vial 72	633248	LODV@1.	CLO4-AQN	1		Ctrl Samp

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD01.D

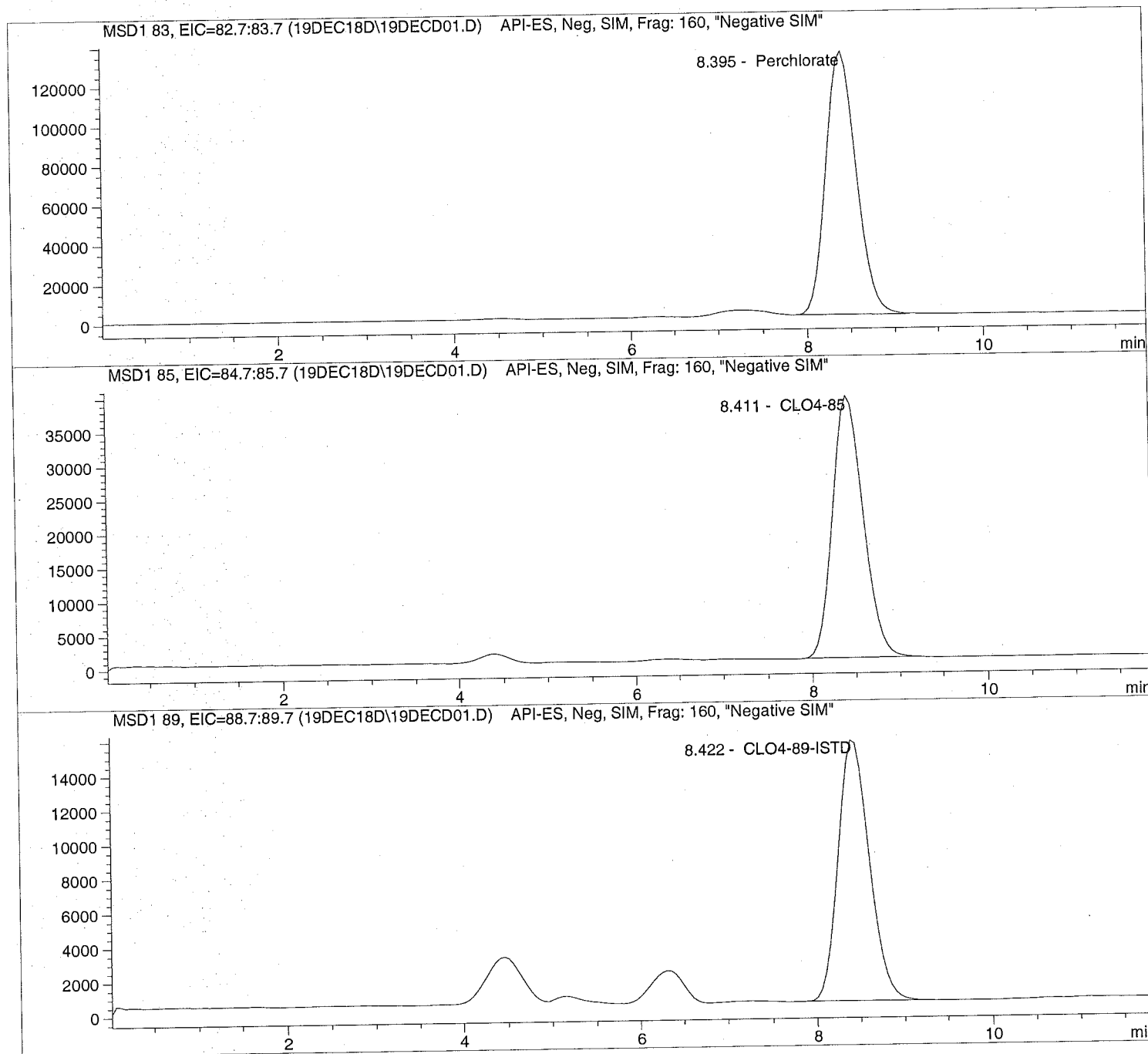
Sample Name: 633238 CCV@25

Injection Date: 12/19/2018 08:25:30  
Sample Name: 633238 CCV@25  
Acq Operator: TNB

Seq Line: 1  
Location: Vial 71  
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\19DEC18D\19DECD01.D

Sample Name: 633238 CCV@25

```

=====
Injection Date: 12/19/2018 08:25:30      Seq Line: 1
Sample Name: 633238 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
8.395	VBA	3232085.0	25.4821	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.411	PBA	946861.3	24.7614	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.422	PBA	378208.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

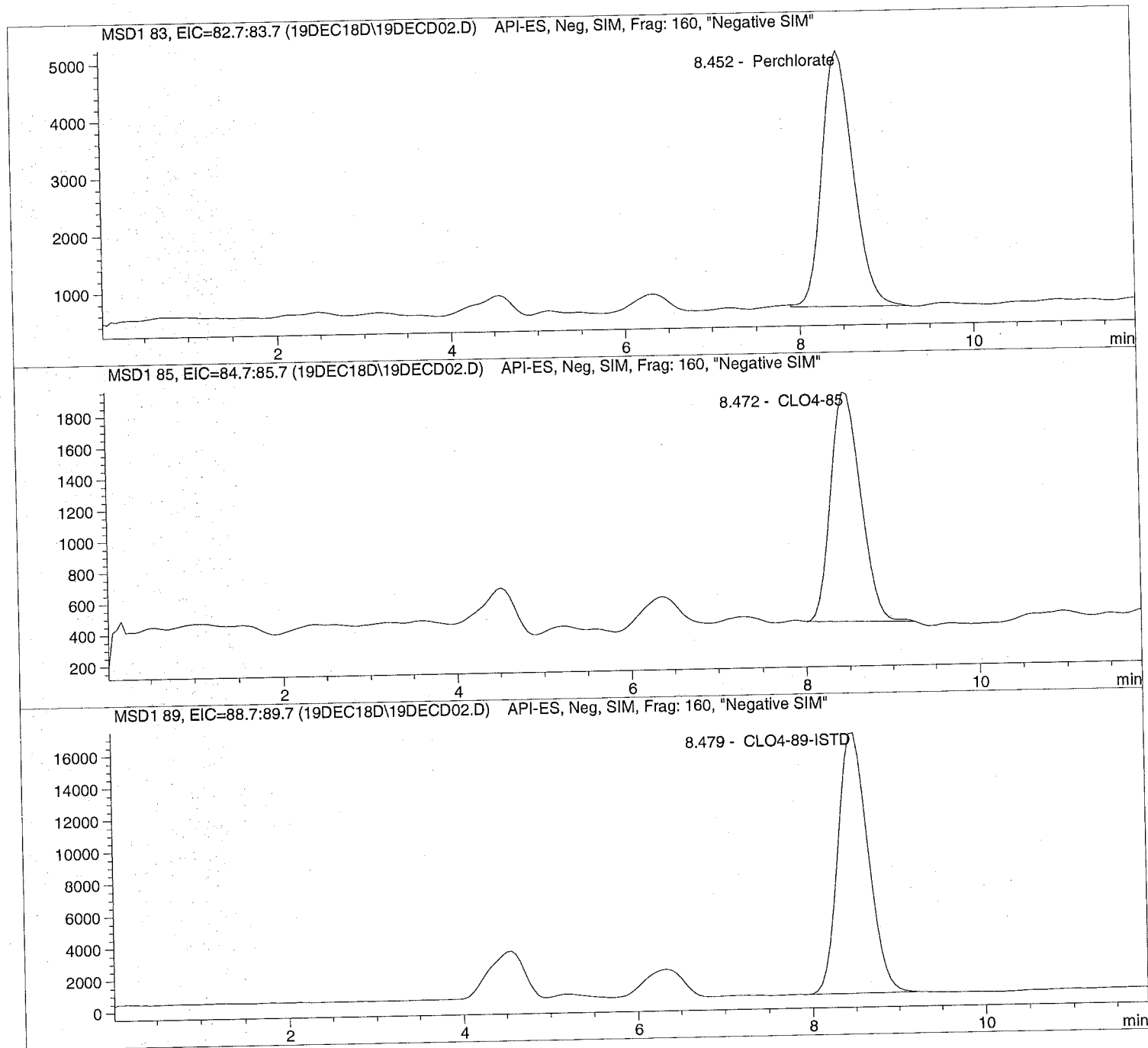
```

Injection Date: 12/19/2018 08:40:55  
Sample Name: 633239 LODV@1.  
Acq Operator: TNB

Seq Line: 2  
Location: Vial 72  
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





Injection Date: 12/19/2018 08:40:55      Seq Line: 2  
Sample Name: 633239 LODV@1.      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: 1.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.452	BBA	111007.7	1.0764	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.472	PBA	35446.1	1.0234	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.479	PBA	394819.7	5.0000	CLO4-89-ISTD

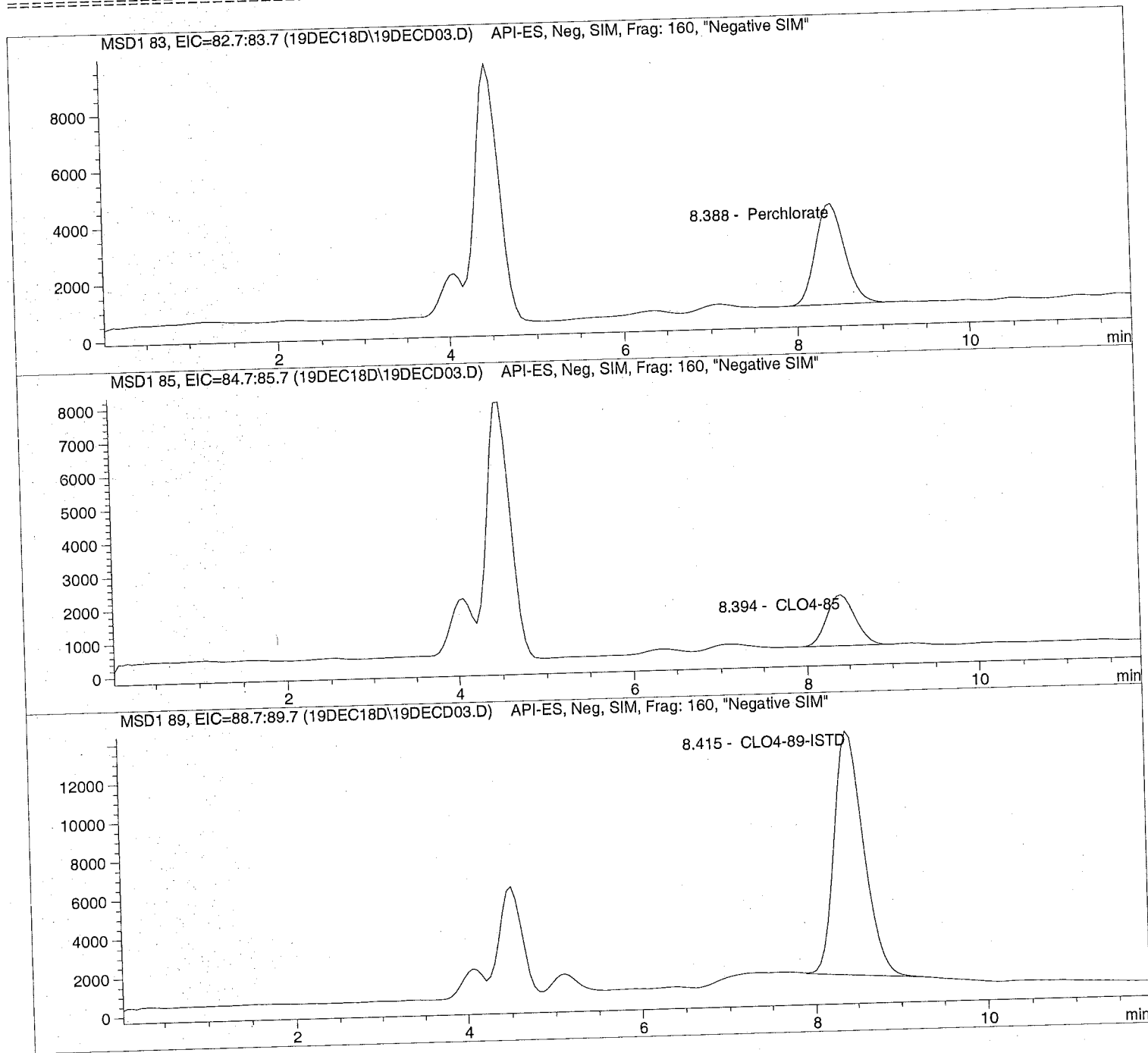
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 08:54:37  
Sample Name: 633240 ICS@1.0  
Acq Operator: TNB

Seq Line: 3  
Location: Vial 73  
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\19DEC18D\19DECD03.D

Sample Name: 633240 ICS@1.0

```

=====
Injection Date: 12/19/2018 08:54:37      Seq Line: 3
Sample Name: 633240 ICS@1.0             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: 1.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.388	PBA	85219.1	1.0760	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.394	PBA	35777.1	1.3170	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.415	BBA	303262.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD04.D

Sample Name: 633241 LMB

Injection Date: 12/19/2018 09:08:25

Seq Line: 4

Sample Name: 633241 LMB

Location: Vial 74

Acq Operator: TNB

Inj. No.: 1

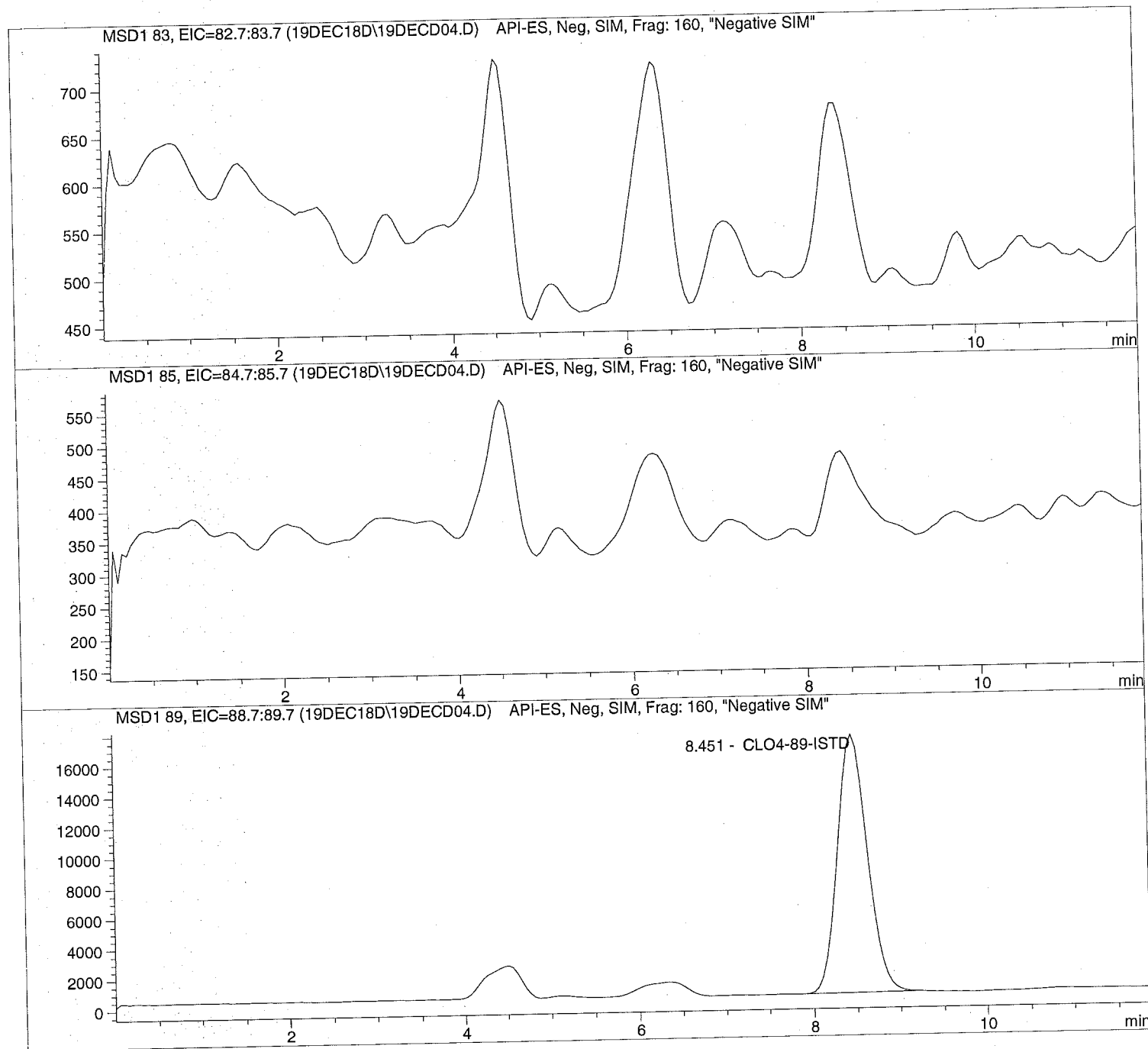
Inj. Vol.: 30 µl

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\19DEC18D\19DECD04.D

Sample Name: 633241 LMB

```

=====
Injection Date: 12/19/2018 09:08:25      Seq Line: 4
Sample Name: 633241 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
8.451	PBA	407685.9	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD05.D

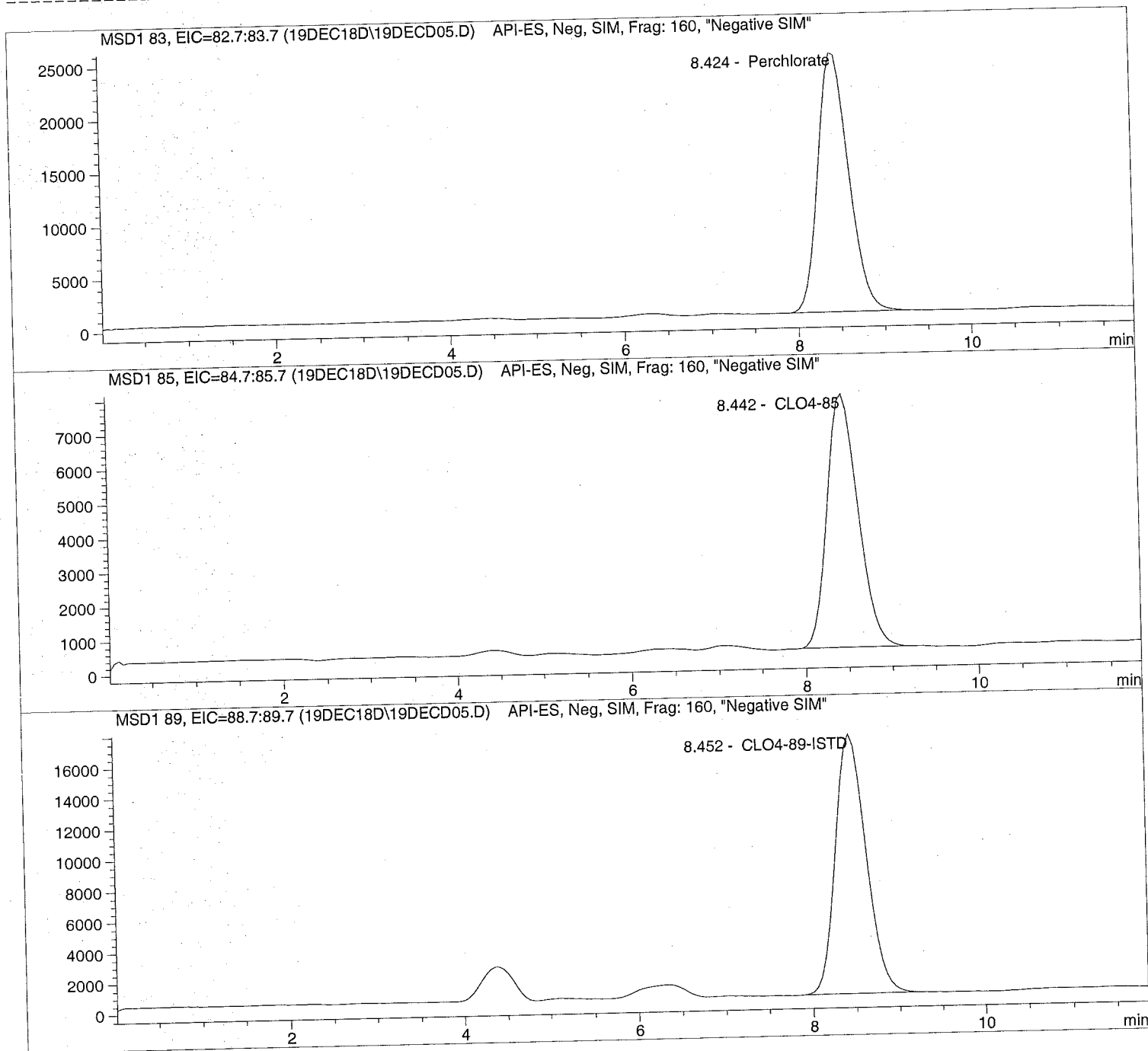
Sample Name: 633242 QC@5.0

Injection Date: 12/19/2018 09:22:11  
Sample Name: 633242 QC@5.0  
Acq Operator: TNB

Seq Line: 5  
Location: Vial 75  
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\19DEC18D\19DECD05.D Sample Name: 633242 QC@5.0

```

=====
Injection Date: 12/19/2018 09:22:11      Seq Line: 5
Sample Name: 633242 QC@5.0              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: 5.000
=====

```

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.424	PBA	602025.1	4.6817	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.442	BBA	183470.3	4.6858	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.452	BBA	412803.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD06.D

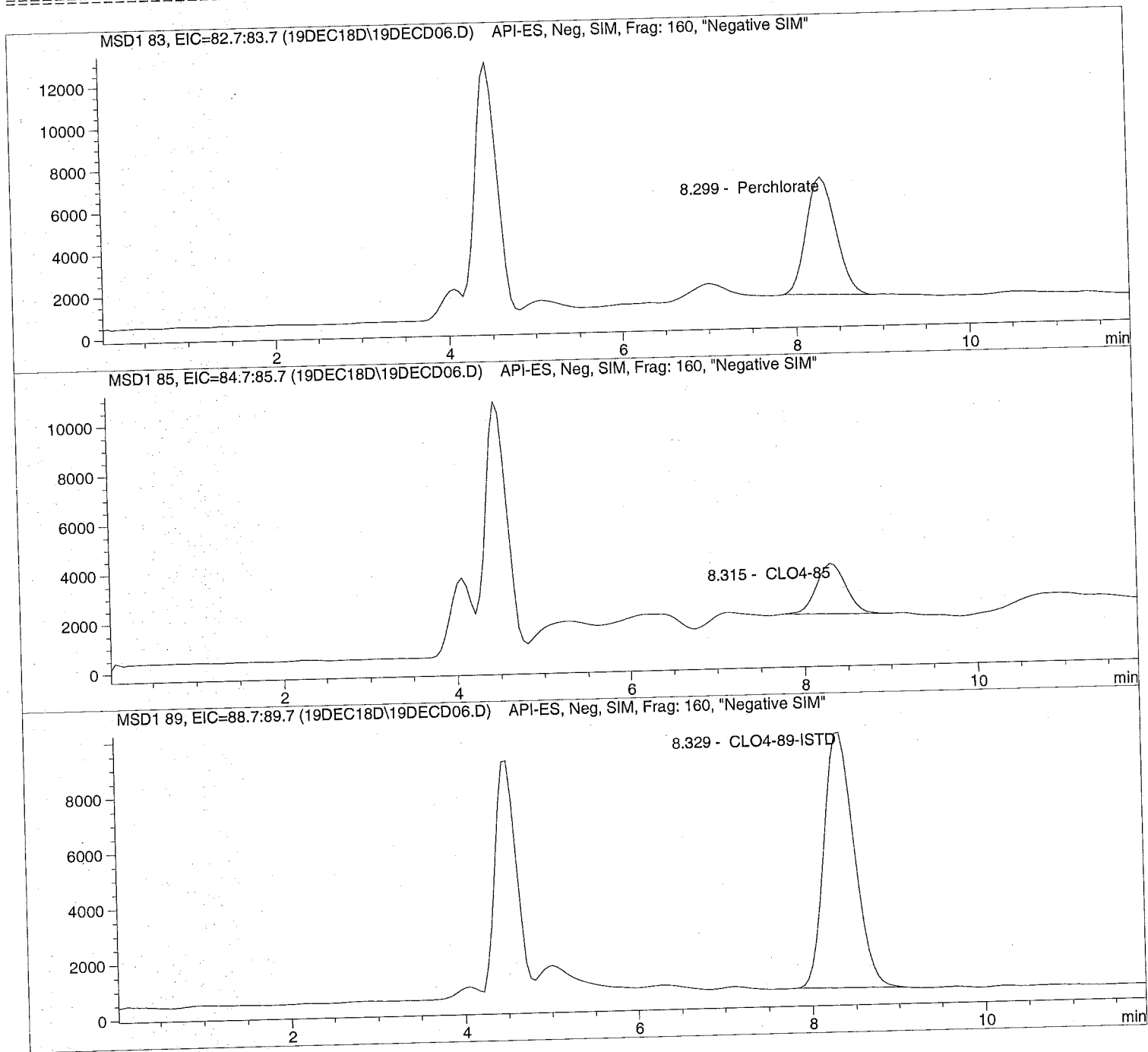
Sample Name: 1834583001

Injection Date: 12/19/2018 09:37:12  
Sample Name: 1834583001  
Acq Operator: TNB

Seq Line: 6  
Location: Vial 76  
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\19DEC18D\19DECD06.D

Sample Name: 1834583001

```

=====
Injection Date: 12/19/2018 09:37:12      Seq Line:          6
Sample Name:    1834583001                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
8.299	PBA	130682.0	2.0277	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.315	BBA	47682.8	2.3281	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	221385.7	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

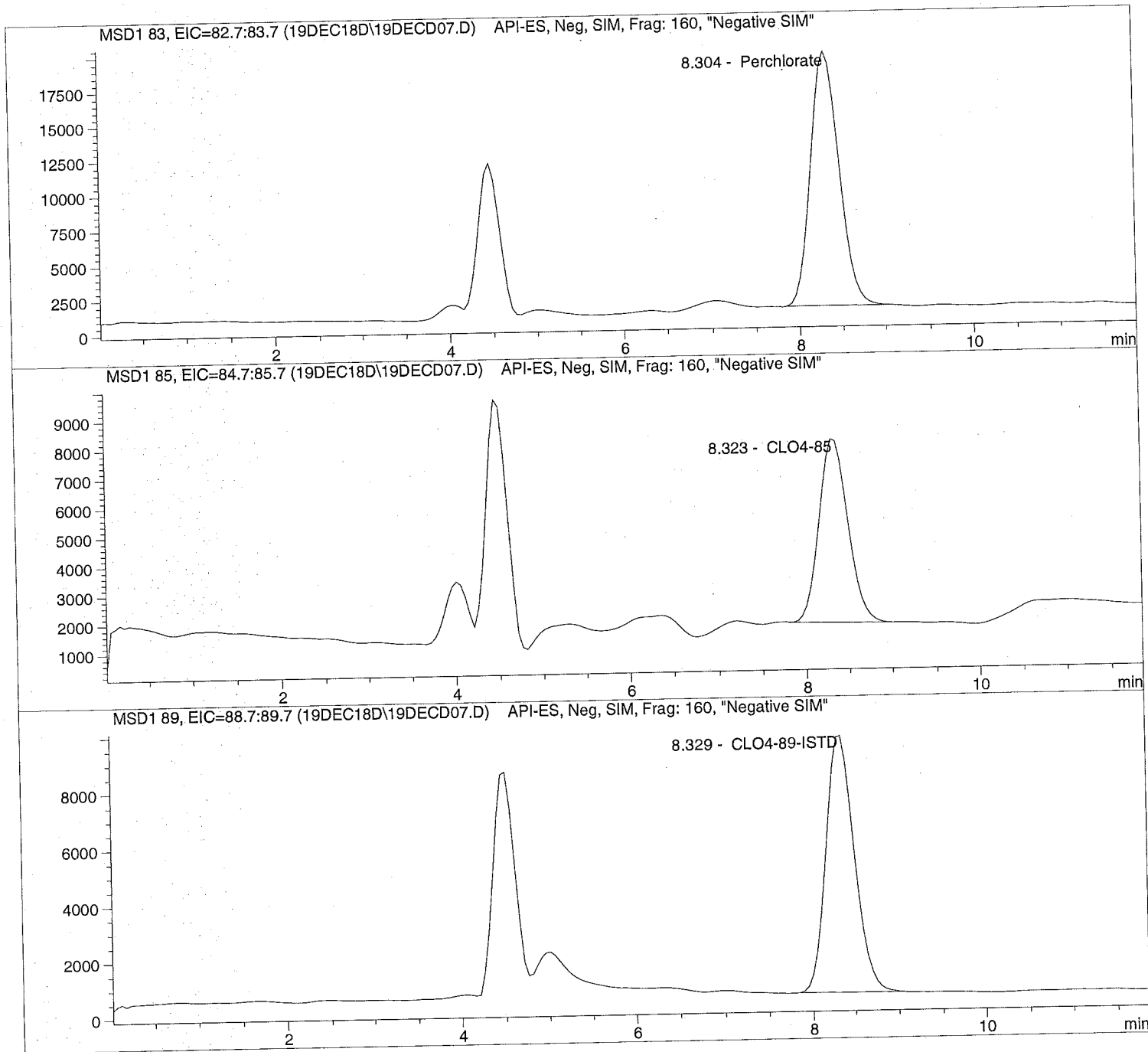
```

Injection Date: 12/19/2018 09:50:58  
Sample Name: 633243 345831S  
Acq Operator: TNB

Seq Line: 7  
Location: Vial 77  
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\19DEC18D\19DECD07.D

Sample Name: 633243 345831S

```

=====
Injection Date: 12/19/2018 09:50:58      Seq Line: 7
Sample Name: 633243 345831S              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
8.304	PBA	418727.5	6.2136	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.323	BBA	149047.9	7.2722	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	213288.8	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD08.D

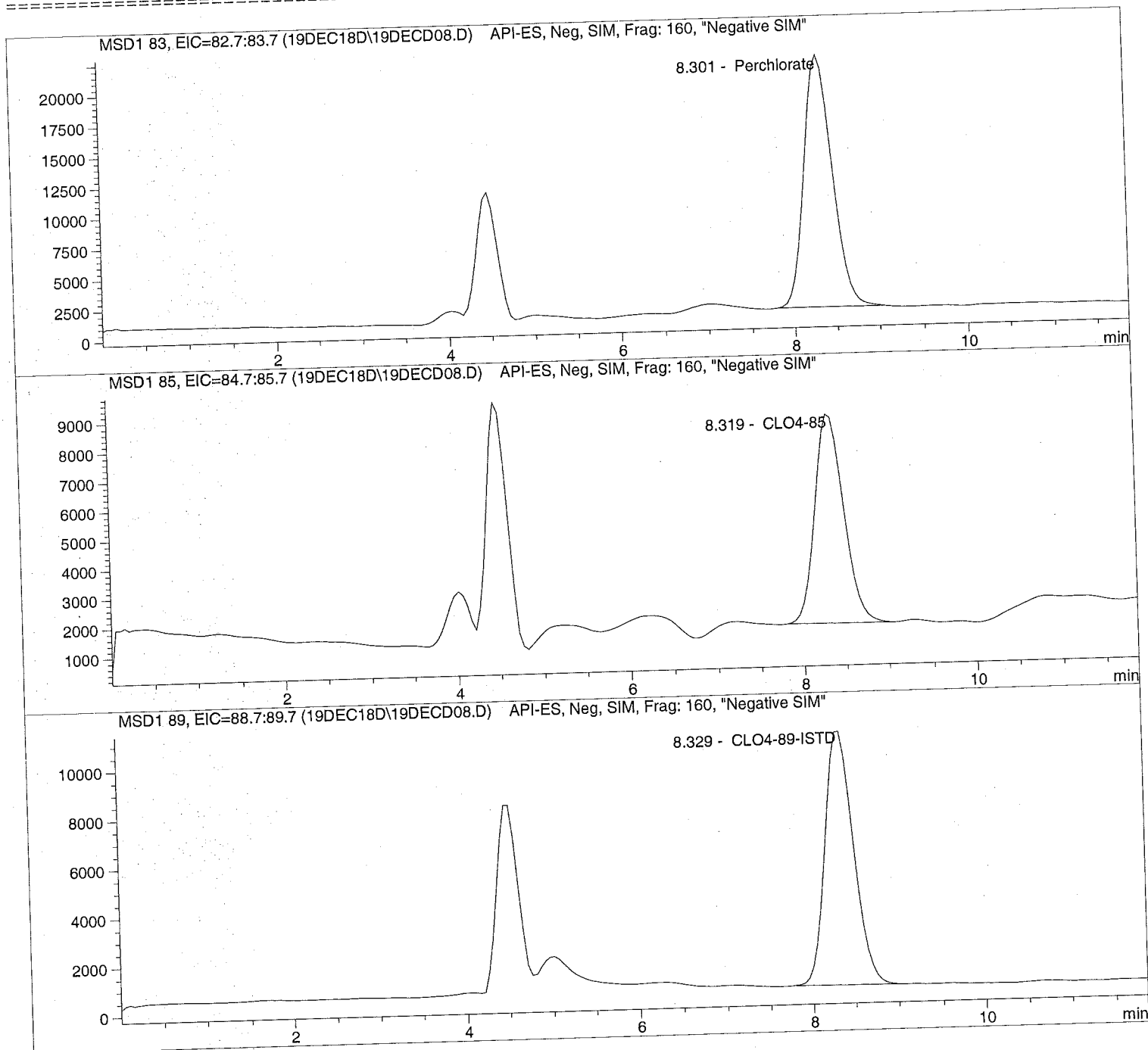
Sample Name: 633244 345831D

Injection Date: 12/19/2018 10:04:44  
Sample Name: 633244 345831D  
Acq Operator: TNB

Seq Line: 8  
Location: Vial 78  
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\19DEC18D\19DECD08.D Sample Name: 633244 345831D

```

=====
Injection Date: 12/19/2018 10:04:44      Seq Line:      8
Sample Name:    633244 345831D          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
8.301	PBA	470343.0	6.1589	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.319	PBA	168272.1	7.2427	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	241807.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD09.D

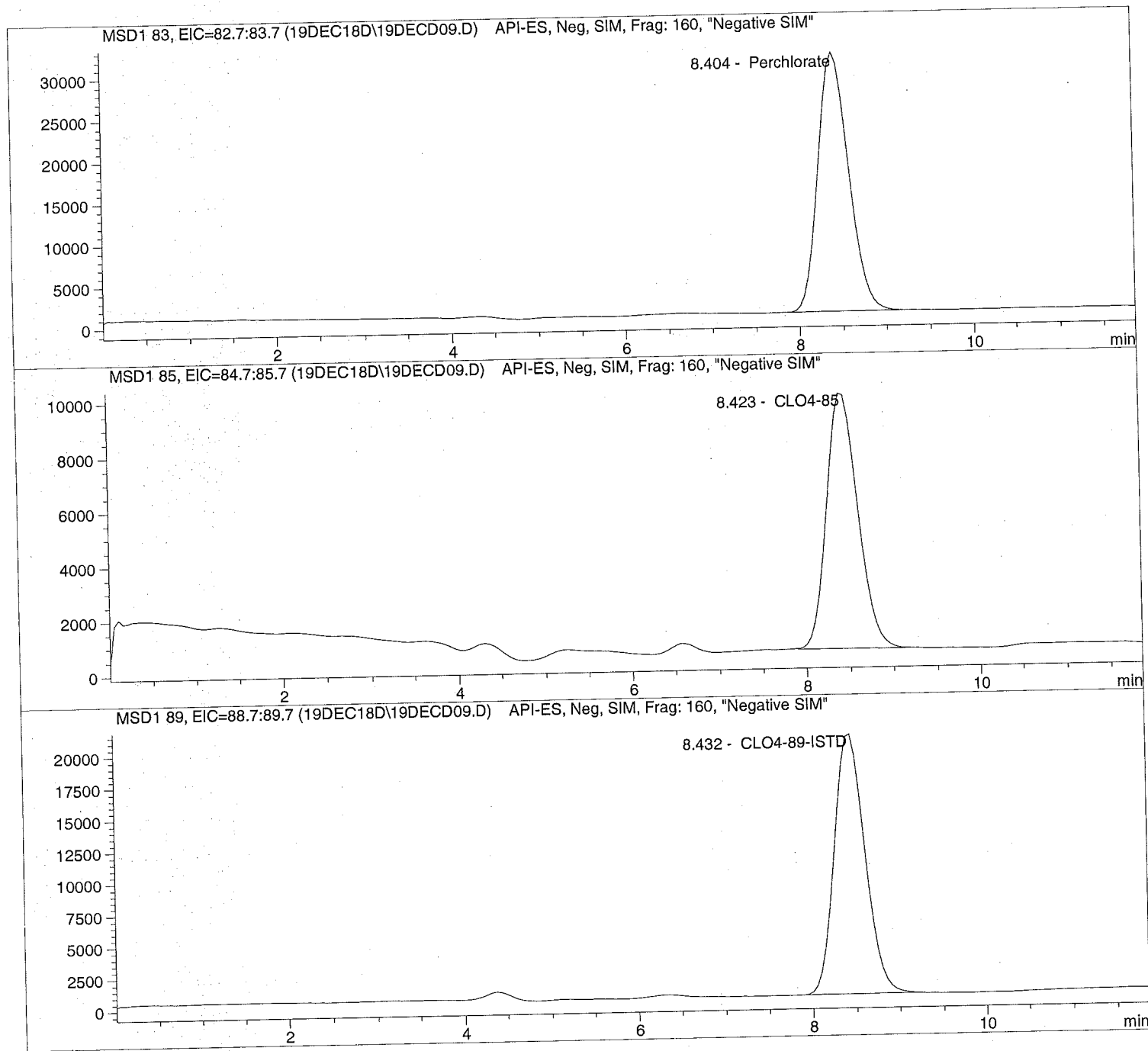
Sample Name: 1834584001 1K

Injection Date: 12/19/2018 10:18:30  
Sample Name: 1834584001 1K  
Acq Operator: TNB

Seq Line: 9  
Location: Vial 79  
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\19DEC18D\19DECD09.D

Sample Name: 1834584001 1K

```

=====
Injection Date: 12/19/2018 10:18:30      Seq Line:          9
Sample Name:    1834584001 1K             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:      1000.000000
Sample Amount: 0.000
    
```

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.404	PBA	755206.2	4863.4443	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.423	BBA	232386.3	4917.9848	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.432	PBA	497457.1	5000.0000	CLO4-89-ISTD

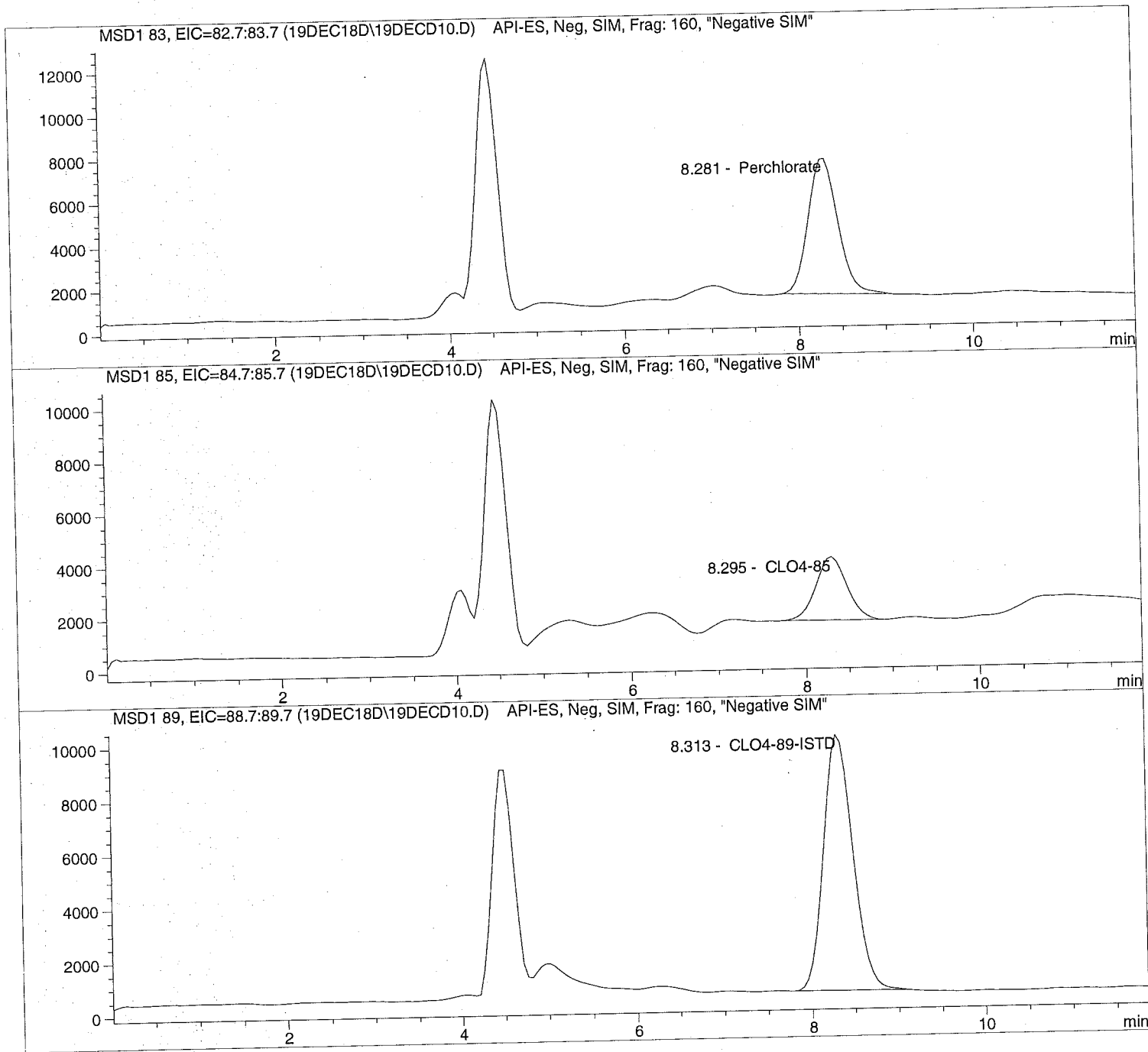
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 10:32:20  
Sample Name: 1834586001  
Acq Operator: TNB

Seq Line: 10  
Location: Vial 80  
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\19DEC18\19DECD10.D

Sample Name: 1834586001

```

=====
Injection Date: 12/19/2018 10:32:20      Seq Line:          10
Sample Name:    1834586001                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
8.281	PBA	147417.2	2.2212	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.295	PBA	60405.7	2.8691	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.313	PBA	225638.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD11.D

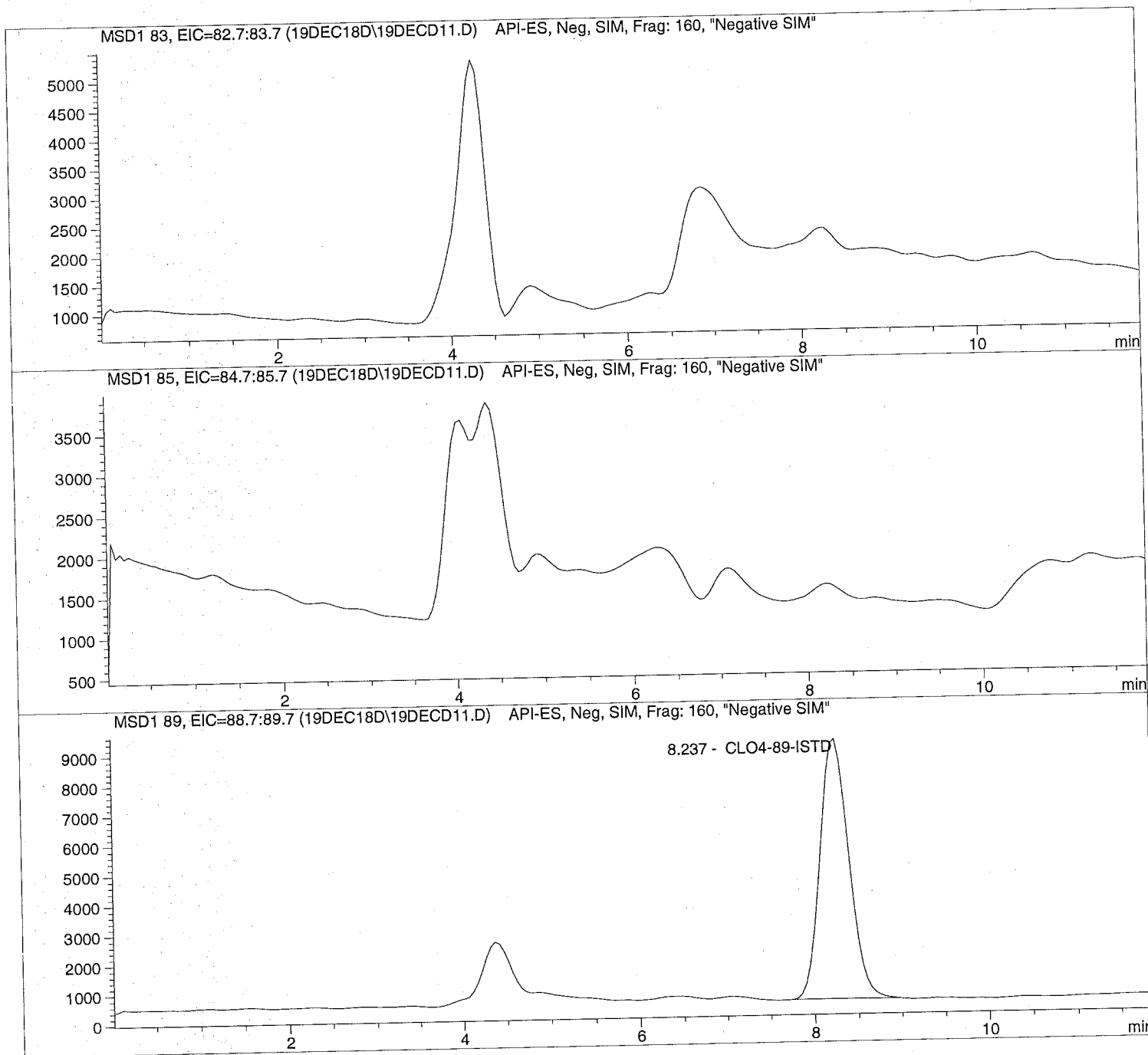
Sample Name: 1834591001

Injection Date: 12/19/2018 10:46:05  
Sample Name: 1834591001  
Acq Operator: TNB

Seq Line: 11  
Location: Vial 81  
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\19DEC18D\19DECD11.D

Sample Name: 1834591001

```

=====
Injection Date: 12/19/2018 10:46:05      Seq Line:          11
Sample Name:   1834591001                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:       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
8.237	PBA	198333.0	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD12.D

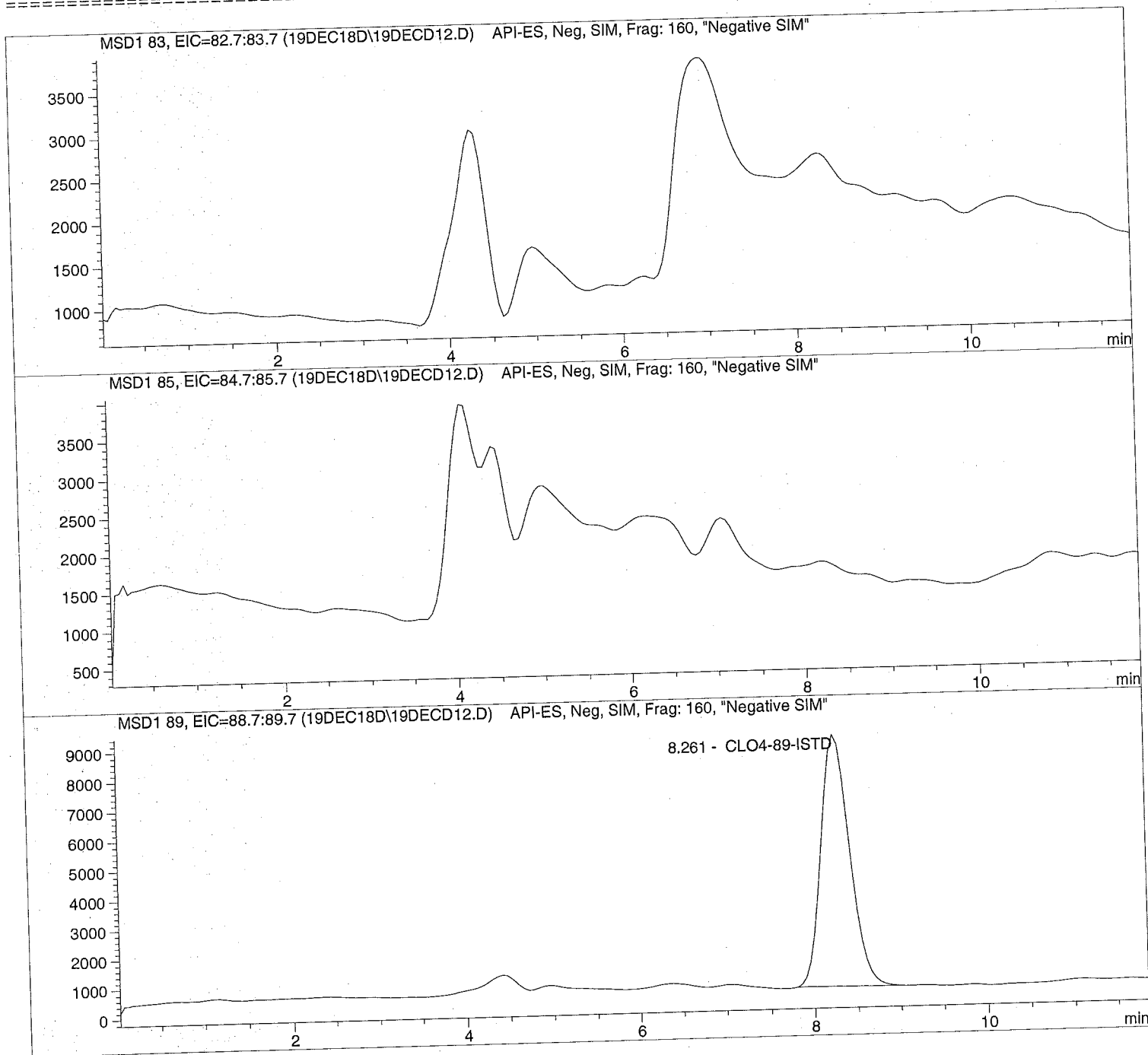
Sample Name: 1834591002

Injection Date: 12/19/2018 10:59:50  
Sample Name: 1834591002  
Acq Operator: TNB

Seq Line: 12  
Location: Vial 82  
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\19DEC18D\19DECD12.D

Sample Name: 1834591002

```

=====
Injection Date: 12/19/2018 10:59:50      Seq Line:          12
Sample Name:    1834591002                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
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
8.261	PBA	194131.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

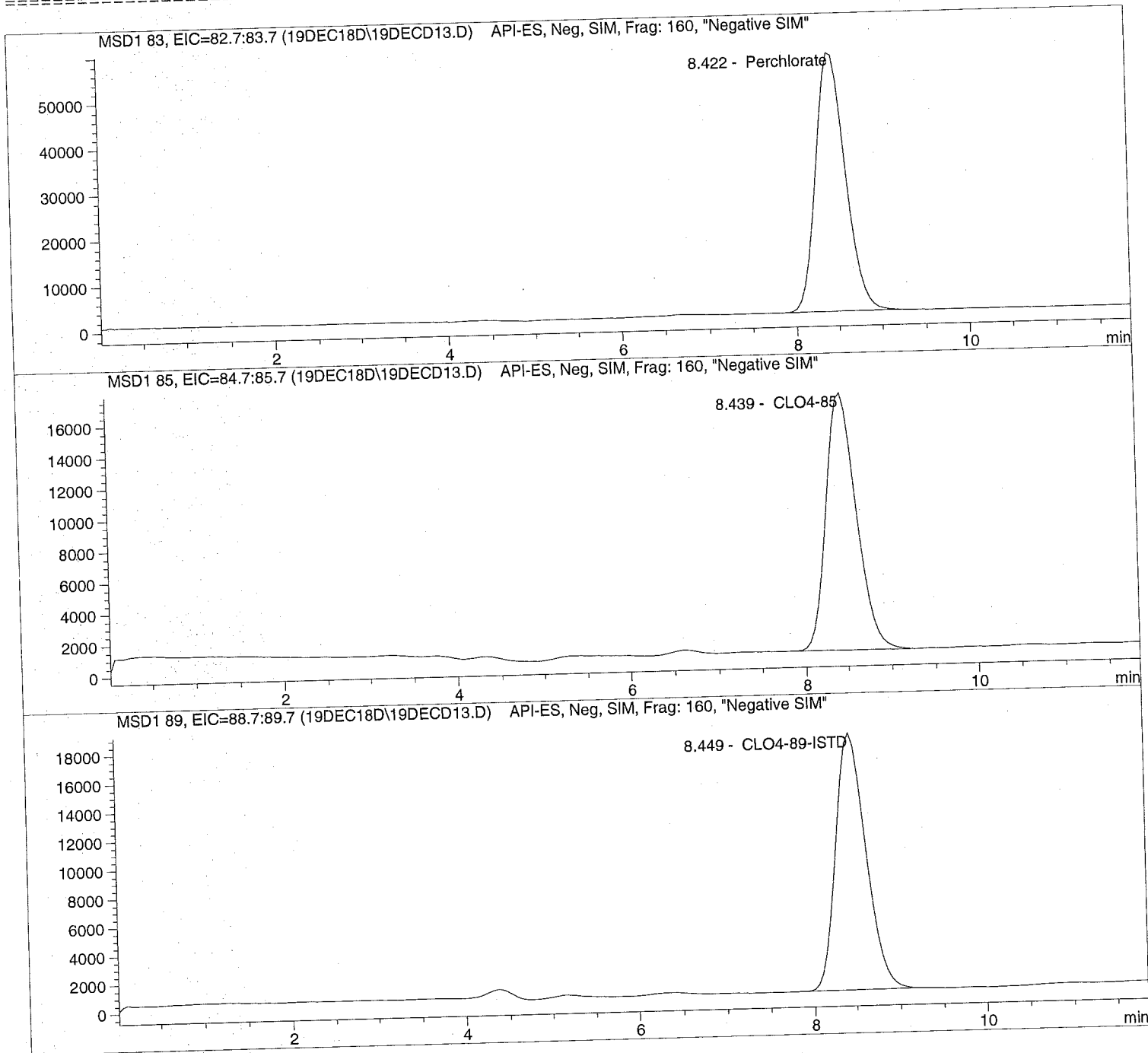
```

Injection Date: 12/19/2018 11:13:33  
Sample Name: 1834591003 1K  
Acq Operator: TNB

Seq Line: 13  
Location: Vial 83  
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



Injection Date: 12/19/2018 11:13:33 Seq Line: 13  
Sample Name: 1834591003 1K 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: 1000.000000  
Sample Amount: 0.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.422	PBA	1372828.2	9673.9958	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.439	BBA	408001.0	9548.2655	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.449	PBA	440927.1	5000.0000	CLO4-89-ISTD

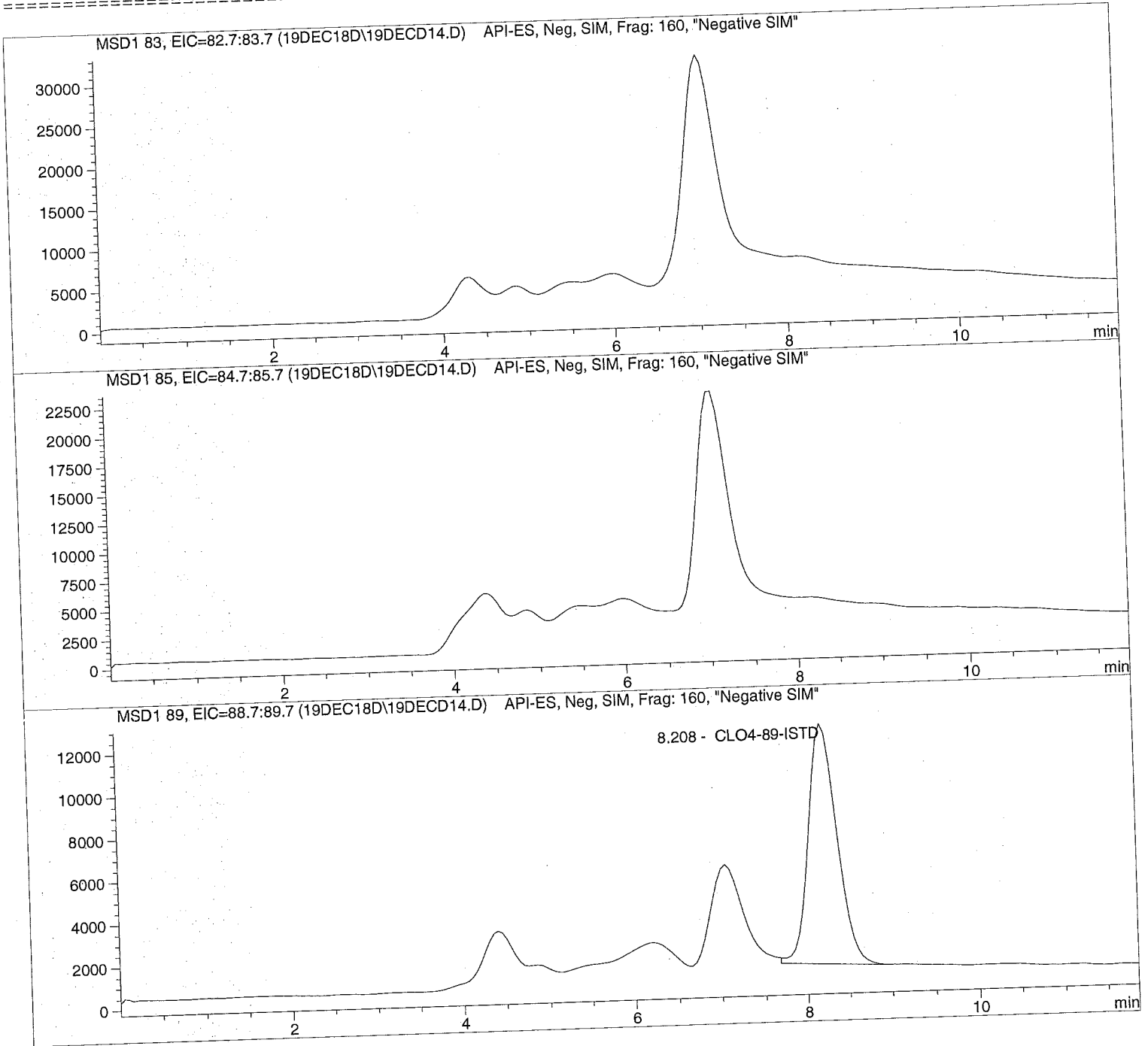
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 11:27:19  
Sample Name: 1834591004  
Acq Operator: TNB

Seq Line: 14  
Location: Vial 84  
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\19DEC18D\19DECD14.D

Sample Name: 1834591004

```

=====
Injection Date: 12/19/2018 11:27:19      Seq Line: 14
Sample Name: 1834591004                  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: 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
8.208	BBA	266698.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

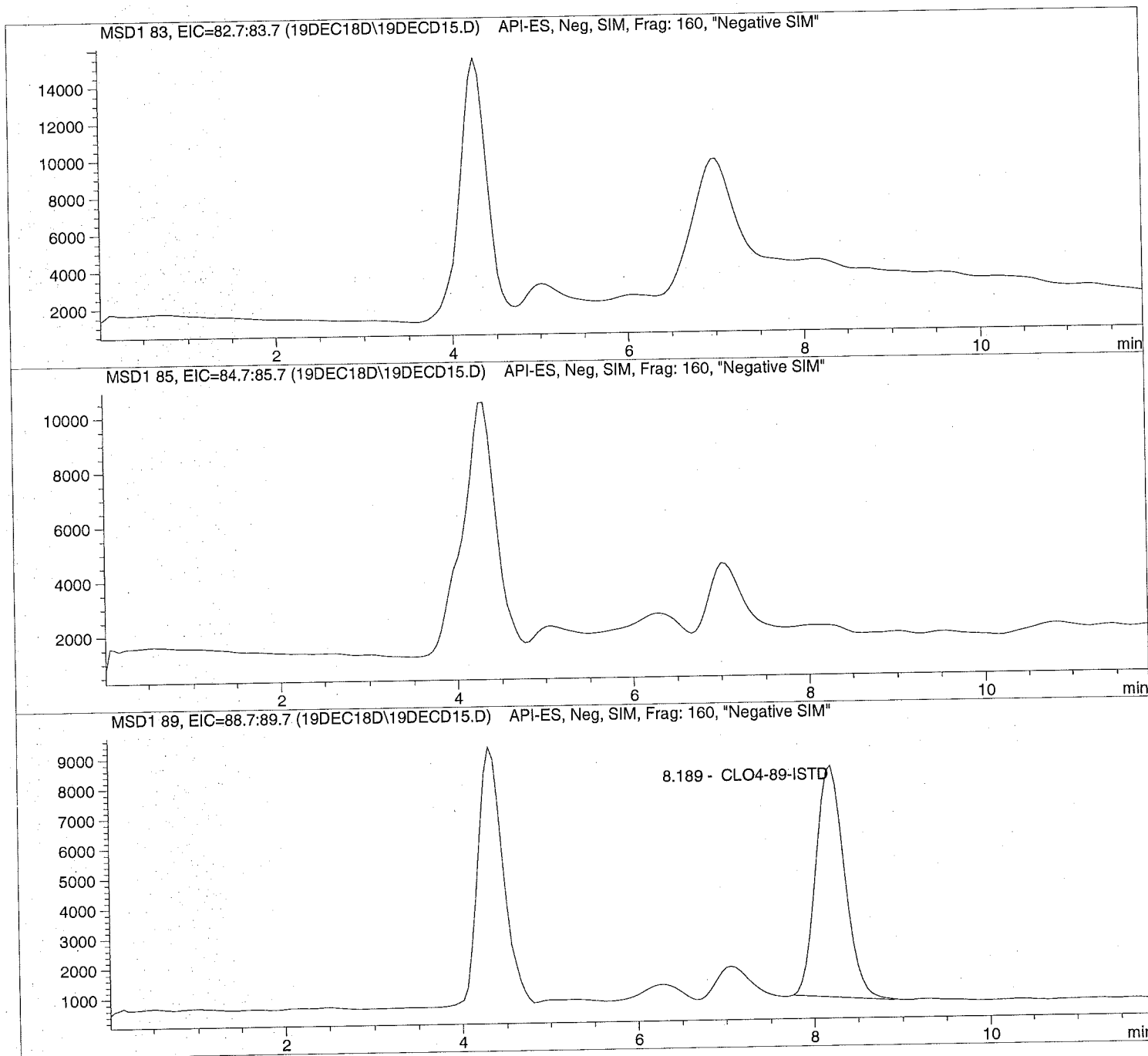
```

Injection Date: 12/19/2018 11:41:03  
Sample Name: 1834591005  
Acq Operator: TNB

Seq Line: 15  
Location: Vial 85  
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\19DEC18D\19DECD15.D

Sample Name: 1834591005

Injection Date: 12/19/2018 11:41:03  
 Sample Name: 1834591005  
 Acq Operator: TNB

Seq Line: 15  
 Location: Vial 85  
 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
8.189	PBA	176359.5	5.0000	CLO4-89-ISTD

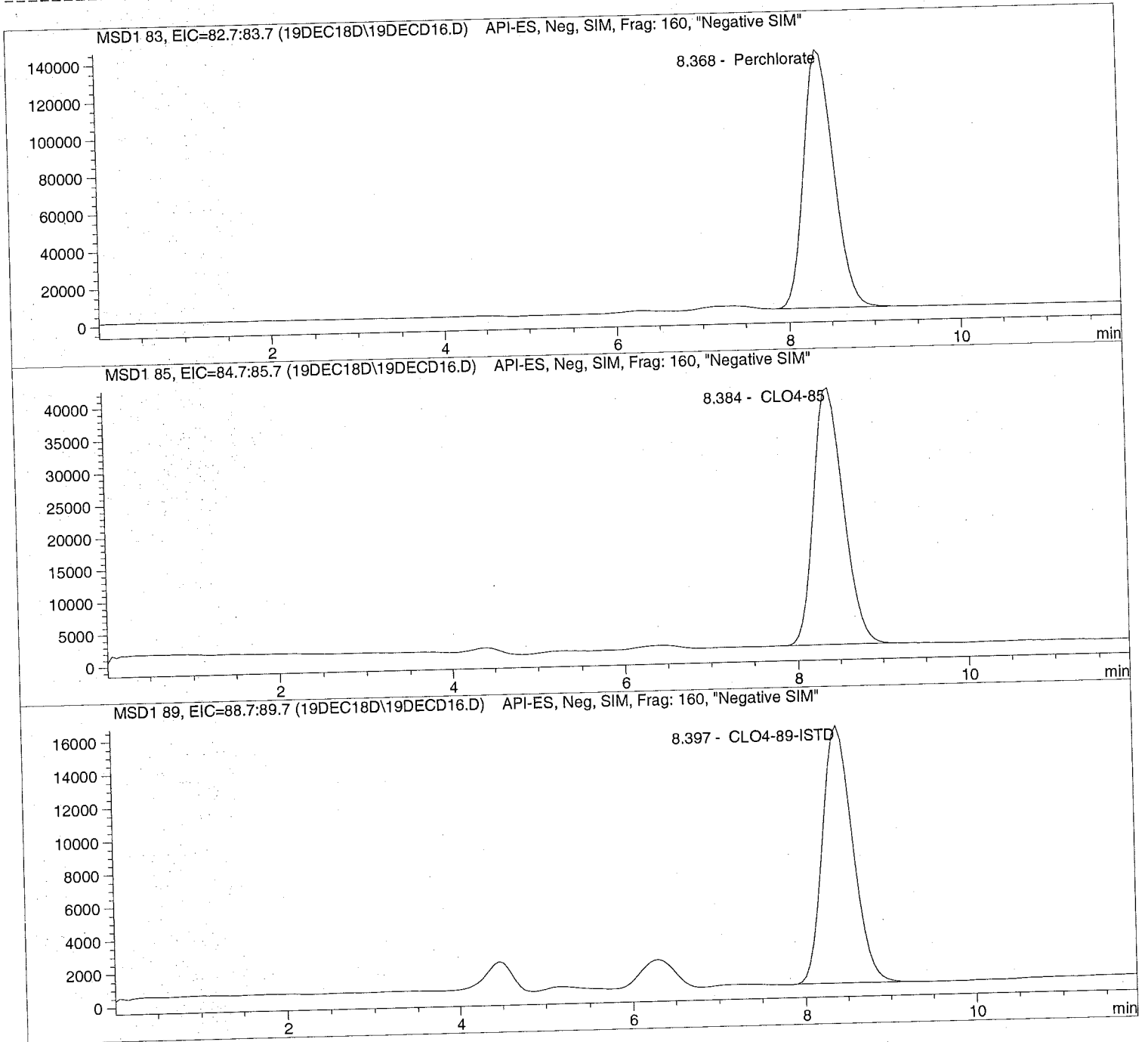
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 11:54:49  
Sample Name: 633245 CCV@25  
Acq Operator: TNB

Seq Line: 16  
Location: Vial 71  
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\19DEC18D\19DECD16.D

Sample Name: 633245 CCV@25

Injection Date: 12/19/2018 11:54:49  
 Sample Name: 633245 CCV@25  
 Acq Operator: TNB

Seq Line: 16  
 Location: Vial 71  
 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
8.368	VBA	3353514.5	26.1222	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.384	PBA	969700.1	25.0677	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.397	PBA	382303.9	5.0000	CLO4-89-ISTD

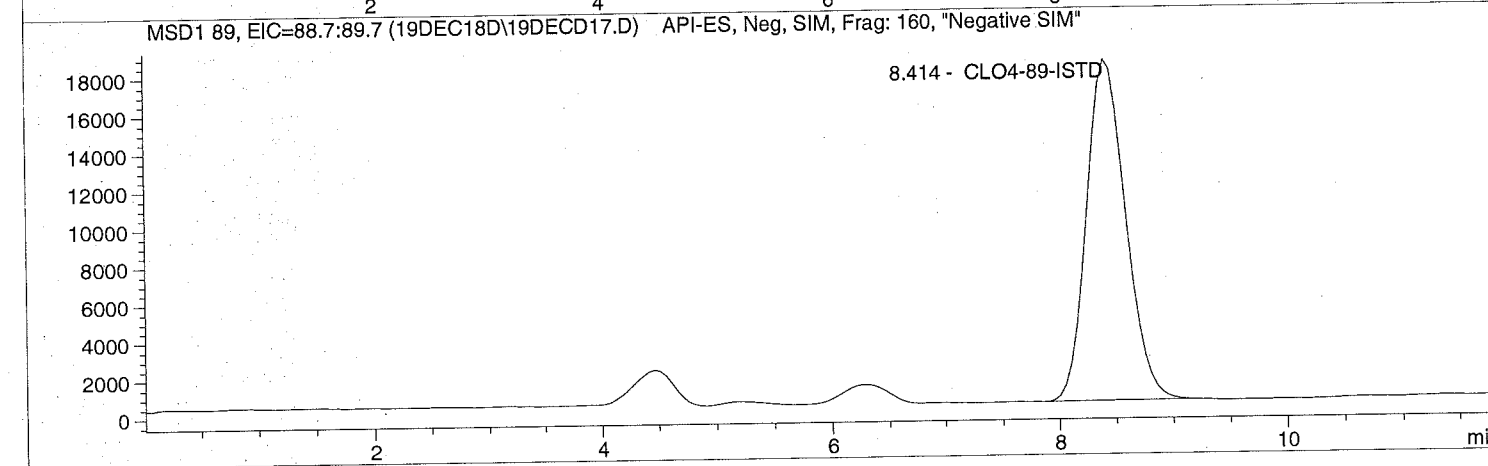
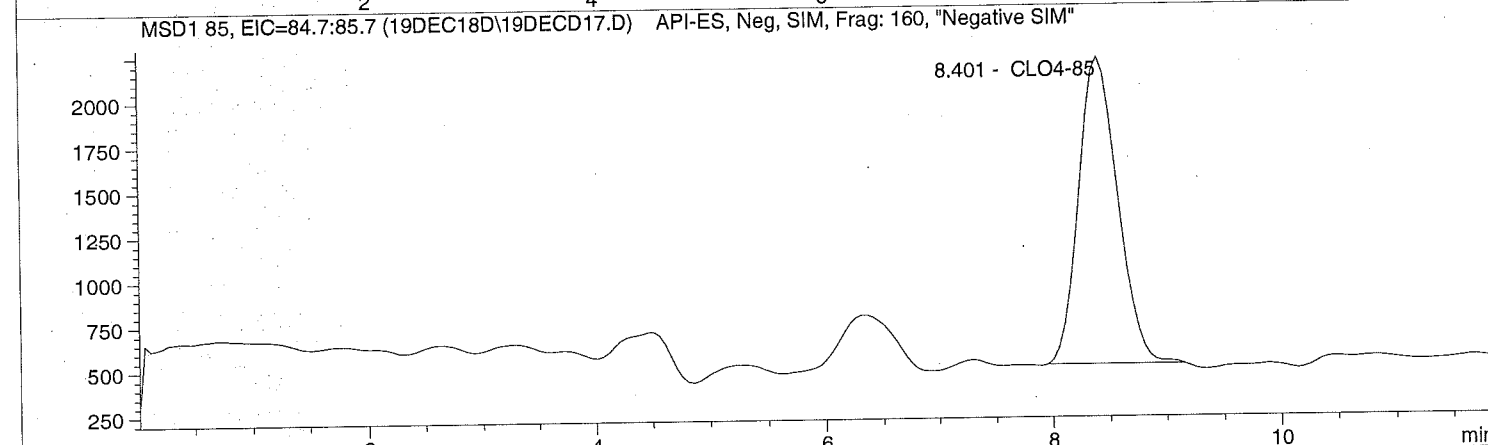
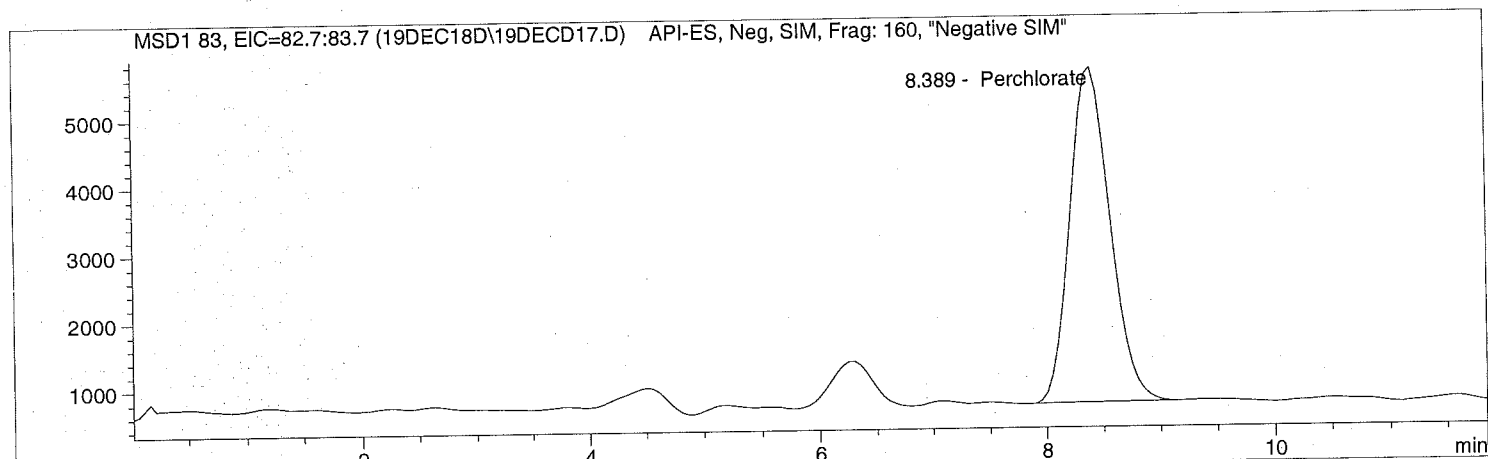
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 12:08:33  
Sample Name: 633246 LODV@1.  
Acq Operator: TNB

Seq Line: 17  
Location: Vial 72  
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\19DEC18D\19DECD17.D Sample Name: 633246 LODV@1.

```

=====
Injection Date: 12/19/2018 12:08:33      Seq Line:          17
Sample Name:    633246  LODV@1.           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:  1.000
=====

```

```

=====
                          LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.389	PBA	120916.8	1.0714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.401	PBA	40771.1	1.0700	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.414	PBA	432577.5	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

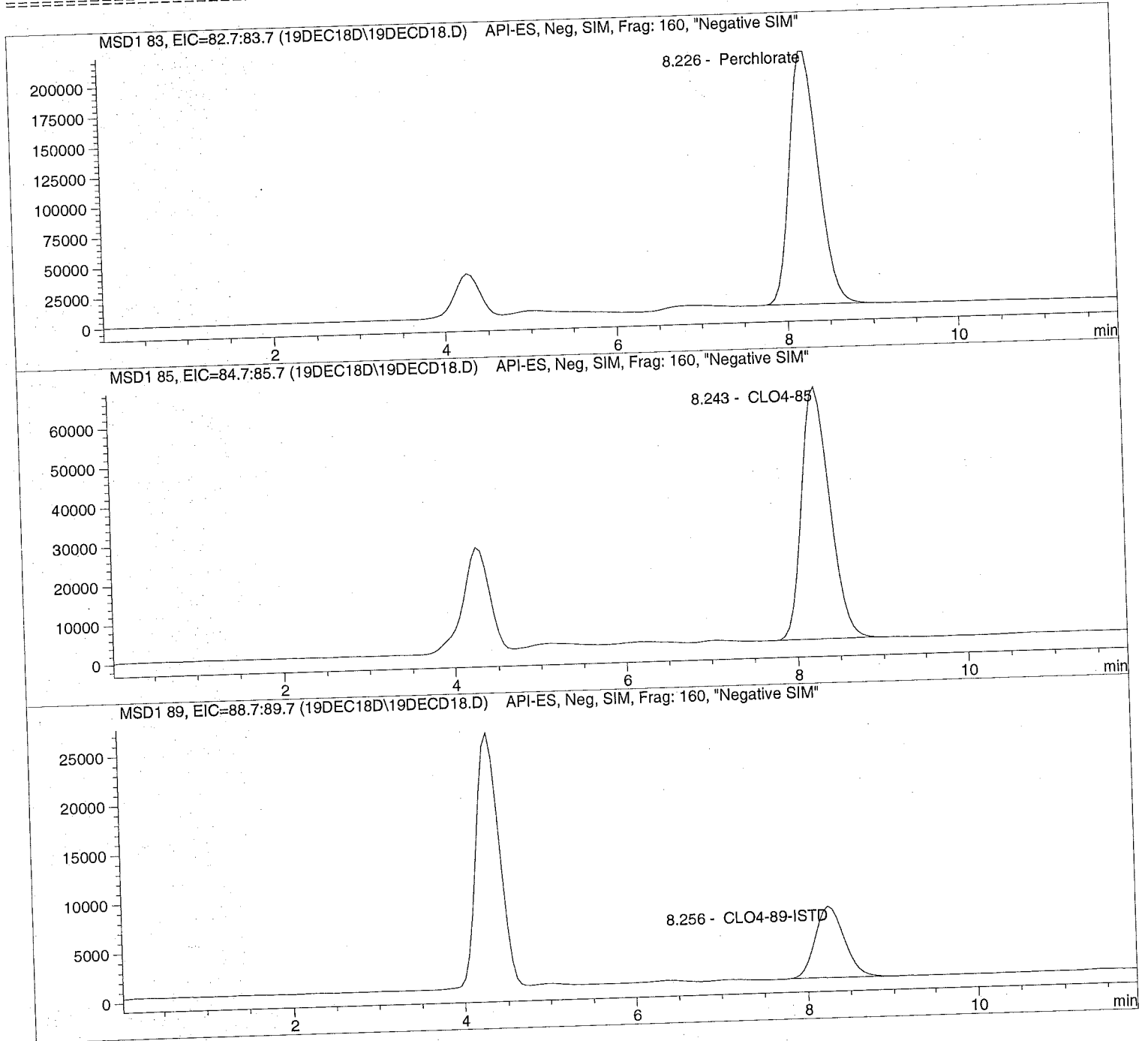
```

Injection Date: 12/19/2018 12:22:19  
Sample Name: 1834591006  
Acq Operator: TNB

Seq Line: 18  
Location: Vial 86  
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\19DEC18D\19DECD18.D

Sample Name: 1834591006

```

=====
Injection Date: 12/19/2018 12:22:19      Seq Line: 18
Sample Name: 1834591006                  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
8.226	PBA	4861195.0	77.3193	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.243	PBA	1468235.9	75.5226	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.256	PBA	171171.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

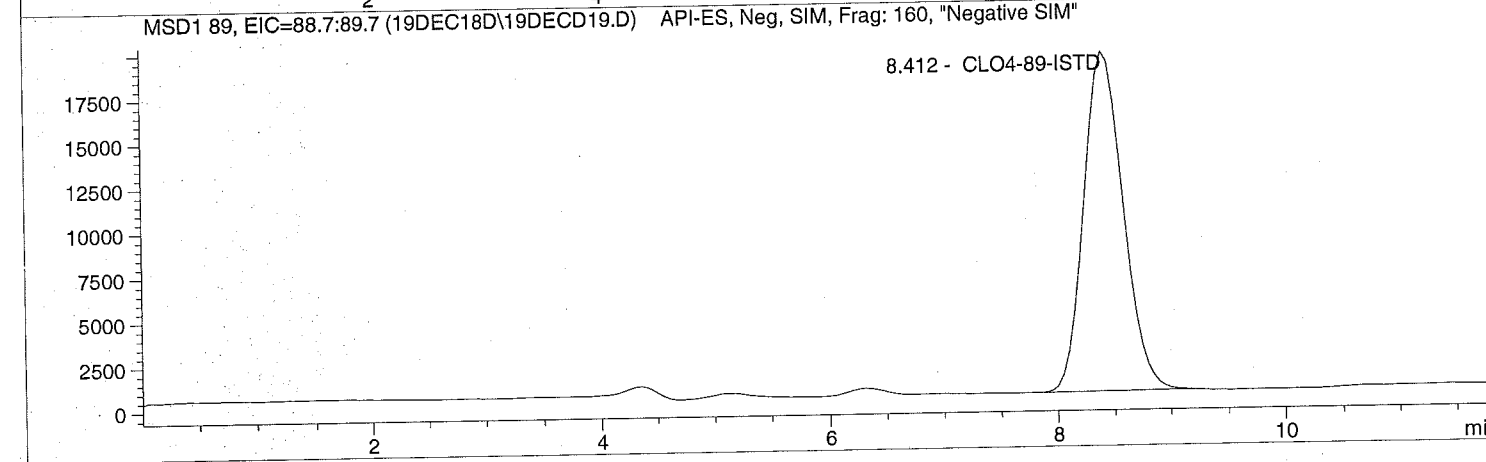
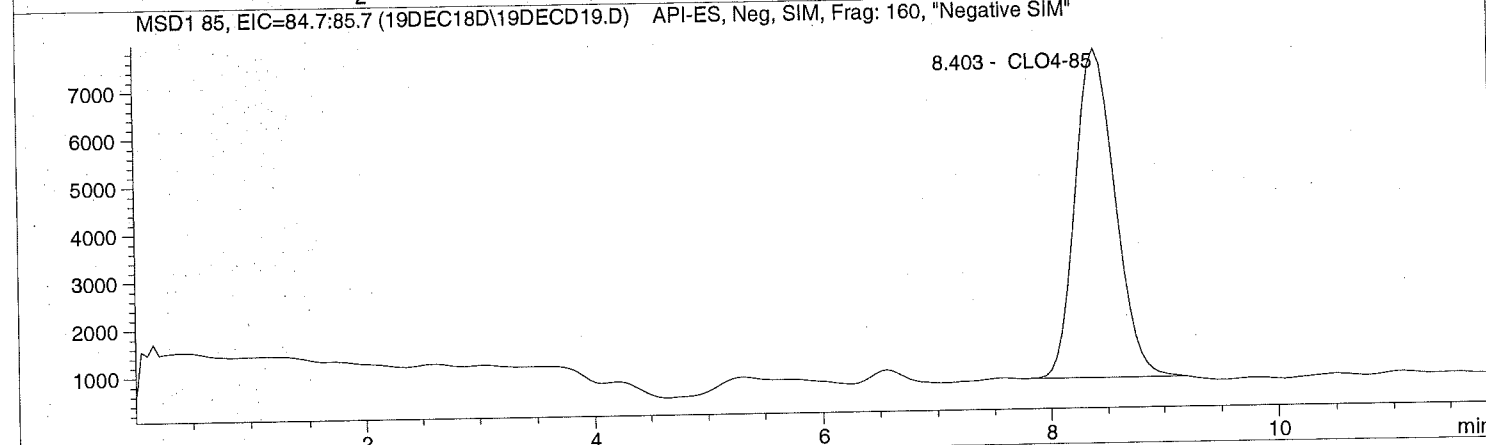
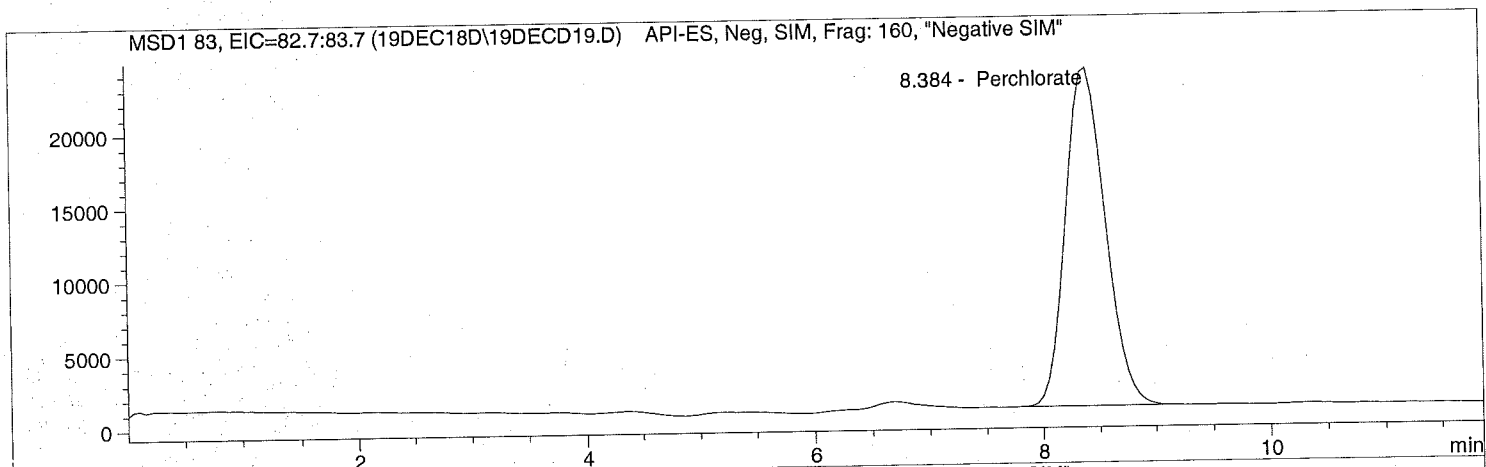
```

Injection Date: 12/19/2018 12:36:05  
Sample Name: 1834591007 100  
Acq Operator: TNB

Seq Line: 19  
Location: Vial 87  
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



Injection Date: 12/19/2018 12:36:05      Seq Line: 19  
Sample Name: 1834591007 100      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: 100.000000  
Sample Amount: 0.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.384	PBA	552737.7	390.1173	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.403	BBA	168774.7	389.2722	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.412	PBA	459757.1	500.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD20.D

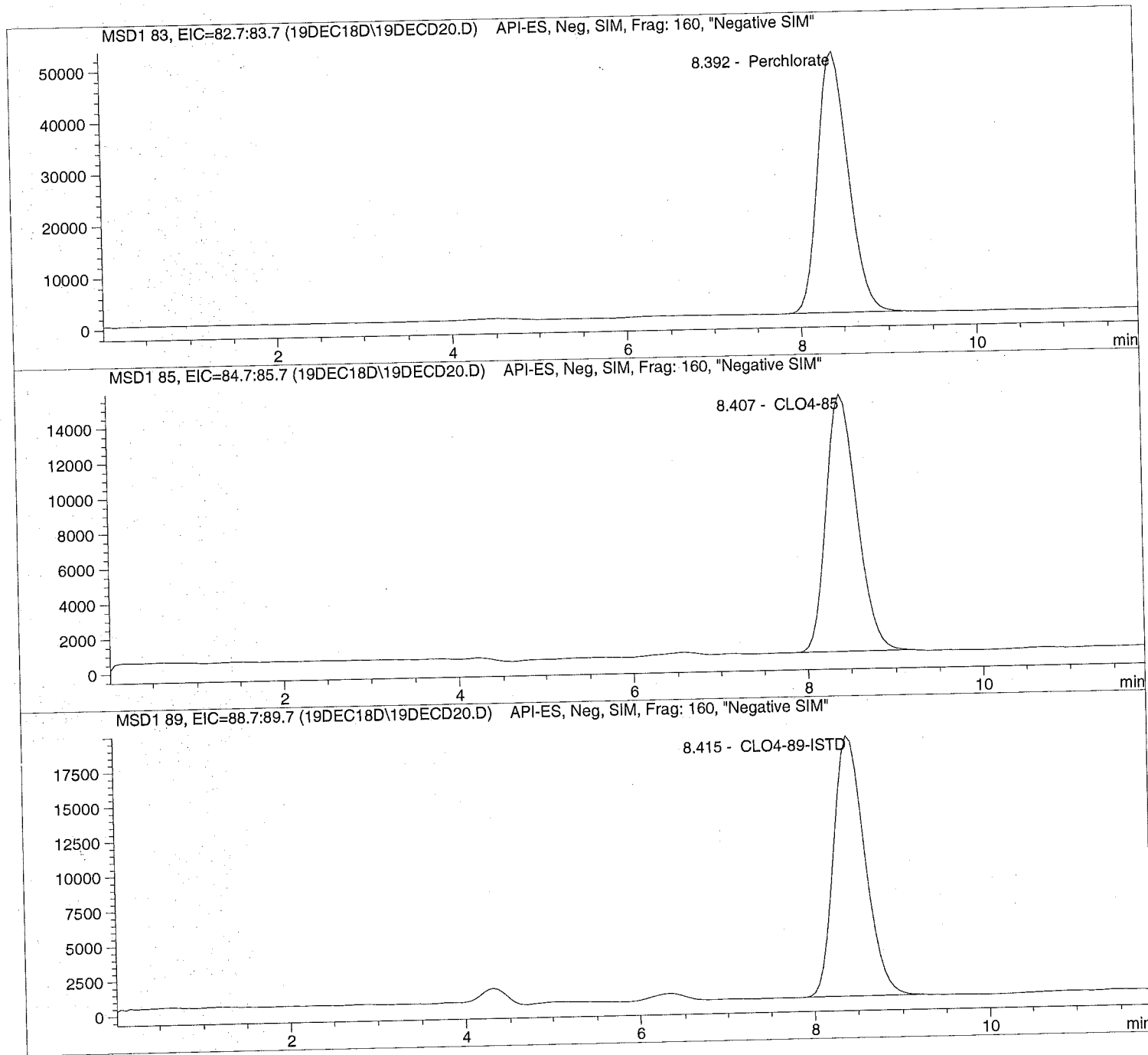
Sample Name: 1834591008 100

Injection Date: 12/19/2018 12:49:52  
Sample Name: 1834591008 100  
Acq Operator: TNB

Seq Line: 20  
Location: Vial 88  
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



```
=====
Injection Date: 12/19/2018 12:49:52      Seq Line:          20
Sample Name:    1834591008 100           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:       100.000000
Sample Amount:  0.000
=====
```

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.392	PBA	1225937.5	833.5335	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.407	PBA	359153.4	810.3836	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.415	PBA	459695.6	500.0000	CLO4-89-ISTD

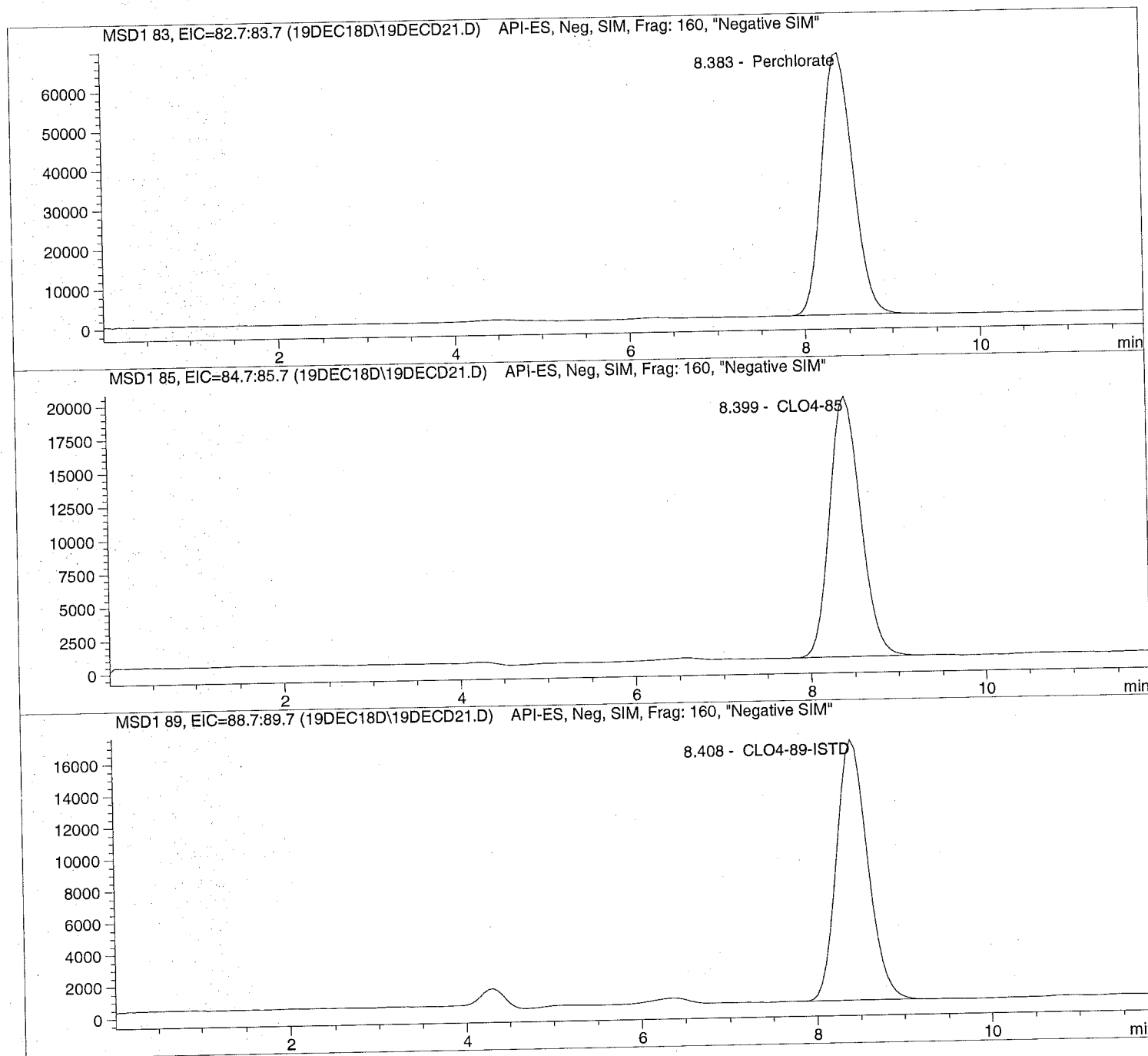
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 13:03:38  
Sample Name: 1834591009 100  
Acq Operator: TNB

Seq Line: 21  
Location: Vial 89  
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



Injection Date: 12/19/2018 13:03:38  
Sample Name: 1834591009 100  
Acq Operator: TNB

Seq Line: 21  
Location: Vial 89  
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
8.383	PBA	1624602.3	1220.2714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.399	BBA	478619.9	1195.4450	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.408	BBA	409950.0	500.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD22.D

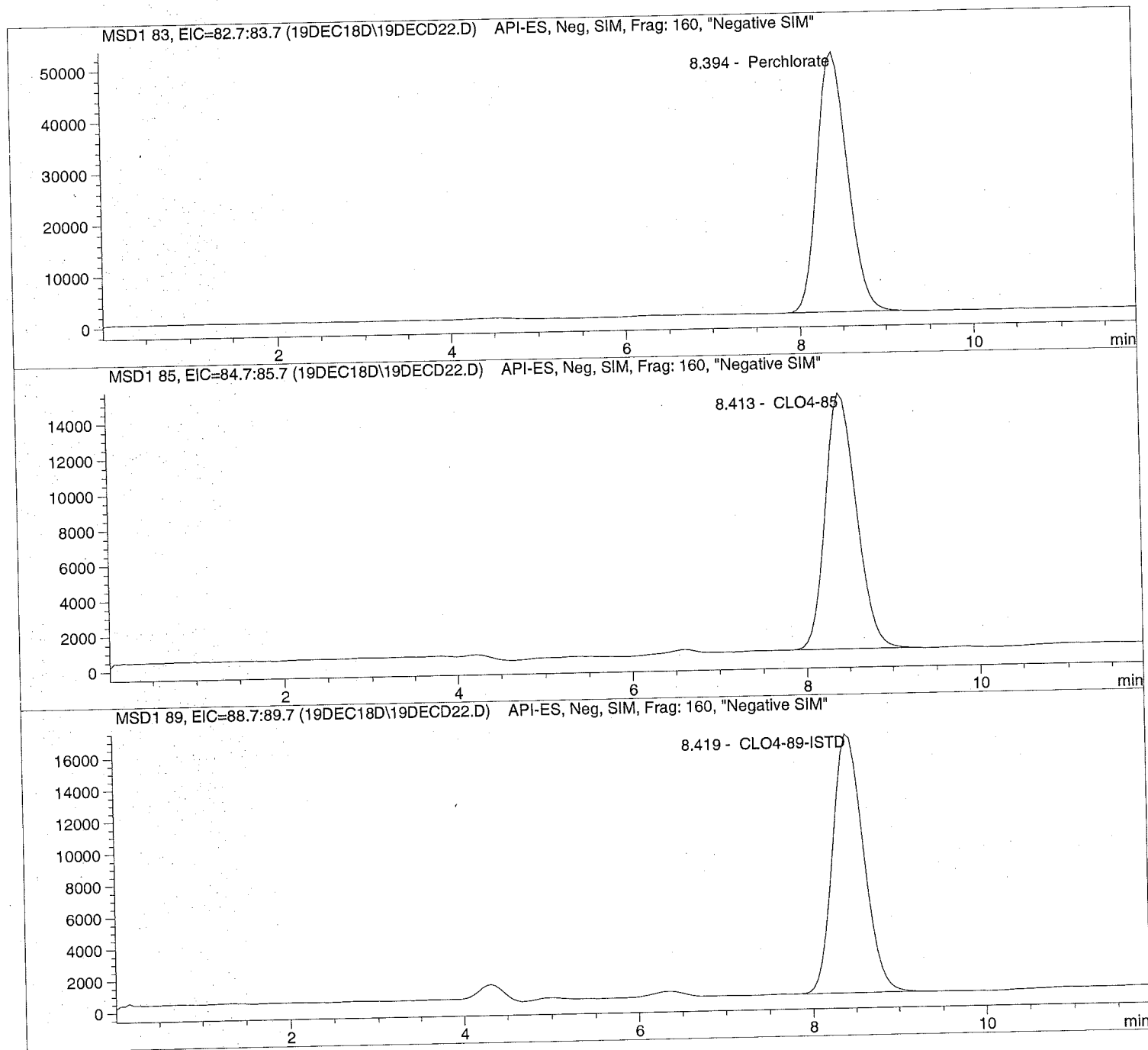
Sample Name: 1834591010 100

Injection Date: 12/19/2018 13:17:30  
Sample Name: 1834591010 100  
Acq Operator: TNB

Seq Line: 22  
Location: Vial 90  
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\19DEC18D\19DECD22.D Sample Name: 1834591010 100

=====  
 Injection Date: 12/19/2018 13:17:30 Seq Line: 22  
 Sample Name: 1834591010 100 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: 100.000000  
 Sample Amount: 0.000

=====  
 LCMS Results  
 =====

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.394	PBA	1236587.0	941.3072	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.413	PBA	363480.3	919.0352	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.419	BBA	408616.1	500.0000	CLO4-89-ISTD

=====  
 \*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD23.D

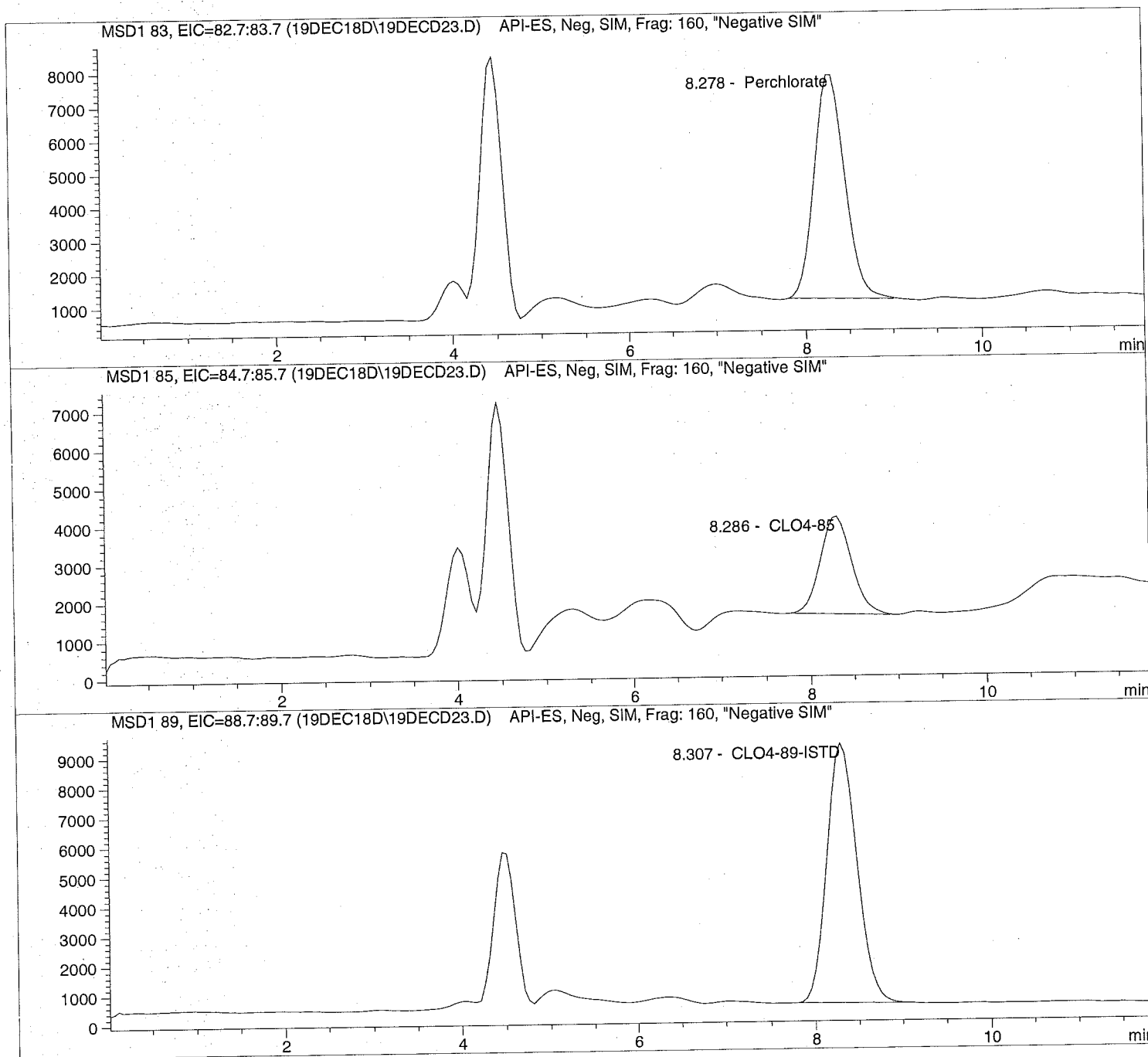
Sample Name: 1834871001

Injection Date: 12/19/2018 13:31:20  
Sample Name: 1834871001  
Acq Operator: TNB

Seq Line: 23  
Location: Vial 91  
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\19DEC18D\19DECD23.D

Sample Name: 1834871001

```

=====
Injection Date: 12/19/2018 13:31:20      Seq Line:          23
Sample Name:    1834871001                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:       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
8.278	PBA	162192.9	2.6000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.286	PBA	63760.8	3.2576	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.307	PBA	208798.9	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD24.D

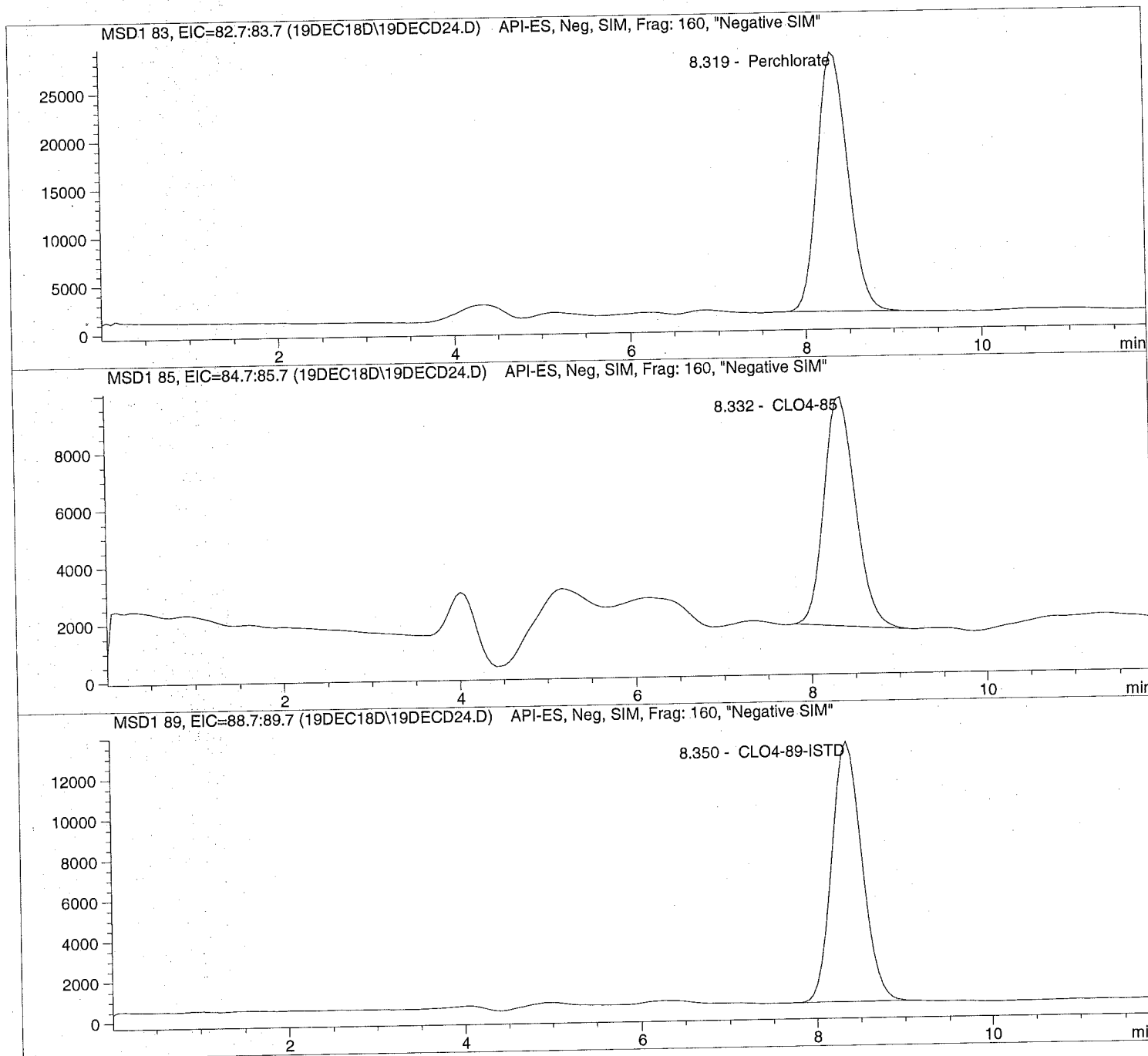
Sample Name: 1834591006 10X

Injection Date: 12/19/2018 13:45:08  
Sample Name: 1834591006 10X  
Acq Operator: TNB

Seq Line: 24  
Location: Vial 92  
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\19DEC18D\19DECD24.D Sample Name: 1834591006 10X

```

=====
Injection Date: 12/19/2018 13:45:08      Seq Line:          24
Sample Name:    1834591006 10X           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-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
8.319	BBA	648996.5	66.5194	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.332	PBA	199622.2	67.6252	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.350	PBA	307854.8	50.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

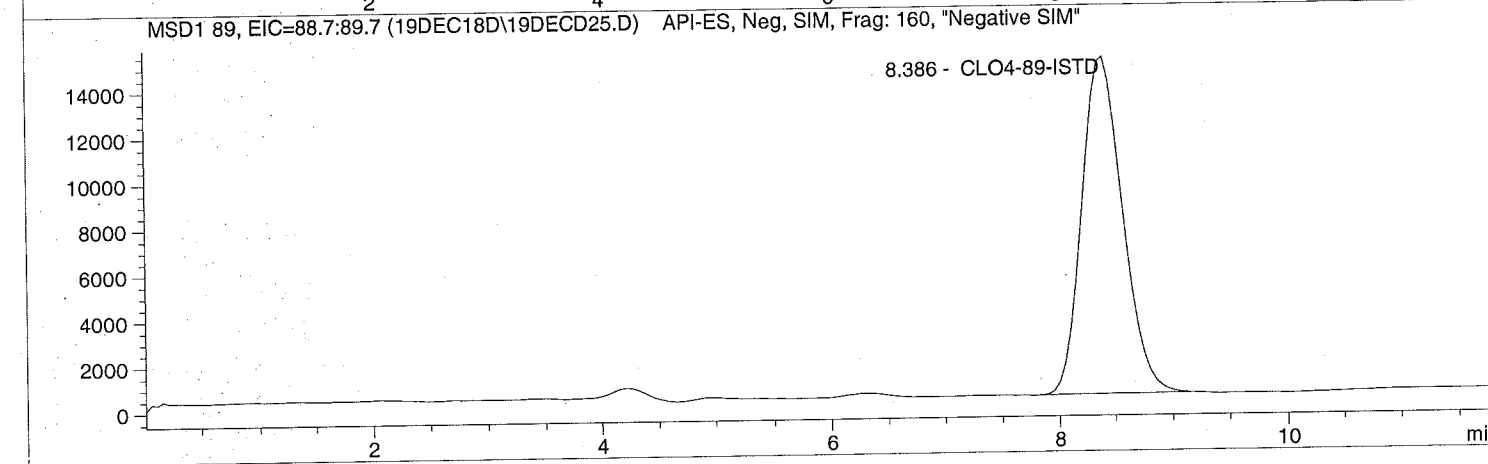
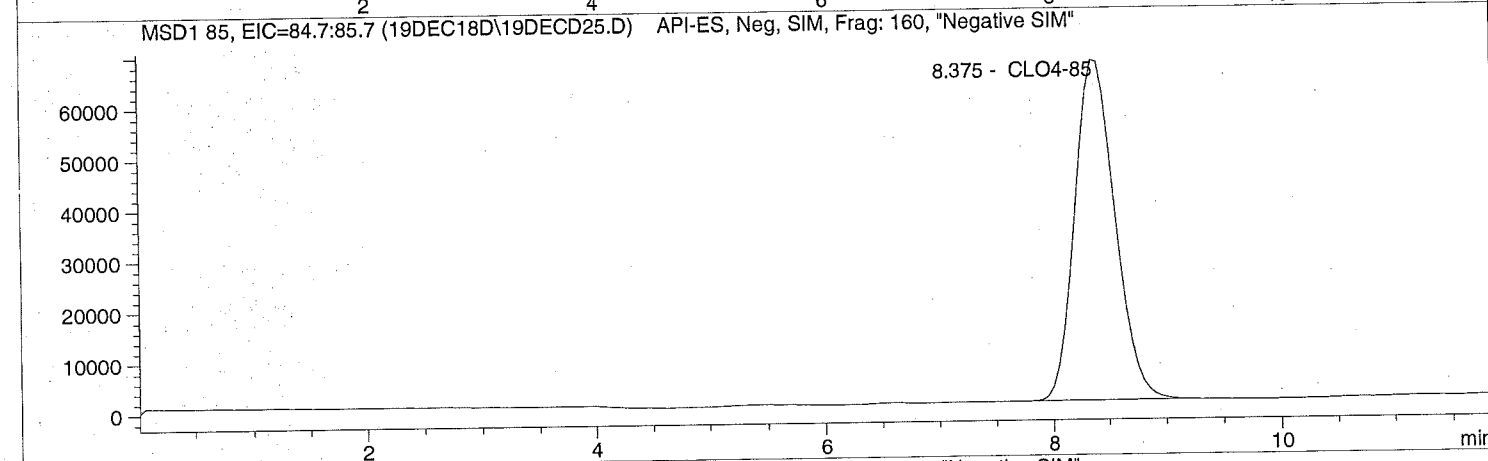
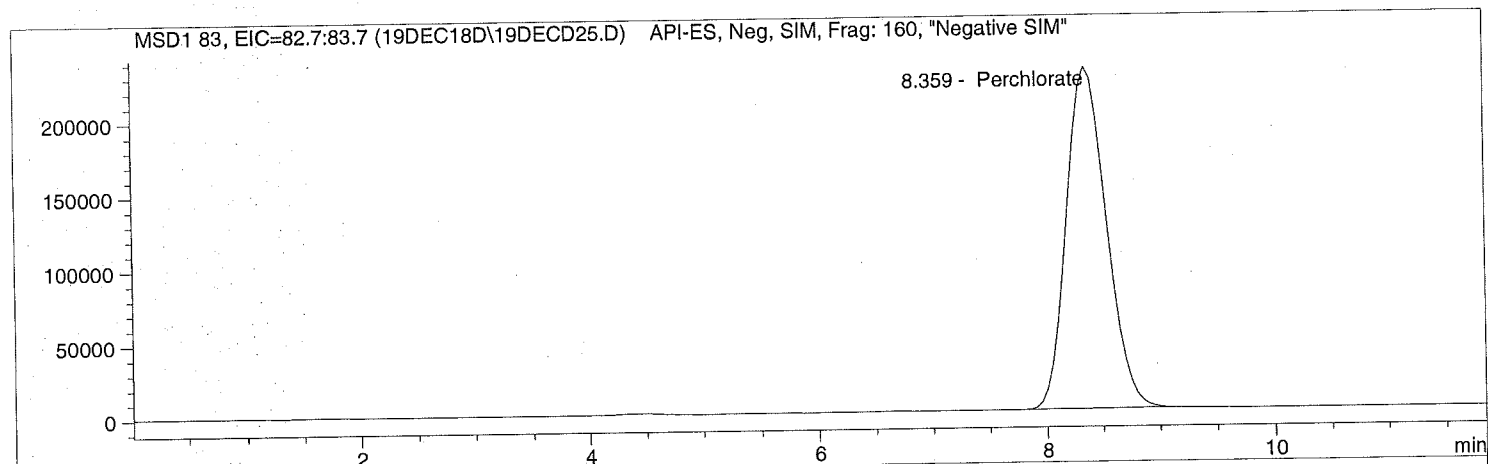
```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD25.D Sample Name: 1834591007 10X

=====  
Injection Date: 12/19/2018 13:58:54 Seq Line: 25  
Sample Name: 1834591007 10X 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-DPR.M  
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis  
=====



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD25.D Sample Name: 1834591007 10X

=====  
 Injection Date: 12/19/2018 13:58:54 Seq Line: 25  
 Sample Name: 1834591007 10X 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-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
8.359	PBA	5688991.5	441.4471	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.375	PBA	1662108.8	424.5719	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.386	PBA	371021.2	50.0000	CLO4-89-ISTD

=====  
 \*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD26.D

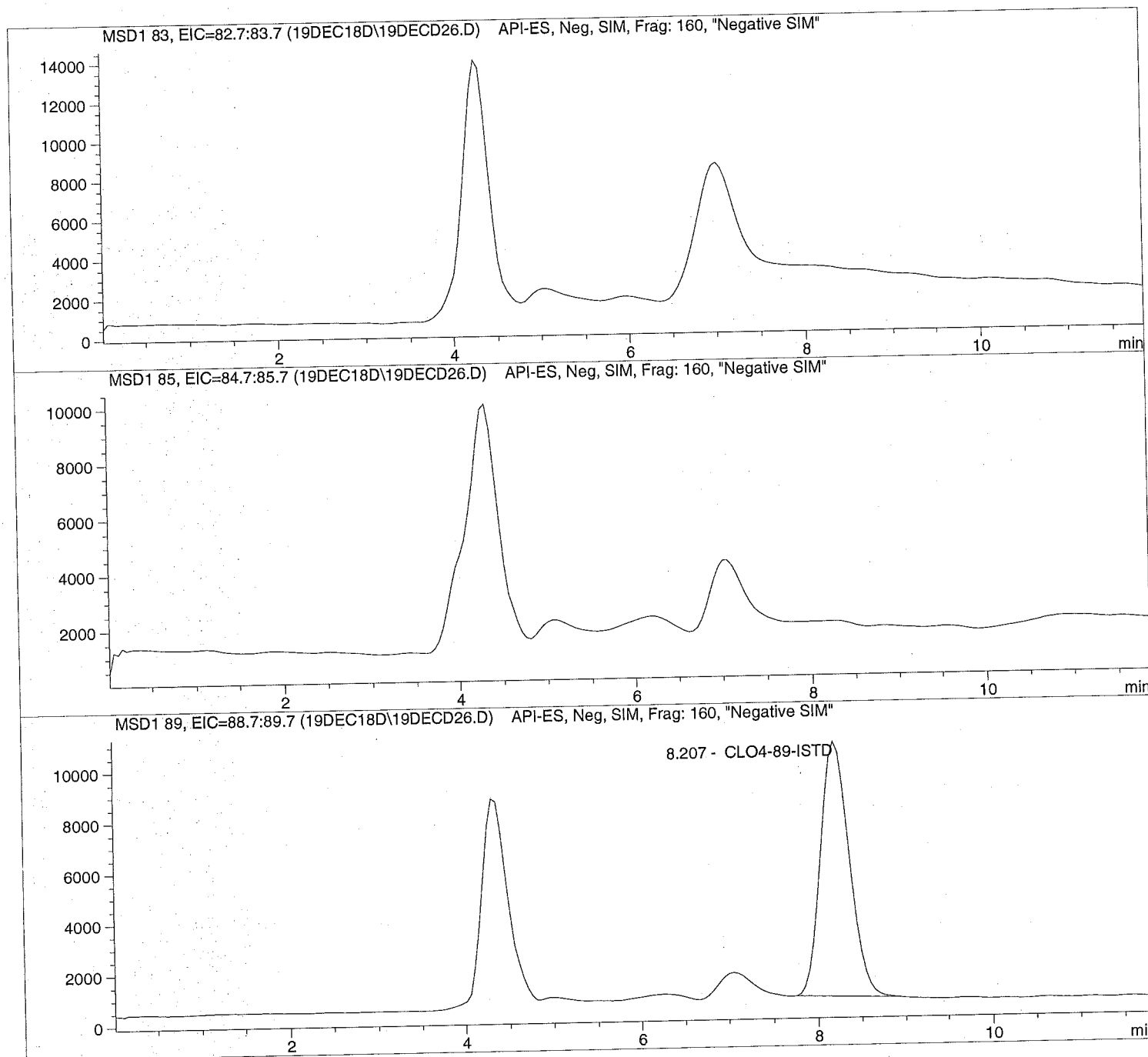
Sample Name: 1834591005 RE

Injection Date: 12/19/2018 14:12:47  
Sample Name: 1834591005 RE  
Acq Operator: TNB

Seq Line: 26  
Location: Vial 94  
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\19DEC18D\19DECD26.D

Sample Name: 1834591005 RE

```

=====
Injection Date: 12/19/2018 14:12:47      Seq Line:          26
Sample Name:    1834591005 RE             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-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
8.207	PBA	229203.5	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD27.D

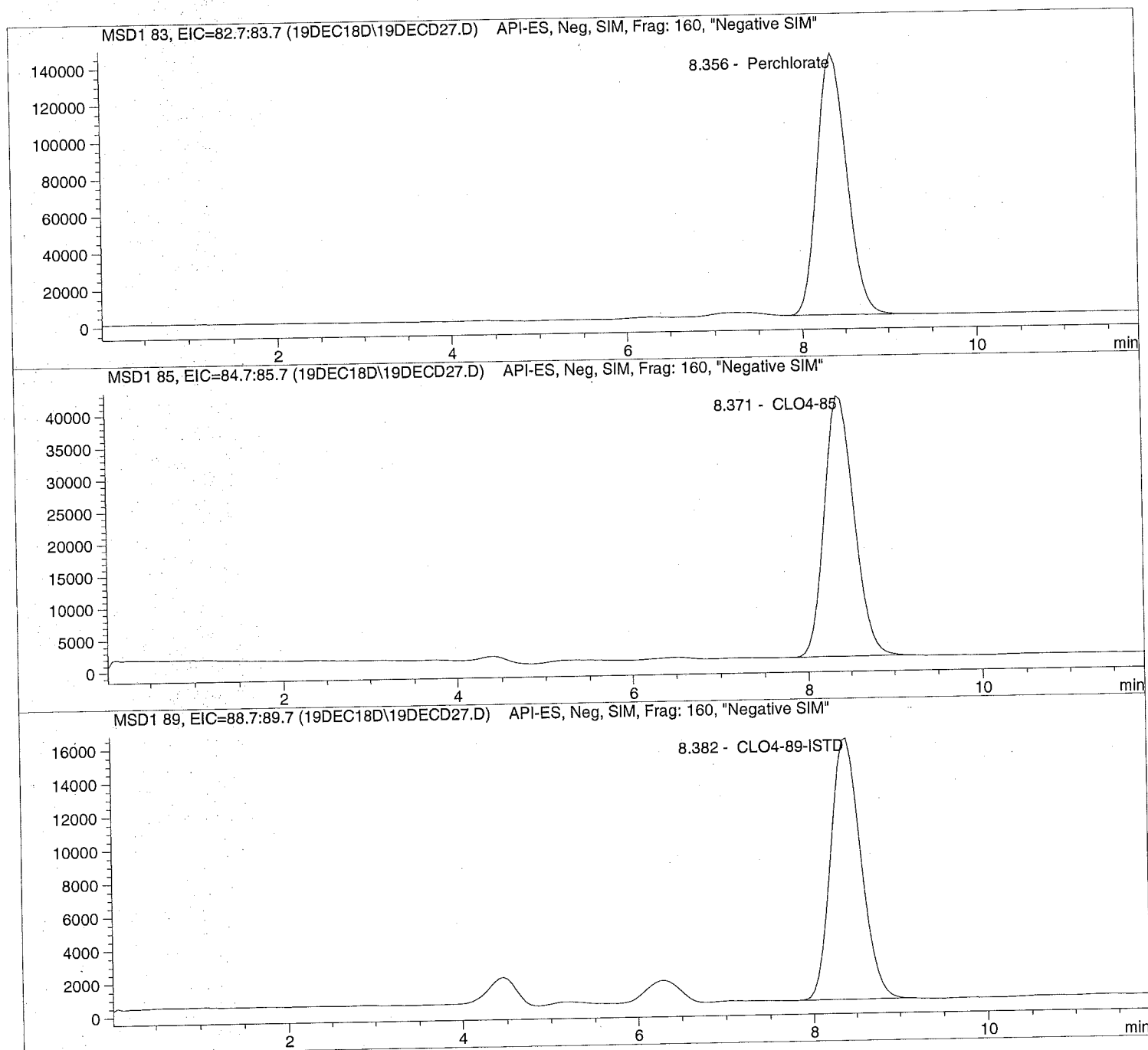
Sample Name: 633247 CCV@25

Injection Date: 12/19/2018 14:26:31  
Sample Name: 633247 CCV@25  
Acq Operator: TNB

Seq Line: 27  
Location: Vial 71  
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\19DEC18D\19DECD27.D

Sample Name: 633247 CCV@25

```

=====
Injection Date: 12/19/2018 14:26:31      Seq Line:          27
Sample Name:    633247    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
8.356	VBA	3387879.3	26.2108	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.371	PBA	985046.6	25.2825	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.382	PBA	384846.7	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

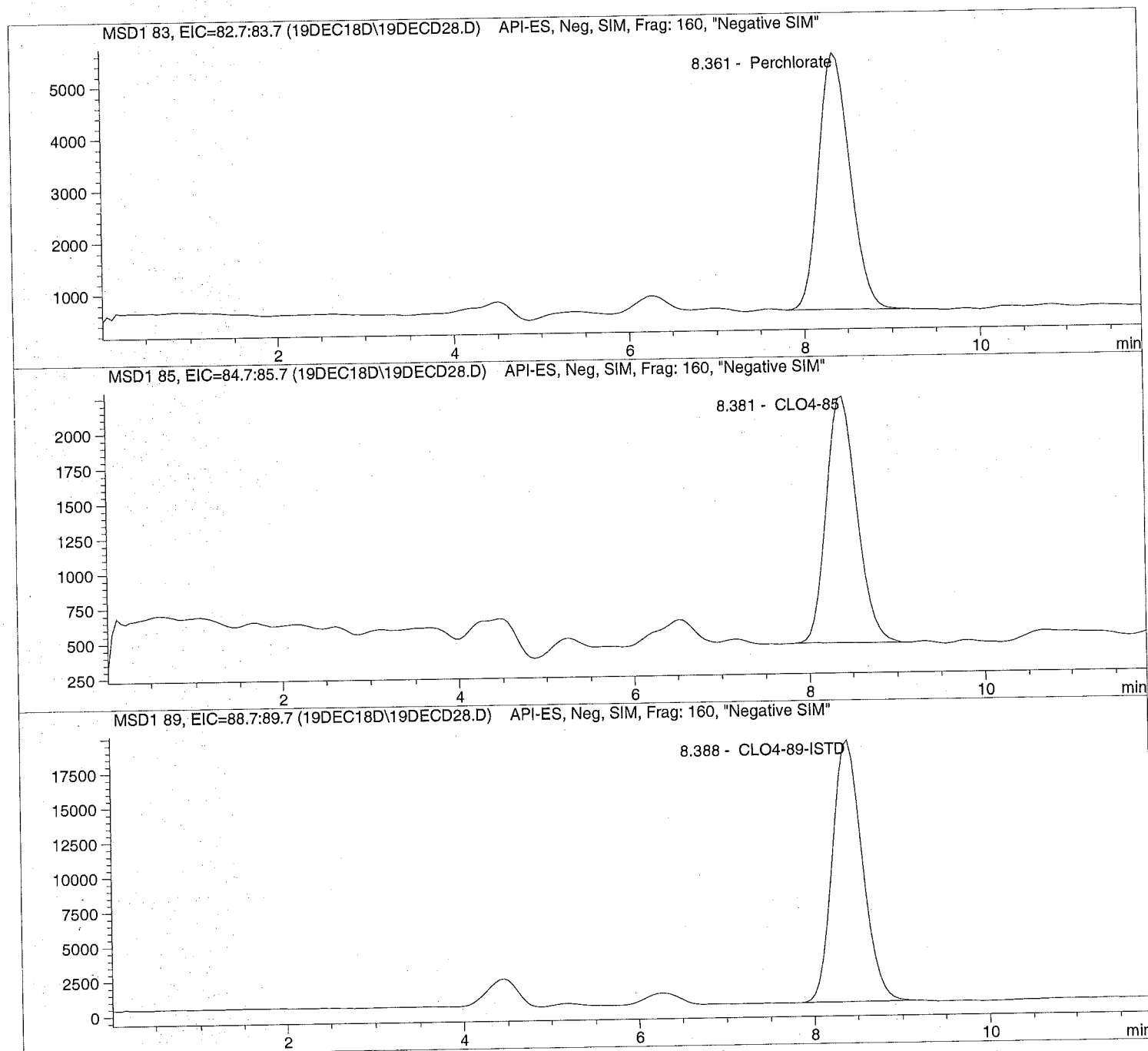
Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD28.D

Sample Name: 633248 LODV@1.

=====  
Injection Date: 12/19/2018 14:40:17  
Sample Name: 633248 LODV@1.  
Acq Operator: TNB

Seq Line: 28  
Location: Vial 72  
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\19DEC18D\19DECD28.D

Sample Name: 633248 LODV@1.

```

=====
Injection Date: 12/19/2018 14:40:17      Seq Line:          28
Sample Name:    633248  LODV@1.           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:  1.000
=====

```

```

=====
                          LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.361	PBA	123908.4	1.0564	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.381	PBA	43105.4	1.0834	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.388	PBA	451163.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Raw Data**

## **Initial Calibration**

## Batch Review Method:

C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==&gt; Run has not been reprocessed with Batch Review Method

['\*' ==&gt; 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 Verfe	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 Verfe	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 Verfe	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 &amp; 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
9.287	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	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	1.00000	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		



ethod C:\HPCHEM\1\METHODS\CLO4-DPR.M

RetTime [min]	Lvl Sig	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

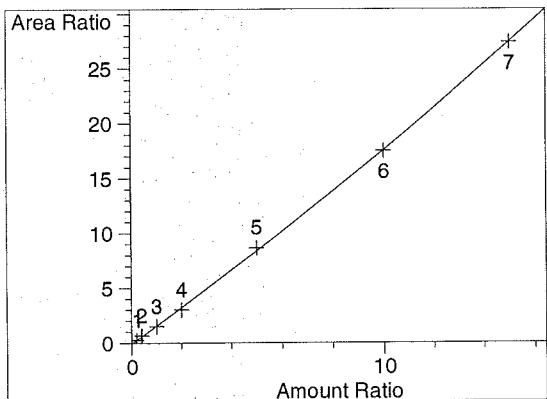
Level 6 : 0.02

Level 7 : 0.013333

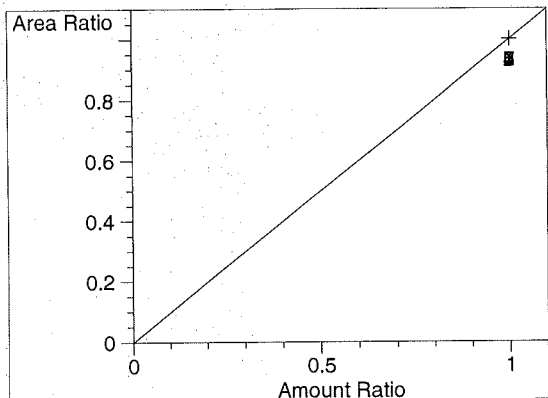
=====  
Peak Sum Table  
=====

\*\*\*No Entries in table\*\*\*  
=====

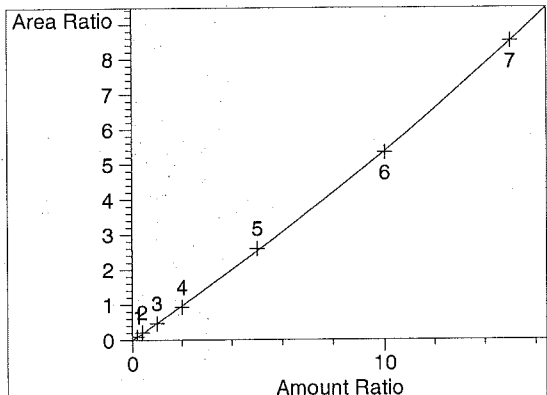
=====  
 Calibration Curves  
 =====



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

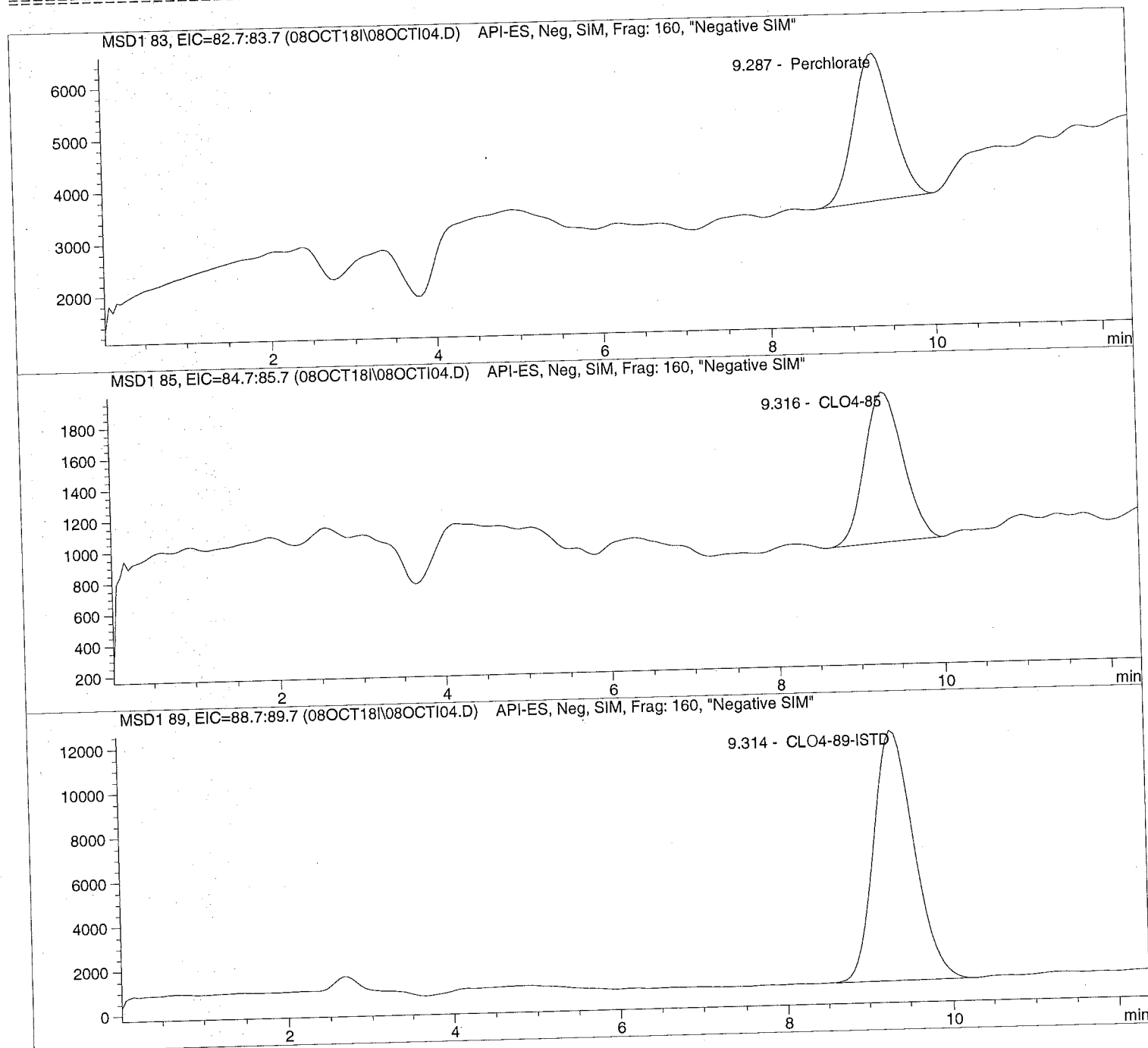
Sample Name: CLO4@ 1.0ug/L

Injection Date: 10/08/2018 11:37:35  
Sample Name: CLO4@ 1.0ug/L  
Acq Operator: TNB

Seq Line: 4  
Location: Vial 74  
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

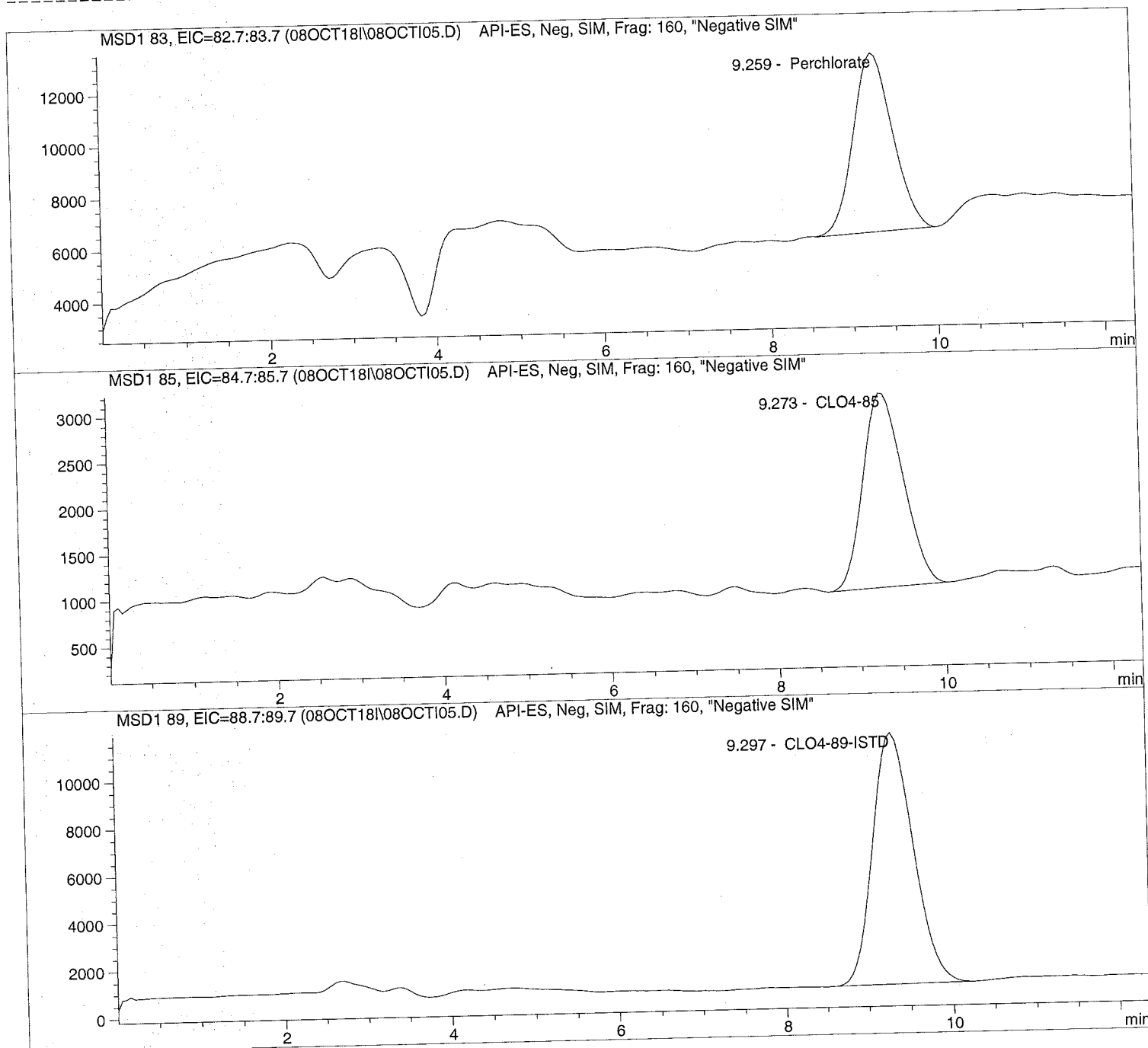
Sample Name: CLO4@ 2.0ug/L

Injection Date: 10/08/2018 11:51:45  
Sample Name: CLO4@ 2.0ug/L  
Acq Operator: TNB

Seq Line: 5  
Location: Vial 75  
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



```
=====
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

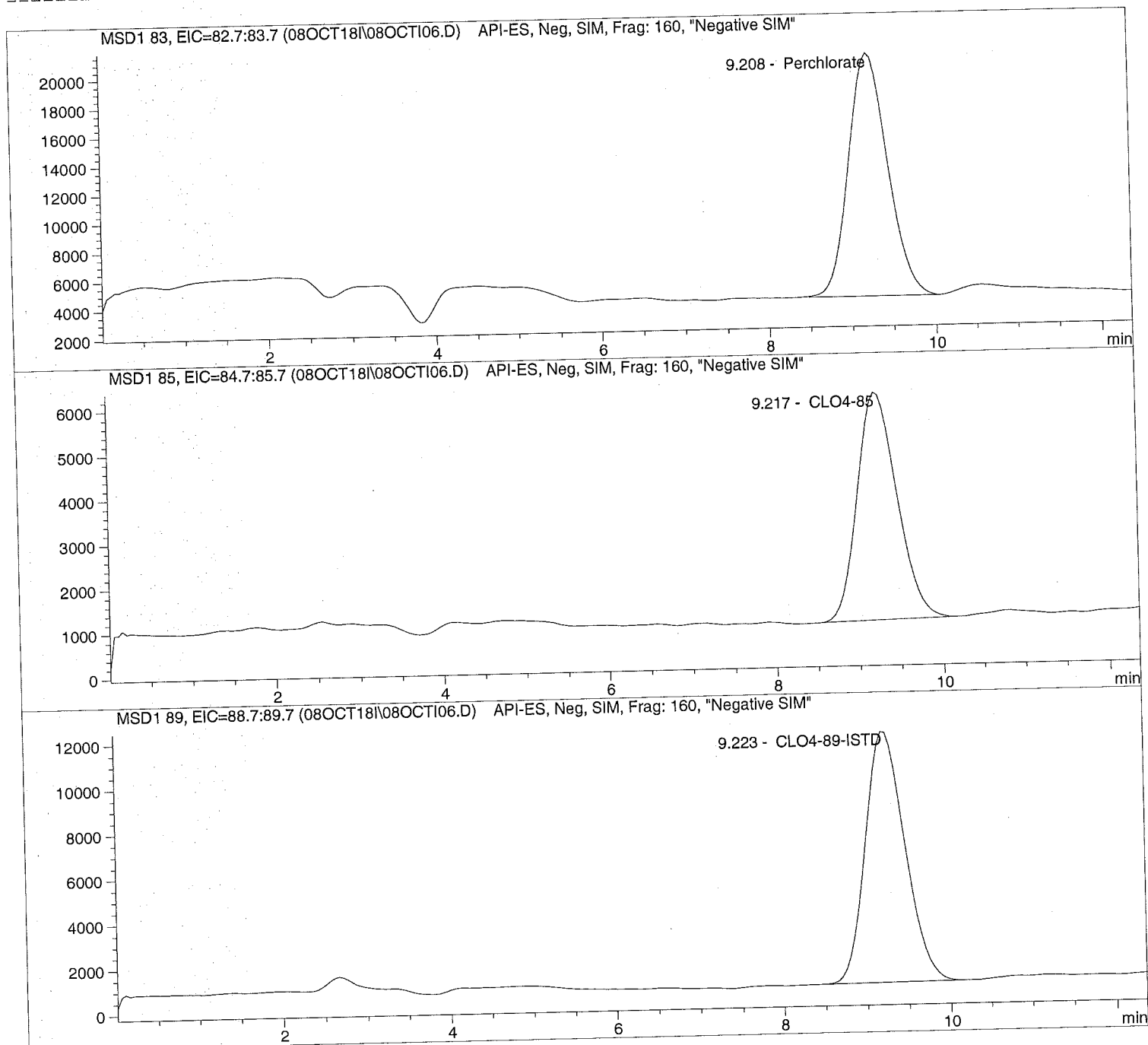
Sample Name: CLO4@ 5.0ug/L

Injection Date: 10/08/2018 12:05:59  
Sample Name: CLO4@ 5.0ug/L  
Acq Operator: TNB

Seq Line: 6  
Location: Vial 76  
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





```

=====
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

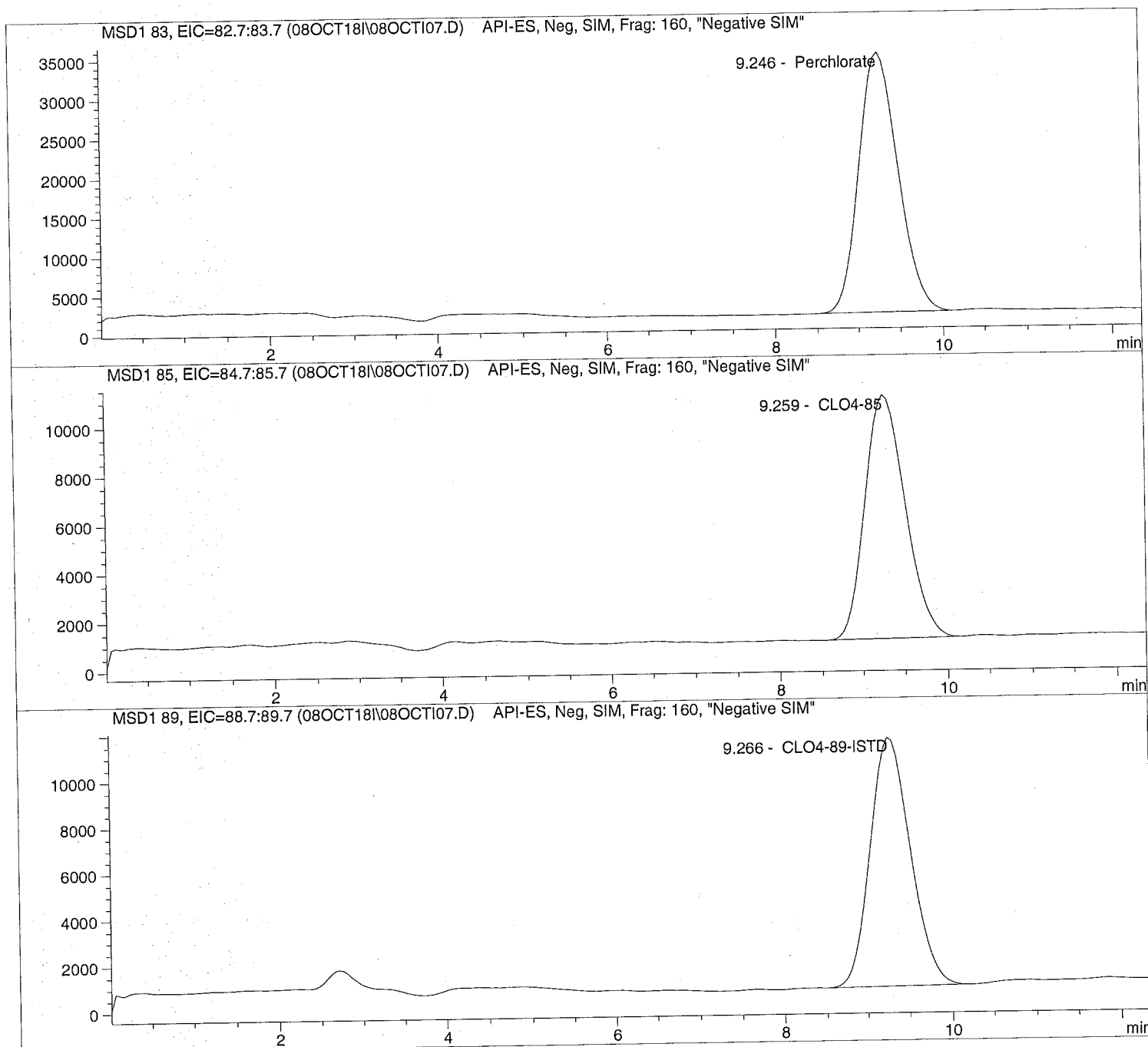
Sample Name: CLO4@ 10.ug/L

Injection Date: 10/08/2018 12:20:10  
Sample Name: CLO4@ 10.ug/L  
Acq Operator: TNB

Seq Line: 7  
Location: Vial 77  
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

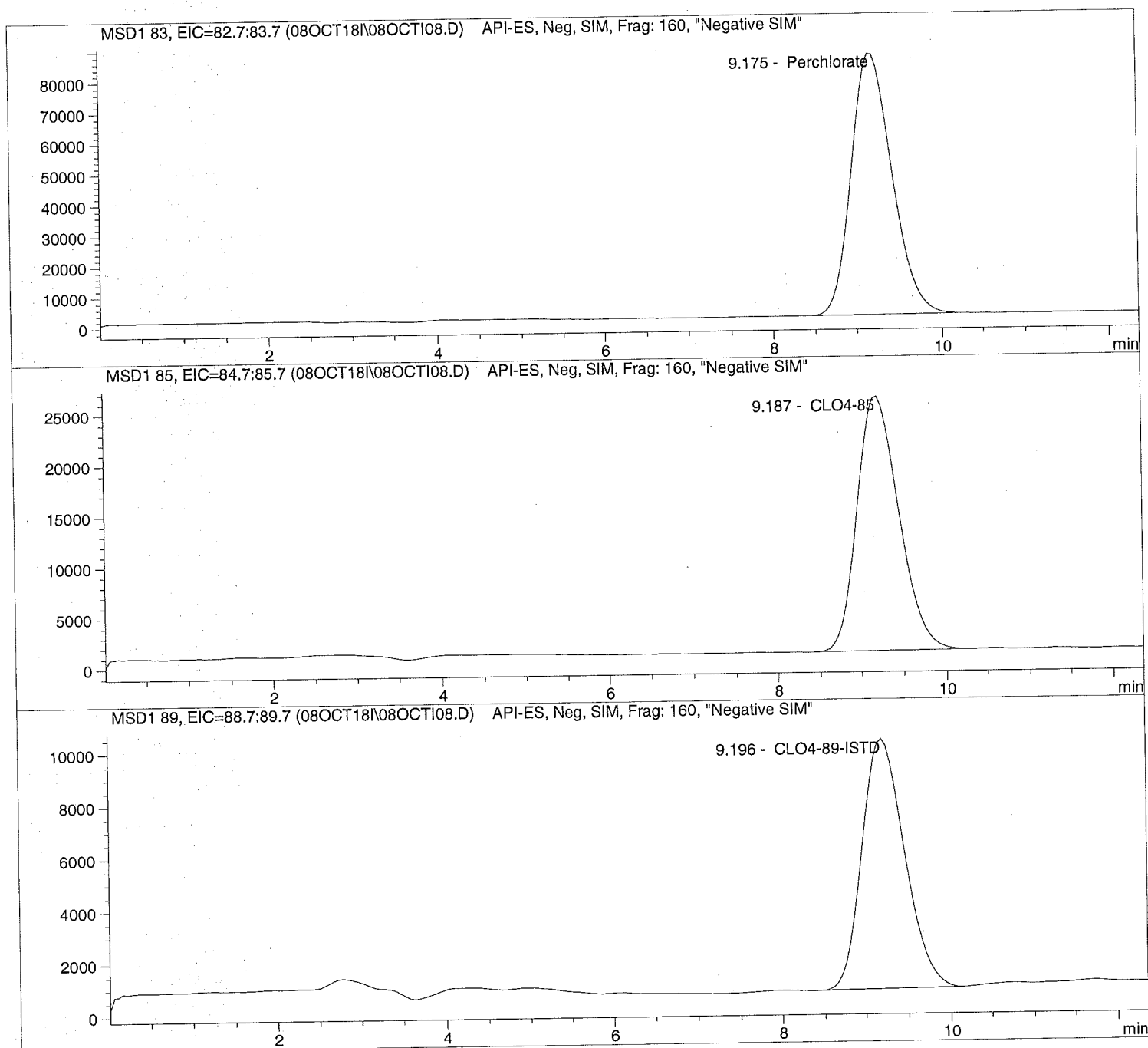
Sample Name: CLO4@ 25.ug/L

Injection Date: 10/08/2018 12:34:24  
Sample Name: CLO4@ 25.ug/L  
Acq Operator: TNB

Seq Line: 8  
Location: Vial 78  
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

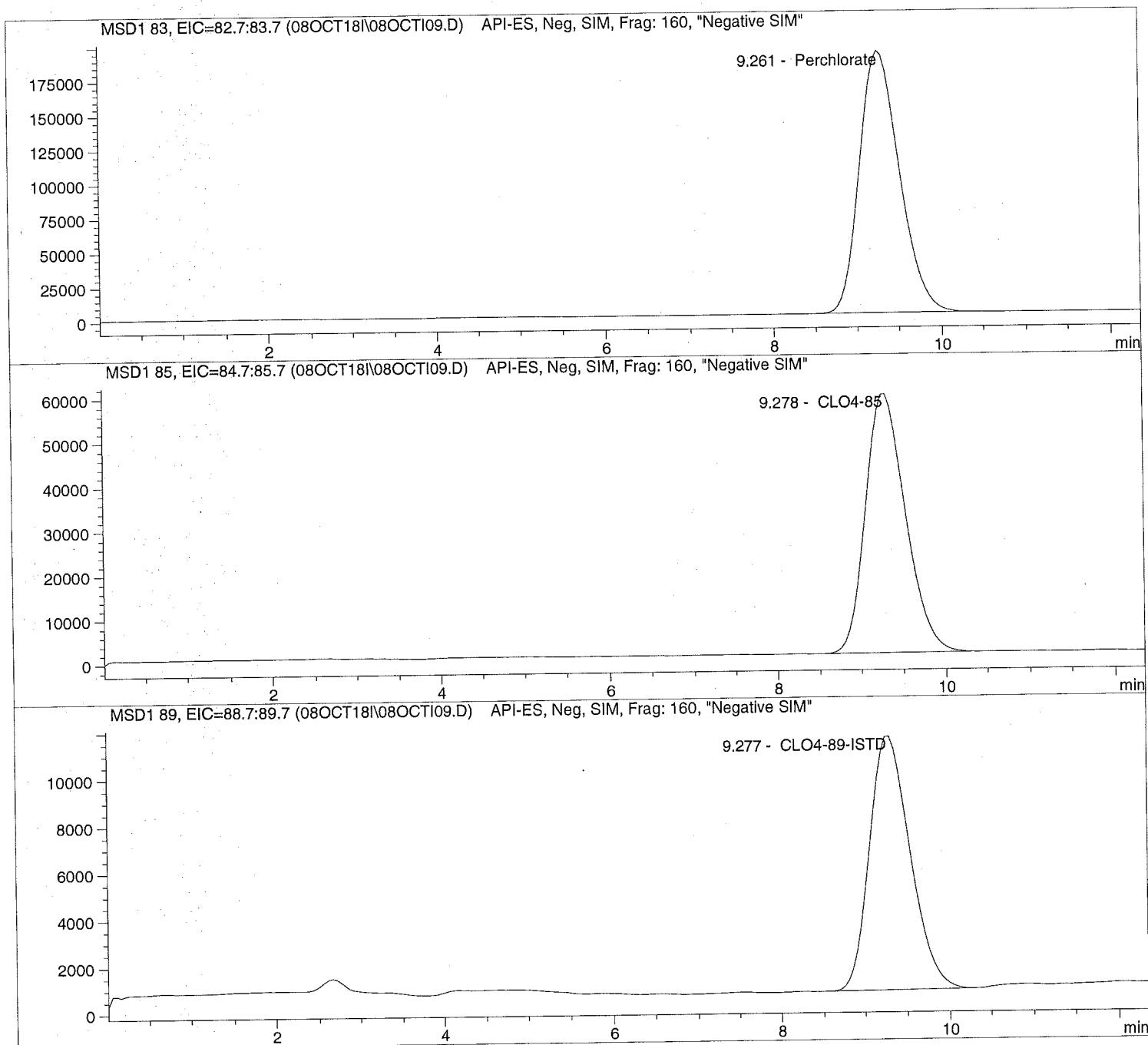
Sample Name: CLO4@ 50.ug/L

Injection Date: 10/08/2018 12:48:34  
Sample Name: CLO4@ 50.ug/L  
Acq Operator: TNB

Seq Line: 9  
Location: Vial 79  
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

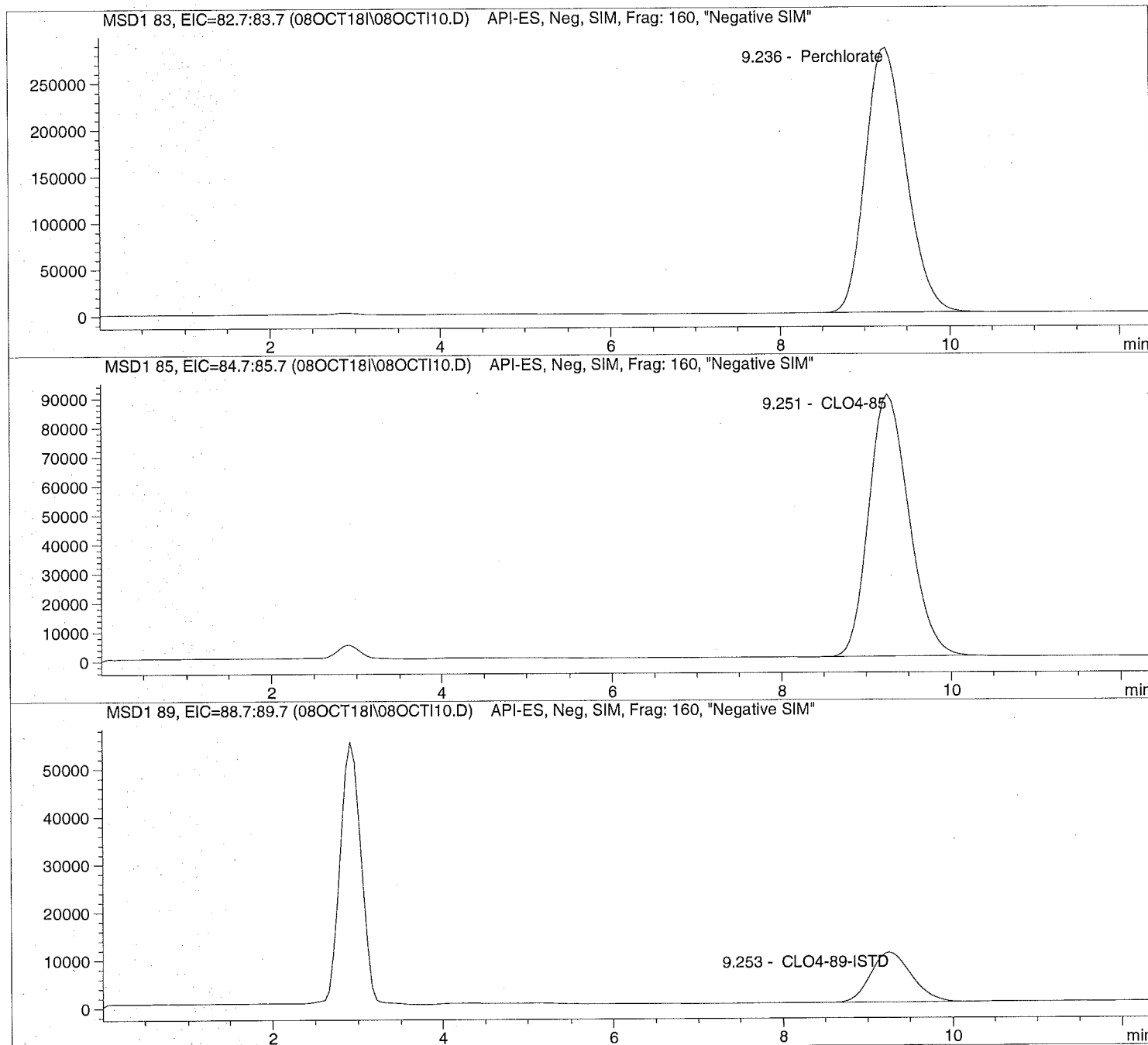
Sample Name: CLO4@ 75.ug/L

Injection Date: 10/08/2018 13:02:48  
Sample Name: CLO4@ 75.ug/L  
Acq Operator: TNB

Seq Line: 10  
Location: Vial 80  
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 ***
=====

```

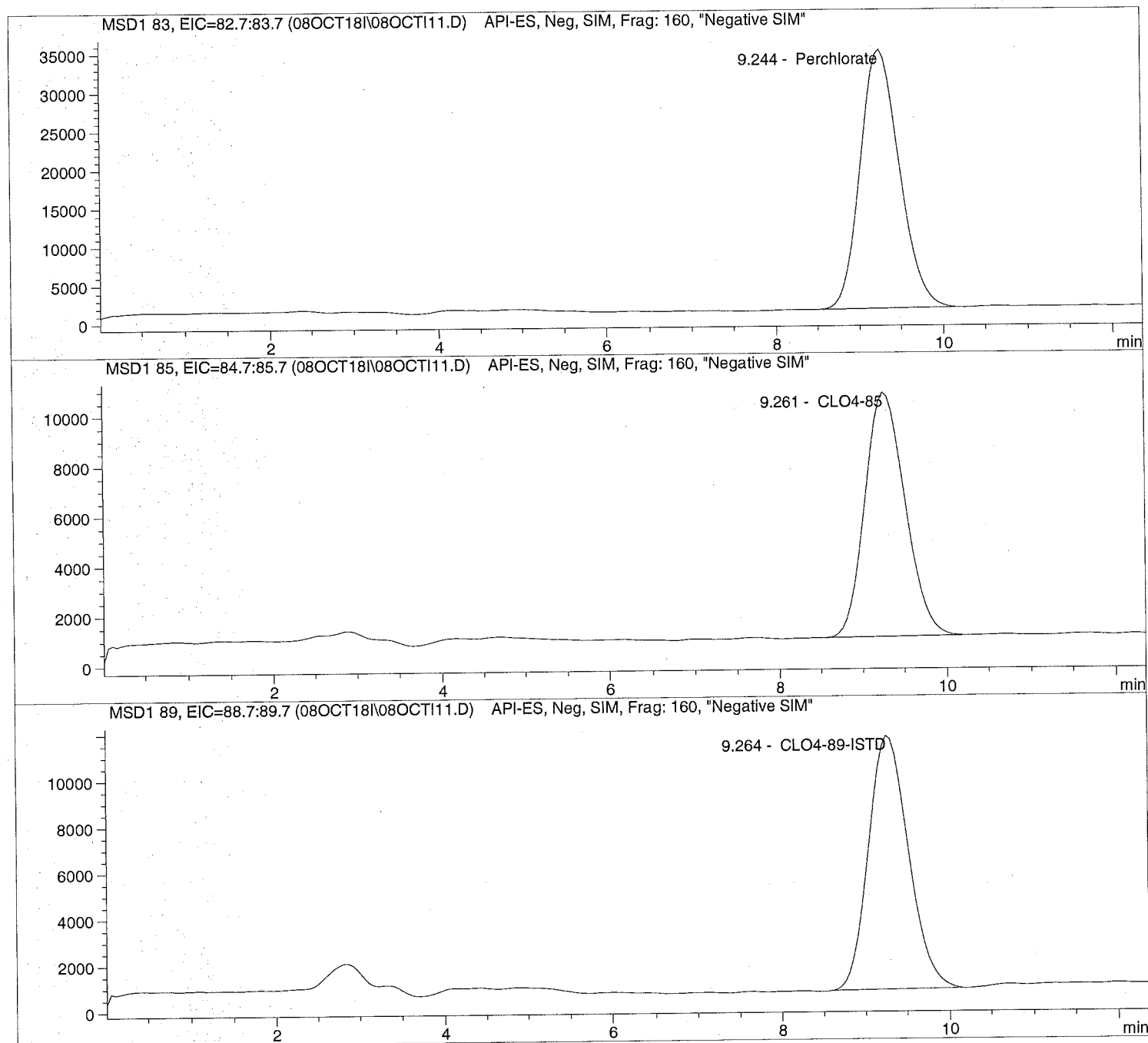
Data file: C:\HPCHEM\1\DATA\08OCT18\08OCTI11.D

Sample Name: ICAL Verf@10ug/L

=====  
Injection Date: 10/08/2018 13:17:00  
Sample Name: ICAL Verf@10ug/L  
Acq Operator: TNB

Seq Line: 11  
Location: Vial 81  
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 \*\*\*



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

December 26, 2018

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

Work Order: **HS18120379**

Laboratory Results for: **Groundwater Treatment Plant Monthly Influent Samples**

Dear Marcia,

ALS Environmental received 1 sample(s) on Dec 07, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval scribble.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 26-Dec-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**Work Order:** HS18120379

---

**SAMPLE SUMMARY**

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120379-01	LH18/24-SP140_120618	Water		06-Dec-2018 14:00	07-Dec-2018 10:00	<input type="checkbox"/>

---

**ALS Houston, US**

Date: 26-Dec-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**Work Order:**

---

**CASE NARRATIVE**

---

**Work Order Comments**

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

**Metals by Method SW6020****Batch ID: 135381**

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

**Subcontracted by Method NA****Batch ID: R329912**

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

**WetChemistry by Method SW7196****Batch ID: R328845**

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

## ALS Houston, US

Date: 26-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Monthly Influent Samples  
 Sample ID: LH18/24-SP140\_120618  
 Collection Date: 06-Dec-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18120379  
 Lab ID:HS18120379-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>ICP-MS METALS BY SW6020A</b>		<b>Method:SW6020</b>				Prep:SW3010A / 10-Dec-2018		Analyst: JCJ
Selenium	0.00200	U	0.00110	0.00200	0.00200	mg/L	1	14-Dec-2018 13:37
Silver	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	13-Dec-2018 20:21
<b>HEXAVALENT CHROMIUM BY SW7196A</b>		<b>Method:SW7196</b>				Prep:SW7196		Analyst: KVL
Chromium, Hexavalent	0.0100	U	0.00600	0.0100	0.0100	mg/L	1	07-Dec-2018 13:57
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	26-Dec-2018 12:21

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

**WEIGHT LOG**

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18120379

**Batch ID:** 135381      **Method:** ICP-MS METALS BY SW6020A      **Prep:** 3010A

SampleID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18120379-01	1	10	10 (mL)	1



ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18120379

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> 135381	<b>Test Name :</b> ICP-MS METALS BY SW6020A		<b>Matrix:</b> Water			
HS18120379-01	LH18/24-SP140_120618	06 Dec 2018 14:00		10 Dec 2018 09:30	14 Dec 2018 13:37	1
HS18120379-01	LH18/24-SP140_120618	06 Dec 2018 14:00		10 Dec 2018 09:30	13 Dec 2018 20:21	1
<b>Batch ID</b> R328845	<b>Test Name :</b> HEXAVALENT CHROMIUM BY SW7196A		<b>Matrix:</b> Water			
HS18120379-01	LH18/24-SP140_120618	06 Dec 2018 14:00			07 Dec 2018 13:57	1
<b>Batch ID</b> R329912	<b>Test Name :</b> SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18120379-01	LH18/24-SP140_120618	06 Dec 2018 14:00			26 Dec 2018 12:21	1

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18120379

**QC BATCH REPORT**

Batch ID: 135381		Instrument: ICPMS04		Method: SW6020					
<b>MBLK</b>	Sample ID: <b>MBLK-135381</b>	Units: <b>mg/L</b>		Analysis Date: <b>13-Dec-2018 18:52</b>					
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4863889</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Selenium	0.00200	0.00200							U
Silver	0.00100	0.00200							U
<b>LCS</b>	Sample ID: <b>LCS-135381</b>	Units: <b>mg/L</b>		Analysis Date: <b>13-Dec-2018 18:54</b>					
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4863890</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Selenium	0.04523	0.00200	0.05	0	90.5	80 - 120			
Silver	0.04791	0.00200	0.05	0	95.8	80 - 120			
<b>MS</b>	Sample ID: <b>HS18111538-04MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>14-Dec-2018 13:26</b>					
Client ID:	Run ID: <b>ICPMS04_329261</b>	SeqNo: <b>4865342</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Selenium	0.05252	0.00200	0.05	0.001578	102	80 - 120			
<b>MS</b>	Sample ID: <b>HS18111538-04MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>13-Dec-2018 19:34</b>					
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4864136</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Silver	0.04813	0.00200	0.05	0.000209	95.8	80 - 120			
<b>MSD</b>	Sample ID: <b>HS18111538-04MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>14-Dec-2018 13:28</b>					
Client ID:	Run ID: <b>ICPMS04_329261</b>	SeqNo: <b>4865343</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Selenium	0.05209	0.00200	0.05	0.001578	101	80 - 120	0.05252	0.822	20
<b>MSD</b>	Sample ID: <b>HS18111538-04MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>13-Dec-2018 19:36</b>					
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4864137</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Silver	0.04794	0.00200	0.05	0.000209	95.5	80 - 120	0.04813	0.385	20

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18120379

**QC BATCH REPORT**

Batch ID:	135381	Instrument:	ICPMS04	Method:	SW6020					
<b>PDS</b>	Sample ID: <b>HS18111538-04PDS</b>	Units: <b>mg/L</b>	Analysis Date: <b>14-Dec-2018 13:30</b>							
Client ID:	Run ID: <b>ICPMS04_329261</b>	SeqNo: <b>4865344</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Selenium	0.1046	0.00200	0.1	0.001578	103	75 - 125				
<b>PDS</b>	Sample ID: <b>HS18111538-04PDS</b>	Units: <b>mg/L</b>	Analysis Date: <b>13-Dec-2018 19:38</b>							
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4864138</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Silver	0.09484	0.00200	0.1	0.000209	94.6	75 - 125				
<b>SD</b>	Sample ID: <b>HS18111538-04SD</b>	Units: <b>mg/L</b>	Analysis Date: <b>14-Dec-2018 13:23</b>							
Client ID:	Run ID: <b>ICPMS04_329261</b>	SeqNo: <b>4865341</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>5</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Selenium	0.0100	0.0100					0.001578	0	10	U
<b>SD</b>	Sample ID: <b>HS18111538-04SD</b>	Units: <b>mg/L</b>	Analysis Date: <b>13-Dec-2018 19:31</b>							
Client ID:	Run ID: <b>ICPMS04_329160</b>	SeqNo: <b>4864135</b>	PrepDate: <b>10-Dec-2018</b>	DF: <b>5</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Silver	0.00500	0.0100					0.000209	0	10	U

The following samples were analyzed in this batch: HS18120379-01

ALS Houston, US

Date: 26-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**WorkOrder:** HS18120379

**QC BATCH REPORT**

Batch ID: R328845		Instrument: UV-2450		Method: SW7196					
<b>MBLK</b>	Sample ID: <b>MBLK-R328845</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 13:57</b>					
Client ID:	Run ID: <b>UV-2450_328845</b>	SeqNo: <b>4855018</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.0100	0.0100							
								U	
<b>LCS</b>	Sample ID: <b>LCS-R328845</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 13:57</b>					
Client ID:	Run ID: <b>UV-2450_328845</b>	SeqNo: <b>4855017</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.277	0.0100	0.25	0	111	80 - 120			
<b>MS</b>	Sample ID: <b>HS18120375-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 13:57</b>					
Client ID:	Run ID: <b>UV-2450_328845</b>	SeqNo: <b>4855020</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.265	0.0100	0.25	-0.001	106	75 - 125			
<b>MSD</b>	Sample ID: <b>HS18120375-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 13:57</b>					
Client ID:	Run ID: <b>UV-2450_328845</b>	SeqNo: <b>4855019</b>		PrepDate:		DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Chromium, Hexavalent	0.265	0.0100	0.25	-0.001	106	75 - 125	0.265	0 20	

The following samples were analyzed in this batch: HS18120379-01

**ALS Houston, US**

Date: 26-Dec-18

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<b>Client:</b>	Bhate Environmental Associates, Inc.	<b>QUALIFIERS, ACRONYMS, UNITS</b>
<b>Project:</b>	Groundwater Treatment Plant Monthly Influent Samples	
<b>WorkOrder:</b>	<b>HS18120379</b>	

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<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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

ALS Houston, US

Date: 26-Dec-18

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Monthly Influent Samples  
**Work Order:** HS18120379

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**SAMPLE TRACKING**

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Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18120379-01	LH18/24-SP140_120618	Login	12/7/2018 12:14:18 PM	JRM	Sub
HS18120379-01	LH18/24-SP140_120618	Login	12/7/2018 12:14:18 PM	JRM	WET270
HS18120379-01	LH18/24-SP140_120618	Login	12/7/2018 12:14:18 PM	JRM	MET049

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**Sample Receipt Checklist**

Client Name: Bhate Environmental  
 Work Order: HS18120379

Date/Time Received: **07-Dec-2018 10:00**  
 Received by: **JRM**

Checklist completed by: Jared R. Makan | 7-Dec-2018  
 eSignature | Date

Reviewed by: RJ Modashia | 8-Dec-2018  
 eSignature | Date

Matrices: **Water**

Carrier name: **FedEx Priority Overnight**

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- TX1005 solids received in hermetically sealed vials? Yes  No  N/A
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No

Temperature(s)/Thermometer(s): 3.0c/3.3c UC/C | IR25  
 Cooler(s)/Kit(s): 44423  
 Date/Time sample(s) sent to storage: 12/07/2018 12:16

- Water - VOA vials have zero headspace? Yes  No  No VOA vials submitted
- Water - pH acceptable upon receipt? Yes  No  N/A
- pH adjusted? Yes  No  N/A

pH adjusted by:

Login Notes:

Client Contacted: \_\_\_\_\_ Date Contacted: \_\_\_\_\_ Person Contacted: \_\_\_\_\_

Contacted By: \_\_\_\_\_ Regarding: \_\_\_\_\_

Comments:

Corrective Action:



**CHAIN OF CUSTODY**

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

<b>Project:</b> BHATE LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS			<b>Project No.</b> NWO1312.0150.0 16.0001		<b>Analyses</b>										Remarks (Preservatives, etc.)	Lab I.D.#			
<b>Job:</b> GROUNDWATER TREATMENT PLANT MONTHLY INFLUENT SAMPLES			MS /MSD	No. OF CONTAINERS	SILVER & SELENIUM	HEXAVALENT CHROMIUM	PERCHLORATE												
<b>Prepared By:</b> Scott Beesinger		<b>P.O. Number</b>																	
<b>Field Sample I.D.</b>	<b>Sample Matrix</b>	<b>Date / Time</b>																	
LH18/24-SP140_120618	Water	12/06/18 / 14:00	1	X															HNO3
LH18/24-SP140_120618	Water	12/06/18 / 14:00	2		X	X													NONE

**Additional Remarks:** STANDARD TURN AROUND TIME

<b>Relinquished By:</b>	<b>Date</b>	<b>Time</b>	<b>Received By:</b>	<b>Date</b>	<b>Time</b>	<b>Relinquished By:</b>	<b>Date</b>	<b>Time</b>	<b>Received By:</b>	<b>Date</b>	<b>Time</b>
<i>Scott Beesinger</i>	12/06/18	14:30									

<b>For Lab Use Only</b>									
<b>Received At Lab By:</b>	<b>Date</b>	<b>Time</b>	<b>Airbill No.</b>	<b>Opened By:</b>	<b>Date</b>	<b>Time</b>	<b>Temp of Container</b>	<b>Seal No.</b>	<b>Condition</b>
<i>J. MALWAN</i>	12/7/18	10:05							


**Remarks:** Cooler 44423 11225  
Temp 3.0 C F 0.3

**HS18120379**

Bhate Environmental Associates, Inc.  
 Groundwater Treatment Plant Monthly Influent Samples



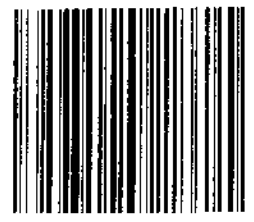
(Word) S:\1-ces\Forms\Chain of Custody - BiWeekly

 <b>ALS</b> 10450 Stanciff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax. +1 281 530 5887	<b>CUSTODY SEAL</b>		Seal Broken By: <i>SMT</i>
	Date: <i>12/6/18</i>	Time: <i>1430</i>	Date: <i>12/07/18</i>
	Name: <i>Scott Bessingell</i>		
	Company: <i>STATE</i>		

*44423* DEC 07 2018

*44423*

DS2N  
 D2-21  
 7749P  
 STAFFORD  
 AAD9537UPS



**J4616880061**



## Case Narrative

**Method:** 6850

**Analysis:** Perchlorate

**Analysis SOP:** LC-MS-CLO4

**ALS WO ID(s):** 1834583; 1834584; 1834586;  
1834591; 1834871

**Client:** ALS Laboratories (Houston, TX)

**Matrix:** Water

**ELMS Batch (HBN):** 2187 (229705)

**General Set Information:** There were fourteen 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  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** Field samples 1834584001/1834591003 were analyzed and reported from 1:1,000 dilutions. Field samples 1834591006/07 were analyzed and reported from 1:10 dilutions. Field samples 1834591008-10 were analyzed and reported from 1:100 dilutions. The reporting limits have been adjusted accordingly.

**Method QC data:** The method blank (LMB 633241) was less than 1/2 the CRDL. The recovery for the LCS (633242) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on sample 1834583001 (Client ID: LH18/24-SP650\_120618\_BIX). 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 Matrix Spike (MS – 633243) failed QC acceptance criteria for percent recovery, biased high. This is due to the fact that the unspiked sample result of 2.028µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected. The relative percent difference (RPD) 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  $(A) \times (B)$ ,

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.

Thomas Bosch                      December 21, 2018  
Analyst    Date



## ANALYTICAL REPORT

Report Date: December 21, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1834584**

Project ID: HS18120379

Purchase Order: HS18120379

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP140_120618	1834584001	12/06/18	12/11/18	

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 268 9992

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18 of 126



## ANALYTICAL REPORT

Workorder: **34-1834584**Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP140_120618</b>	Sampling Site: NA	Collected: 12/06/2018				
Lab ID: 1834584001	Media: 125 mL Nalgene	Received: 12/11/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2187 (HBN: 229705) Analyzed: 12/19/2018 10:18	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
Perchlorate	<b>4900</b>	1000	2000	4000	1000	

## Comments

**Workorder: 1834584**

Field sample 1834584001 was analyzed and reported from a 1:1,000 dilution. The reporting limit has been adjusted accordingly.

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

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 12/20/2018 13:51	/S/ Stephen Brose 12/21/2018 13:13

## Laboratory Contact Information

ALS Environmental  
960 W Levoy Drive  
Salt Lake City, Utah 84123Phone: (801) 266-7700  
Email: als@alst.com  
Web: www.alst.com



## ANALYTICAL REPORT

**Workorder:** 34-1834584

**Client:** ALS Environmental  
(Houston)

**Project Manager:** Kevin W. Griffiths

### General Lab Comments

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

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

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

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

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

### Result Symbol Definitions

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

### Qualifier Symbol Definitions

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



# Quality Control Sample Batch Report

00922261

## Analysis Information

**Workorder:** 1834584

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2187 (HBN: 229705)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 633241 <b>Analyzed:</b> 12/19/2018 09:08 <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 633242 <b>Analyzed:</b> 12/19/2018 09:22 <b>Dilution:</b> 1 <b>Units:</b> ug/L				
Analyte	Result	Target	% Rec	QC Limits
Perchlorate	4.68	5.00	93.6	78.8   123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1834583001 <b>Analyzed:</b> 12/19/2018 09:37 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MS:</b> 633243 <b>Analyzed:</b> 12/19/2018 09:50 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MSD:</b> 633244 <b>Analyzed:</b> 12/19/2018 10:04 <b>Dilution:</b> 1 <b>Units:</b> ug/L			
Analyte	Result	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Perchlorate	2.00	6.21	5 #	124	78.8   123.8	6.16	123	0.884	0.0   20.0

## Continuing Calibration Verification

<b>CCV:</b> 633238 <b>Analyzed:</b> 12/19/2018 08:25 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 633245 <b>Analyzed:</b> 12/19/2018 11:54 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 633247 <b>Analyzed:</b> 12/19/2018 14:26 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	25.5	25.0	102	26.1	25.0	104	26.2	25.0	105

## Interference Check Sample

<b>ICSA:</b> 633240 <b>Analyzed:</b> 12/19/2018 08:54 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	1.08	1.00	108

## Limit of Detection Verification

<b>LODV:</b> 633239 <b>Analyzed:</b> 12/19/2018 08:40 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 633246 <b>Analyzed:</b> 12/19/2018 12:08 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 633248 <b>Analyzed:</b> 12/19/2018 14:40 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.08	1.00	108	1.07	1.00	107	1.06	1.00	106





# Quality Control Sample Batch Report

00922262

## Analysis Information

**Workorder:** 1834584

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2187 (HBN: 229705)

**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 12/20/2018 13:51	/S/ Stephen Brose 12/21/2018 13:13

## Symbols and Definitions

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

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



18693/2

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



### Chain of Custody

COC ID: 10386

1834584

#### 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:** HS18120379  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18120379-01	LH18/24-SP140_120618	Water	06 Dec 2018 14:00
SUB_Perch-6850			21 Dec 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By:   
Received By:   
Cooler ID(s): \_\_\_\_\_

Date/Time: 12/10/18 1800  
Date/Time: 12/11/18 8:45  
Temperature(s): \_\_\_\_\_

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

**COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)**

1834584

Client Name: ALS Houston  
 Date/Time of Receipt: 12-11-18 8:45

Project/Task/Site: \_\_\_\_\_  
 Number of Coolers Received: 1

Condition of Coolers: Acceptable/Unacceptable  
 Cooler Custody Seals: Present/Absent/NA  
 Container Custody Seals: Present/Absent/NA  
 Ice Present: Yes/No/NA  
Intact/Broken/NA  
Present/Absent/NA  
Intact/Broken/NA  
Yes/No/NA  
Frozen/Melted/NA

Temperature Control: Present/Not Included  
 Location Temp Taken: Control/Between Samples  
 Are all temperatures within project specific guidelines? Yes/No/NA  
 VOA Headspace Present? Yes/No/NA

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

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 9018	1 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Jammyn Russell Tammara Gsell 12-11-18  
Signature Printed Name Date

**CLIENT-RELATED INFORMATION**

- |  |   |  |   |
|--|---|--|---|
| <input type="checkbox"/> Missing Cooler                  | <input type="checkbox"/> Missing Samples/Bottles          | <input type="checkbox"/> Incorrect Preservation    | <input type="checkbox"/> Insufficient Sample Volume |
| <input type="checkbox"/> Cooler Conditions               | <input type="checkbox"/> Broken/Leaking Samples           | <input type="checkbox"/> pH Criteria Not Met       | <input type="checkbox"/> Chain of Custody Problems  |
| <input type="checkbox"/> Missing Paperwork               | <input type="checkbox"/> Incorrect Bottle Type            | <input type="checkbox"/> Residual Chlorine Present | <input type="checkbox"/> Other:                     |
| <input type="checkbox"/> Missing/Incorrect Bottle Labels | <input type="checkbox"/> Cooler Temperatures Out of Range | <input type="checkbox"/> 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: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature



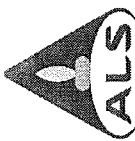


# ALS Environmental CHAIN-OF-CUSTODY

Project / Job / Task: HS18120379		Split:	Workorder ID: 1834584	Level: ENV_LVL4	Requested Analysis	
Client: ALS Environmental (Houston)		Account: 8101		Type: 125Poly		
Comments:						
Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers
1	12/06/2018 14:00	LH18/24-SP140_120618	1834584001		Water	1
2						
3						
4						
5						
6						
7						
8						
9						
10						

EPA 8850, DdD GSM

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY				SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY			
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location	Sample Prep / Analysis for: Prepared / Analyzed by:	Lab Notebook No.:	Received By: (Signature)	Reason for Transfer / Storage Location
<i>Julie W...</i>	12/11/2018 08:45	ALS Sample Receiving	Sample Login				
<i>R.33.1</i>	12/18/18 12:25	<i>T. Bond</i>	<i>Storage</i>				
			<i>6850</i>				



# Batch Worklist

HBN: 229705

Instrument:

Created: 12/18/2018 15:40



Status: WP

Analyst: T. Bosch

Batch: ELMS/ 2187

- Rule: EPA 6850, DoD QSM Water
- Workorder: 1834583 [ENV\_LVL4]
- Workorder: 1834584 [ENV\_LVL4]
- Workorder: 1834586 [ENV\_LVL4]
- Workorder: 1834591 [ENV\_LVL4]
- Workorder: 1834871 [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	633238	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
2	633239	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	
3	633240	ICS for HBN 229705 [ELMS/2187]				ICS	3		E6850..D3Q	5311		12/26/2018	
4	633241	LMB for HBN 229705 [ELMS/2187]				LMB	3		E6850Q413Q	5311		12/26/2018	
5	633242	LCS for HBN 229705 [ELMS/2187]				LCS	3		E6850Q413Q	5311		12/26/2018	
6	1834583001	LH18/24-SP650_120618_BIX				SAMPLE	3	1834583001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
7	633243	LH18/24-SP650...(1834583001MS)				MS	3		E6850Q413Q	5311		12/26/2018	
8	633244	LH18/24-SP65...(1834583001MSD)				MSD	3		E6850Q413Q	5311		12/26/2018	
9	1834584001	LH18/24-SP140_120618				SAMPLE	3	1834584001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
10	1834586001	LH18/24-SP650_120618_BIX				SAMPLE	3	1834586001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
11	1834591001	MW-25-12062018				SAMPLE	3	1834591001-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
12	1834591002	MW-28-12062018				SAMPLE	3	1834591002-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
13	1834591003	MW-26-12062018				SAMPLE	3	1834591003-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
14	1834591004	MW-20-12062018				SAMPLE	3	1834591004-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
15	1834591005	MW-5-12062018				SAMPLE	3	1834591005-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
16	633245	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
17	633246	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	
18	1834591006	MW-19-12062018				SAMPLE	3	1834591006-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
19	1834591007	MW-8-12062018				SAMPLE	3	1834591007-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
20	1834591008	MW-6-12062018				SAMPLE	3	1834591008-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
21	1834591009	MW-12-12062018				SAMPLE	3	1834591009-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
22	1834591010	DUP-1A-12062018				FLDDUP	3	1834591010-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
23	1834871001	LH18/24-SP650_121218				SAMPLE	3	1834871001-A	E6850Q41.3	5480	1/9/2019	12/31/2018	
24	633247	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
25	633248	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**

ALS Work Order #'s & Sample #('): 1834583 (001); 1834584(001); 1834586(001);1834591(001-10);1834871 (001)  
 ELMS Batch/HBN ID: 2187 (229705)  
 Prep Date: 12/18/2018 Analysis Date: 12/19/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\DEC\19DEC18D.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 633242; Target = 5.0µg/L. ASTM type II water was used for LMB 633241.

**MS/MSD:** MS/MSD was performed on sample 1834483001 (Client ID: LH18/24-SP650\_120618\_BIX). 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 1834584001/1834591003 were analyzed and reported from 1:1,000 dilutions. Field samples 1834591006/07 were analyzed and reported from 1:10 dilutions. Field samples 1834591008-10 were analyzed and reported from 1:100 dilutions. The reporting limits have been adjusted accordingly. Sample 1834591005 failed the 50-150% method requirement for IS/D recovery. The sample was re-prepped, re-analyzed and reported.
- 2) All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike (MS - 633243) failed QC acceptance criteria for percent recovery, biased high. This is due to the fact that the unspiked sample result of 2.028µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.
- 3) Sample data can be viewed at two directories within the ALS system: \\ALS\TWS013\LCMS\LCMS04\2018\DEC\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- 4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\229705-DoD-ALS-Hstn LCMS4 or through \\ALS\TWS013\DATAREVIEW\HBN#



### 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.

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
Batch(es)/SDG: ELMS: 2187 HBN: 229705		
Sample Set IDs if Applicable: 1834591 / 1834871 1834583 / 1834584 / 1834586		
Calibration standards analyzed and meets criteria	TB	SB
Standards traceability checked and meets criteria	TB	SB
Standard curve coefficients evaluated and meet criteria	TB	SB
ICVs analyzed and meet acceptance criteria	TB	SB
CCVs analyzed and meet acceptance criteria	TB	SB
Method Blanks analyzed and meet acceptance criteria	TB	SB
Retention Time Windows checked	TB	SB
<b>For method 8081A, Endrin/DDT Breakdown is checked for compliance</b>	—	—
Surrogate recoveries checked and appropriately addressed	—	—
Method Preparation Blanks analyzed and meet acceptance criteria	TB	SB
MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed	TB	SB
RLVS analyzed	TB	SB
Preparation and analysis hold times met	TB	SB
Preparation deviations and re-preparations noted when performed	TB	SB
Analysis deviations and re-analyses noted when performed	TB	SB
Sample dilution factors noted on reports	TB	SB
Electronic records in HBN transcription accuracy and completeness checked	TB	SB
Preparation and analysis calculations checked	TB	SB
NCRs are completed as necessary NC/CAR# _____	—	—
Report forms are complete and accurate	TB	SB
Manual integrations checked	TB	SB



## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK			Description - 6850 WKG Std 100.ug/L		
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL	
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020	
MFG Lot: 218065075		Usable: No	
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Constituent

## Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK			Description - 6850 QC WKG STD 100ug/L		
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				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		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



**STANDARD REPORT**  
**Constituent**

**Solvent Standard - ASTM H2O**

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			





## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description: 6850 QC Stock STD 1,000ug/mL	
Standard: 36748	Created By: Thomas Bosch	Amount: 100 mL	
MFG: Ultra Scientific	Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020	
MFG Lot: CP-0860		Usable: Yes	
Part ID: ICC-013		Lab Lot: CLO4 QC STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730	Created By: Thomas Bosch	Amount: 25 mL			
MFG: ALS/SLC	Create Date: 09/20/2018 09:09AM	Expires: 09/20/2019			
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes			
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK			
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK			Description - Perchlorate ISTD Stock
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL



# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

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

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

Solvent: water (low TOC, < 50 ppb)

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

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

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

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

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

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

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

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





# Certificate of Analysis



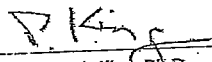
## ISO Guide 34 Reference Material

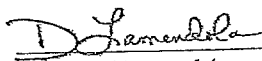
Product Number: ICC-013  
Lot Number: CP-0860

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. Lattendola  
Director of QA/RA



125 Market Street  
New Haven, CT 06513  
USA



AccuStandard®

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# CERTIFICATE OF ANALYSIS



43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> 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



Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

Quality Standards:

ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

## Product Information

Chemical Purity Specification:  $\geq 98\%$

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/NCSL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

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

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

Approved by: T. J. Eckersley

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

## Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LCMS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# Raw Data



Batch Report: C:\HPCHEM\1\DATA\19DEC18D\19DEC18S.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	
*	633238	C	Vial 71	1	Control	1	3.23209e6	8.395	25.48210
*	633239	L	Vial 72	1	Control	2	1.11008e5	8.452	1.07645
*	633240	I	Vial 73	1	Control	3	8.52191e4	8.388	1.07598
*	633241	L	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	633242	Q	Vial 75	1	Control	5	6.02025e5	8.424	4.68168
*	1834583001		Vial 76	1	Sample	6	1.30682e5	8.299	2.02766
*	633243	3	Vial 77	1	Sample	7	4.18728e5	8.304	6.21365
*	633244	3	Vial 78	1	Sample	8	4.70343e5	8.301	6.15892
*	1834584001		Vial 79	1	Sample	9	7.55206e5	8.404	4863.44428
*	1834586001		Vial 80	1	Sample	10	1.47417e5	8.281	2.22125
*	1834591001		Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1834591002		Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1834591003		Vial 83	1	Sample	13	1.37283e6	8.422	9673.99580
*	1834591004		Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1834591005		Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	633245	C	Vial 71	1	Control	16	3.35351e6	8.368	26.12216
*	633246	L	Vial 72	1	Control	17	1.20917e5	8.389	1.07141
*	1834591006		Vial 86	1	Sample	18	4.86119e6	8.226	77.31931
*	1834591007		Vial 87	1	Sample	19	5.52738e5	8.384	390.11734
*	1834591008		Vial 88	1	Sample	20	1.22594e6	8.392	833.53348
*	1834591009		Vial 89	1	Sample	21	1.62460e6	8.383	1220.27143
*	1834591010		Vial 90	1	Sample	22	1.23659e6	8.394	941.30723
*	1834871001		Vial 91	1	Sample	23	1.62193e5	8.278	2.59996
*	1834591006		Vial 92	1	Sample	24	6.48996e5	8.319	66.51942
*	1834591007		Vial 93	1	Sample	25	5.68899e6	8.359	441.44711
*	1834591005		Vial 94	1	Sample	26	0.00000	0.000	0.00000
*	633247	C	Vial 71	1	Control	27	3.38788e6	8.356	26.21078
*	633248	L	Vial 72	1	Control	28	1.23908e5	8.361	1.05635

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount	
*	633238	C	Vial 71	1	Control	1	9.46861e5	8.411	24.76143
*	633239	L	Vial 72	1	Control	2	3.54461e4	8.472	1.02337
*	633240	I	Vial 73	1	Control	3	3.57771e4	8.394	1.31699
*	633241	L	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	633242	Q	Vial 75	1	Control	5	1.83470e5	8.442	4.68584
*	1834583001		Vial 76	1	Sample	6	4.76828e4	8.315	2.32808
*	633243	3	Vial 77	1	Sample	7	1.49048e5	8.323	7.27217
*	633244	3	Vial 78	1	Sample	8	1.68272e5	8.319	7.24272
*	1834584001		Vial 79	1	Sample	9	2.32386e5	8.423	4917.98483
*	1834586001		Vial 80	1	Sample	10	6.04057e4	8.295	2.86912
*	1834591001		Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1834591002		Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1834591003		Vial 83	1	Sample	13	4.08001e5	8.439	9548.26549
*	1834591004		Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1834591005		Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	633245	C	Vial 71	1	Control	16	9.69700e5	8.384	25.06771
*	633246	L	Vial 72	1	Control	17	4.07711e4	8.401	1.06998
*	1834591006		Vial 86	1	Sample	18	1.46824e6	8.243	75.52262
*	1834591007		Vial 87	1	Sample	19	1.68775e5	8.403	389.27218
*	1834591008		Vial 88	1	Sample	20	3.59153e5	8.407	810.38358
*	1834591009		Vial 89	1	Sample	21	4.78620e5	8.399	1195.44501
*	1834591010		Vial 90	1	Sample	22	3.63480e5	8.413	919.03518
*	1834871001		Vial 91	1	Sample	23	6.37608e4	8.286	3.25760
*	1834591006		Vial 92	1	Sample	24	1.99622e5	8.332	67.62522
*	1834591007		Vial 93	1	Sample	25	1.66211e6	8.375	424.57193
*	1834591005		Vial 94	1	Sample	26	0.00000	0.000	0.00000
*	633247	C	Vial 71	1	Control	27	9.85047e5	8.371	25.28254
*	633248	L	Vial 72	1	Control	28	4.31054e4	8.381	1.08344

Batch Report: C:\HPCHEM\1\DATA\19DEC18D\19DEC18S.B

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	633238	C	Vial 71	1	Control	1	3.78208e5	5.00000
*	633239	L	Vial 72	1	Control	2	3.94820e5	5.00000
*	633240	I	Vial 73	1	Control	3	3.03262e5	5.00000
*	633241	L	Vial 74	1	Control	4	4.07686e5	5.00000
*	633242	Q	Vial 75	1	Control	5	4.12803e5	5.00000
*	1834583001		Vial 76	1	Sample	6	2.21386e5	5.00000
*	633243	3	Vial 77	1	Sample	7	2.13289e5	5.00000
*	633244	3	Vial 78	1	Sample	8	2.41807e5	5.00000
*	1834584001		Vial 79	1	Sample	9	4.97457e5	5000.00000
*	1834586001		Vial 80	1	Sample	10	2.25638e5	5.00000
*	1834591001		Vial 81	1	Sample	11	1.98333e5	5.00000
*	1834591002		Vial 82	1	Sample	12	1.94131e5	5.00000
*	1834591003		Vial 83	1	Sample	13	4.40927e5	5000.00000
*	1834591004		Vial 84	1	Sample	14	2.66698e5	5.00000
*	1834591005		Vial 85	1	Sample	15	1.76359e5	5.00000
*	633245	C	Vial 71	1	Control	16	3.82304e5	5.00000
*	633246	L	Vial 72	1	Control	17	4.32578e5	5.00000
*	1834591006		Vial 86	1	Sample	18	1.71171e5	5.00000
*	1834591007		Vial 87	1	Sample	19	4.59757e5	500.00000
*	1834591008		Vial 88	1	Sample	20	4.59696e5	500.00000
*	1834591009		Vial 89	1	Sample	21	4.09950e5	500.00000
*	1834591010		Vial 90	1	Sample	22	4.08616e5	500.00000
*	1834871001		Vial 91	1	Sample	23	2.08799e5	5.00000
*	1834591006		Vial 92	1	Sample	24	3.07855e5	50.00000
*	1834591007		Vial 93	1	Sample	25	3.71021e5	50.00000
*	1834591005		Vial 94	1	Sample	26	2.29204e5	5.00000
*	633247	C	Vial 71	1	Control	27	3.84847e5	5.00000
*	633248	L	Vial 72	1	Control	28	4.51163e5	5.00000

\*\*\* End of Report \*\*\*

equence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\DEC\19DEC18D.S

Sequence Table:

Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
====	=====	=====	=====	===	=====	=====	=====
1	Vial 71	633238	CCV@25	CLO4-AQN	1		Ctrl Samp
2	Vial 72	633239	LODV@1.	CLO4-AQN	1		Ctrl Samp
3	Vial 73	633240	ICS@1.0	CLO4-AQN	1		Ctrl Samp
4	Vial 74	633241	LMB	CLO4-AQN	1		Ctrl Samp
5	Vial 75	633242	QC@5.0	CLO4-AQN	1		Ctrl Samp
6	Vial 76	1834583001		CLO4-AQN	1		Sample
7	Vial 77	633243	345831S	CLO4-AQN	1		Sample
8	Vial 78	633244	345831D	CLO4-AQN	1		Sample
9	Vial 79	1834584001	1K	CLO4-AQN	1		Sample
10	Vial 80	1834586001		CLO4-AQN	1		Sample
11	Vial 81	1834591001		CLO4-AQN	1		Sample
12	Vial 82	1834591002		CLO4-AQN	1		Sample
13	Vial 83	1834591003	1K	CLO4-AQN	1		Sample
14	Vial 84	1834591004		CLO4-AQN	1		Sample
15	Vial 85	1834591005		CLO4-AQN	1		Sample
16	Vial 71	633245	CCV@25	CLO4-AQN	1		Ctrl Samp
17	Vial 72	633246	LODV@1.	CLO4-AQN	1		Ctrl Samp
18	Vial 86	1834591006		CLO4-AQN	1		Sample
19	Vial 87	1834591007	100	CLO4-AQN	1		Sample
20	Vial 88	1834591008	100	CLO4-AQN	1		Sample
21	Vial 89	1834591009	100	CLO4-AQN	1		Sample
22	Vial 90	1834591010	100	CLO4-AQN	1		Sample
23	Vial 91	1834871001		CLO4-AQN	1		Sample
24	Vial 92	1834591006	10X	CLO4-AQN	1		Sample
25	Vial 93	1834591007	10X	CLO4-AQN	1		Sample
26	Vial 94	1834591005	RE	CLO4-AQN	1		Sample
27	Vial 71	633247	CCV@25	CLO4-AQN	1		Ctrl Samp
28	Vial 72	633248	LODV@1.	CLO4-AQN	1		Ctrl Samp

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD01.D

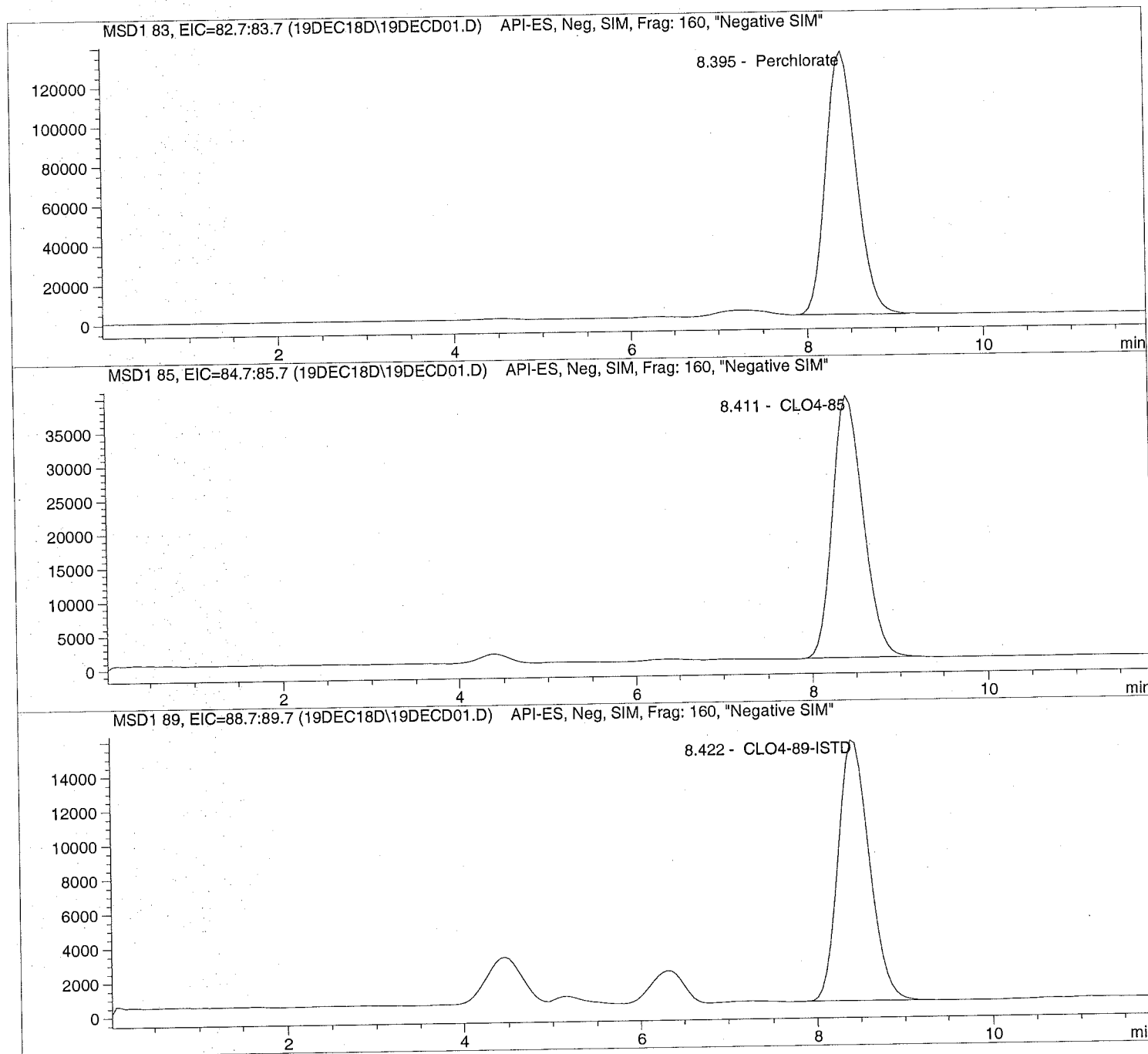
Sample Name: 633238 CCV@25

Injection Date: 12/19/2018 08:25:30  
Sample Name: 633238 CCV@25  
Acq Operator: TNB

Seq Line: 1  
Location: Vial 71  
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\19DEC18D\19DECD01.D

Sample Name: 633238 CCV@25

```

=====
Injection Date: 12/19/2018 08:25:30      Seq Line: 1
Sample Name: 633238 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
8.395	VBA	3232085.0	25.4821	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.411	PBA	946861.3	24.7614	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.422	PBA	378208.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

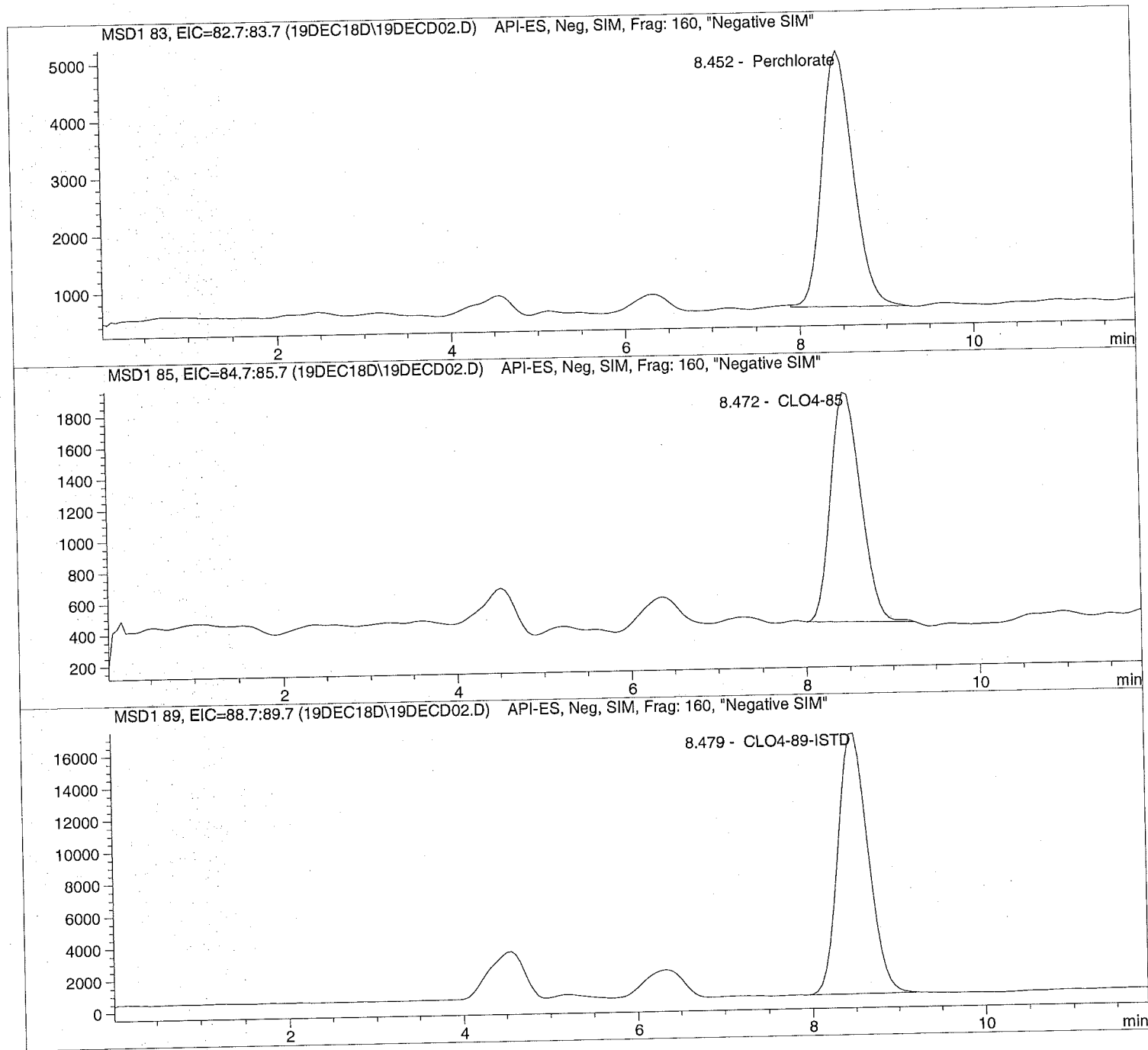
```

Injection Date: 12/19/2018 08:40:55  
Sample Name: 633239 LODV@1.  
Acq Operator: TNB

Seq Line: 2  
Location: Vial 72  
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



Injection Date: 12/19/2018 08:40:55      Seq Line: 2  
Sample Name: 633239 LODV@1.      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: 1.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.452	BBA	111007.7	1.0764	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.472	PBA	35446.1	1.0234	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.479	PBA	394819.7	5.0000	CLO4-89-ISTD

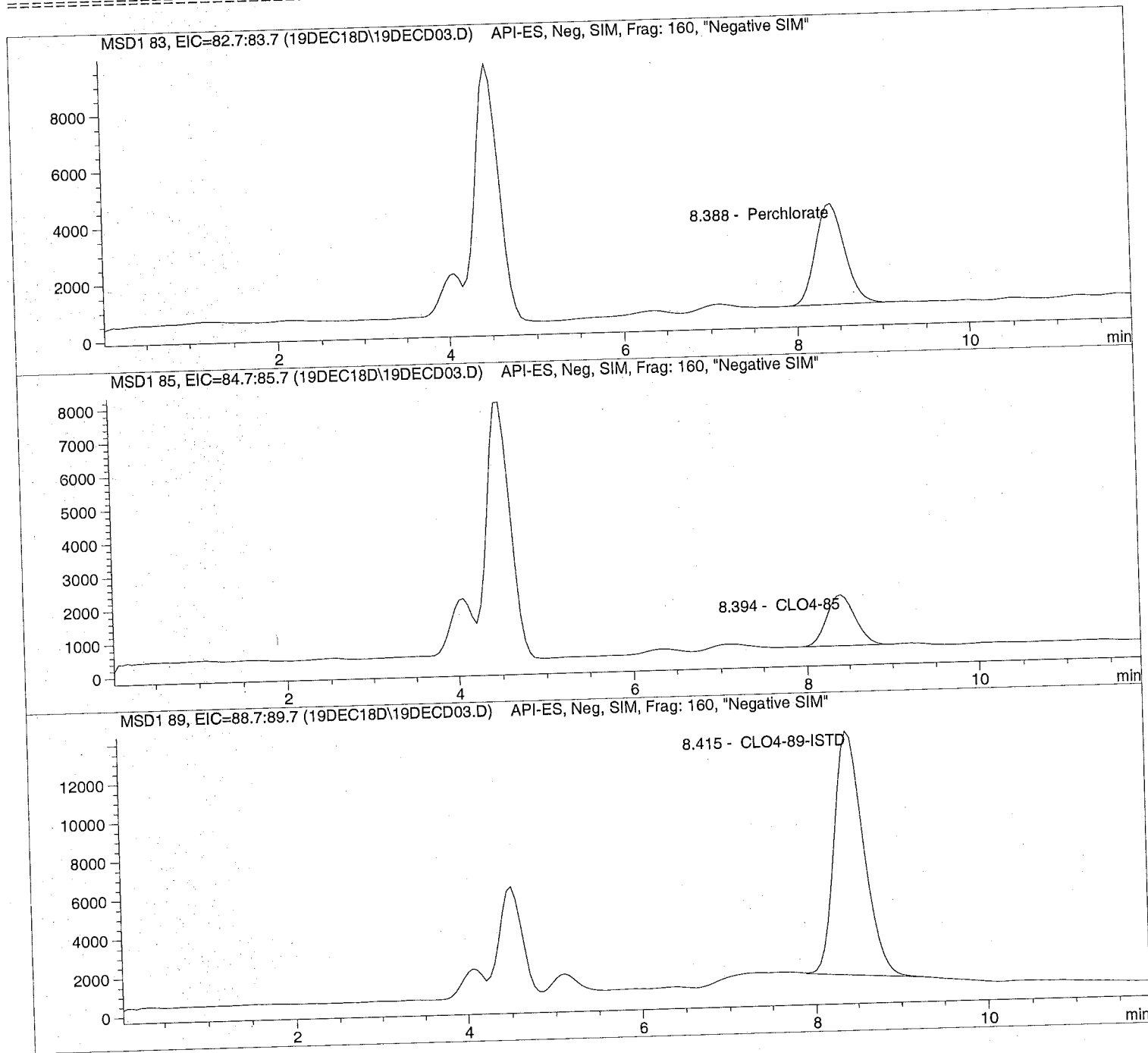
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 08:54:37  
Sample Name: 633240 ICS@1.0  
Acq Operator: TNB

Seq Line: 3  
Location: Vial 73  
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\19DEC18D\19DECD03.D

Sample Name: 633240 ICS@1.0

```

=====
Injection Date: 12/19/2018 08:54:37      Seq Line: 3
Sample Name: 633240 ICS@1.0              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: 1.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.388	PBA	85219.1	1.0760	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.394	PBA	35777.1	1.3170	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.415	BBA	303262.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD04.D

Sample Name: 633241 LMB

Injection Date: 12/19/2018 09:08:25

Seq Line: 4

Sample Name: 633241 LMB

Location: Vial 74

Acq Operator: TNB

Inj. No.: 1

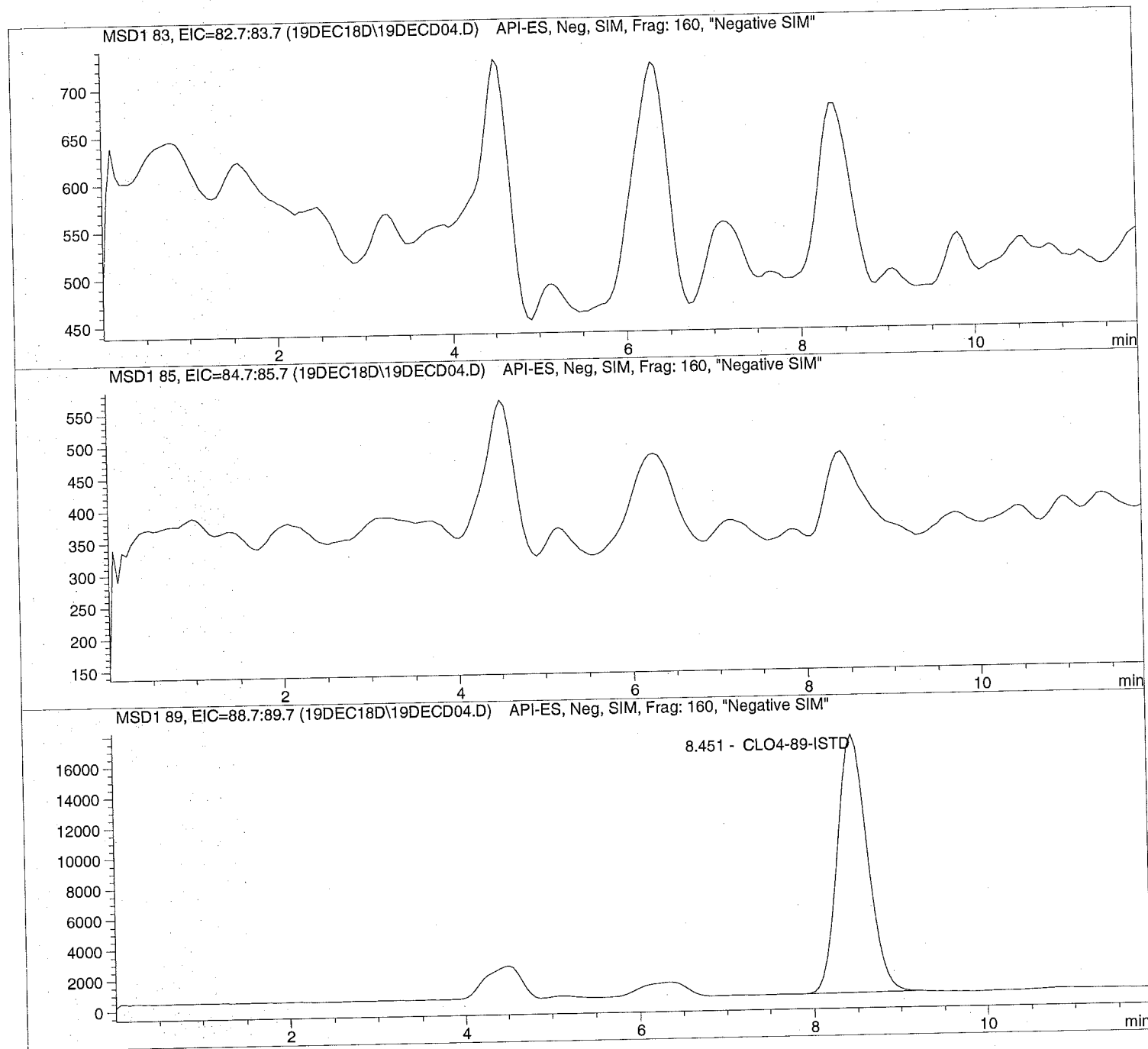
Inj. Vol.: 30 µl

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\19DEC18D\19DECD04.D

Sample Name: 633241 LMB

```

=====
Injection Date: 12/19/2018 09:08:25      Seq Line: 4
Sample Name: 633241 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
8.451	PBA	407685.9	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD05.D

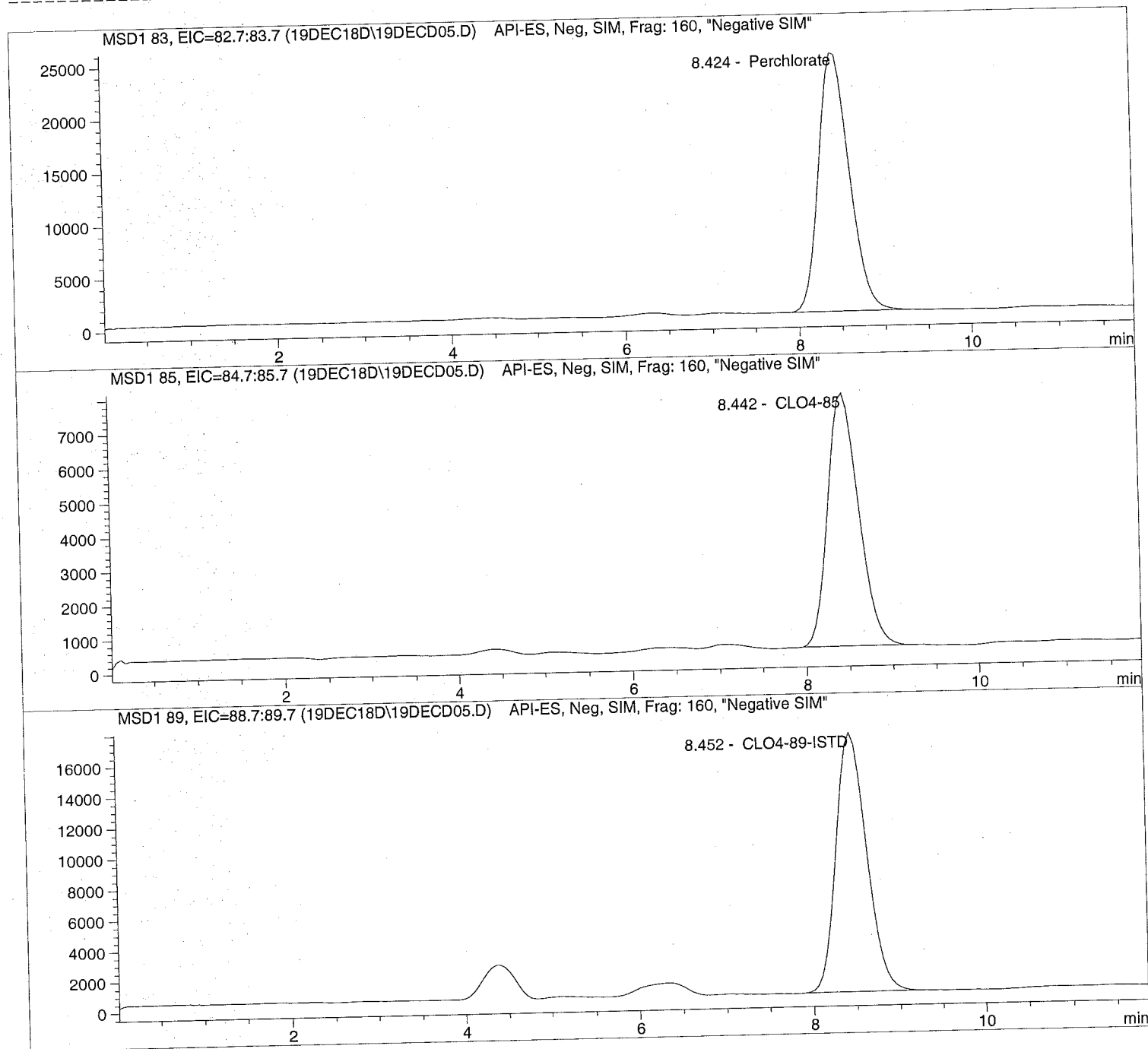
Sample Name: 633242 QC@5.0

Injection Date: 12/19/2018 09:22:11  
Sample Name: 633242 QC@5.0  
Acq Operator: TNB

Seq Line: 5  
Location: Vial 75  
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\19DEC18D\19DECD05.D

Sample Name: 633242 QC@5.0

```

=====
Injection Date: 12/19/2018 09:22:11      Seq Line:          5
Sample Name:    633242 QC@5.0             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:  5.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.424	PBA	602025.1	4.6817	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.442	BBA	183470.3	4.6858	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.452	BBA	412803.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD06.D

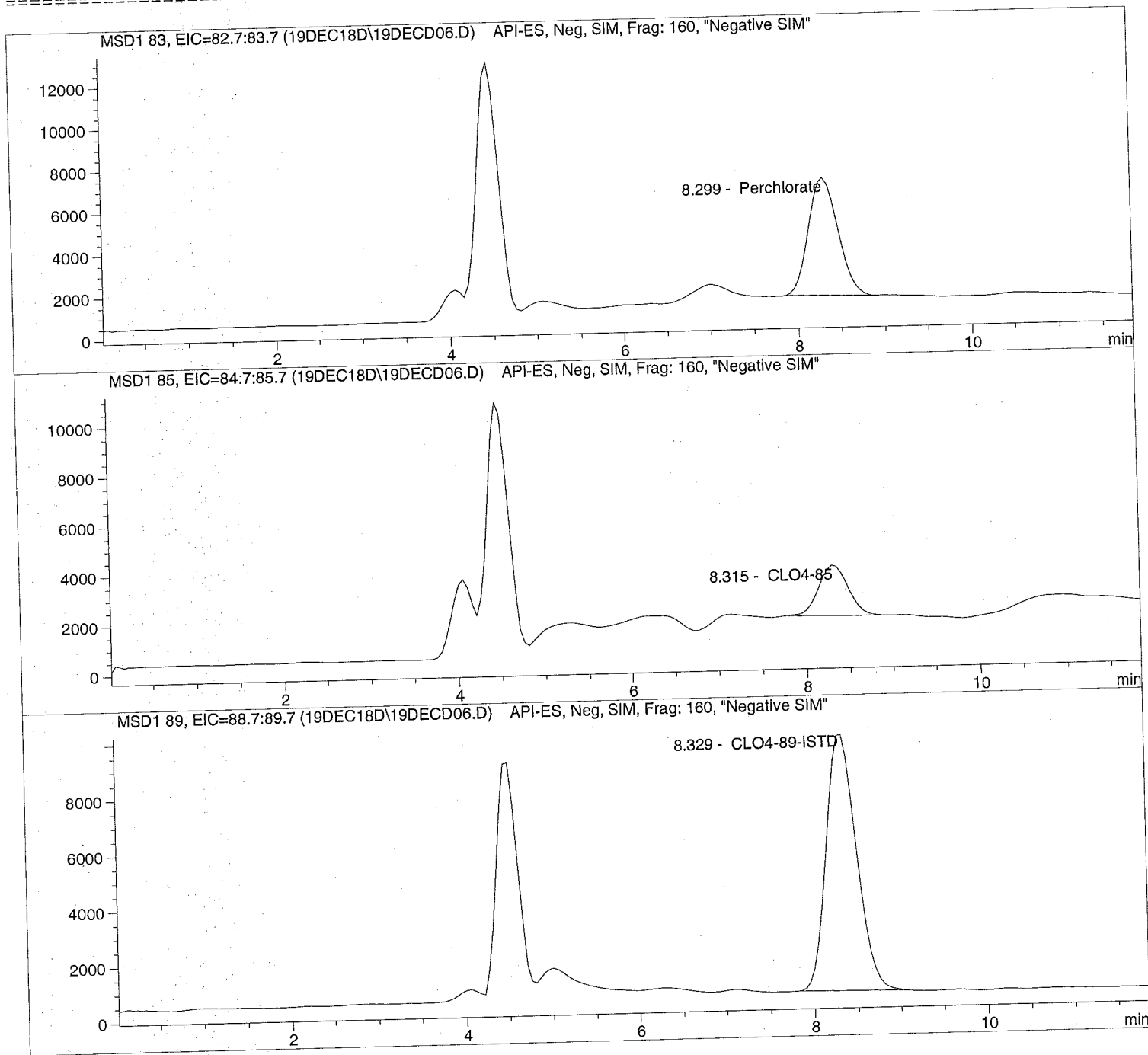
Sample Name: 1834583001

Injection Date: 12/19/2018 09:37:12  
Sample Name: 1834583001  
Acq Operator: TNB

Seq Line: 6  
Location: Vial 76  
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\19DEC18D\19DECD06.D

Sample Name: 1834583001

```

=====
Injection Date: 12/19/2018 09:37:12      Seq Line:          6
Sample Name:    1834583001                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
8.299	PBA	130682.0	2.0277	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.315	BBA	47682.8	2.3281	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	221385.7	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

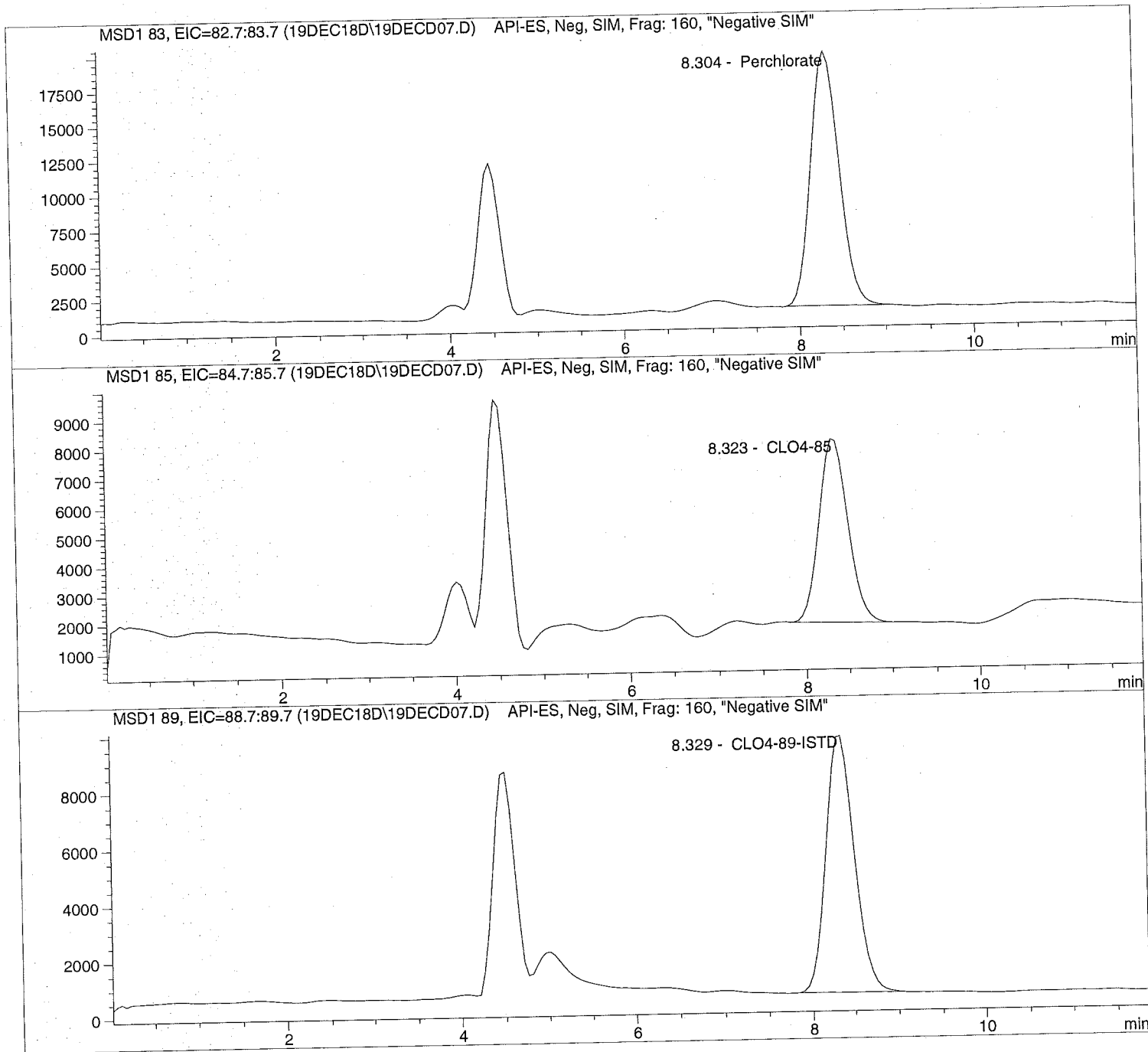
```

Injection Date: 12/19/2018 09:50:58  
Sample Name: 633243 345831S  
Acq Operator: TNB

Seq Line: 7  
Location: Vial 77  
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\19DEC18D\19DECD07.D

Sample Name: 633243 345831S

```

=====
Injection Date: 12/19/2018 09:50:58      Seq Line: 7
Sample Name: 633243 345831S             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
8.304	PBA	418727.5	6.2136	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.323	BBA	149047.9	7.2722	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	213288.8	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD08.D

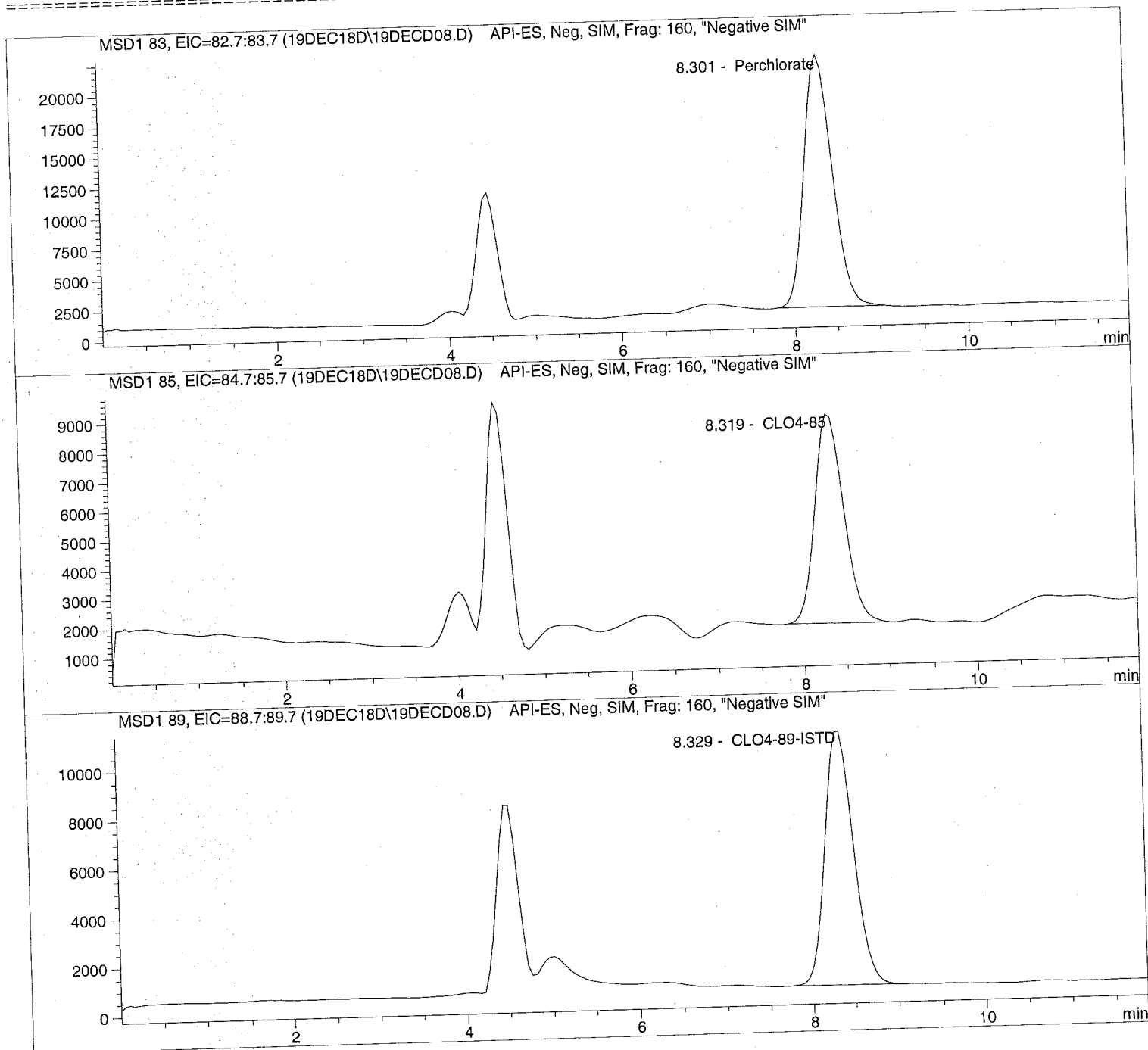
Sample Name: 633244 345831D

Injection Date: 12/19/2018 10:04:44  
Sample Name: 633244 345831D  
Acq Operator: TNB

Seq Line: 8  
Location: Vial 78  
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



Injection Date: 12/19/2018 10:04:44      Seq Line: 8  
Sample Name: 633244 345831D      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
8.301	PBA	470343.0	6.1589	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.319	PBA	168272.1	7.2427	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	241807.3	5.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD09.D

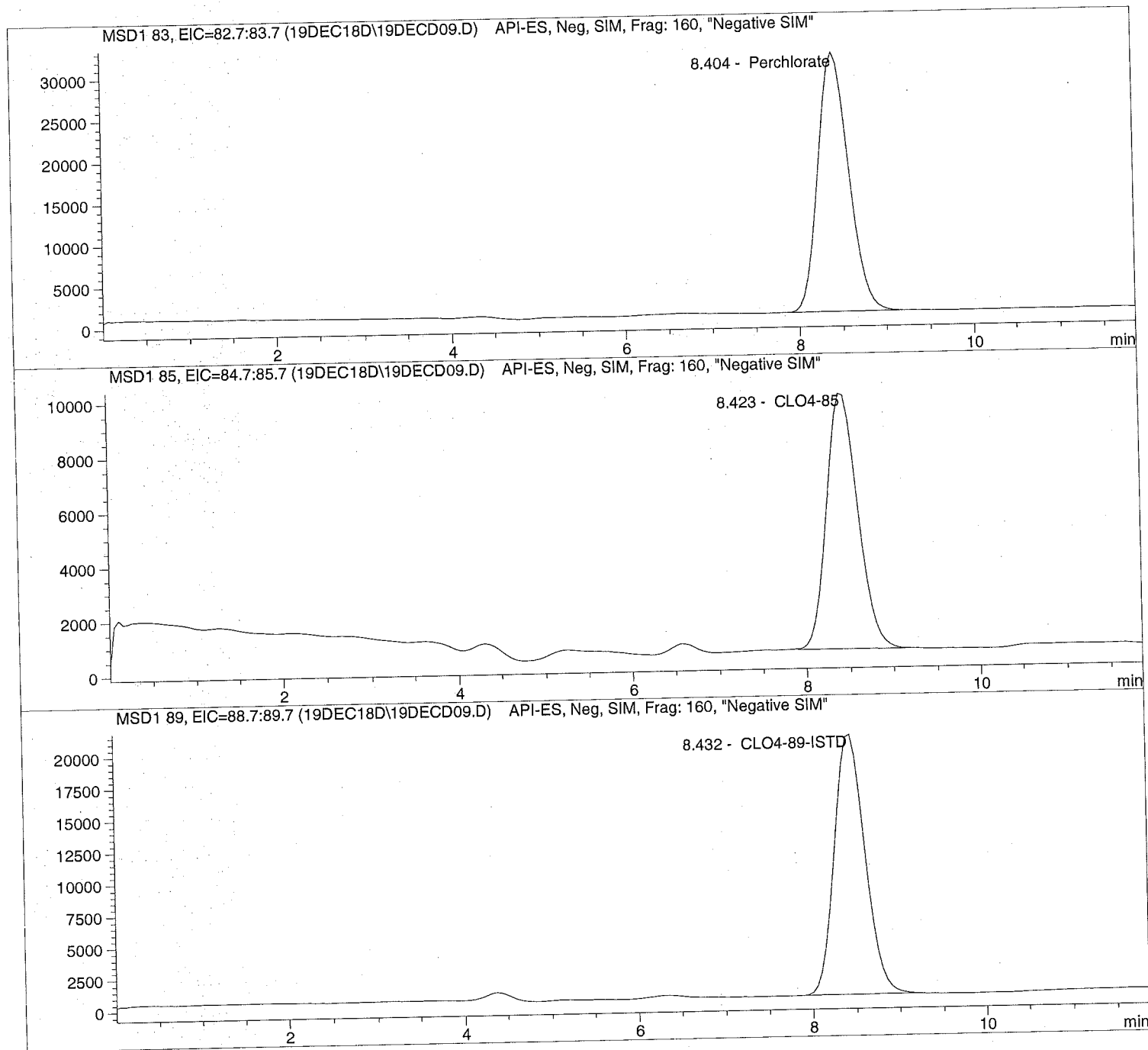
Sample Name: 1834584001 1K

Injection Date: 12/19/2018 10:18:30  
Sample Name: 1834584001 1K  
Acq Operator: TNB

Seq Line: 9  
Location: Vial 79  
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\19DEC18D\19DECD09.D

Sample Name: 1834584001 1K

```

=====
Injection Date: 12/19/2018 10:18:30      Seq Line:          9
Sample Name:    1834584001 1K             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:       1000.000000
Sample Amount:  0.000
=====

```

```

=====
                          LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.404	PBA	755206.2	4863.4443	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.423	BBA	232386.3	4917.9848	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.432	PBA	497457.1	5000.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

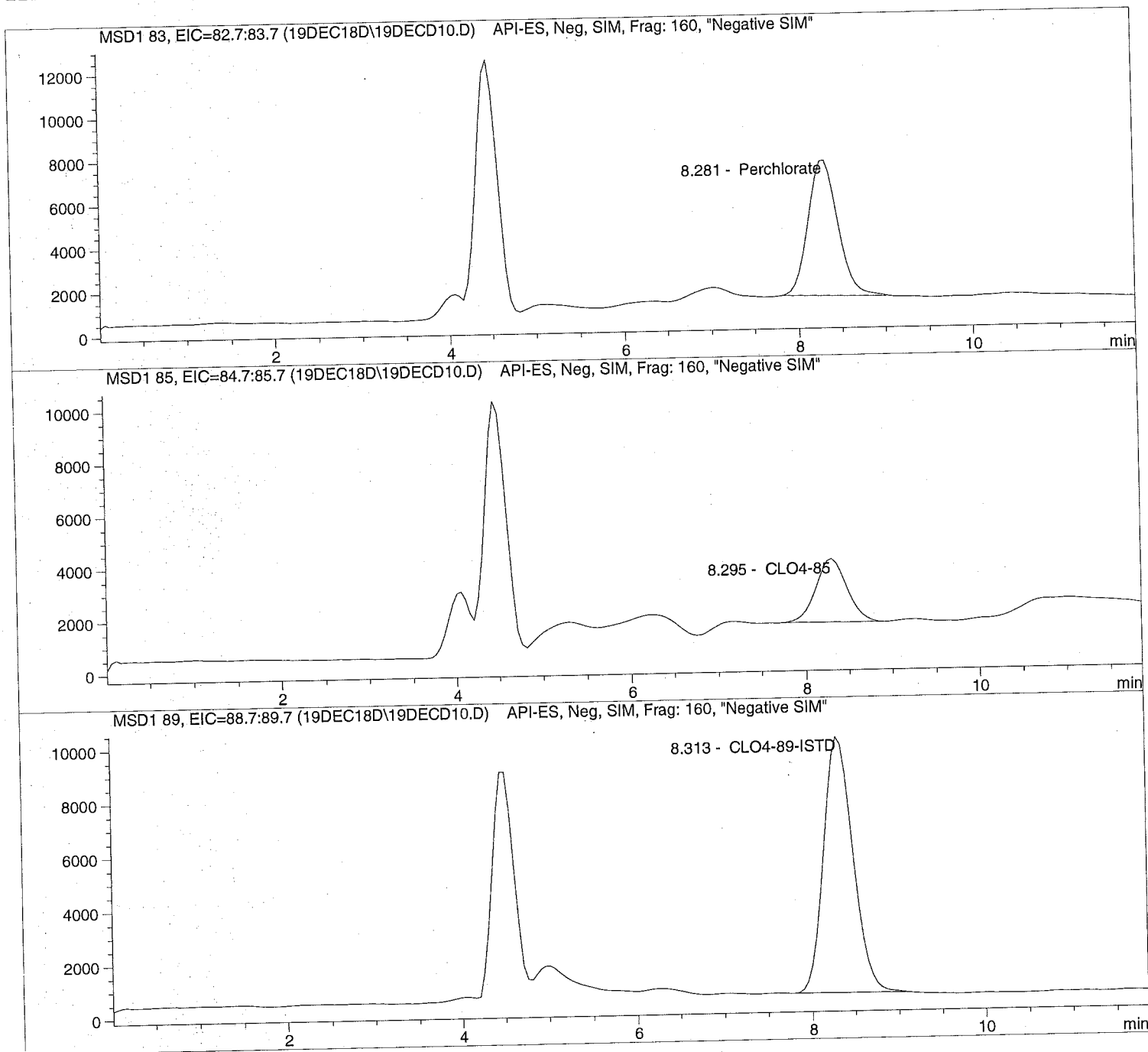
```

Injection Date: 12/19/2018 10:32:20  
Sample Name: 1834586001  
Acq Operator: TNB

Seq Line: 10  
Location: Vial 80  
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\19DEC18\19DECD10.D

Sample Name: 1834586001

```

=====
Injection Date: 12/19/2018 10:32:20      Seq Line:          10
Sample Name:    1834586001                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
8.281	PBA	147417.2	2.2212	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.295	PBA	60405.7	2.8691	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.313	PBA	225638.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD11.D

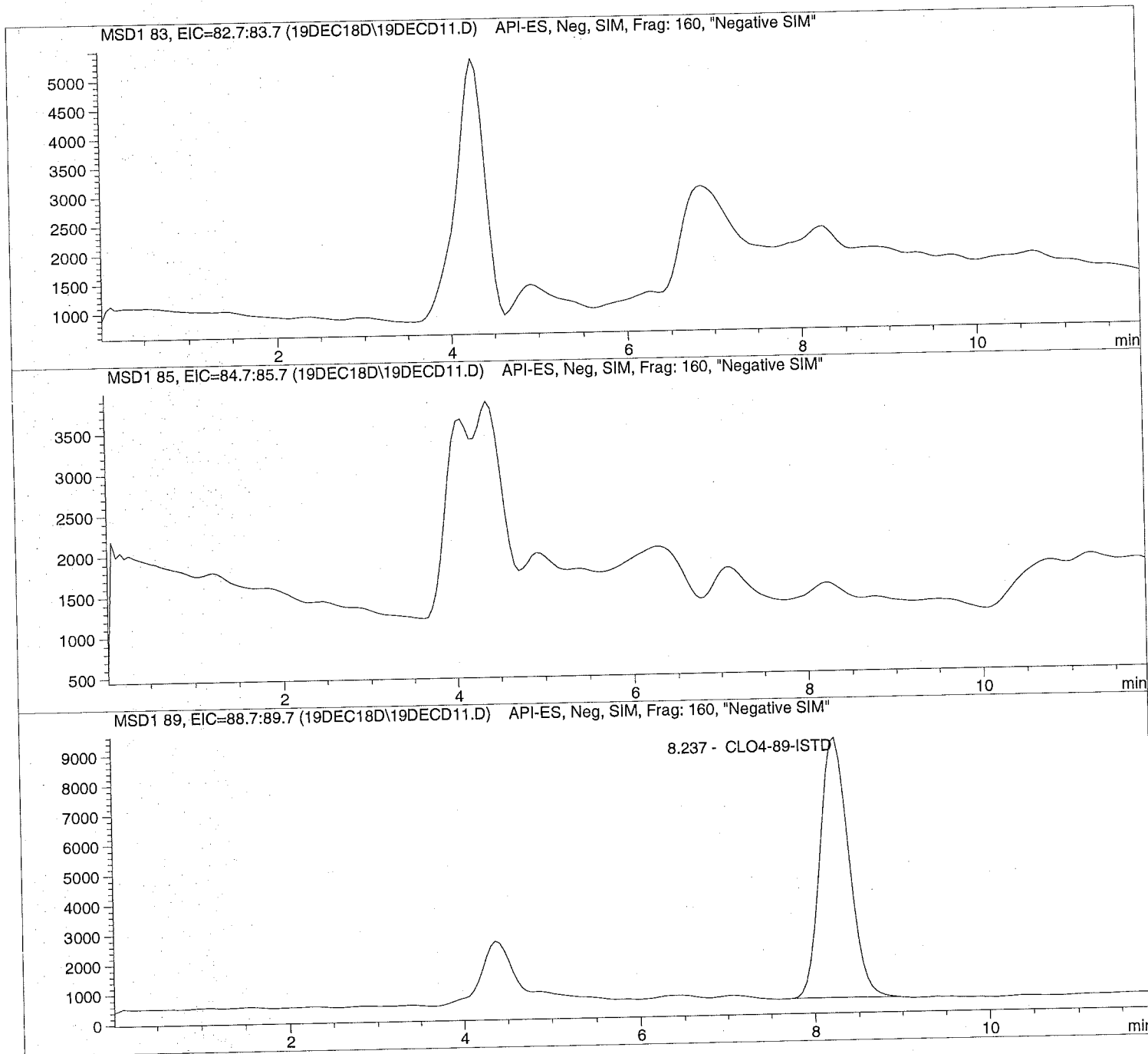
Sample Name: 1834591001

Injection Date: 12/19/2018 10:46:05  
Sample Name: 1834591001  
Acq Operator: TNB

Seq Line: 11  
Location: Vial 81  
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\19DEC18D\19DECD11.D

Sample Name: 1834591001

```

=====
Injection Date: 12/19/2018 10:46:05      Seq Line:          11
Sample Name:    1834591001                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:       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
8.237	PBA	198333.0	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD12.D

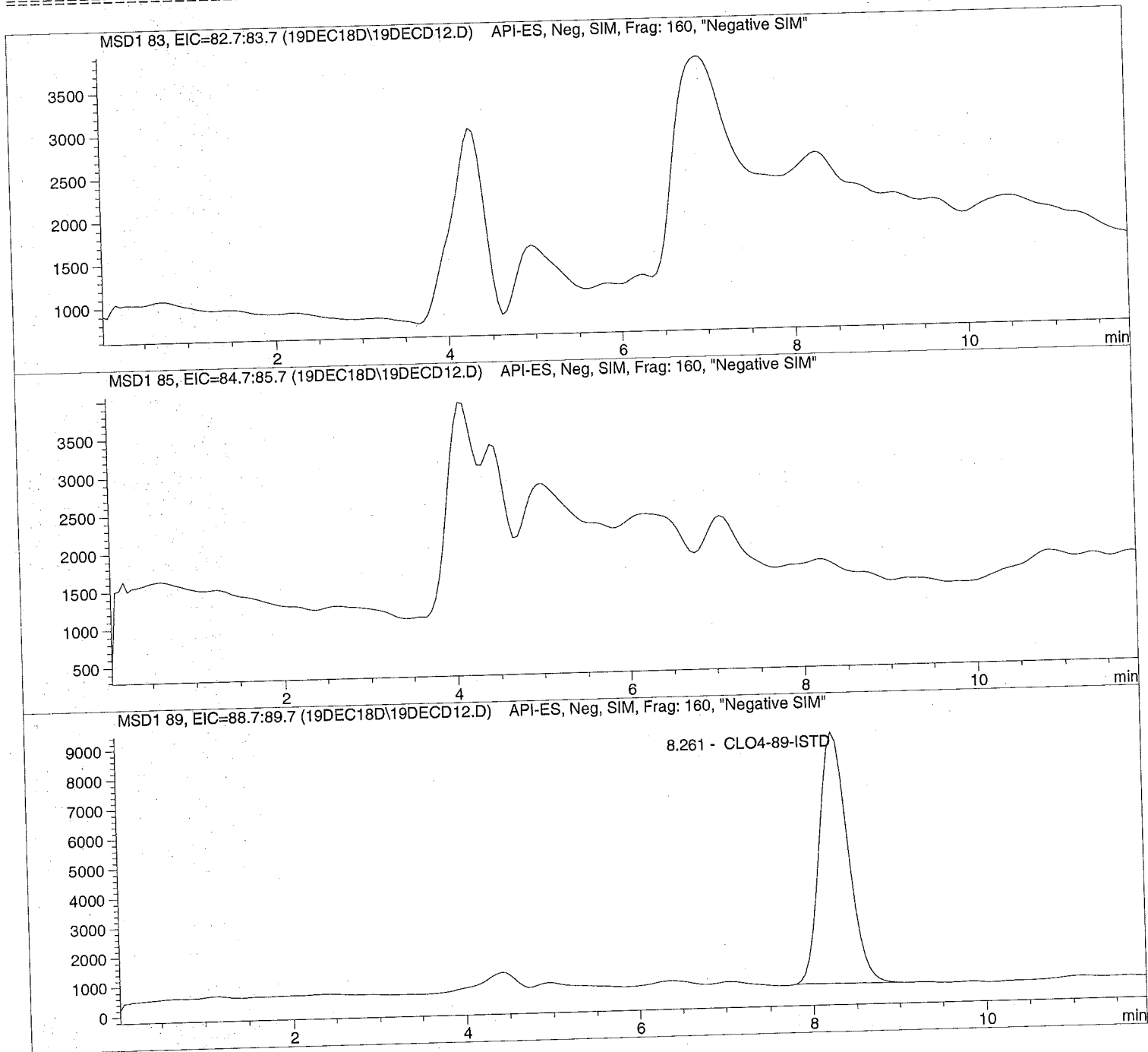
Sample Name: 1834591002

Injection Date: 12/19/2018 10:59:50  
Sample Name: 1834591002  
Acq Operator: TNB

Seq Line: 12  
Location: Vial 82  
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\19DEC18D\19DECD12.D

Sample Name: 1834591002

```

=====
Injection Date: 12/19/2018 10:59:50      Seq Line:          12
Sample Name:    1834591002                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
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
8.261	PBA	194131.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

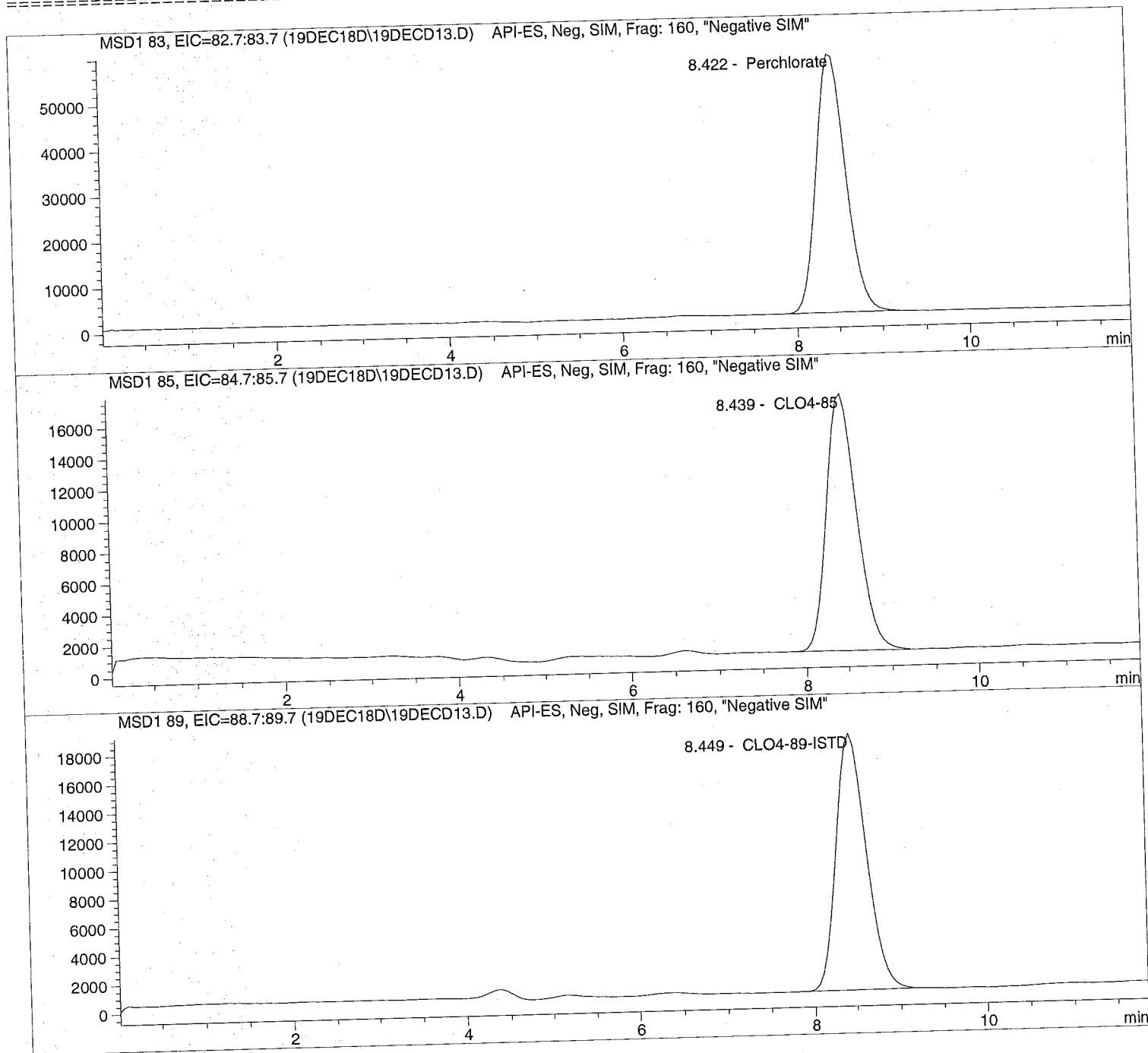
```

Injection Date: 12/19/2018 11:13:33  
Sample Name: 1834591003 1K  
Acq Operator: TNB

Seq Line: 13  
Location: Vial 83  
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



Injection Date: 12/19/2018 11:13:33 Seq Line: 13  
Sample Name: 1834591003 1K 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: 1000.000000  
Sample Amount: 0.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.422	PBA	1372828.2	9673.9958	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.439	BBA	408001.0	9548.2655	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.449	PBA	440927.1	5000.0000	CLO4-89-ISTD

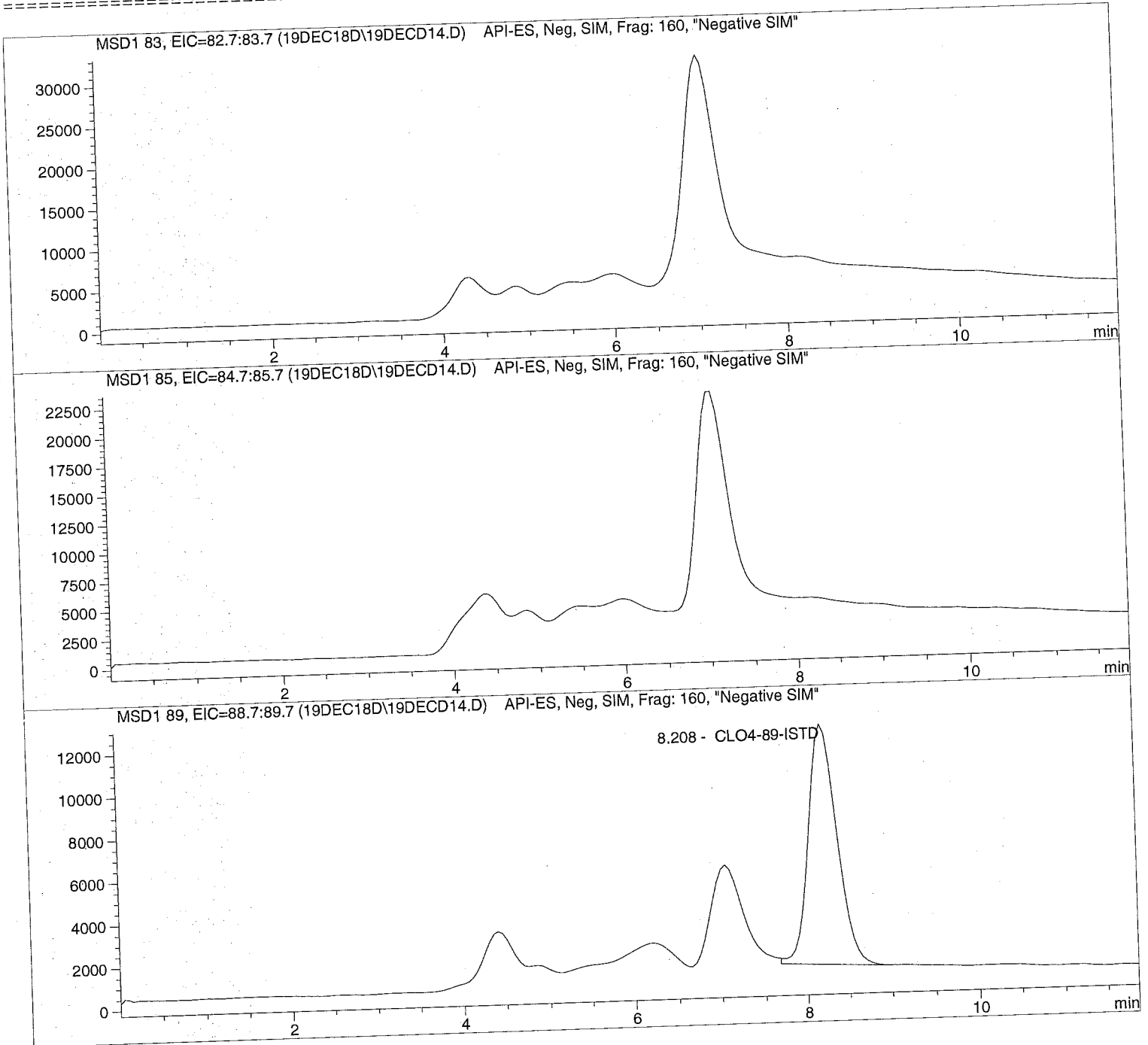
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 11:27:19  
Sample Name: 1834591004  
Acq Operator: TNB

Seq Line: 14  
Location: Vial 84  
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\19DEC18D\19DECD14.D

Sample Name: 1834591004

```

=====
Injection Date: 12/19/2018 11:27:19      Seq Line: 14
Sample Name: 1834591004                  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: 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
8.208	BBA	266698.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

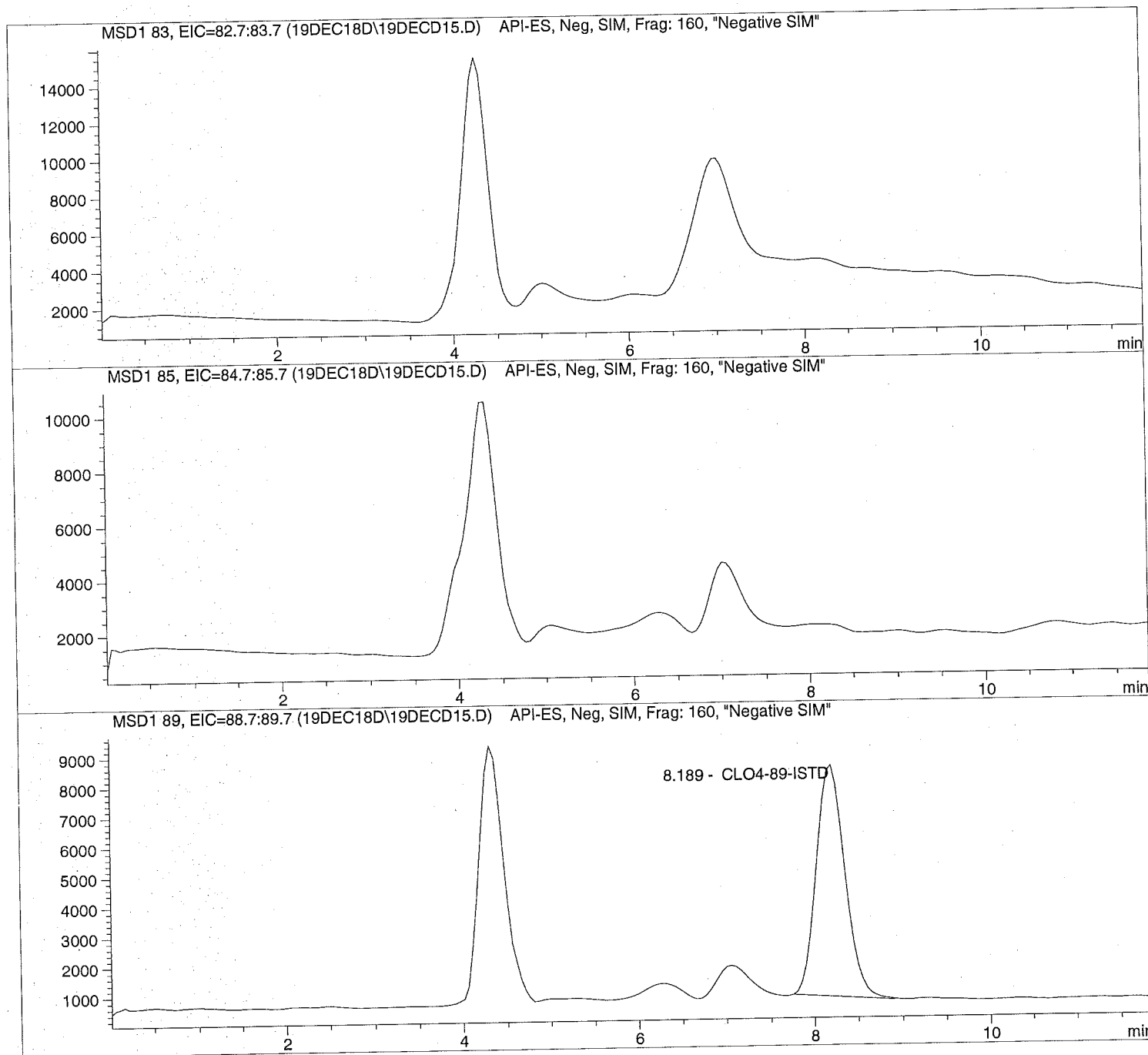
```

Injection Date: 12/19/2018 11:41:03  
Sample Name: 1834591005  
Acq Operator: TNB

Seq Line: 15  
Location: Vial 85  
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\19DEC18D\19DECD15.D

Sample Name: 1834591005

Injection Date: 12/19/2018 11:41:03  
 Sample Name: 1834591005  
 Acq Operator: TNB

Seq Line: 15  
 Location: Vial 85  
 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
8.189	PBA	176359.5	5.0000	CLO4-89-ISTD

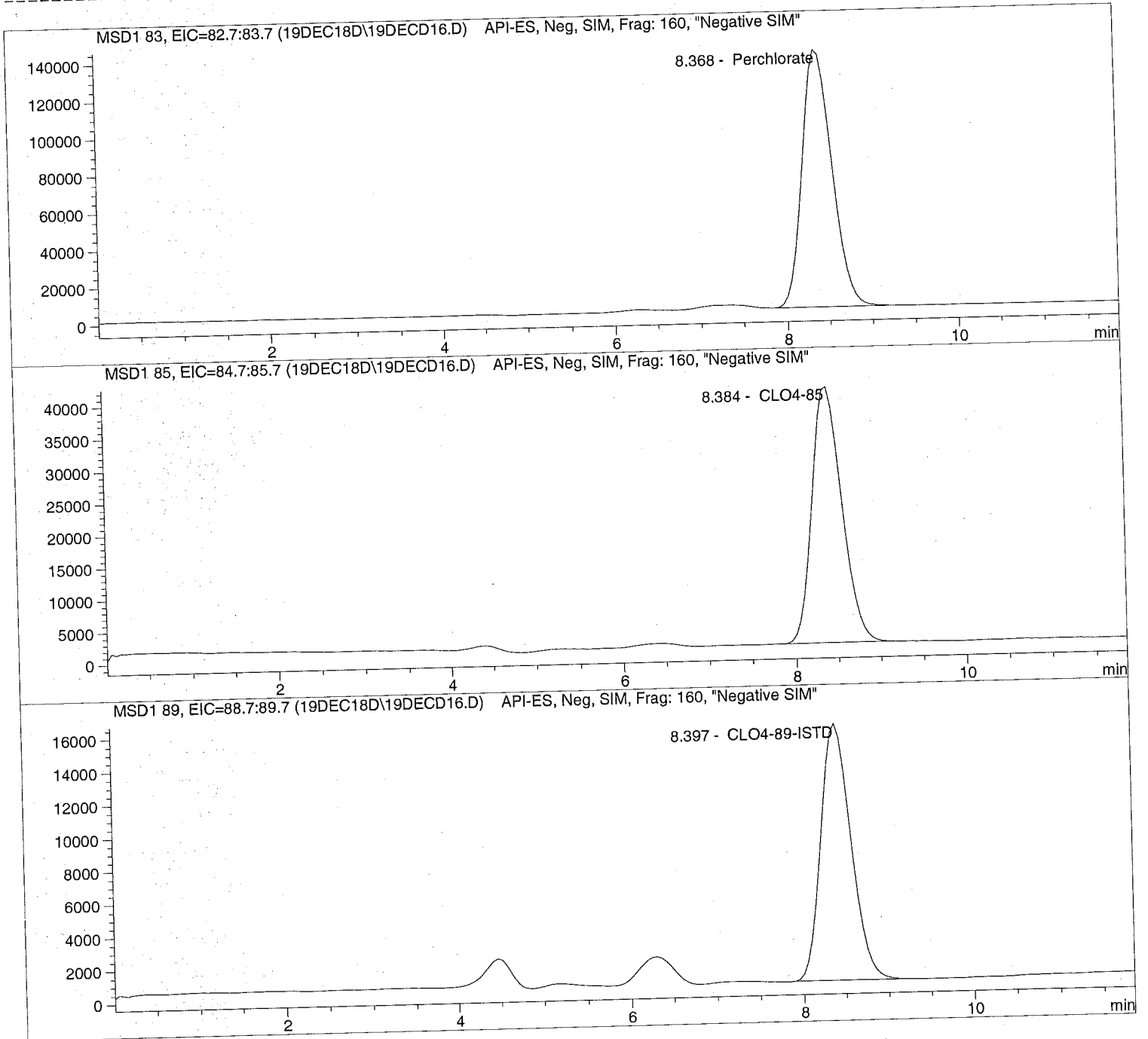
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 11:54:49  
Sample Name: 633245 CCV@25  
Acq Operator: TNB

Seq Line: 16  
Location: Vial 71  
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\19DEC18D\19DECD16.D

Sample Name: 633245 CCV@25

Injection Date: 12/19/2018 11:54:49  
 Sample Name: 633245 CCV@25  
 Acq Operator: TNB

Seq Line: 16  
 Location: Vial 71  
 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
8.368	VBA	3353514.5	26.1222	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.384	PBA	969700.1	25.0677	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.397	PBA	382303.9	5.0000	CLO4-89-ISTD

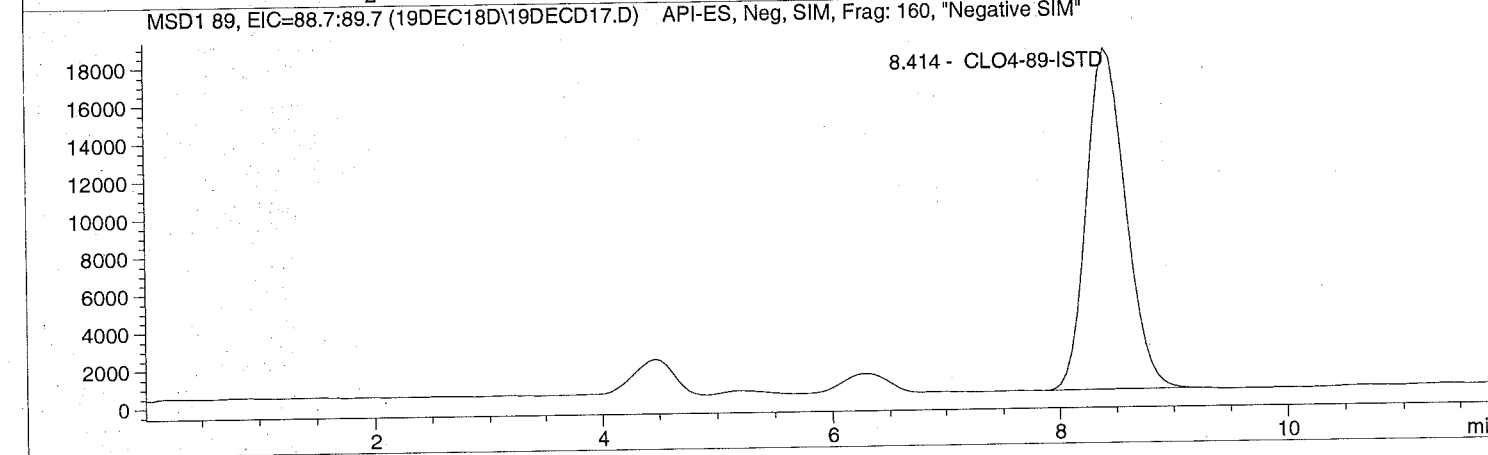
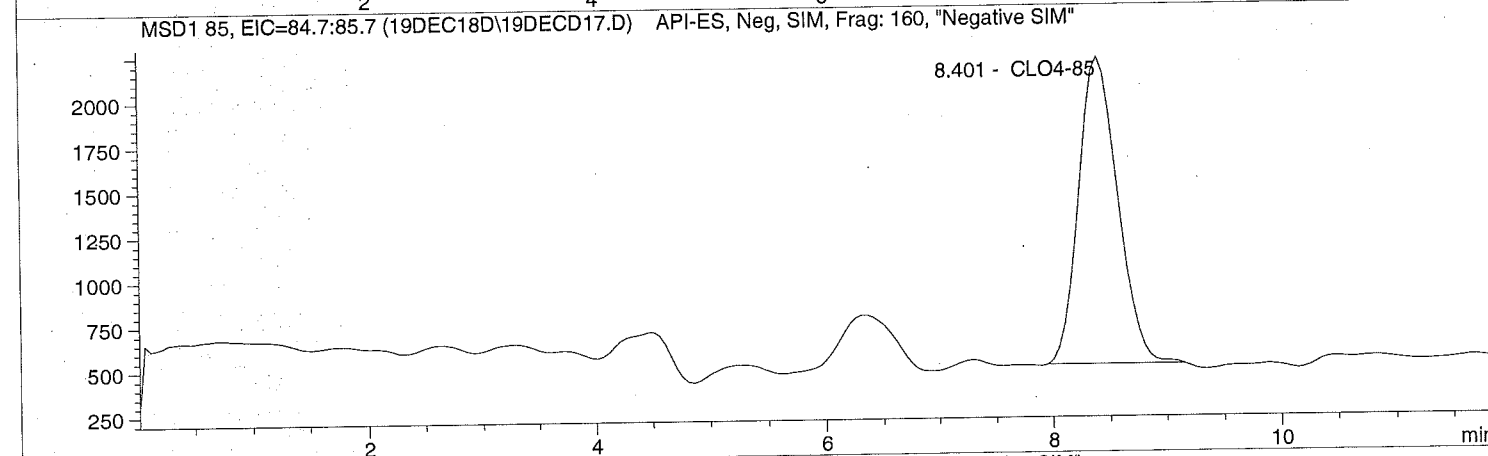
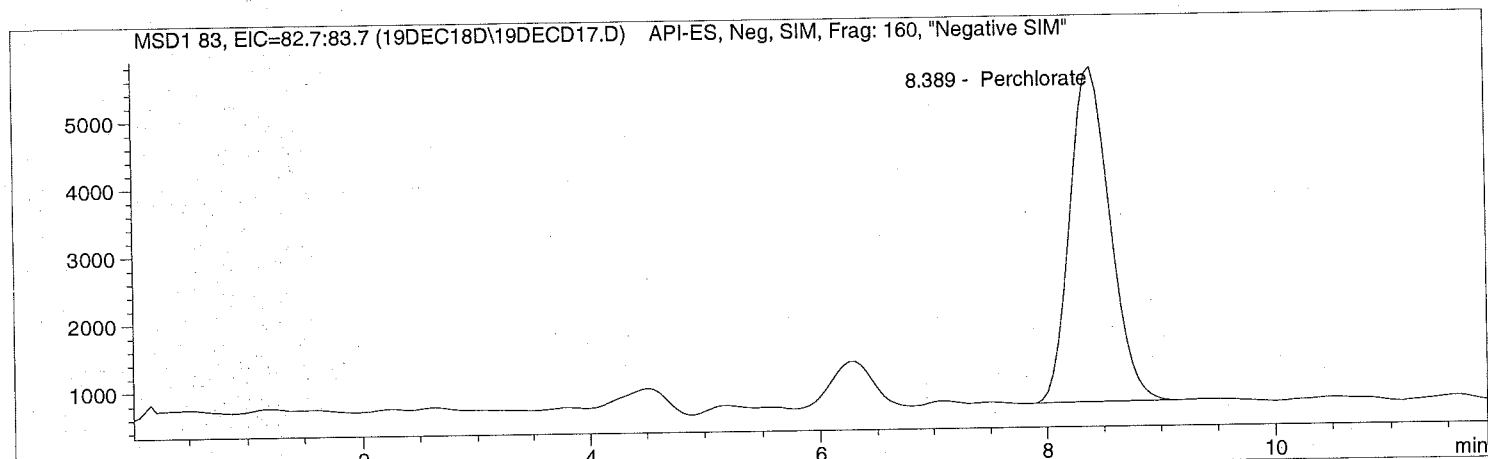
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 12:08:33  
Sample Name: 633246 LODV@1.  
Acq Operator: TNB

Seq Line: 17  
Location: Vial 72  
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\19DEC18D\19DECD17.D Sample Name: 633246 LODV@1.

Injection Date: 12/19/2018 12:08:33 Seq Line: 17  
 Sample Name: 633246 LODV@1. 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: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.389	PBA	120916.8	1.0714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.401	PBA	40771.1	1.0700	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.414	PBA	432577.5	5.0000	CLO4-89-ISTD

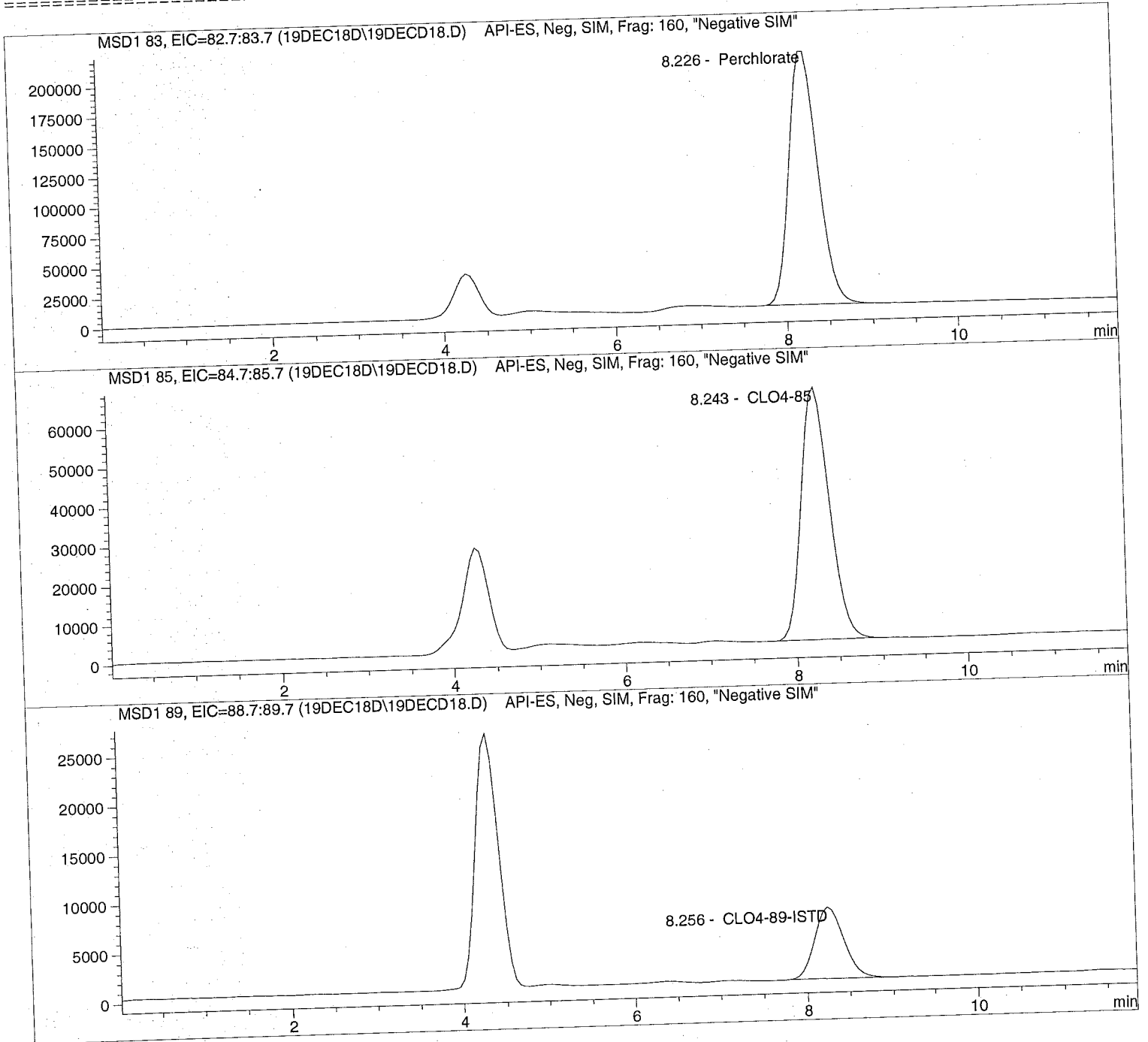
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 12:22:19  
Sample Name: 1834591006  
Acq Operator: TNB

Seq Line: 18  
Location: Vial 86  
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\19DEC18D\19DECD18.D

Sample Name: 1834591006

```

=====
Injection Date: 12/19/2018 12:22:19      Seq Line: 18
Sample Name: 1834591006                  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
8.226	PBA	4861195.0	77.3193	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.243	PBA	1468235.9	75.5226	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.256	PBA	171171.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

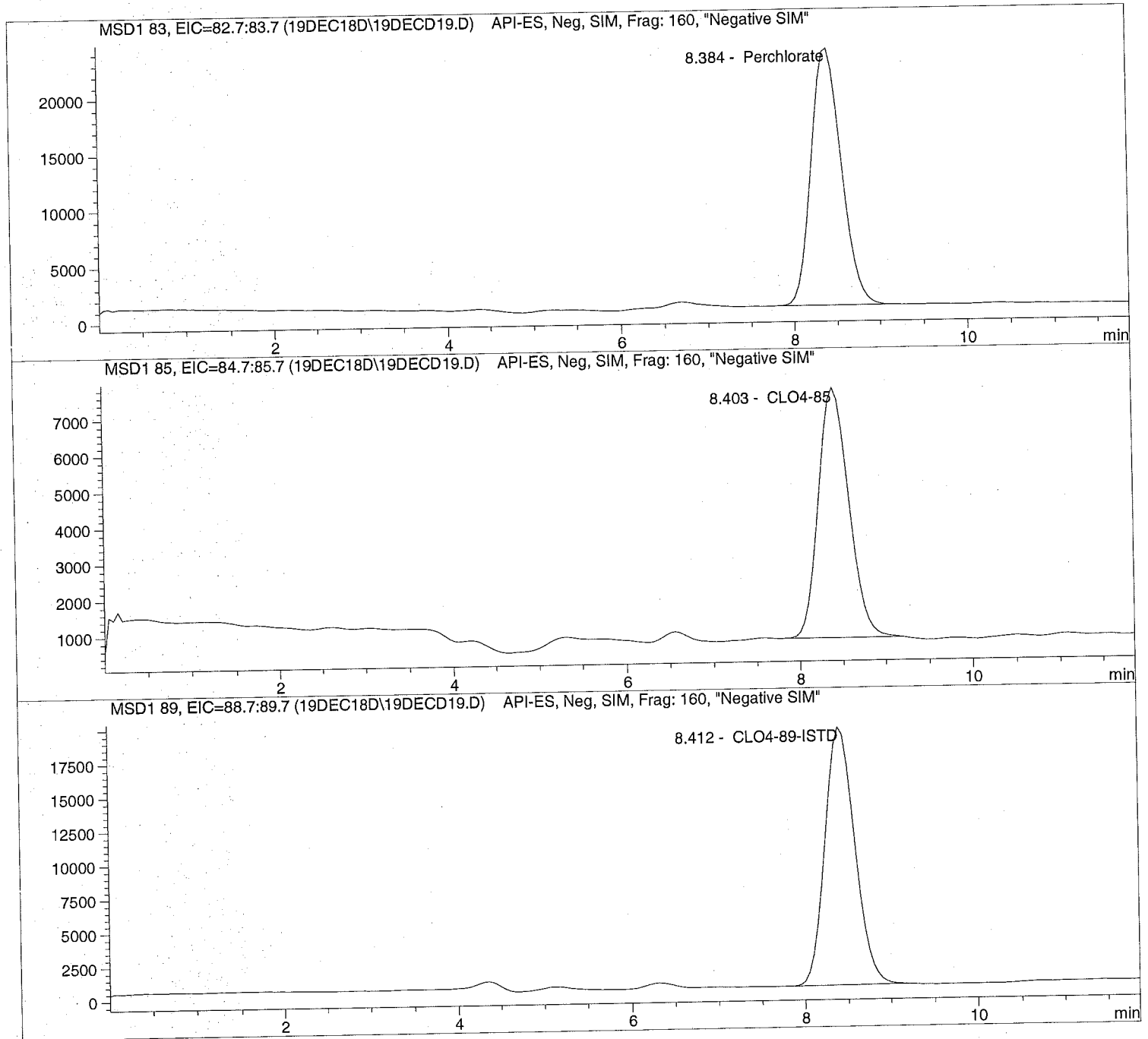
```

Injection Date: 12/19/2018 12:36:05  
Sample Name: 1834591007 100  
Acq Operator: TNB

Seq Line: 19  
Location: Vial 87  
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





Injection Date: 12/19/2018 12:36:05      Seq Line: 19  
Sample Name: 1834591007 100      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: 100.000000  
Sample Amount: 0.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.384	PBA	552737.7	390.1173	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.403	BBA	168774.7	389.2722	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.412	PBA	459757.1	500.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD20.D

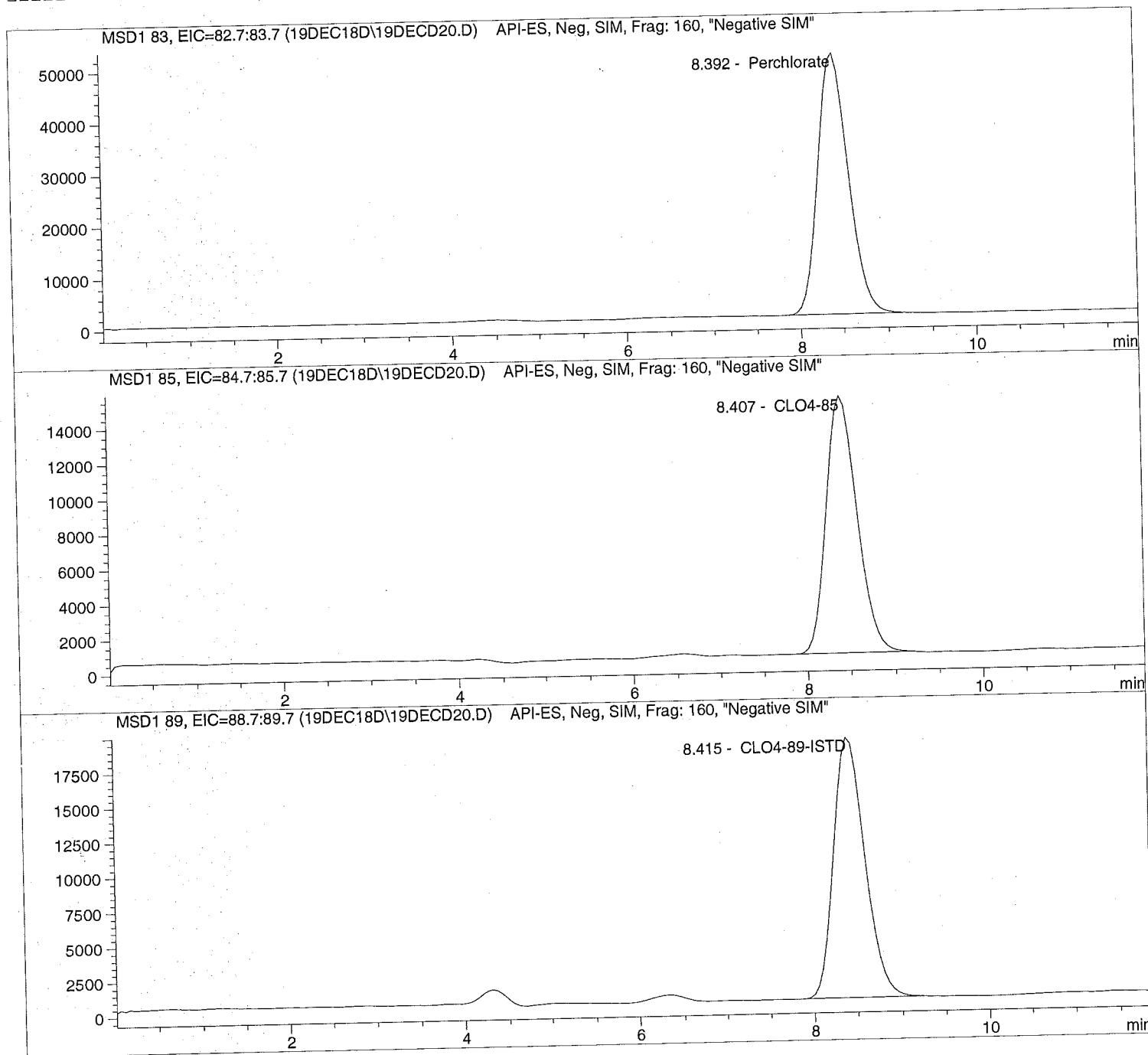
Sample Name: 1834591008 100

Injection Date: 12/19/2018 12:49:52  
Sample Name: 1834591008 100  
Acq Operator: TNB

Seq Line: 20  
Location: Vial 88  
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



```
=====
Injection Date: 12/19/2018 12:49:52      Seq Line:          20
Sample Name:    1834591008 100           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:       100.000000
Sample Amount:  0.000
=====
```

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.392	PBA	1225937.5	833.5335	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.407	PBA	359153.4	810.3836	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.415	PBA	459695.6	500.0000	CLO4-89-ISTD

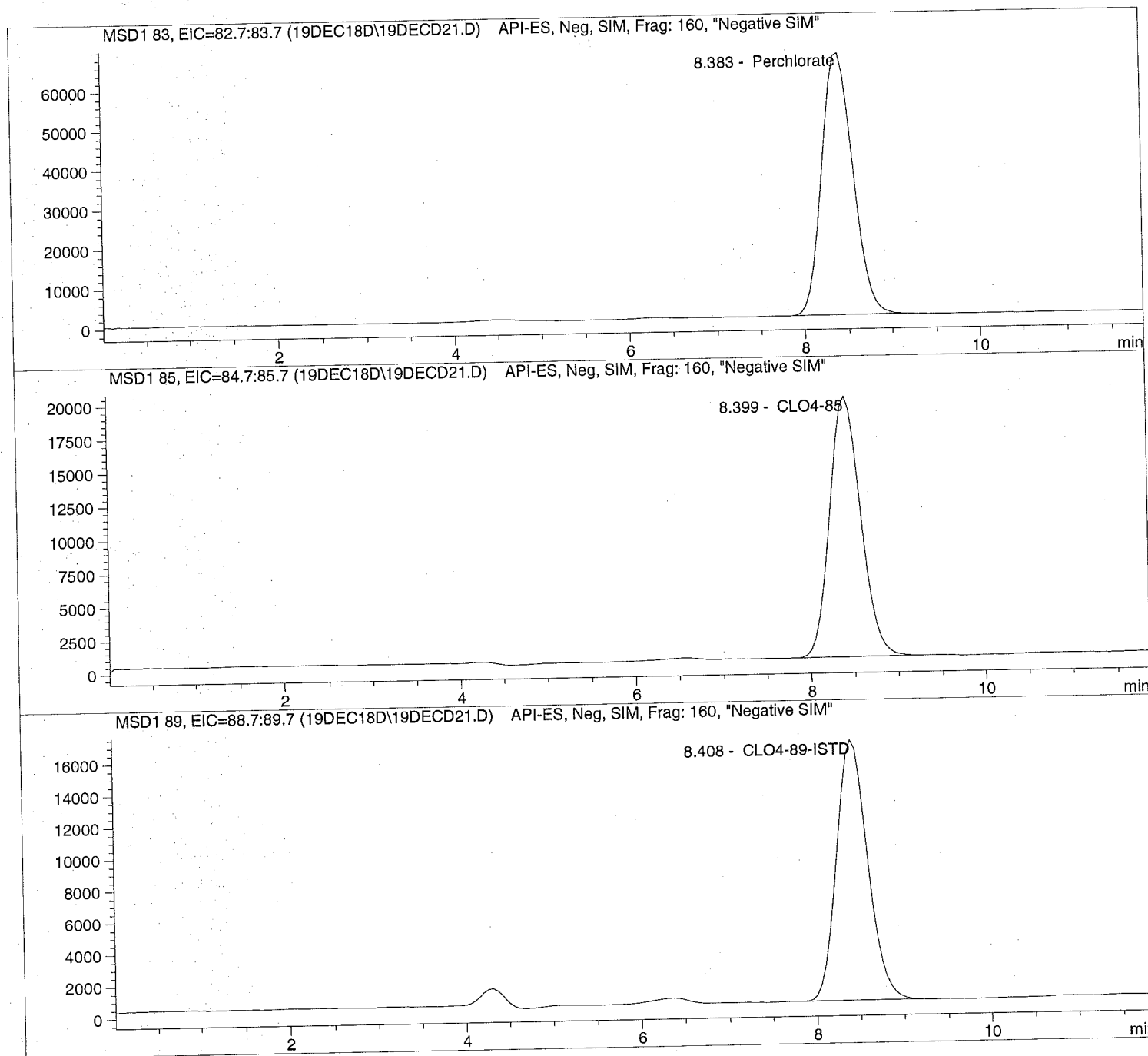
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 13:03:38  
Sample Name: 1834591009 100  
Acq Operator: TNB

Seq Line: 21  
Location: Vial 89  
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



```
=====  
Injection Date: 12/19/2018 13:03:38      Seq Line:          21  
Sample Name:   1834591009 100            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:      100.000000  
Sample Amount: 0.000
```

=====  
LCMS Results  
=====

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.383	PBA	1624602.3	1220.2714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.399	BBA	478619.9	1195.4450	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.408	BBA	409950.0	500.0000	CLO4-89-ISTD

=====  
\*\*\* End of Report \*\*\*  
=====

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD22.D

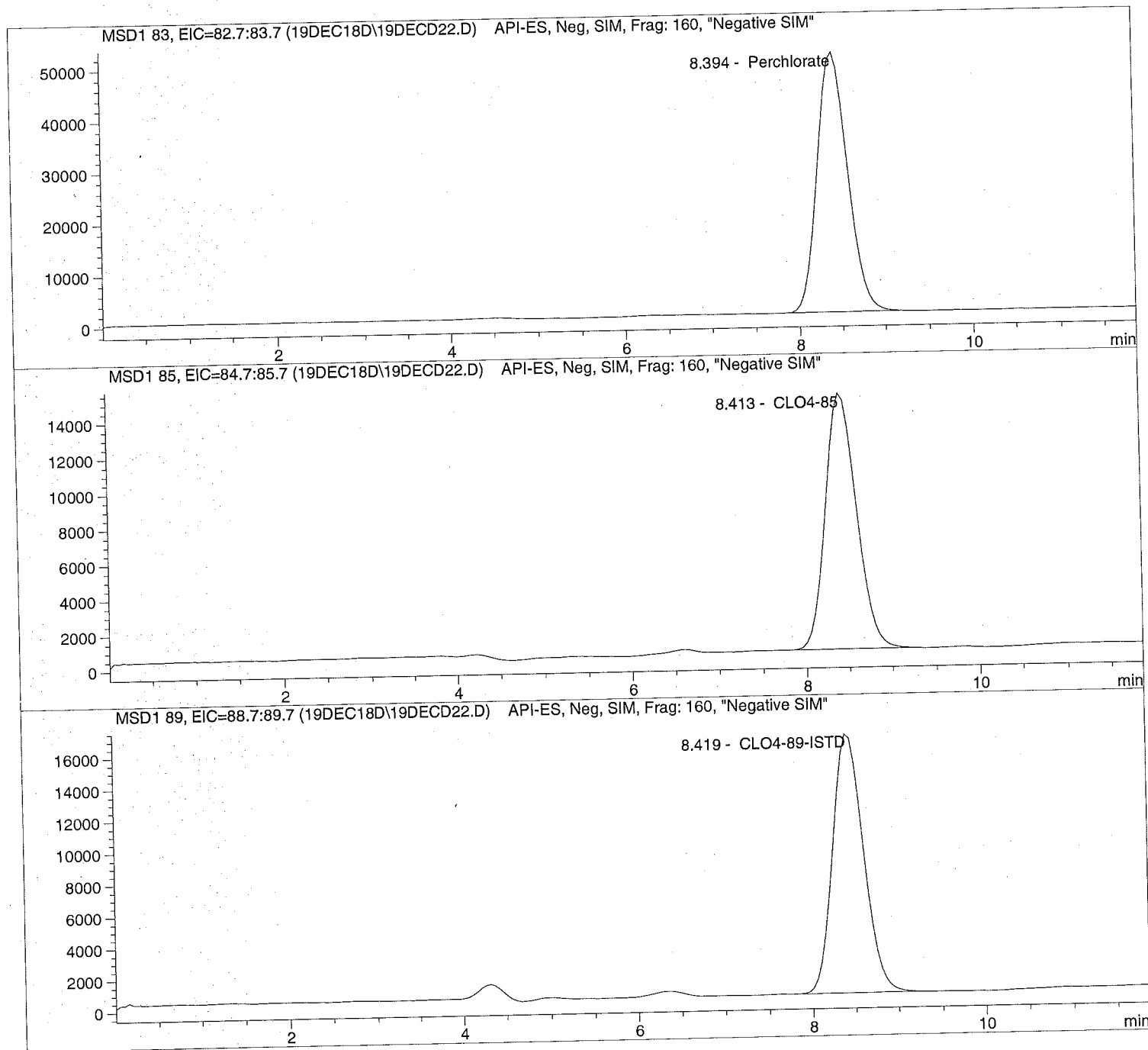
Sample Name: 1834591010 100

Injection Date: 12/19/2018 13:17:30  
Sample Name: 1834591010 100  
Acq Operator: TNB

Seq Line: 22  
Location: Vial 90  
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\19DEC18D\19DECD22.D Sample Name: 1834591010 100

=====  
 Injection Date: 12/19/2018 13:17:30 Seq Line: 22  
 Sample Name: 1834591010 100 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: 100.000000  
 Sample Amount: 0.000

=====  
 LCMS Results  
 =====

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.394	PBA	1236587.0	941.3072	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.413	PBA	363480.3	919.0352	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.419	BBA	408616.1	500.0000	CLO4-89-ISTD

=====  
 \*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD23.D

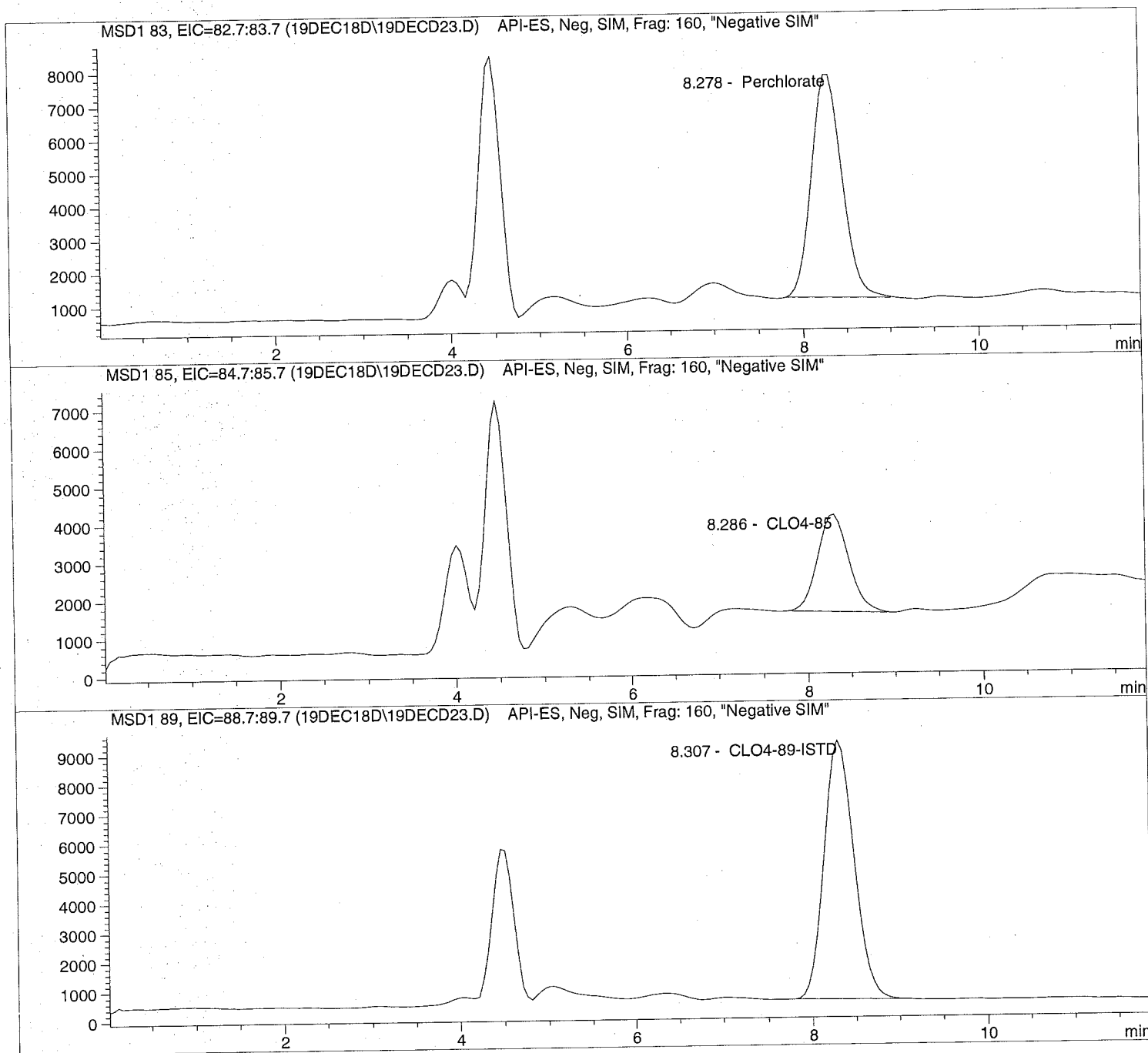
Sample Name: 1834871001

Injection Date: 12/19/2018 13:31:20  
Sample Name: 1834871001  
Acq Operator: TNB

Seq Line: 23  
Location: Vial 91  
Inj. No.: 1  
Inj. Vol.: 30  $\mu$ l

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\19DEC18D\19DECD23.D

Sample Name: 1834871001

```

=====
Injection Date: 12/19/2018 13:31:20      Seq Line:          23
Sample Name:    1834871001                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:       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
8.278	PBA	162192.9	2.6000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.286	PBA	63760.8	3.2576	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.307	PBA	208798.9	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

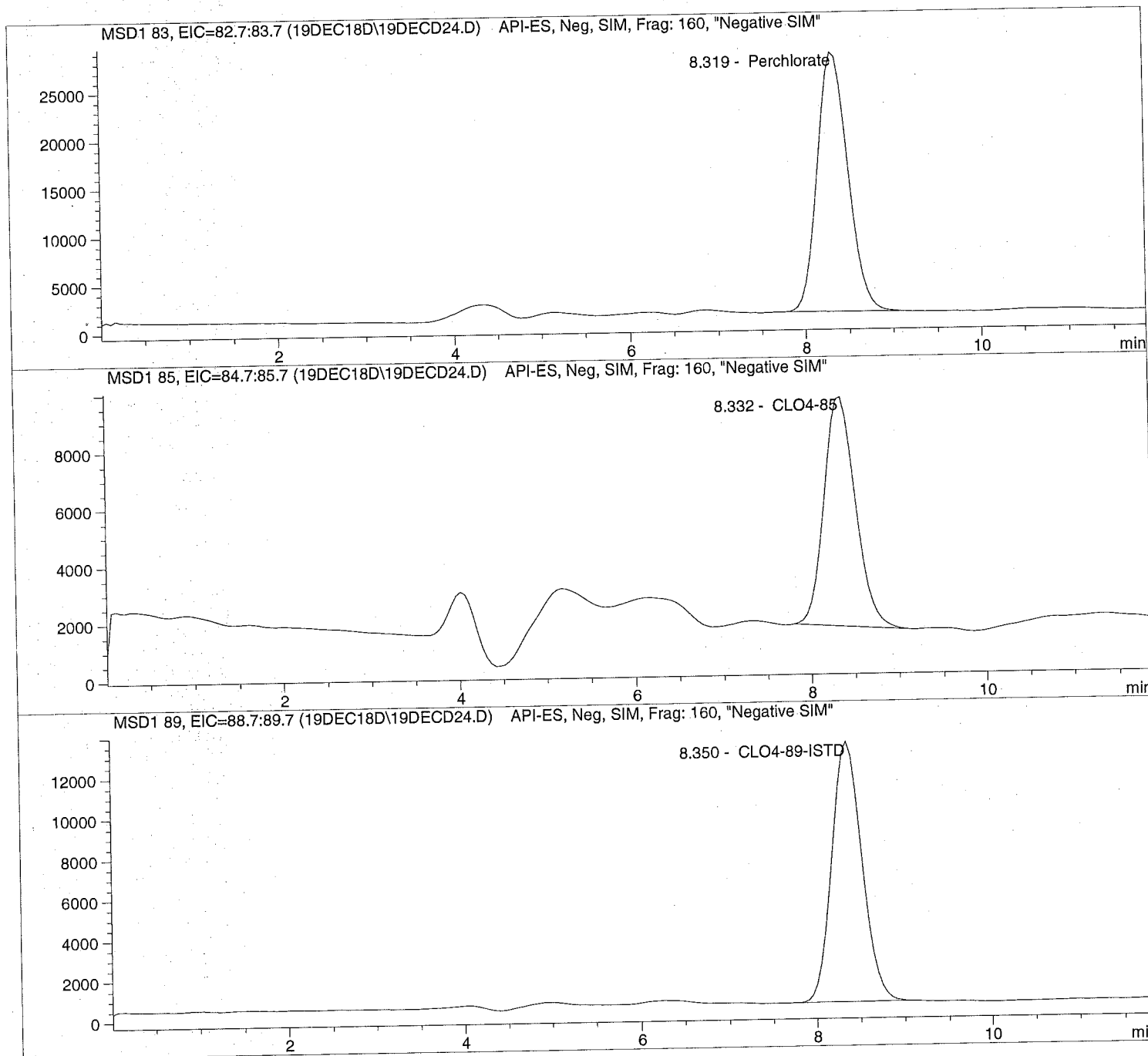
```

Injection Date: 12/19/2018 13:45:08  
Sample Name: 1834591006 10X  
Acq Operator: TNB

Seq Line: 24  
Location: Vial 92  
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\19DEC18D\19DECD24.D Sample Name: 1834591006 10X

```

=====
Injection Date: 12/19/2018 13:45:08      Seq Line:          24
Sample Name:    1834591006 10X           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-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
8.319	BBA	648996.5	66.5194	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.332	PBA	199622.2	67.6252	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.350	PBA	307854.8	50.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

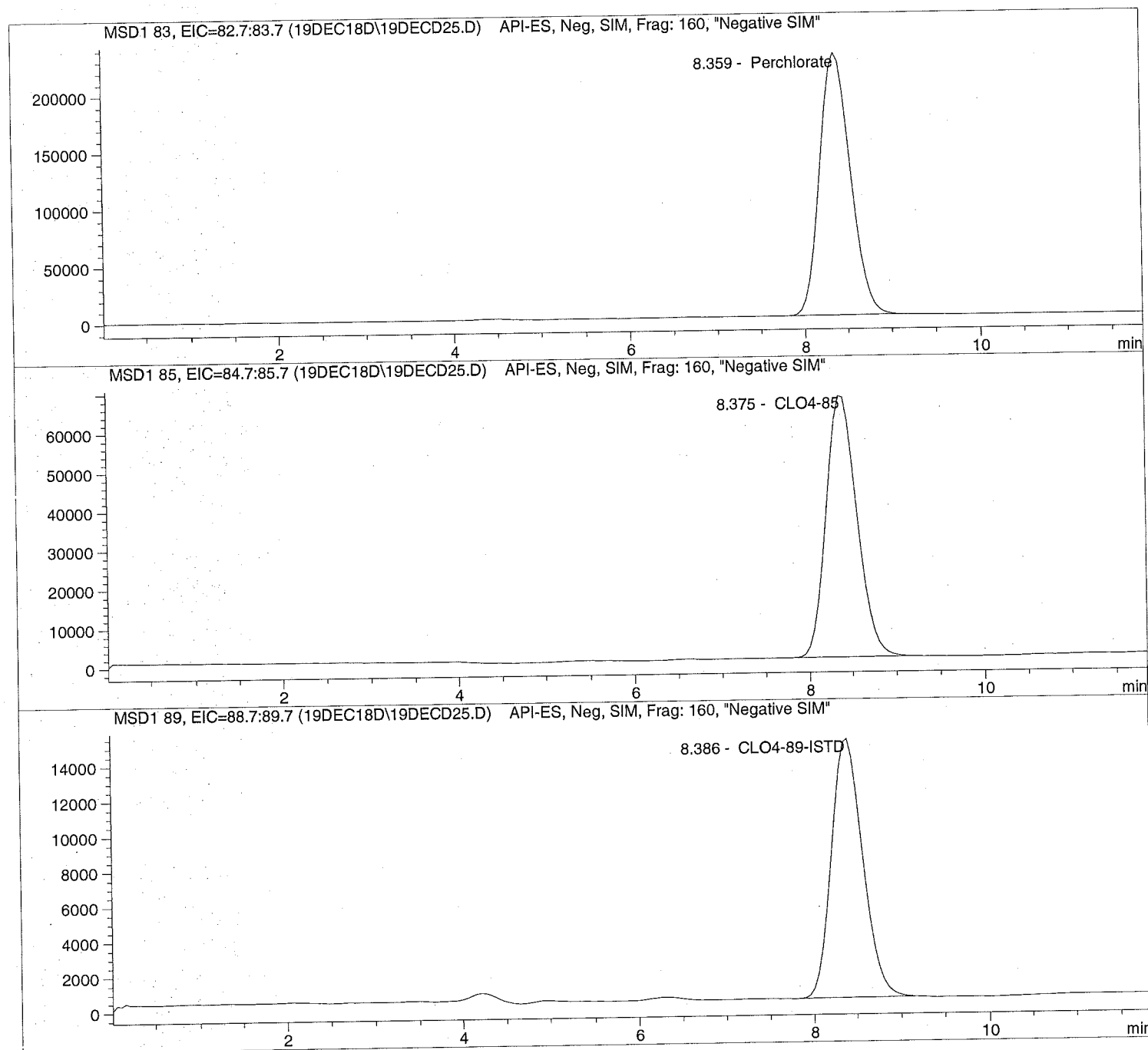
```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD25.D Sample Name: 1834591007 10X

```
=====
Injection Date: 12/19/2018 13:58:54      Seq Line:          25
Sample Name:    1834591007 10X           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-DPR.M
Last Changed:   12/3/2018 12:46:06
=====
```

## Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD25.D Sample Name: 1834591007 10X

=====  
 Injection Date: 12/19/2018 13:58:54 Seq Line: 25  
 Sample Name: 1834591007 10X 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-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
8.359	PBA	5688991.5	441.4471	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.375	PBA	1662108.8	424.5719	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.386	PBA	371021.2	50.0000	CLO4-89-ISTD

=====  
 \*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD26.D

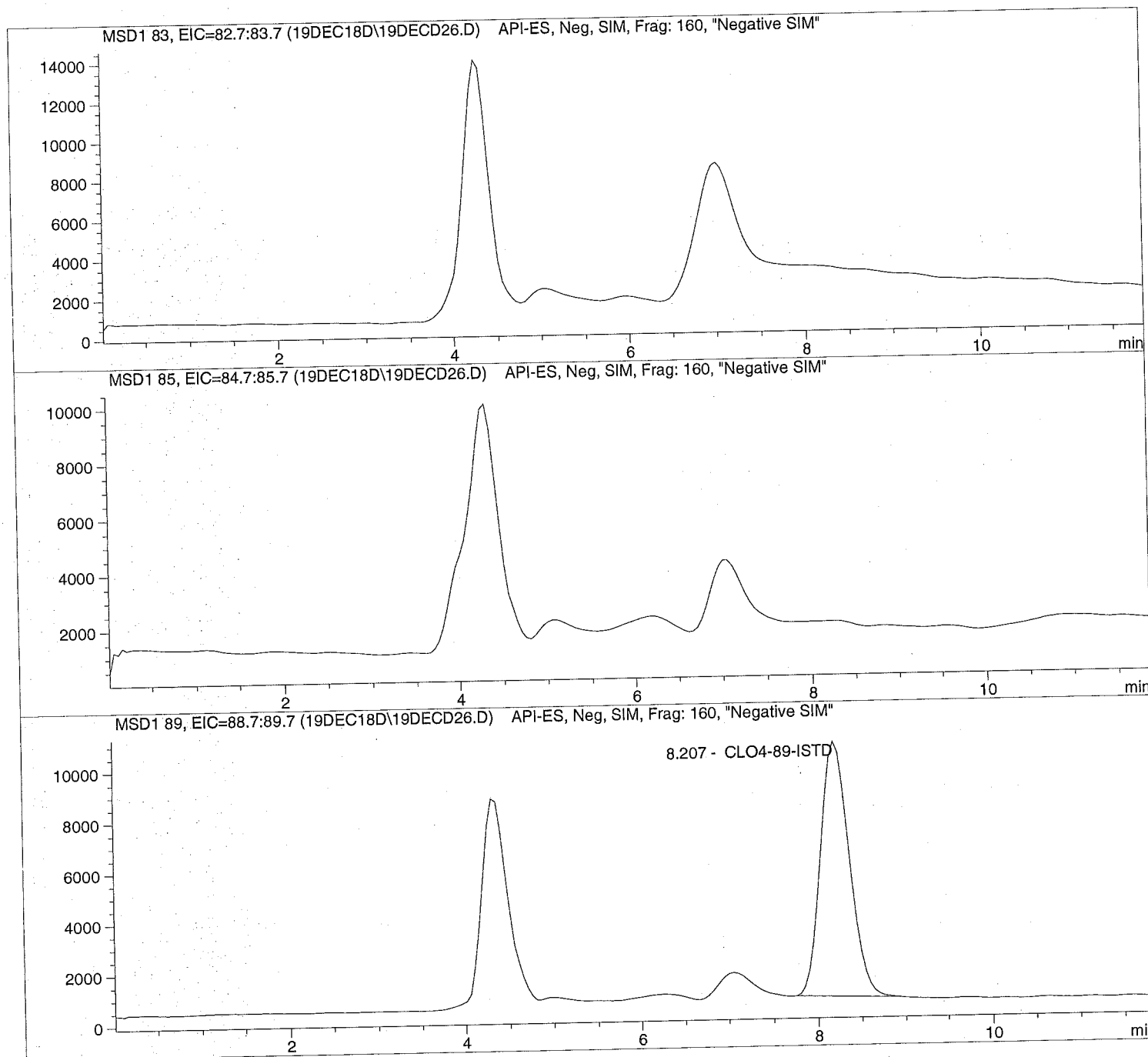
Sample Name: 1834591005 RE

Injection Date: 12/19/2018 14:12:47  
Sample Name: 1834591005 RE  
Acq Operator: TNB

Seq Line: 26  
Location: Vial 94  
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\19DEC18D\19DECD26.D

Sample Name: 1834591005 RE

```

=====
Injection Date: 12/19/2018 14:12:47      Seq Line:          26
Sample Name:    1834591005 RE             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-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
8.207	PBA	229203.5	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD27.D

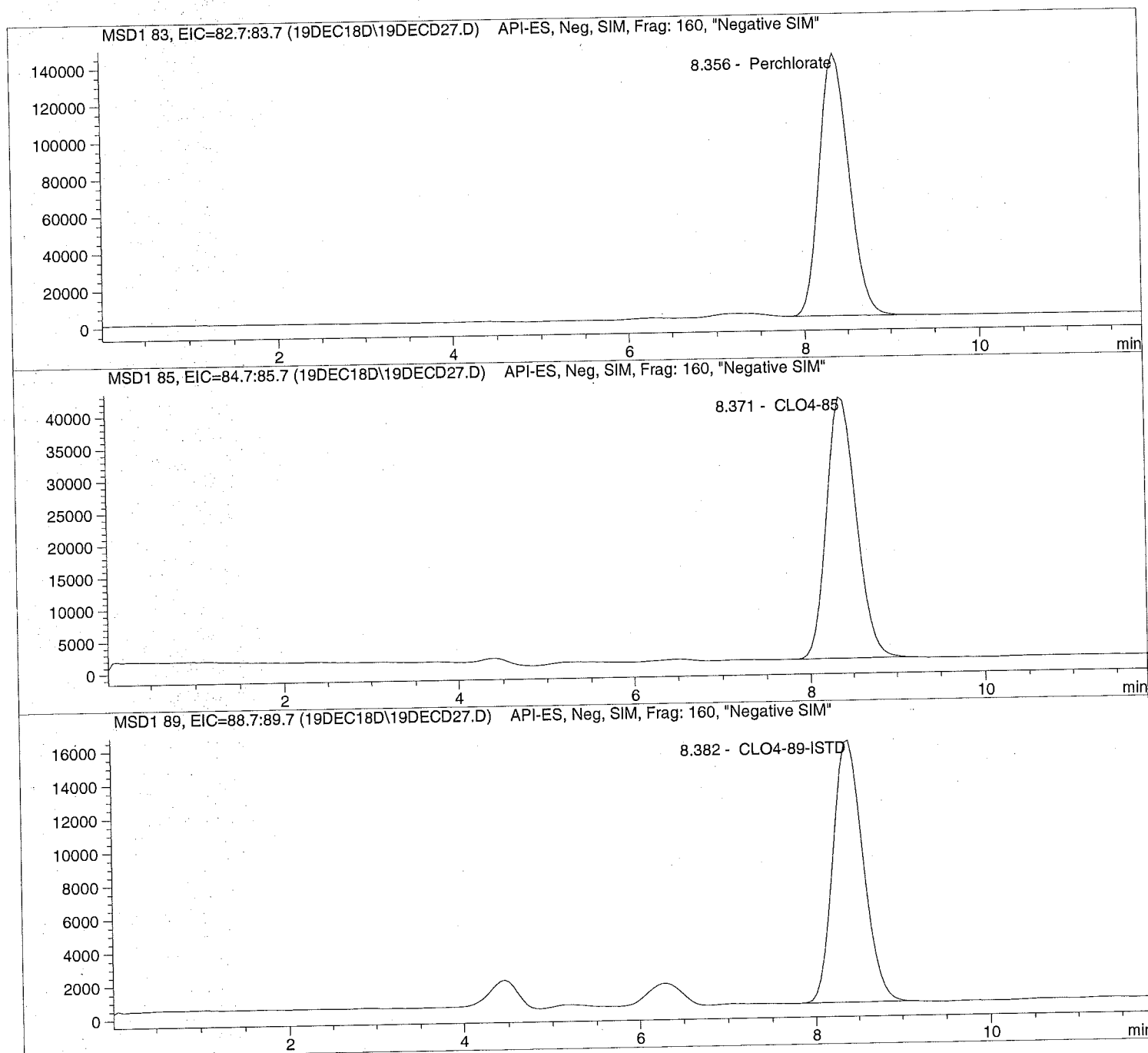
Sample Name: 633247 CCV@25

Injection Date: 12/19/2018 14:26:31  
Sample Name: 633247 CCV@25  
Acq Operator: TNB

Seq Line: 27  
Location: Vial 71  
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\19DEC18D\19DECD27.D

Sample Name: 633247 CCV@25

```

=====
Injection Date: 12/19/2018 14:26:31      Seq Line:          27
Sample Name:    633247    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
8.356	VBA	3387879.3	26.2108	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.371	PBA	985046.6	25.2825	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.382	PBA	384846.7	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

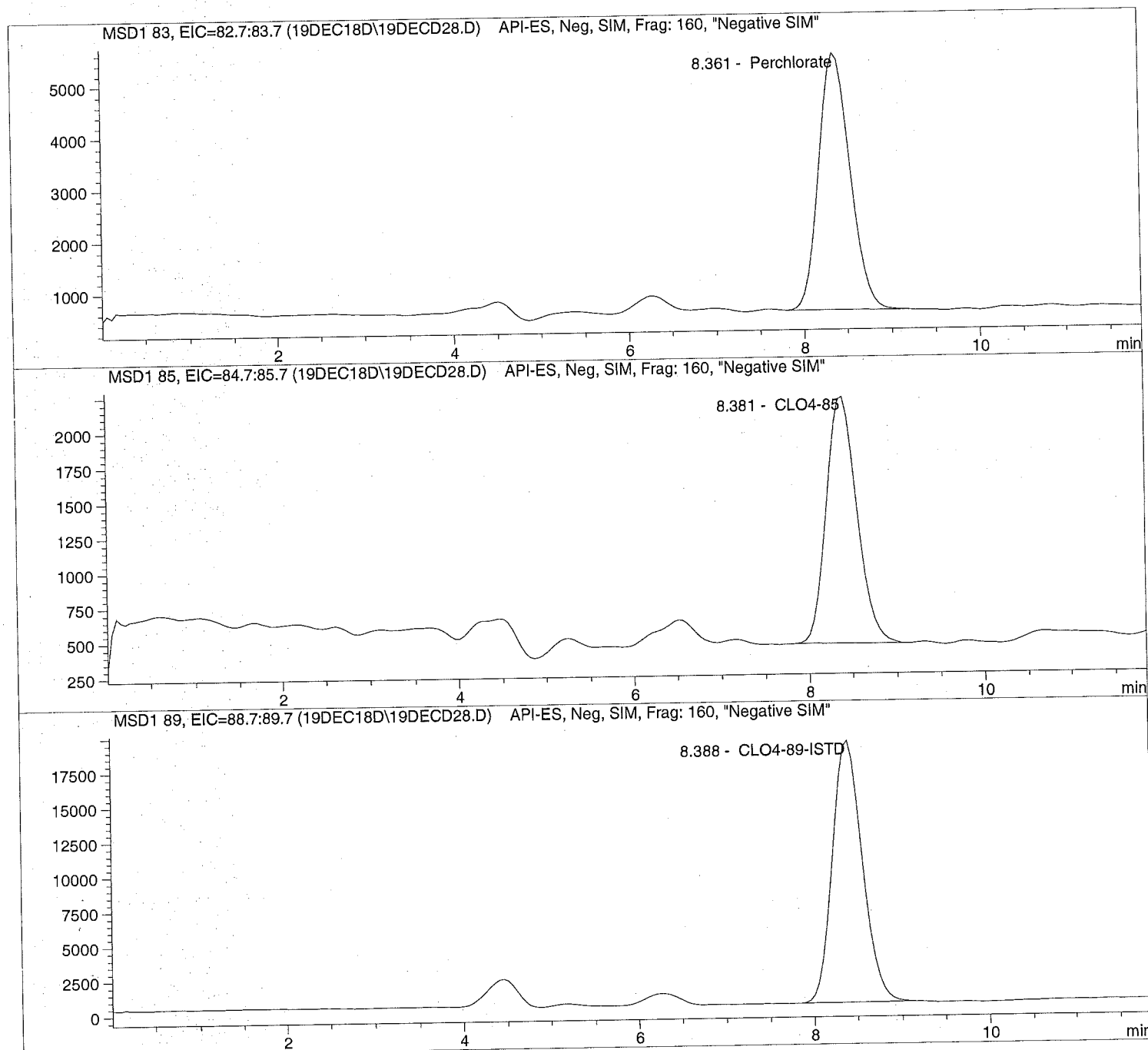
Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD28.D

Sample Name: 633248 LODV@1.

=====  
Injection Date: 12/19/2018 14:40:17  
Sample Name: 633248 LODV@1.  
Acq Operator: TNB

Seq Line: 28  
Location: Vial 72  
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\19DEC18D\19DECD28.D Sample Name: 633248 LODV@1.

```

=====
Injection Date: 12/19/2018 14:40:17      Seq Line:          28
Sample Name:    633248  LODV@1.           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:  1.000
=====

```

```

=====
                          LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.361	PBA	123908.4	1.0564	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.381	PBA	43105.4	1.0834	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.388	PBA	451163.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Raw Data**

## **Initial Calibration**

## Batch Review Method:

C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==&gt; Run has not been reprocessed with Batch Review Method

['\*' ==&gt; 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 Verfe	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 Verfe	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 Verfe	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 &amp; 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
9.287	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	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	1.00000	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		

ethod C:\HPCHEM\1\METHODS\CLO4-DPR.M

RetTime [min]	Lvl Sig	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

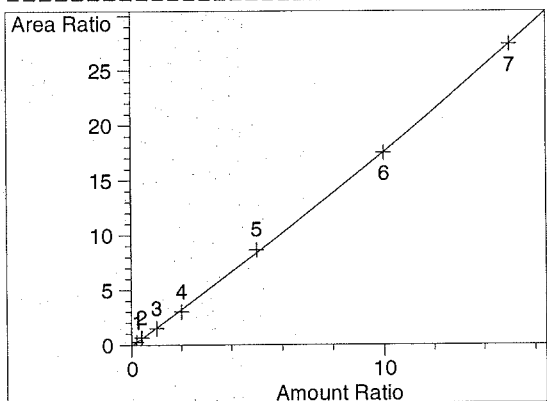
Compound: CLO4-85

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

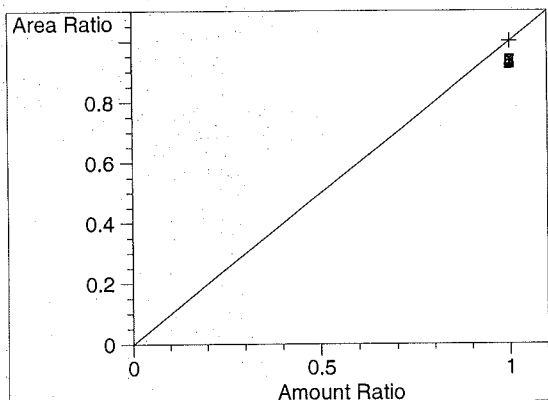
=====  
 Peak Sum Table  
 =====

\*\*\*No Entries in table\*\*\*  
 =====

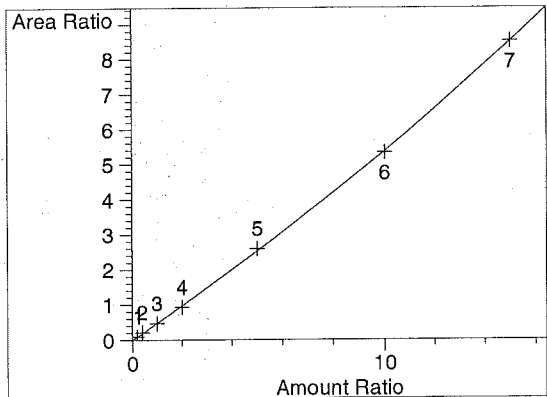
=====  
Calibration Curves  
=====



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

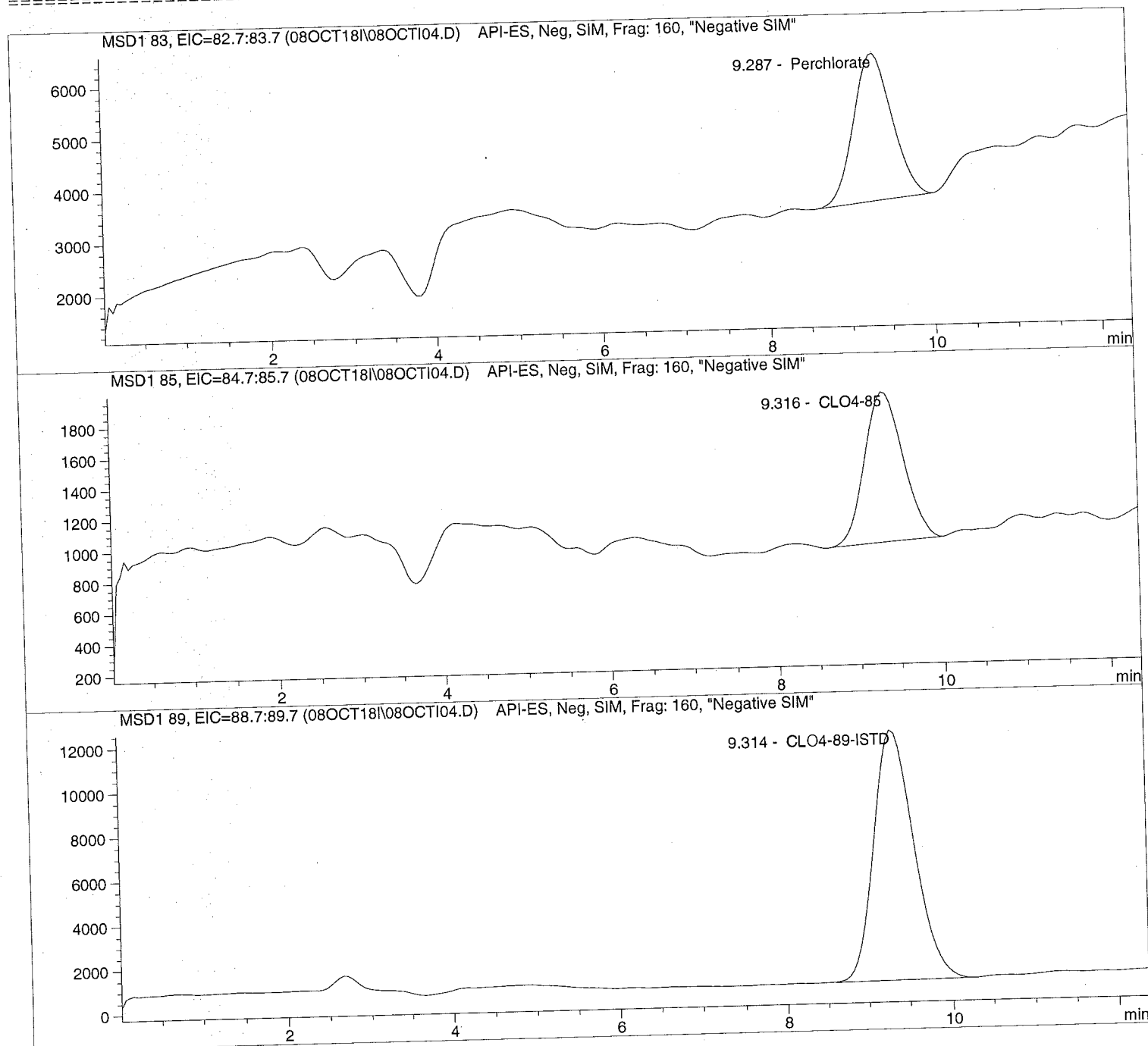
Sample Name: CLO4@ 1.0ug/L

Injection Date: 10/08/2018 11:37:35  
Sample Name: CLO4@ 1.0ug/L  
Acq Operator: TNB

Seq Line: 4  
Location: Vial 74  
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

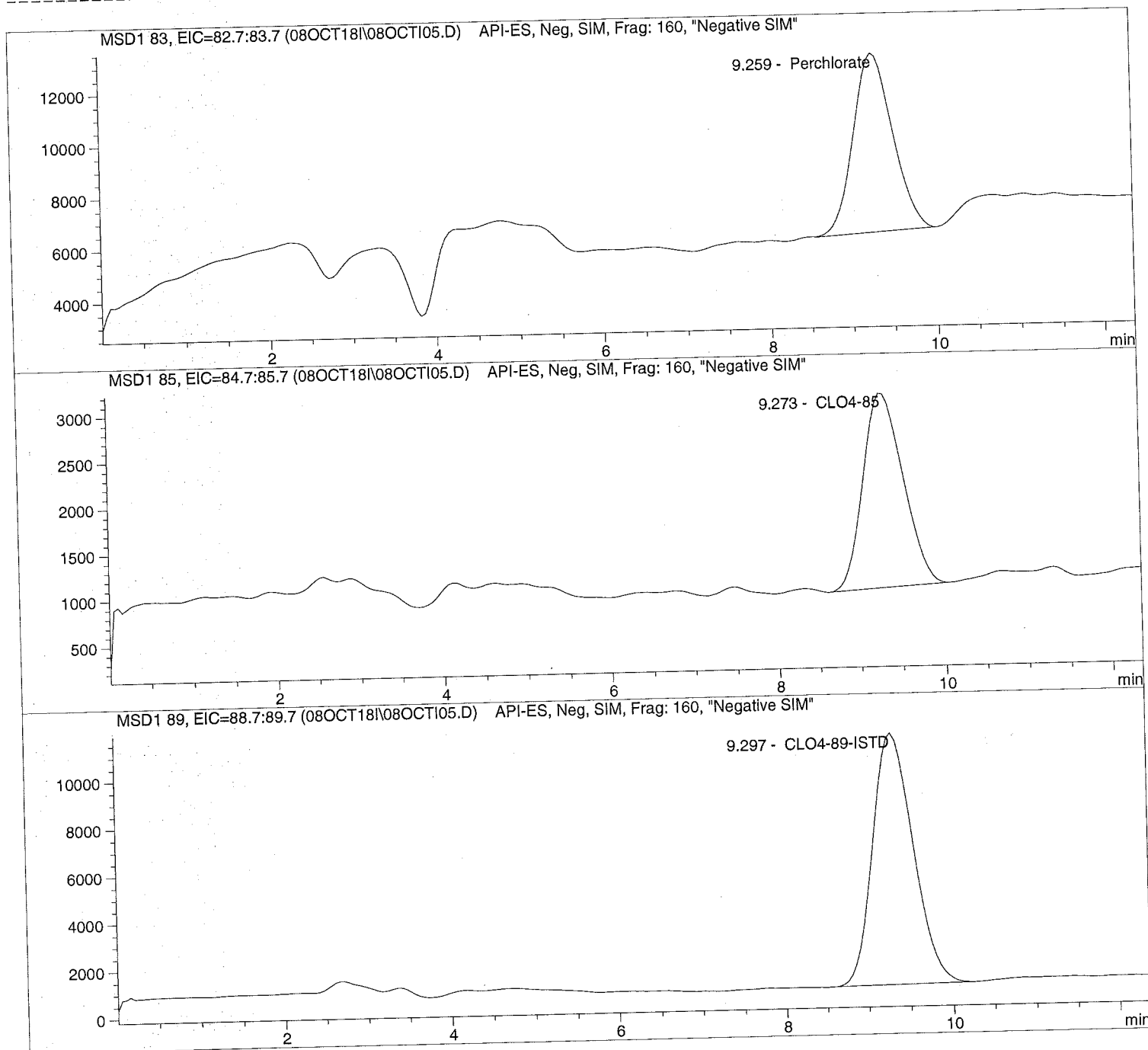
Sample Name: CLO4@ 2.0ug/L

Injection Date: 10/08/2018 11:51:45  
Sample Name: CLO4@ 2.0ug/L  
Acq Operator: TNB

Seq Line: 5  
Location: Vial 75  
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

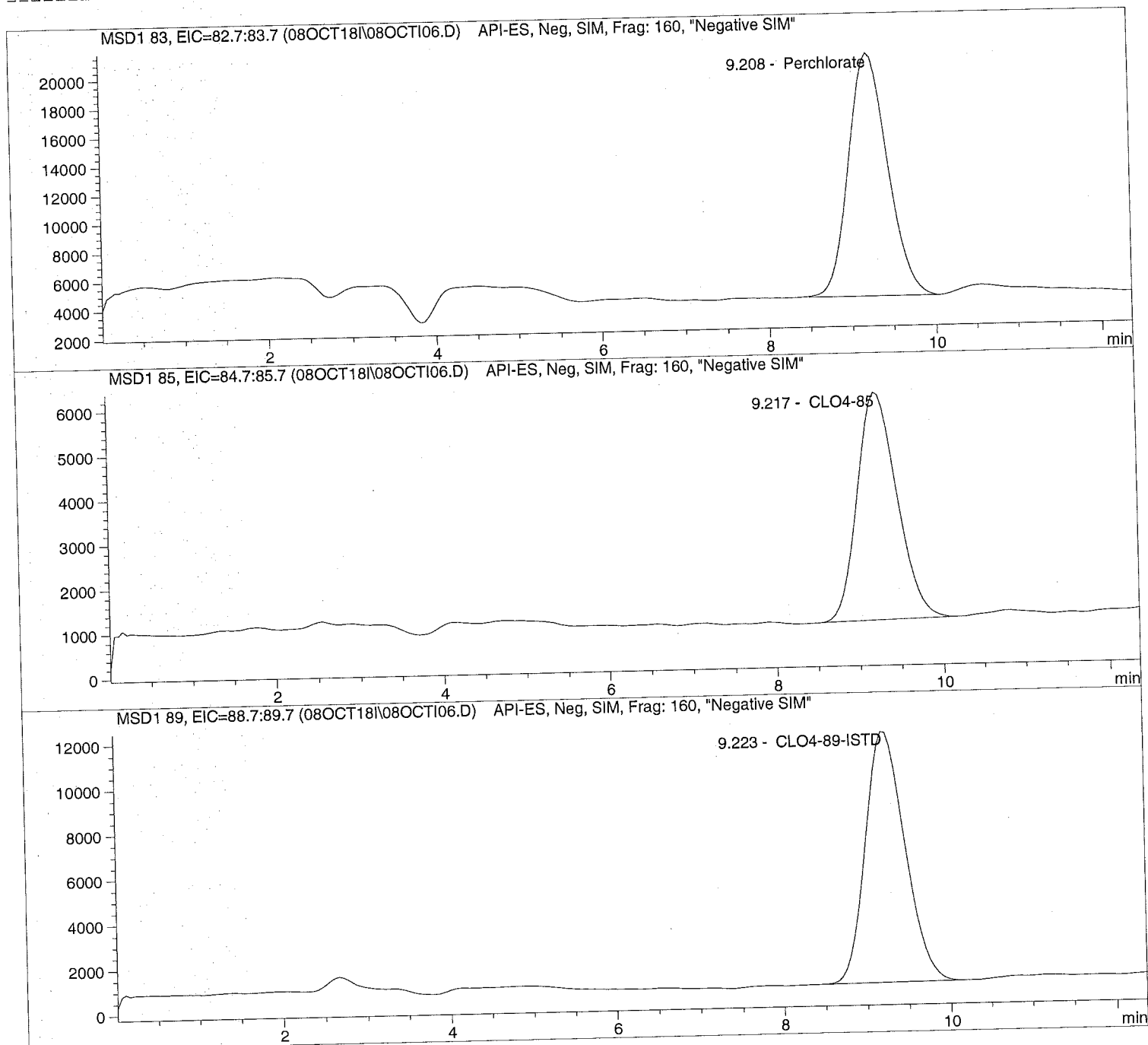
Sample Name: CLO4@ 5.0ug/L

Injection Date: 10/08/2018 12:05:59  
Sample Name: CLO4@ 5.0ug/L  
Acq Operator: TNB

Seq Line: 6  
Location: Vial 76  
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



```
=====
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

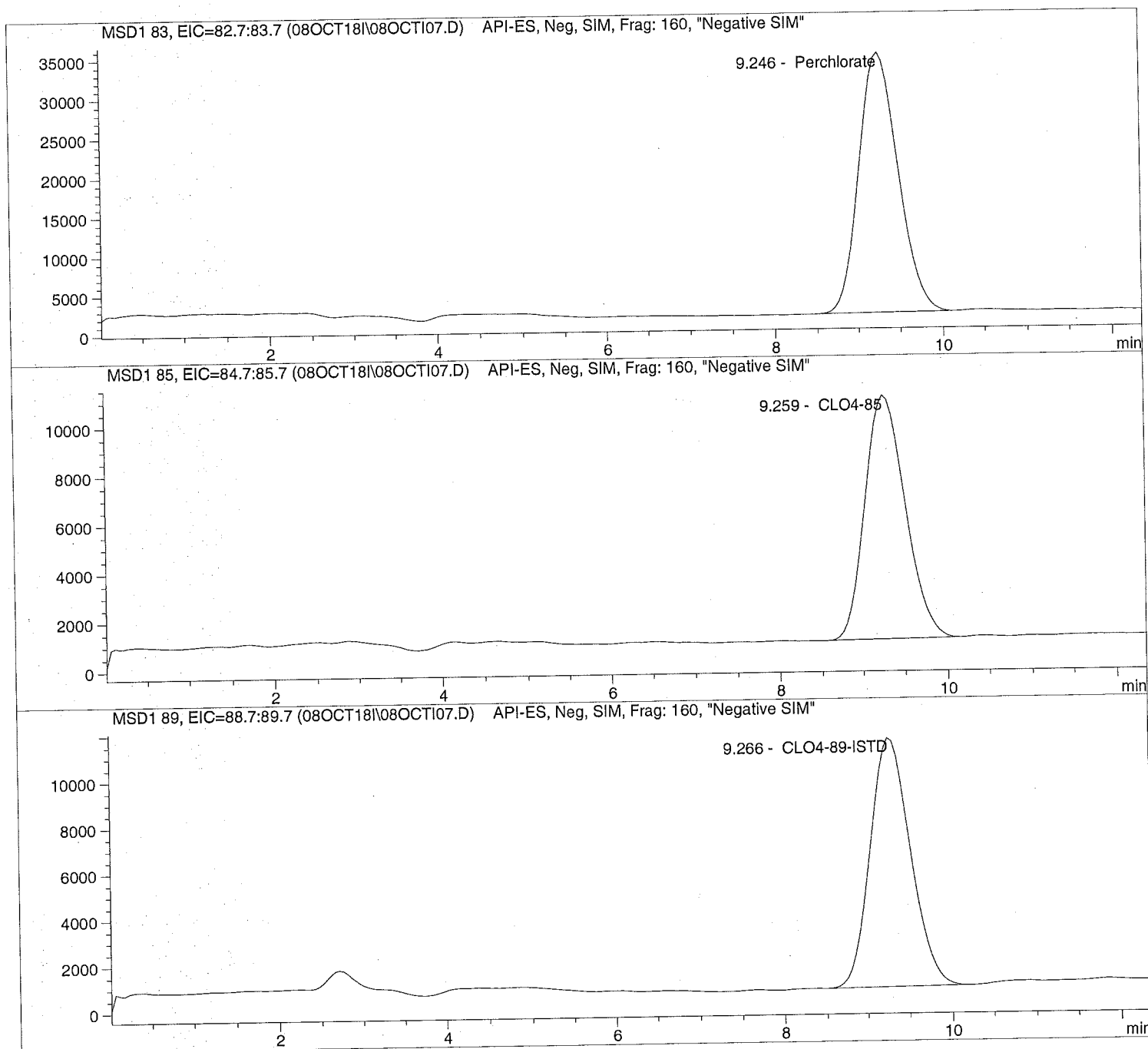
Sample Name: CLO4@ 10.ug/L

Injection Date: 10/08/2018 12:20:10  
Sample Name: CLO4@ 10.ug/L  
Acq Operator: TNB

Seq Line: 7  
Location: Vial 77  
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

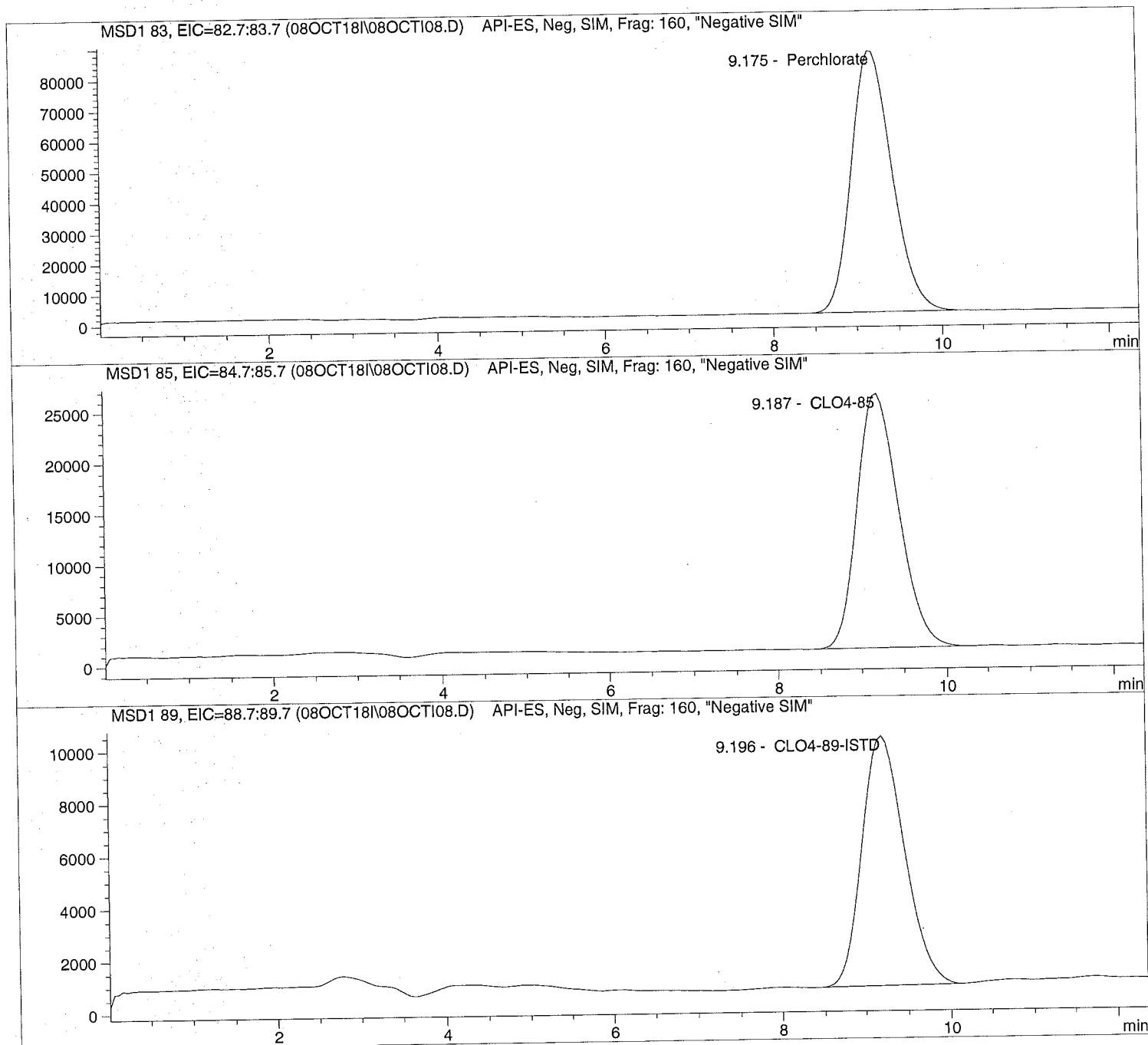
Sample Name: CLO4@ 25.ug/L

Injection Date: 10/08/2018 12:34:24  
Sample Name: CLO4@ 25.ug/L  
Acq Operator: TNB

Seq Line: 8  
Location: Vial 78  
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

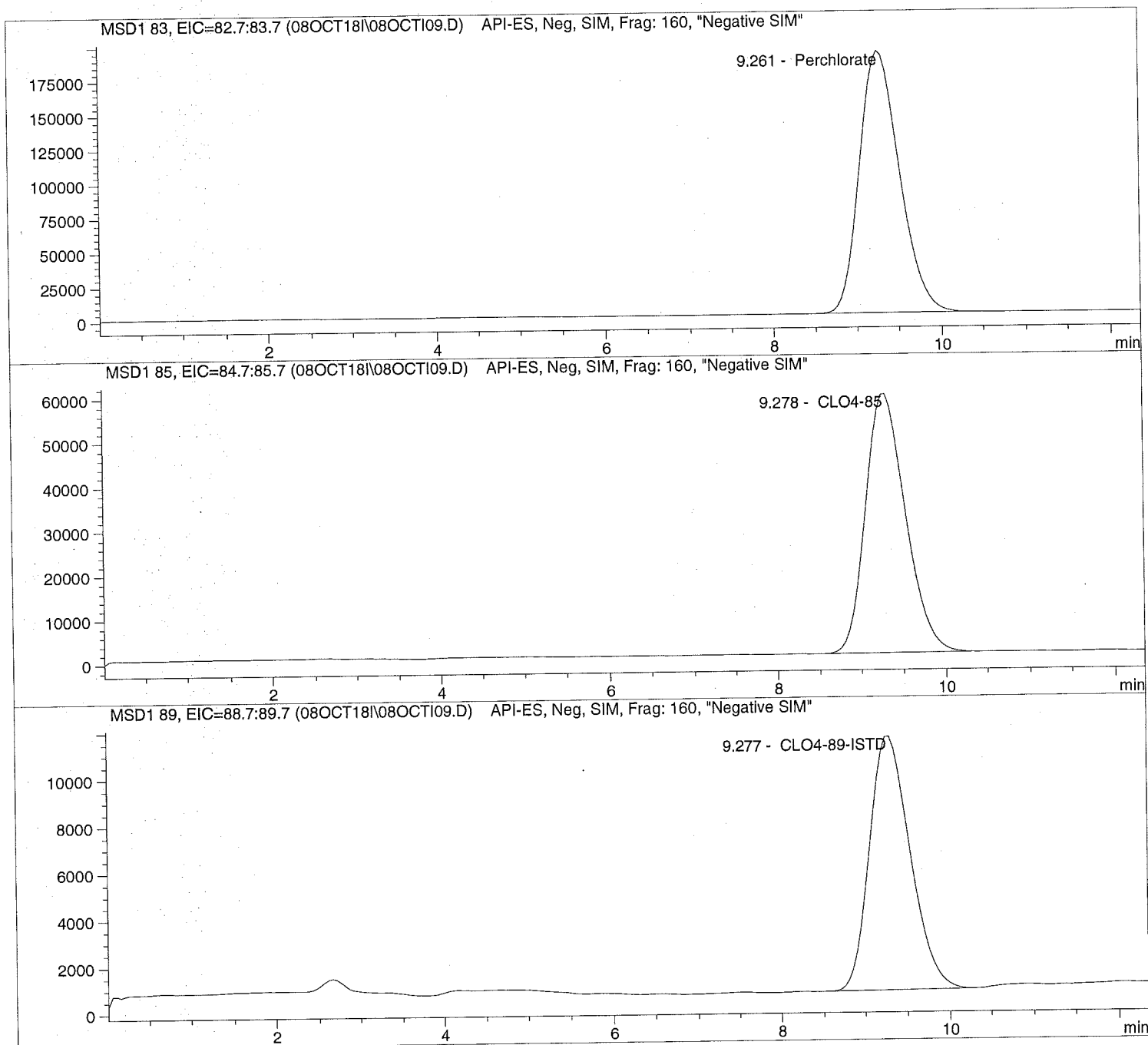
Sample Name: CLO4@ 50.ug/L

Injection Date: 10/08/2018 12:48:34  
Sample Name: CLO4@ 50.ug/L  
Acq Operator: TNB

Seq Line: 9  
Location: Vial 79  
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

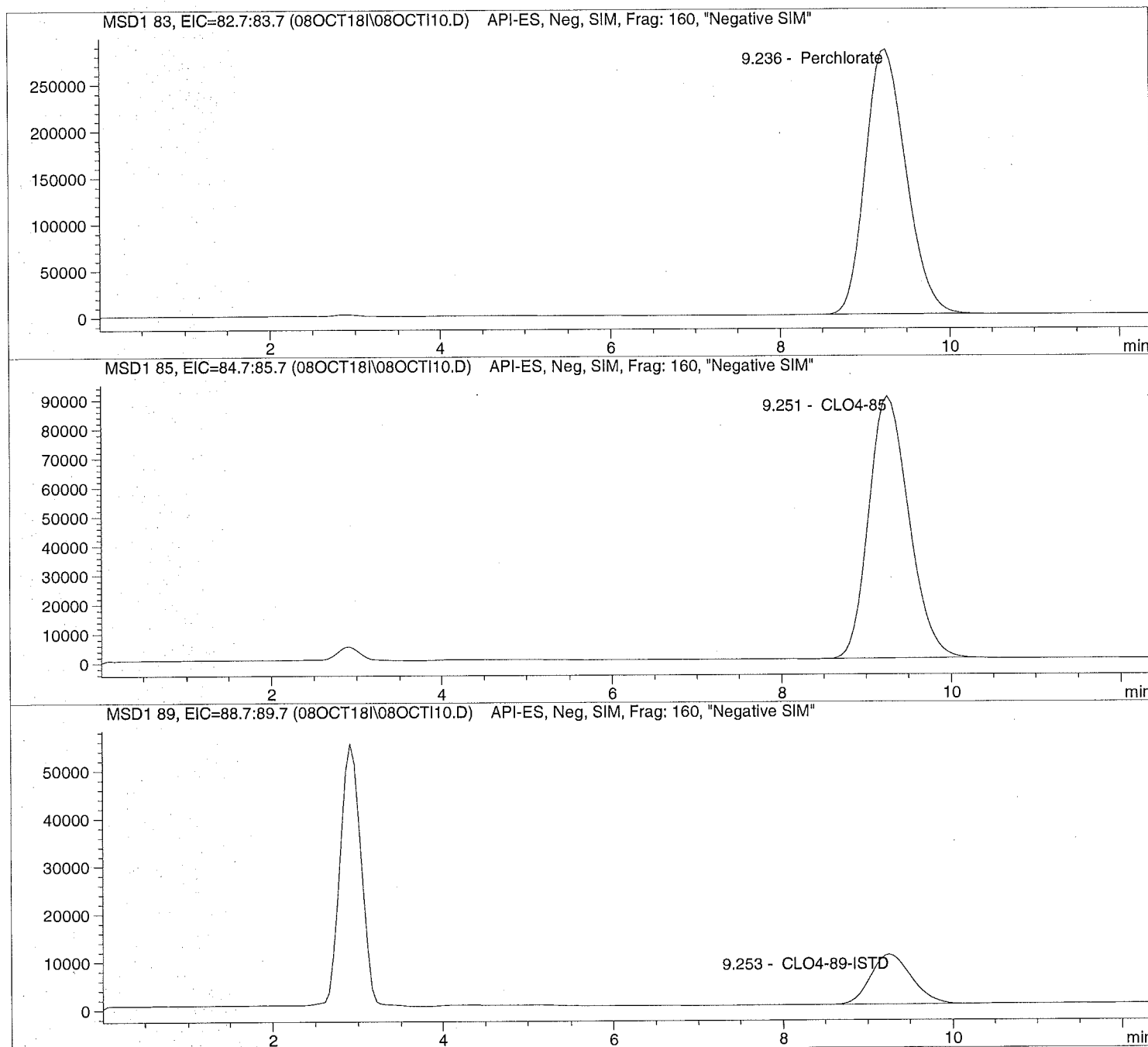
Sample Name: CLO4@ 75.ug/L

Injection Date: 10/08/2018 13:02:48  
Sample Name: CLO4@ 75.ug/L  
Acq Operator: TNB

Seq Line: 10  
Location: Vial 80  
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\08OCT18\08OCTI11.D

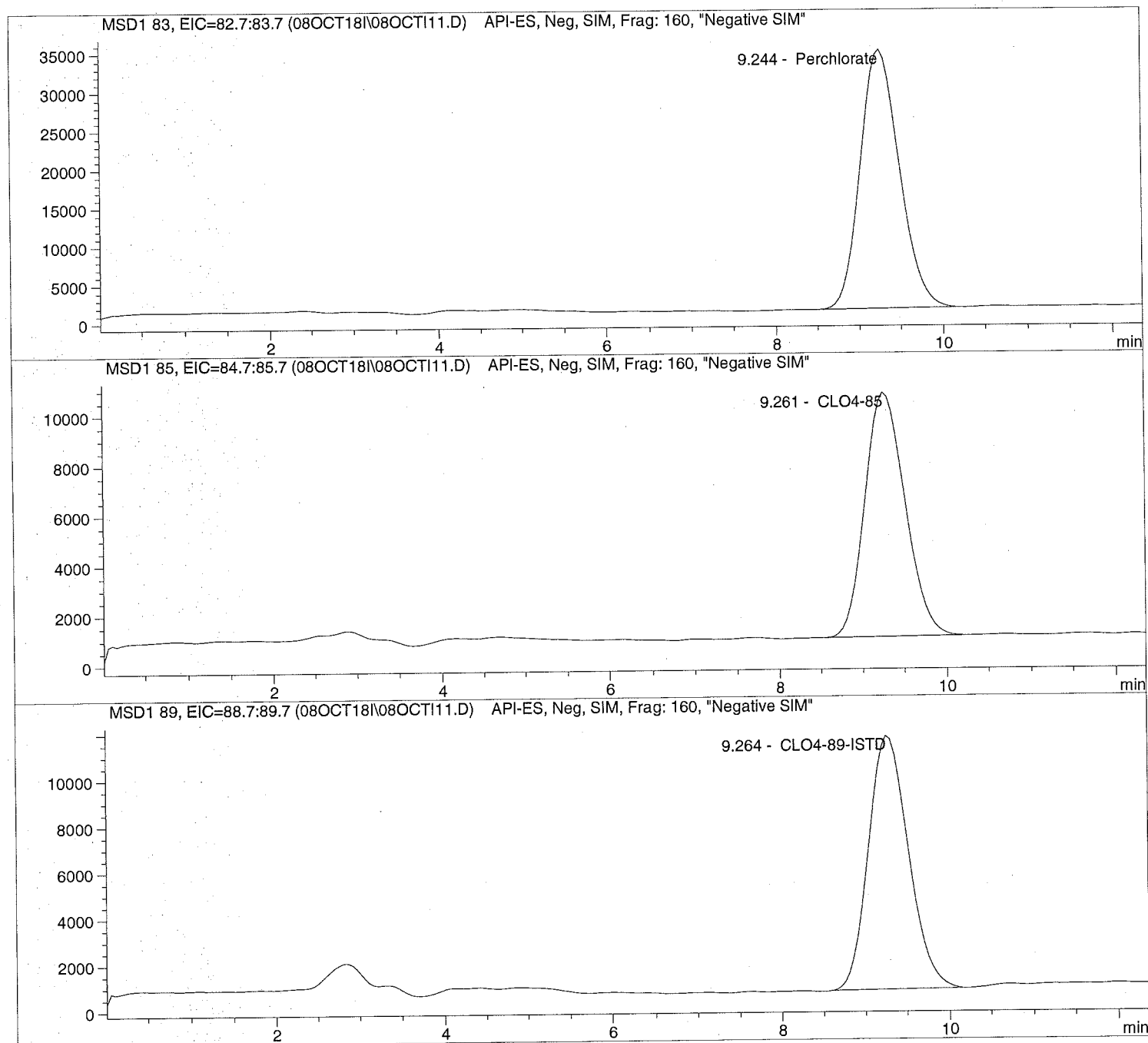
Sample Name: ICAL Verf@10ug/L

Injection Date: 10/08/2018 13:17:00  
Sample Name: ICAL Verf@10ug/L  
Acq Operator: TNB

Seq Line: 11  
Location: Vial 81  
Inj. No.: 1  
Inj. Vol.: 25  $\mu$ l

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

December 27, 2018

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

Work Order: **HS18120380**

Laboratory Results for: **Groundwater Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Dec 07, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval scribble.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 27-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18120380

**SAMPLE SUMMARY**

---

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120380-01	LH18/24-SP650_120618	Water		06-Dec-2018 14:00	07-Dec-2018 10:05	<input type="checkbox"/>
HS18120380-02	LH18/24-SP650_120618_BIX	Water		06-Dec-2018 14:00	07-Dec-2018 10:05	<input type="checkbox"/>

---

**ALS Houston, US**

Date: 27-Dec-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:**

---

**CASE NARRATIVE**

---

**Work Order Comments**

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

**Work Order Comments**

- The analysis for TOC subcontracted to ALS Environmental in Kelso, WA. Final report attached.
- 

**WetChemistry by Method E365.3****Batch ID: R329301**

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

**WetChemistry by Method E350.3****Batch ID: R328981**

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

## ALS Houston, US

Date: 27-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_120618  
 Collection Date: 06-Dec-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18120380  
 Lab ID:HS18120380-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>AMMONIA AS N BY E350.3(ISE)</b>								Analyst: MZD
	<b>Method:E350.3</b>							
Nitrogen, Ammonia (As N)	24		0.20	0.50	0.20	mg/L	1	11-Dec-2018 13:50
<b>ORTHO PHOSPHATE (PO4) AS P BY E365.3</b>								Analyst: MZD
	<b>Method:E365.3</b>							
Phosphorus, Total Orthophosphate (As P)	4.76		0.100	0.400	0.250	mg/L	10	07-Dec-2018 16:48
<b>SUBCONTRACT ANALYSIS - TOC ANALYSIS</b>								Analyst: SUBK
	<b>Method:NA</b>							
Subcontract Analysis	See Attached		0	0		NA	1	27-Dec-2018 16:04

## ALS Houston, US

Date: 27-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_120618\_BIX  
 Collection Date: 06-Dec-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18120380  
 Lab ID:HS18120380-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>		Analyst: SUB				
Subcontract Analysis	See Attached		0	0		NA	1	26-Dec-2018 12:21

ALS Houston, US

Date: 27-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120380

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R328981	<b>Test Name</b> : AMMONIA AS N BY E350.3(ISE)		<b>Matrix:</b> Water			
HS18120380-01	LH18/24-SP650_120618	06 Dec 2018 14:00			11 Dec 2018 13:50	1
<b>Batch ID</b> R329301	<b>Test Name</b> : ORTHO PHOSPHATE (PO4) AS P BY E365.3		<b>Matrix:</b> Water			
HS18120380-01	LH18/24-SP650_120618	06 Dec 2018 14:00			07 Dec 2018 16:48	10
<b>Batch ID</b> R329912	<b>Test Name</b> : SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18120380-02	LH18/24-SP650_120618_BIX	06 Dec 2018 14:00			26 Dec 2018 12:21	1
<b>Batch ID</b> R330042	<b>Test Name</b> : SUBCONTRACT ANALYSIS - TOC ANALYSIS		<b>Matrix:</b> Water			
HS18120380-01	LH18/24-SP650_120618	06 Dec 2018 14:00			27 Dec 2018 16:04	1

ALS Houston, US

Date: 27-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120380

**QC BATCH REPORT**

Batch ID:	R328981	Instrument:	WetChem_HS	Method:	E350.3					
<b>MBLK</b>	Sample ID: <b>MBLK-328981</b>	Units:	mg/L	Analysis Date:	11-Dec-2018 13:50					
Client ID:	Run ID: <b>WetChem_HS_328981</b>	SeqNo:	4858554	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.50	0.20								U
<b>LCS</b>	Sample ID: <b>LCS-328981</b>	Units:	mg/L	Analysis Date:	11-Dec-2018 13:50					
Client ID:	Run ID: <b>WetChem_HS_328981</b>	SeqNo:	4858555	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.879	0.20	10	0	98.8	80 - 120				
<b>MS</b>	Sample ID: <b>HS18120098-01MS</b>	Units:	mg/L	Analysis Date:	11-Dec-2018 13:50					
Client ID:	Run ID: <b>WetChem_HS_328981</b>	SeqNo:	4858557	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.526	0.20	10	0.8531	86.7	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18120098-01MSD</b>	Units:	mg/L	Analysis Date:	11-Dec-2018 13:50					
Client ID:	Run ID: <b>WetChem_HS_328981</b>	SeqNo:	4858558	PrepDate:	DF: 1					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.53	0.20	10	0.8531	86.8	80 - 120	9.526	0.042	20	

The following samples were analyzed in this batch: HS18120380-01



ALS Houston, US

Date: 27-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120380

**QC BATCH REPORT**

Batch ID: R329301		Instrument: UV-2450		Method: E365.3						
<b>MBLK</b>	Sample ID: <b>MBLK-329301</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 16:48</b>						
Client ID:	Run ID: <b>UV-2450_329301</b>	SeqNo: <b>4866160</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.0400	0.0250								U
<b>LCS</b>	Sample ID: <b>LCS-329301</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 16:48</b>						
Client ID:	Run ID: <b>UV-2450_329301</b>	SeqNo: <b>4866161</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.244	0.0250	0.25	0	97.6	85 - 115				
<b>MS</b>	Sample ID: <b>HS18120299-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 11:23</b>						
Client ID:	Run ID: <b>UV-2450_329301</b>	SeqNo: <b>4866163</b>	PrepDate:	DF: <b>50</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	23.45	1.25	12.5	12.75	85.6	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18120299-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>07-Dec-2018 11:23</b>						
Client ID:	Run ID: <b>UV-2450_329301</b>	SeqNo: <b>4866164</b>	PrepDate:	DF: <b>50</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	23.7	1.25	12.5	12.75	87.6	80 - 120	23.45	1.06	20	

The following samples were analyzed in this batch: HS18120380-01

**ALS Houston, US**

Date: 27-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120380

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

---

**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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

---

ALS Houston, US

Date: 27-Dec-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18120380

---

**SAMPLE TRACKING**

---

Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18120380-01	LH18/24-SP650_120618	Login	12/7/2018 12:35:20 PM	JRM	WET249
HS18120380-01	LH18/24-SP650_120618	Login	12/7/2018 12:35:20 PM	JRM	WET249
HS18120380-01	LH18/24-SP650_120618	Login	12/7/2018 12:35:20 PM	JRM	Sub
HS18120380-02	LH18/24-SP650_120618_BIX	Login	12/7/2018 12:35:20 PM	JRM	Sub

---

ALS Houston, US

Date: 27-Dec-18

## Sample Receipt Checklist

Client Name: Bhate Environmental  
Work Order: HS18120380

Date/Time Received: **07-Dec-2018 10:05**  
Received by: **JRM**

Checklist completed by: Nilesh D. Ranchod 7-Dec-2018 Reviewed by: RJ Modashia 8-Dec-2018  
eSignature Date eSignature Date

Matrices: **Water**Carrier name: **UPS**

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
TX1005 solids received in hermetically sealed vials?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	

Temperature(s)/Thermometer(s):	3.0c/3.3c UC/C		IR25
Cooler(s)/Kit(s):	44423		
Date/Time sample(s) sent to storage:	12/07/2018 12:45		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted by:	<input type="text"/>		

Login Notes: 

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

Corrective Action:

**CHAIN OF CUSTODY**

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

Project: BHATE LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS			Project No. NWO1312.0150.0 16.0001		Analyses										Remarks (Preservatives, etc.)	Lab I.D.#			
Job: <b>GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES</b>			Prepared By: Scott Beesinger		P.O. Number		MS / MSD	No. OF CONTAINERS	AMMONIA-N	TOTAL ORGANIC CARBON	ORTHO-PHOSPHATE	PERCHLORATE							
Field Sample I.D.	Sample Matrix	Date / Time																	
LH18/24-SP650_120618	Water	12/06/18 / 14:00	2	X	X														H2SO4
LH18/24-SP650_120618	Water	12/06/18 / 14:00	1			X													NONE
LH18/24-SP650_120618_BIX	Water	12/06/18 / 14:00	1				X												NONE

Additional Remarks: **Standard TAT on all parameters**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
<i>Scott Beesinger</i>	12/06/18	14:30									


For Lab Use Only									
Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition
<i>J. W. WATSON</i>	12/7/18	10:05							

Remarks: *Cooler 44423 19225  
Temp 3.0 C/F 0.3*

**HS18120380**

Bhate Environmental Associates, Inc.  
Groundwater Treatment Plant Weekly Samples



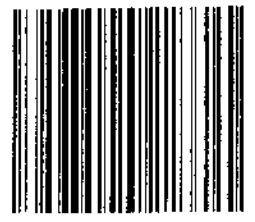
 <b>ALS</b> 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax. +1 281 530 5887	<b>CUSTODY SEAL</b>		Seal Broken By: <i>sm</i>
	Date: <i>12/6/18</i>	Time: <i>1430</i>	Date:
	Name: <i>Scott Beering</i>		Date: <i>12/07/18</i>
Company: <i>BH&amp;A</i>			

44423

DEC 07 2018

44423

DS2N  
 D2-21  
 7749P  
 STAFFORD  
 AAD9537UPS



J4616880061





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ALS Environmental  
ALS Group USA, Corp  
1317 South 13th Avenue  
Kelso, WA 98626  
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F : +1 360 636 1068  
[www.alsglobal.com](http://www.alsglobal.com)

December 27, 2018

**Analytical Report for Service Request No: K1812101**

RJ Modashia  
ALS Laboratory Group  
10450 Stancliff Road  
Suite 210  
Houston, TX 77099-4338

**RE: HS18120380**

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory December 11, 2018. For your reference, these analyses have been assigned our service request number **K1812101**.

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](http://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](mailto:Kelley.Lovejoy@alsglobal.com).

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

for Kelley Lovejoy  
Project Manager





---

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## Table of Contents

Acronyms

Qualifiers

State Certifications, Accreditations, And Licenses

Case Narrative

Chain of Custody

General Chemistry

Raw Data

    General Chemistry

## 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**

<b>Agency</b>	<b>Web Site</b>	<b>Number</b>
Alaska DEH	<a href="http://dec.alaska.gov/eh/lab/cs/csapproval.htm">http://dec.alaska.gov/eh/lab/cs/csapproval.htm</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2795
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L16-58-R4
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Hawaii DOH	<a href="http://health.hawaii.gov/">http://health.hawaii.gov/</a>	-
ISO 17025	<a href="http://www.pjllabs.com/">http://www.pjllabs.com/</a>	L16-57
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	03016
Maine DHS	<a href="http://www.maine.gov/dhhs/">http://www.maine.gov/dhhs/</a>	WA01276
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-457
Nevada DEP	<a href="http://ndep.nv.gov/bsdw/labservice.htm">http://ndep.nv.gov/bsdw/labservice.htm</a>	WA01276
New Jersey DEP	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	WA005
New York - DOH	<a href="https://www.wadsworth.org/regulatory/elap">https://www.wadsworth.org/regulatory/elap</a>	12060
North Carolina DEQ	<a href="https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification">https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA100010
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/EnvironmentalLabCertification/">http://www.scdhec.gov/environment/EnvironmentalLabCertification/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704427
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C544
Wyoming (EPA Region 8)	<a href="https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water">https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water</a>	-
Kelso Laboratory Website	<a href="http://www.alsglobal.com">www.alsglobal.com</a>	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](http://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/analyte 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](http://www.alsglobal.com)



**Client:** ALS Environmental - US  
**Project:** HS18120380  
**Sample Matrix:** Water

**Service Request:** K1812101  
**Date Received:** 12/11/2018

#### CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

#### Sample Receipt:

One water sample was received for analysis at ALS Environmental on 12/11/2018. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

#### General Chemistry:

No significant anomalies were noted with this analysis.

Approved by

*Noel D. Darr*

Date

12/27/2018



## Chain of Custody

**ALS Environmental—Kelso Laboratory**  
1317 South 13th Avenue, Kelso, WA 98626  
Phone (360)577-7222 Fax (360)636-1068  
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K1812101

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: 10388

**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:** HS18120380  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18120380-01	LH18/24-SP650_120618	Water	06 Dec 2018 14:00
TOC Analysis for DOD Level IV			26 Dec 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: J. Modashia  
Received By: [Signature]  
Cooler ID(s): \_\_\_\_\_

Date/Time: 12/10/18 18:00  
Date/Time: 12/11/18 09:50  
Temperature(s): \_\_\_\_\_





### Cooler Receipt and Preservation Form

Client ALS Houston Service Request K18 12101  
 Received: 12/11/18 Opened: 12/11/18 By: BR Unloaded: 12/11/18 By: BR

- 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	Tracking Number	NA	Filed
<u>-0.3</u>	<u>-0.4</u>	<u>1.8</u>	<u>1.7</u>	<u>-0.1</u>	<u>349</u>	<input checked="" type="checkbox"/> NA	<u>438095354618</u>	<input type="checkbox"/> NA	

- Packing material:  Inserts  Baggies  Bubble Wrap  Gel Packs  Wet Ice  Dry Ice  Sleeves
- Were custody papers properly filled out (ink, signed, etc.)?  NA  Y  N
- 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
- Were all sample labels complete (i.e analysis, preservation, etc.)?  NA  Y  N
- Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.*  NA  Y  N
- Were appropriate bottles/containers and volumes received for the tests indicated?  NA  Y  N
- Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below*  NA  Y  N
- Were VOA vials received without headspace? *Indicate in the table below.*  NA  Y  N
- 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](http://www.alsglobal.com)

Analytical Report

**Client:** ALS Environmental - US  
**Project:** HS18120380  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:** K1812101  
**Date Collected:** 12/6/18  
**Date Received:** 12/11/18  
**Units:** mg/L  
**Basis:** NA

**Carbon, Total Organic**

Sample Name	Lab Code	Result	LOQ	LOD	MDL	Dil.	Date Analyzed	Q
LH18/24-SP650_120618	K1812101-001	16.0	0.50	0.20	0.07	1	12/21/18 09:45	
Method Blank	K1812101-MB	ND U	0.50	0.20	0.07	1	12/21/18 11:06	

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18120380  
**Sample Matrix:** Water

**Service Request:** K1812101  
**Date Analyzed:** 12/21/18  
**Date Extracted:** NA

**Lab Control Sample Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA  
**Analysis Lot:** 619810

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K1812101-LCS	20.3	21.9	93	83-117

**Client:** ALS Environmental - US  
**Project:** HS18120380

**Service Request:** K1812101

**Continuing Calibration Verification (CCV) Summary**

**Carbon, Total Organic**

**Analysis Method:** SM 5310 C

**Units:** mg/L

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>True Value</b>	<b>Measured Value</b>	<b>Percent Recovery</b>	<b>Acceptance Limits</b>
CCV1	619810	KQ1818709-28	12/21/18 05:13	25.0	24.3	97	90-110
CCV2	619810	KQ1818709-29	12/21/18 10:33	25.0	24.0	96	90-110
CCV3	619810	KQ1818709-30	12/21/18 15:37	25.0	23.7	95	90-110
CCV4	619810	KQ1818709-31	12/21/18 21:13	25.0	23.6	94	90-110
CCV5	619810	KQ1818709-32	12/22/18 02:33	25.0	23.6	95	90-110
CCV6	619810	KQ1818709-33	12/22/18 07:36	25.0	23.9	95	90-110

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18120380

**Service Request:** K1812101

**Continuing Calibration Blank (CCB) Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C

**Units:** mg/L

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>LOQ</b>	<b>LOD</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	619810	KQ1818709-34	12/21/18 05:30	0.50	0.20	0.07	ND	U
CCB2	619810	KQ1818709-35	12/21/18 10:49	0.50	0.20	0.07	ND	U
CCB3	619810	KQ1818709-36	12/21/18 15:54	0.50	0.20	0.07	ND	U
CCB4	619810	KQ1818709-37	12/21/18 21:29	0.50	0.20	0.07	ND	U
CCB5	619810	KQ1818709-38	12/22/18 02:49	0.50	0.20	0.07	ND	U
CCB6	619810	KQ1818709-39	12/22/18 07:53	0.50	0.20	0.07	ND	U



## Raw Data

**ALS Environmental—Kelso Laboratory**  
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Phone (360)577-7222 Fax (360)636-1068  
[www.alsglobal.com](http://www.alsglobal.com)



## General Chemistry

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[www.alsglobal.com](http://www.alsglobal.com)



Work Request # (Original) K18/1658, 1888, 2001, 1625, 1728, 1789, 1849, 1831, 2101, 2154  
 Tier: II IV IV I I IV II II IV IV  
 Date Analyzed: 12/20/18 1928, 2278, 2279, 2272, 1745, 1747, 2416  
 Analyst: CES Run # TOC: 619808,  
 Analysis: TOC/DOC 619810  
DOC: 620105

### 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?  | <input checked="" type="radio"/> yes/no/NA                                   |
| 2.  | Holding times met for all analyses and for all samples?   | <input checked="" type="radio"/> yes/no/NA                                   |
| 3.  | Are calculations correct?   | <input checked="" type="radio"/> yes/no/NA                                   |
| 4.  | Is the reporting basis correct? (Dry Weight)  | <input checked="" type="radio"/> yes/no/NA                                   |
| 5.  | All quality control criteria met?   | <input checked="" type="radio"/> yes/ <input checked="" type="radio"/> no    |
| 6.  | Is the calibration curve correlation coefficient $\geq 0.995$ ?   | <input checked="" type="radio"/> yes/no/NA                                   |
| 7.  | MBs, CCVs, CCBs, LCSs, Dups, and Spikes, analyzed at proper frequency?  | <input checked="" type="radio"/> yes/no/NA                                   |
| 8.  | Are ICVs, CCVs, and CCBs all within acceptance limits?  | <input checked="" type="radio"/> yes/no/NA                                   |
| 9.  | Are results for methods blanks all ND?  | <input checked="" type="radio"/> yes/no/NA                                   |
| 10. | Are all QC samples within acceptance criteria?<br>(LCS % rec, MS/DMS % rec, DUP or MS/DMS RPDs, etc.)               | <input checked="" type="radio"/> yes/ <input checked="" type="radio"/> no/NA |
| 11. | Are all exceptions explained?   | <input checked="" type="radio"/> yes/no/NA                                   |
| 12. | Have all applicable service requests been reviewed?   | <input checked="" type="radio"/> yes/no/NA                                   |
| 13. | Are all samples labeled correctly?  | <input checked="" type="radio"/> yes/no/NA                                   |
| 14. | Have all instructions on the service request been followed?<br>(e.g. Special MRLs, QC on a specific sample, Form V) | <input checked="" type="radio"/> yes/no/NA                                   |
| 15. | Are detection limits and units reported correctly?  | <input checked="" type="radio"/> yes/no/NA                                   |
| 16. | Is the unused space on the benchsheet crossed out?  | <input checked="" type="radio"/> yes/no/NA                                   |
| 17. | Was analysis turned in by the due date? (n-2) (If not record SR#)   | <input checked="" type="radio"/> yes/ <input checked="" type="radio"/> no/NA |

#### COMMENTS:

1789-2, 3, 4, 5, 8, 1849-4, 2416-35 RPD not within acceptance limits. The sample results are less than 5x the MRL.  
 RA 2154-1, 2154-5 - over diluted.  
 1831-2, 1745-1 RPD not within acceptance limits - samples contain sediment - non homogeneous.

Final Approved by: [Signature] Date: 12/26/18 DQREPORT



## Analytical Results Summary

Instrument Name: K-TOC-03

Analyst: CSETHE

Analysis Lot: 619808 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
K1811625-001	Carbon, Total Organic	N/A		Ground Water	4.25 mg/L	10 ml	8.5 mg/L	2	0.2	1.0			12/20/18 16:31	N	I
K1811625-003	Carbon, Total Organic	N/A		Ground Water	4.47 mg/L	10 ml	4.47 mg/L	1	0.07	0.50			12/20/18 17:51	N	I
K1811658-004	Carbon, Total Organic	N/A		Water	3.83 mg/L	10 ml	3.83 mg/L	1	0.07	0.50			12/20/18 13:18	N	II
K1811728-001	Carbon, Total Organic	N/A		Reagent Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/20/18 18:54	N	I
K1811728-002	Carbon, Total Organic	N/A		Reagent Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/20/18 19:26	N	I
K1811789-002	Carbon, Total Organic	N/A		Ground Water	0.51 mg/L	10 ml	0.51 mg/L	1	0.07	0.50			12/20/18 19:58	N	IV
K1811789-003	Carbon, Total Organic	N/A		Ground Water	0.74 mg/L	10 ml	0.74 mg/L	1	0.07	0.50			12/20/18 22:39	N	IV
K1811789-004	Carbon, Total Organic	N/A		Ground Water	0.16 mg/L	10 ml	0.16 mg/L	J 1	0.07	0.50			12/20/18 23:42	N	IV
K1811789-005	Carbon, Total Organic	N/A		Ground Water	0.77 mg/L	10 ml	0.77 mg/L	1	0.07	0.50			12/21/18 00:45	N	IV
K1811789-006	Carbon, Total Organic	N/A		Ground Water	0.55 mg/L	10 ml	0.55 mg/L	1	0.07	0.50			12/21/18 01:48	N	IV
K1811789-008	Carbon, Total Organic	N/A		Ground Water	0.39 mg/L	10 ml	0.39 mg/L	J 1	0.07	0.50			12/21/18 02:51	N	IV
K1811831-002	Carbon, Total Organic	N/A		Water	6.74 mg/L	10 ml	6.74 mg/L	1	0.07	0.50			12/21/18 08:25	N	II
K1811849-001	Carbon, Total Organic	N/A		Water	1.24 mg/L	10 ml	1.24 mg/L	1	0.07	0.50			12/21/18 04:25	N	II
K1811849-002	Carbon, Total Organic	N/A		Water	8.22 mg/L	10 ml	32.9 mg/L	4	0.3	2.0			12/21/18 05:46	N	II
K1811849-003	Carbon, Total Organic	N/A		Water	7.74 mg/L	10 ml	31.0 mg/L	4	0.3	2.0			12/21/18 06:18	N	II
K1811849-004	Carbon, Total Organic	N/A		Water	1.09 mg/L	10 ml	1.09 mg/L	1	0.07	0.50			12/21/18 06:50	N	II
K1811849-005	Carbon, Total Organic	N/A		Water	5.34 mg/L	10 ml	5.34 mg/L	1	0.07	0.50			12/21/18 07:22	N	II
K1811888-002	Carbon, Total Organic	N/A		Water	2.74 mg/L	10 ml	2.74 mg/L	1	0.07	0.50			12/20/18 14:22	N	IV
K1812001-001	Carbon, Total Organic	N/A		Water	6.94 mg/L	10 ml	69.4 mg/L	10	0.7	5.0			12/20/18 14:54	N	IV
KQ1818705-01	Carbon, Total Organic	DUP	K1811658-004	Water	3.91 mg/L	10 ml	3.91 mg/L	1	0.07	0.50		2	12/20/18 13:18	N	II
KQ1818705-02	Carbon, Total Organic	DUP	K1811888-002	Water	2.73 mg/L	10 ml	2.73 mg/L	1	0.07	0.50		<1	12/20/18 14:22	N	IV
KQ1818705-03	Carbon, Total Organic	MS	K1812001-001	Water	31.62 mg/L	10 ml	316 mg/L	10	0.7	5.0	99		12/20/18 15:25	N	IV
KQ1818705-04	Carbon, Total Organic	DUP	K1812001-001	Water	6.88 mg/L	10 ml	68.8 mg/L	10	0.7	5.0		<1	12/20/18 14:54	N	IV
KQ1818705-05	Carbon, Total Organic	MS	K1811625-001	Ground Water	29.15 mg/L	10 ml	58.3 mg/L	2	0.2	1.0	100		12/20/18 17:03	N	I
KQ1818705-06	Carbon, Total Organic	DUP	K1811625-001	Ground Water	3.84 mg/L	10 ml	7.7 mg/L	2	0.2	1.0		10	12/20/18 16:31	N	I
KQ1818705-07	Carbon, Total Organic	DUP	K1811625-003	Ground Water	4.23 mg/L	10 ml	4.23 mg/L	1	0.07	0.50		6	12/20/18 17:51	N	I
KQ1818705-08	Carbon, Total Organic	DUP	K1811728-001	Reagent Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50		NC	12/20/18 18:54	N	I
KQ1818705-09	Carbon, Total Organic	DUP	K1811728-002	Reagent Water	0.80 mg/L	10 ml	0.80 mg/L	1	0.07	0.50		NC	12/20/18 19:26	N	I

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

## Analytical Results Summary

Instrument Name: K-TOC-03		Analyst: CSETHE		Analysis Lot: 619808		Method/Testcode: 9060/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
KQ1818705-10	Carbon, Total Organic	MS	K1811789-002	Ground Water	25.21 mg/L	10 ml	25.2 mg/L	1	0.07	0.50	99		12/20/18 21:01	N	IV
KQ1818705-11	Carbon, Total Organic	DUP	K1811789-002	Ground Water	0.26 mg/L	10 ml	0.26 mg/L	J 1	0.07	0.50		66*	12/20/18 19:58	N	IV
KQ1818705-12	Carbon, Total Organic	TRP	K1811789-002	Ground Water	0.22 mg/L	10 ml	0.22 mg/L	J 1	0.07	0.50		48*	12/20/18 19:58	N	IV
KQ1818705-13	Carbon, Total Organic	QUAD	K1811789-002	Ground Water	0.23 mg/L	10 ml	0.23 mg/L	J 1	0.07	0.50		45*	12/20/18 19:58	N	IV
KQ1818705-14	Carbon, Total Organic	DUP	K1811789-003	Ground Water	0.60 mg/L	10 ml	0.60 mg/L	1	0.07	0.50		21*	12/20/18 22:39	N	IV
KQ1818705-15	Carbon, Total Organic	TRP	K1811789-003	Ground Water	0.58 mg/L	10 ml	0.58 mg/L	1	0.07	0.50		14	12/20/18 22:39	N	IV
KQ1818705-16	Carbon, Total Organic	QUAD	K1811789-003	Ground Water	0.52 mg/L	10 ml	0.52 mg/L	1	0.07	0.50		16	12/20/18 22:39	N	IV
KQ1818705-17	Carbon, Total Organic	DUP	K1811789-004	Ground Water	1.01 mg/L	10 ml	1.01 mg/L	1	0.07	0.50		146*	12/20/18 23:42	N	IV
KQ1818705-18	Carbon, Total Organic	TRP	K1811789-004	Ground Water	0.19 mg/L	10 ml	0.19 mg/L	J 1	0.07	0.50		106*	12/20/18 23:42	N	IV
KQ1818705-19	Carbon, Total Organic	QUAD	K1811789-004	Ground Water	0.07 mg/L	10 ml	0.07 mg/L	J 1	0.07	0.50		122*	12/20/18 23:42	N	IV
KQ1818705-20	Carbon, Total Organic	DUP	K1811789-005	Ground Water	0.58 mg/L	10 ml	0.58 mg/L	1	0.07	0.50		27*	12/21/18 00:45	N	IV
KQ1818705-21	Carbon, Total Organic	TRP	K1811789-005	Ground Water	0.57 mg/L	10 ml	0.57 mg/L	1	0.07	0.50		17	12/21/18 00:45	N	IV
KQ1818705-22	Carbon, Total Organic	QUAD	K1811789-005	Ground Water	0.61 mg/L	10 ml	0.61 mg/L	1	0.07	0.50		14	12/21/18 00:45	N	IV
KQ1818705-23	Carbon, Total Organic	DUP	K1811789-006	Ground Water	0.53 mg/L	10 ml	0.53 mg/L	1	0.07	0.50		3	12/21/18 01:48	N	IV
KQ1818705-24	Carbon, Total Organic	TRP	K1811789-006	Ground Water	0.50 mg/L	10 ml	0.50 mg/L	1	0.07	0.50		5	12/21/18 01:48	N	IV
KQ1818705-25	Carbon, Total Organic	QUAD	K1811789-006	Ground Water	0.54 mg/L	10 ml	0.54 mg/L	1	0.07	0.50		4	12/21/18 01:48	N	IV
KQ1818705-26	Carbon, Total Organic	DUP	K1811789-008	Ground Water	0.34 mg/L	10 ml	0.34 mg/L	J 1	0.07	0.50		16	12/21/18 02:51	N	IV
KQ1818705-27	Carbon, Total Organic	TRP	K1811789-008	Ground Water	0.20 mg/L	10 ml	0.20 mg/L	J 1	0.07	0.50		31*	12/21/18 02:51	N	IV
KQ1818705-28	Carbon, Total Organic	QUAD	K1811789-008	Ground Water	0.26 mg/L	10 ml	0.26 mg/L	J 1	0.07	0.50		28*	12/21/18 02:51	N	IV
KQ1818705-29	Carbon, Total Organic	MS	K1811849-001	Water	25.43 mg/L	10 ml	25.4 mg/L	1	0.07	0.50	97		12/21/18 04:57	N	II
KQ1818705-30	Carbon, Total Organic	DUP	K1811849-001	Water	1.25 mg/L	10 ml	1.25 mg/L	1	0.07	0.50		1	12/21/18 04:25	N	II
KQ1818705-31	Carbon, Total Organic	DUP	K1811849-002	Water	8.05 mg/L	10 ml	32.2 mg/L	4	0.3	2.0		2	12/21/18 05:46	N	II
KQ1818705-32	Carbon, Total Organic	DUP	K1811849-003	Water	7.59 mg/L	10 ml	30.3 mg/L	4	0.3	2.0		2	12/21/18 06:18	N	II
KQ1818705-33	Carbon, Total Organic	DUP	K1811849-004	Water	0.86 mg/L	10 ml	0.86 mg/L	1	0.07	0.50		24*	12/21/18 06:50	N	II
KQ1818705-34	Carbon, Total Organic	DUP	K1811849-005	Water	5.16 mg/L	10 ml	5.16 mg/L	1	0.07	0.50		3	12/21/18 07:22	N	II
KQ1818705-35	Carbon, Total Organic	MS	K1811831-002	Water	31.00 mg/L	10 ml	31.0 mg/L	1	0.07	0.50	97		12/21/18 08:57	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.



# Analytical Results Summary

00922401

Instrument Name: K-TOC-03

Analyst: CSETHE

Analysis Lot: 619808 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
KQ1818705-36	Carbon, Total Organic	DUP	K1811831-002	Water	6.02 mg/L	10 ml	6.02 mg/L	1	0.07	0.50		11*	12/21/18 08:25	N	II
KQ1818705-37	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 12:29	N	II
KQ1818705-37	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 12:29	N	II
KQ1818705-38	Carbon, Total Organic	LCS		Water	20.64 mg/L	10 ml	20.6 mg/L	1	0.07	0.50	94		12/20/18 12:46	N	II
KQ1818705-38	Carbon, Total Organic	LCS		Water	20.64 mg/L	10 ml	20.6 mg/L	1	0.07	0.50	94		12/20/18 12:46	N	II
KQ1818705-39	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 22:06	N	II
KQ1818705-39	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 22:06	N	II
KQ1818705-40	Carbon, Total Organic	LCS		Water	20.62 mg/L	10 ml	20.6 mg/L	1	0.07	0.50	94		12/20/18 22:23	N	II
KQ1818705-40	Carbon, Total Organic	LCS		Water	20.62 mg/L	10 ml	20.6 mg/L	1	0.07	0.50	94		12/20/18 22:23	N	II
KQ1818705-41	Carbon, Total Organic	CCV		Water	24.08 mg/L	10 ml	24.1 mg/L	1			96		12/20/18 11:56	N	II
KQ1818705-41	Carbon, Total Organic	CCV		Water	24.08 mg/L	10 ml	24.1 mg/L	1			96		12/20/18 11:56	N	II
KQ1818705-42	Carbon, Total Organic	CCV		Water	24.01 mg/L	10 ml	24.0 mg/L	1			96		12/20/18 15:58	N	II
KQ1818705-42	Carbon, Total Organic	CCV		Water	24.01 mg/L	10 ml	24.0 mg/L	1			96		12/20/18 15:58	N	II
KQ1818705-43	Carbon, Total Organic	CCV		Water	24.07 mg/L	10 ml	24.1 mg/L	1			96		12/20/18 21:33	N	II
KQ1818705-43	Carbon, Total Organic	CCV		Water	24.07 mg/L	10 ml	24.1 mg/L	1			96		12/20/18 21:33	N	II
KQ1818705-44	Carbon, Total Organic	CCV		Water	24.26 mg/L	10 ml	24.3 mg/L	1			97		12/21/18 05:13	N	II
KQ1818705-44	Carbon, Total Organic	CCV		Water	24.26 mg/L	10 ml	24.3 mg/L	1			97		12/21/18 05:13	N	II
KQ1818705-45	Carbon, Total Organic	CCV		Water	24.05 mg/L	10 ml	24.0 mg/L	1			96		12/21/18 10:33	N	II
KQ1818705-45	Carbon, Total Organic	CCV		Water	24.05 mg/L	10 ml	24.0 mg/L	1			96		12/21/18 10:33	N	II
KQ1818705-46	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 12:13	N	II
KQ1818705-46	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 12:13	N	II
KQ1818705-47	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 16:14	N	II
KQ1818705-47	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 16:14	N	II
KQ1818705-48	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 21:50	N	II
KQ1818705-48	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 21:50	N	II
KQ1818705-49	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 05:30	N	II
KQ1818705-49	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 05:30	N	II
KQ1818705-49	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 05:30	N	II
KQ1818705-50	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 10:49	N	II
KQ1818705-50	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 10:49	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: CSETHE

Analysis Lot: 619810 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?	Tier
K1811745-001	Carbon, Total Organic	N/A		Water	1.55 mg/L	10 ml	1.55 mg/L	1	0.07	0.50			12/22/18 05:13	N	IV
K1811747-001	Carbon, Total Organic	N/A		Water	4.71 mg/L	10 ml	4.71 mg/L	1	0.07	0.50			12/22/18 06:48	N	IV
K1811928-001	Carbon, Total Organic	N/A		Drinking Water	0.10 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 17:14	N	II
K1812101-001	Carbon, Total Organic	N/A		Water	16.05 mg/L	10 ml	16.0 mg/L	1	0.07	0.50			12/21/18 09:45	N	IV
K1812154-001	Carbon, Total Organic	N/A		Ground Water	0.19 mg/L	10 ml	10 mg/L J	50	4	25			12/21/18 11:39	N	IV
K1812154-002	Carbon, Total Organic	N/A		Ground Water	1.67 mg/L	10 ml	1.67 mg/L	1	0.07	0.50			12/21/18 12:59	N	IV
K1812154-003	Carbon, Total Organic	N/A		Ground Water	2.17 mg/L	10 ml	2.17 mg/L	1	0.07	0.50			12/21/18 14:02	N	IV
K1812154-004	Carbon, Total Organic	N/A		Ground Water	17.57 mg/L	10 ml	879 mg/L	50	4	25			12/21/18 14:34	N	IV
K1812154-005	Carbon, Total Organic	N/A		Ground Water	0.16 mg/L	10 ml	3 mg/L J	20	2	10			12/21/18 16:10	N	IV
K1812272-001	Carbon, Total Organic	N/A		Ground Water	10.54 mg/L	10 ml	42.2 mg/L	4	0.3	2.0			12/22/18 00:42	N	IV
K1812272-002	Carbon, Total Organic	N/A		Ground Water	3.92 mg/L	10 ml	392 mg/L	100	7	50			12/22/18 03:06	N	IV
K1812272-003	Carbon, Total Organic	N/A		Ground Water	3.97 mg/L	10 ml	3.97 mg/L	1	0.07	0.50			12/22/18 03:38	N	IV
K1812272-004	Carbon, Total Organic	N/A		Ground Water	4.03 mg/L	10 ml	4.03 mg/L	1	0.07	0.50			12/22/18 04:09	N	IV
K1812278-001	Carbon, Total Organic	N/A		Ground Water	13.71 mg/L	10 ml	685 mg/L	50	4	25			12/21/18 18:19	N	IV
K1812278-002	Carbon, Total Organic	N/A		Ground Water	14.02 mg/L	10 ml	701 mg/L	50	4	25			12/21/18 22:19	N	IV
K1812278-003	Carbon, Total Organic	N/A		Ground Water	1.13 mg/L	10 ml	4.5 mg/L	4	0.3	2.0			12/21/18 20:41	N	IV
K1812279-001	Carbon, Total Organic	N/A		Water	24.72 mg/L	10 ml	24.7 mg/L	1	0.07	0.50			12/21/18 23:22	N	IV
KQ1818709-01	Carbon, Total Organic	MS	K1812101-001	Water	40.70 mg/L	10 ml	40.7 mg/L	1	0.07	0.50	99		12/21/18 10:16	N	IV
KQ1818709-02	Carbon, Total Organic	DUP	K1812101-001	Water	16.03 mg/L	10 ml	16.0 mg/L	1	0.07	0.50		<1	12/21/18 09:45	N	IV
KQ1818709-03	Carbon, Total Organic	MS	K1812154-001	Ground Water	24.33 mg/L	10 ml	1220 mg/L	50	4	25	97		12/21/18 12:11	N	IV
KQ1818709-04	Carbon, Total Organic	DUP	K1812154-001	Ground Water	0.00 mg/L	10 ml	25 mg/L U	50	4	25		NC	12/21/18 11:39	N	IV
KQ1818709-05	Carbon, Total Organic	DUP	K1812154-002	Ground Water	1.52 mg/L	10 ml	1.52 mg/L	1	0.07	0.50		9	12/21/18 12:59	N	IV
KQ1818709-06	Carbon, Total Organic	DUP	K1812154-003	Ground Water	2.18 mg/L	10 ml	2.18 mg/L	1	0.07	0.50		<1	12/21/18 14:02	N	IV
KQ1818709-07	Carbon, Total Organic	DUP	K1812154-004	Ground Water	17.56 mg/L	10 ml	878 mg/L	50	4	25		<1	12/21/18 14:34	N	IV
KQ1818709-08	Carbon, Total Organic	DUP	K1812154-005	Ground Water	0.00 mg/L	10 ml	10 mg/L U	20	2	10		NC	12/21/18 16:10	N	IV
KQ1818709-09	Carbon, Total Organic	MS	K1811928-001	Drinking Water	24.48 mg/L	10 ml	24.5 mg/L	1	0.07	0.50	98		12/21/18 17:46	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: CSETHE

Analysis Lot: 619810 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
KQ1818709-10	Carbon, Total Organic	DUP	K1811928-001	Drinking Water	0.01 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	12/21/18 17:14	N	II
KQ1818709-11	Carbon, Total Organic	MS	K1812278-001	Ground Water	38.12 mg/L	10 ml	1910 mg/L	50	4	25	98		12/21/18 19:22	N	IV
KQ1818709-12	Carbon, Total Organic	DUP	K1812278-001	Ground Water	13.53 mg/L	10 ml	677 mg/L	50	4	25		1	12/21/18 18:19	N	IV
KQ1818709-13	Carbon, Total Organic	DUP	K1812278-002	Ground Water	13.66 mg/L	10 ml	683 mg/L	50	4	25		3	12/21/18 22:19	N	IV
KQ1818709-14	Carbon, Total Organic	DUP	K1812278-003	Ground Water	1.15 mg/L	10 ml	4.6 mg/L	4	0.3	2.0		1	12/21/18 20:41	N	IV
KQ1818709-15	Carbon, Total Organic	MS	K1812279-001	Water	48.60 mg/L	10 ml	48.6 mg/L	1	0.07	0.50	96		12/21/18 23:54	N	IV
KQ1818709-16	Carbon, Total Organic	DUP	K1812279-001	Water	24.96 mg/L	10 ml	25.0 mg/L	1	0.07	0.50		<1	12/21/18 23:22	N	IV
KQ1818709-17	Carbon, Total Organic	MS	K1812272-001	Ground Water	36.01 mg/L	10 ml	144 mg/L	4	0.3	2.0	102		12/22/18 01:14	N	IV
KQ1818709-18	Carbon, Total Organic	DUP	K1812272-001	Ground Water	10.47 mg/L	10 ml	41.9 mg/L	4	0.3	2.0		<1	12/22/18 00:42	N	IV
KQ1818709-19	Carbon, Total Organic	DUP	K1812272-002	Ground Water	3.78 mg/L	10 ml	378 mg/L	100	7	50		4	12/22/18 03:06	N	IV
KQ1818709-20	Carbon, Total Organic	DUP	K1812272-003	Ground Water	3.95 mg/L	10 ml	3.95 mg/L	1	0.07	0.50		<1	12/22/18 03:38	N	IV
KQ1818709-21	Carbon, Total Organic	DUP	K1812272-004	Ground Water	3.99 mg/L	10 ml	3.99 mg/L	1	0.07	0.50		1	12/22/18 04:09	N	IV
KQ1818709-23	Carbon, Total Organic	DUP	K1811745-001	Water	2.34 mg/L	10 ml	2.34 mg/L	1	0.07	0.50		41*	12/22/18 05:13	N	IV
KQ1818709-24	Carbon, Total Organic	MS	K1811747-001	Water	29.30 mg/L	10 ml	29.3 mg/L	1	0.07	0.50	98		12/22/18 07:20	N	IV
KQ1818709-25	Carbon, Total Organic	DUP	K1811747-001	Water	4.71 mg/L	10 ml	4.71 mg/L	1	0.07	0.50		<1	12/22/18 06:48	N	IV
KQ1818709-26	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 11:06	N	IV
KQ1818709-26	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 11:06	N	IV
KQ1818709-27	Carbon, Total Organic	LCS		Water	20.26 mg/L	10 ml	20.3 mg/L	1	0.07	0.50	93		12/21/18 11:22	N	IV
KQ1818709-27	Carbon, Total Organic	LCS		Water	20.26 mg/L	10 ml	20.3 mg/L	1	0.07	0.50	93		12/21/18 11:22	N	IV
KQ1818709-28	Carbon, Total Organic	CCV		Water	24.26 mg/L	10 ml	24.3 mg/L	1			97		12/21/18 05:13	N	IV
KQ1818709-28	Carbon, Total Organic	CCV		Water	24.26 mg/L	10 ml	24.3 mg/L	1			97		12/21/18 05:13	N	IV
KQ1818709-29	Carbon, Total Organic	CCV		Water	24.05 mg/L	10 ml	24.0 mg/L	1			96		12/21/18 10:33	N	IV
KQ1818709-29	Carbon, Total Organic	CCV		Water	24.05 mg/L	10 ml	24.0 mg/L	1			96		12/21/18 10:33	N	IV
KQ1818709-30	Carbon, Total Organic	CCV		Water	23.72 mg/L	10 ml	23.7 mg/L	1			95		12/21/18 15:37	N	IV
KQ1818709-30	Carbon, Total Organic	CCV		Water	23.72 mg/L	10 ml	23.7 mg/L	1			95		12/21/18 15:37	N	IV
KQ1818709-31	Carbon, Total Organic	CCV		Water	23.55 mg/L	10 ml	23.6 mg/L	1			94		12/21/18 21:13	N	IV
KQ1818709-31	Carbon, Total Organic	CCV		Water	23.55 mg/L	10 ml	23.6 mg/L	1			94		12/21/18 21:13	N	IV
KQ1818709-32	Carbon, Total Organic	CCV		Water	23.63 mg/L	10 ml	23.6 mg/L	1			94		12/22/18 02:33	N	IV
KQ1818709-32	Carbon, Total Organic	CCV		Water	23.63 mg/L	10 ml	23.6 mg/L	1			94		12/22/18 02:33	N	IV
KQ1818709-33	Carbon, Total Organic	CCV		Water	23.86 mg/L	10 ml	23.9 mg/L	1			96		12/22/18 07:36	N	IV
KQ1818709-33	Carbon, Total Organic	CCV		Water	23.86 mg/L	10 ml	23.9 mg/L	1			96		12/22/18 07:36	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: CSETHE

Analysis Lot: 619810 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
KQ1818709-34	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 05:30	N	IV
KQ1818709-34	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 05:30	N	IV
KQ1818709-35	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 10:49	N	IV
KQ1818709-35	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 10:49	N	IV
KQ1818709-36	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 15:54	N	IV
KQ1818709-36	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 15:54	N	IV
KQ1818709-37	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 21:29	N	IV
KQ1818709-37	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 21:29	N	IV
KQ1818709-38	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/22/18 02:49	N	IV
KQ1818709-38	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/22/18 02:49	N	IV
KQ1818709-39	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/22/18 07:53	N	IV
KQ1818709-39	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/22/18 07:53	N	IV
KQ1818709-40	Carbon, Total Organic	MS	K1811745-001	Water	26.18 mg/L	10 ml	26.2 mg/L	1	0.07	0.50	99		12/22/18 05:45	N	IV
KQ1818709-41	Carbon, Total Organic	DMS	K1811745-001	Water	25.64 mg/L	10 ml	25.6 mg/L	1	0.07	0.50	96		12/22/18 05:45	N	IV

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

# Analytical Results Summary

00922405

Instrument Name: K-TOC-03

Analyst: CSETHE

Analysis Lot: 620105 Method/Testcode: SM 5310 C/TOC D

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1812416-035	Carbon, Dissolved Organic (DOC)	N/A		Water	1.24 mg/L	10 ml	1.24 mg/L	1	0.07	0.50			12/22/18 08:10	N	II
KQ1818712-01	Carbon, Dissolved Organic (DOC)	MS	K1812416-035	Water	24.33 mg/L	10 ml	24.3 mg/L	1	0.07	0.50	92		12/22/18 08:41	N	II
KQ1818712-02	Carbon, Dissolved Organic (DOC)	DUP	K1812416-035	Water	1.48 mg/L	10 ml	1.48 mg/L	1	0.07	0.50		18*	12/22/18 08:10	N	II
KQ1818712-03	Carbon, Dissolved Organic (DOC)	MB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/21/18 21:46	N	II
KQ1818712-04	Carbon, Dissolved Organic (DOC)	LCS		Water	19.23 mg/L	10 ml	19.2 mg/L	1	0.07	0.50	88		12/21/18 22:02	N	II
KQ1818712-05	Carbon, Dissolved Organic (DOC)	CCV		Water	23.55 mg/L	10 ml	23.6 mg/L	1					12/21/18 21:13	N	II
KQ1818712-06	Carbon, Dissolved Organic (DOC)	CCV		Water	23.63 mg/L	10 ml	23.6 mg/L	1					12/22/18 02:33	N	II
KQ1818712-07	Carbon, Dissolved Organic (DOC)	CCV		Water	23.86 mg/L	10 ml	23.9 mg/L	1					12/22/18 07:36	N	II
KQ1818712-08	Carbon, Dissolved Organic (DOC)	CCV		Water	23.93 mg/L	10 ml	23.9 mg/L	1					12/22/18 08:58	N	II
KQ1818712-09	Carbon, Dissolved Organic (DOC)	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/21/18 21:29	N	II
KQ1818712-10	Carbon, Dissolved Organic (DOC)	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/22/18 02:49	N	II
KQ1818712-11	Carbon, Dissolved Organic (DOC)	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/22/18 07:53	N	II
KQ1818712-12	Carbon, Dissolved Organic (DOC)	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/22/18 09:14	N	II

94  
94  
96  
96

C25 12/26/18

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.



StarLIMS Run: 619808, 619810, 620105  
 Analysis: TOC  
 Method: SM 5310 C, 9060, 415.1

CCV: 11-GEN-05-73F 50 ppm      LCS: 11-GEN-05-73C 21.9 ppm

ICAL Date: 11/26/18

ICAL ID: 11-GEN-05-72J

ICS ID: 11-GEN-05-73B

ICS TV: 25.0 ppm      ICS % R < 1

Spike ID: 11-GEN-05-700      0.05 ml of 5000 ppm stock ---> 10.0 ml = 25.0 ppm x dilution factor

Sodium Persulfate: 11-GEN-05-73J

21 % H3PO4: 11-GEN-05-73I

Equipment ID: K-TOC-03

PIPETTE ID: 124276B, Marge, 129001F, N11314F

FILTER ID: NA

Analyzed By: <u>CES</u>	Date Analyzed: <u>12/20/18</u>
Reviewed By: <u>[Signature]</u>	Date Reviewed: <u>12/26/18</u>



TOC: 619808,  
619810  
DOC: 620105

## Schedule: 12202018

Version: 9

Instrument: Fusion1

Last Saved by: Fusion1 (Fusion1)

Last Saved on: 2018/12/21 10:33 - Friday

Position	Sample Type	Sample ID	Method ID (Calibration ID)	Reps
(Clean)	Clean	Clean		1
D	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
(Clean)	Clean	Clean		1
D	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
(Clean)	Clean	Clean		1
D	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
(Blank)	Blank	Reagent/Acid Blank		1
D	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
1	Sample	MB1	Extended Reaction 021711 (Extended Reaction 021711)	1
2	Check Standard	[TOC] LCS ER [21.9 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
3	Sample	ICS	Extended Reaction 021711 (Extended Reaction 021711)	1
4	Sample	K1811658-004.01	Extended Reaction 021711 (Extended Reaction 021711)	2
5	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
6	Sample	K1811888-002.01	Extended Reaction 021711 (Extended Reaction 021711)	2
7	Sample	K1812001-001.01 10x	Extended Reaction 021711 (Extended Reaction 021711)	2
8	Sample	K1812001-001.01 ms 10x	Extended Reaction 021711 (Extended Reaction 021711)	1
9	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
10	Sample	K1811625-001.03 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
11	Sample	K1811625-001.03 ms 2x	Extended Reaction 021711 (Extended Reaction 021711)	1
12	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
13	Sample	K1811625-003.03	Extended Reaction 021711 (Extended Reaction 021711)	2
14	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
15	Sample	K1811728-001	Extended Reaction 021711 (Extended Reaction 021711)	2
16	Sample	K1811728-002	Extended Reaction 021711 (Extended Reaction 021711)	2
17	Sample	K1811789-002.08	Extended Reaction 021711 (Extended Reaction 021711)	4
18	Sample	K1811789-002.08 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
19	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
20	Sample	MB2	Extended Reaction 021711 (Extended Reaction 021711)	1
2	Check Standard	[TOC] LCS ER [21.9 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
21	Sample	K1811789-003.08	Extended Reaction 021711 (Extended Reaction 021711)	4
22	Sample	K1811789-004.08	Extended Reaction 021711 (Extended Reaction 021711)	4
23	Sample	K1811789-005.08	Extended Reaction 021711 (Extended Reaction 021711)	4
24	Sample	K1811789-006.08	Extended Reaction 021711 (Extended Reaction 021711)	4
25	Sample	K1811789-008.08	Extended Reaction 021711 (Extended Reaction 021711)	4
26	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
27	Sample	K1811849-001.04	Extended Reaction 021711 (Extended Reaction 021711)	2
28	Sample	K1811849-001.04 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
29	Sample	K1811849-002.04 4x	Extended Reaction 021711 (Extended Reaction 021711)	2
30	Sample	K1811849-003.04 4x	Extended Reaction 021711 (Extended Reaction 021711)	2
31	Sample	K1811849-004.04	Extended Reaction 021711 (Extended Reaction 021711)	2
32	Sample	K1811849-005.04	Extended Reaction 021711 (Extended Reaction 021711)	2
33	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
34	Sample	K1811831-002.01	Extended Reaction 021711 (Extended Reaction 021711)	2
35	Sample	K1811831-002.01 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
36	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
37	Sample	K1812101-001.02	Extended Reaction 021711 (Extended Reaction 021711)	2

Printed on: December 26, 2018 11:38:18

Page 1





# Fusion Report - 12202018

## Thursday, December 20, 2018 08:21 AM

(View - Repts, Unused Repts, Meta-Data, Signature, History)  
Printed on 2018/12/26 11:38 -  
Wednesday

### Report Summary Information

Company Location: Gen Chem Lab  
 Schedule Name: 12202018  
 Instrument Name: Fusion1  
 Report Version: 1 of 1  
 Report Creation by Operators (schedule version): Fusion1 (Fusion1) (v1)  
 Fusion1 (Fusion1) (v2)  
 Fusion1 (Fusion1) (v3)  
 Fusion1 (Fusion1) (v5)  
 Fusion1 (Fusion1) (v6)  
 Fusion1 (Fusion1) (v7)  
 Fusion1 (Fusion1) (v8)  
 Fusion1 (Fusion1) (v9)

Engine Version: 1.1.5.1  
 Firmware Version: 1.2.0696  
 Connection: RS232 COM1

Comment:

### Report Results

Sample Type: Clean							From Schedule Version 1
Pos	Analysis Type	Sample ID			Start Time		
• (clean)		Clean			2018/12/20 08:21		
Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	IC Clean	12.04	16.47	4.43	49.47	05:34	
2	TC Clean	8.60	11.29	2.69	49.71	07:15	
3	TC Clean	2.48	5.22	2.74	49.77	07:01	
4	TC Clean	1.83	4.57	2.75	49.73	07:03	

Sample Type: Sample							From Schedule Version 1	
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time		
• D	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 08:53		
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	13.50	16.00	2.50	49.87	12:34

Dilution

Blank Contribution

Method

Calibration

1:10 (TC) 17.0445 (IC) Extended Reaction Extended Reaction  
 (v1201) 021711 (v3) 021711 (v24)

Sample Type: Clean							From Schedule Version 1
Pos	Analysis Type	Sample ID			Start Time		
♦ (clean)		Clean			2018/12/20 09:09		
Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	IC Clean	10.06	13.45	3.39	49.37	07:59	
2	TC Clean	5.19	7.86	2.67	49.71	07:17	
3	TC Clean	3.04	5.66	2.63	49.76	07:01	
4	TC Clean	1.91	4.53	2.62	49.76	07:03	

Sample Type: Sample							From Schedule Version 1	
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time		
♦ D	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 09:43		
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	13.36	15.83	2.47	49.86	12:30
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>		
1:10		(TC) 17.0445 (IC) (v1201)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		

Sample Type: Clean							From Schedule Version 1
Pos	Analysis Type	Sample ID			Start Time		
♦ (clean)		Clean			2018/12/20 10:00		
Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	IC Clean	10.15	13.24	3.09	49.44	08:00	
2	TC Clean	4.75	7.44	2.69	49.80	07:17	
3	TC Clean	1.82	4.43	2.62	49.83	07:02	
4	TC Clean	1.43	4.08	2.65	49.84	07:02	

Sample Type: Sample							From Schedule Version 2
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time	

◆	D	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 10:34		
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	0.0000	0.0000	13.13	15.68	2.54	49.91	12:32	
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 17.0445 (IC) (v1201)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			

**Sample Type:** Blank (Creating v1202) From Schedule Version 3

Pos	Analysis Type	Sample ID	Start Time
◆ (blank)		Reagent/Acid Blank	2018/12/20 10:50

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	10.18	13.18	3.00	49.42	07:58
2	TC Clean	4.60	7.15	2.55	49.76	07:16
3	TC Clean	1.96	4.47	2.51	49.84	07:03
4	TC Clean	1.49	4.08	2.59	49.85	07:01
5	Reagent Blank	5.37	8.01	2.63	49.80	08:12
6	Acid Blank	1.31	3.85	2.54	49.49	05:40

**Sample Type:** Sample From Schedule Version 5

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆ D	TOC	RB	0.7100 ppm	0.0000 ppm	0.0000%	2018/12/20 11:40

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7100	7.1003	22.39	25.22	2.83	49.95	12:32

<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			

~~**Sample Type:** Check Standard -> CCV-021711~~ From Schedule Version

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆ B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	24.0779 ppm (PASS)	0.0000 ppm	0%	2018/12/20 11:56

<u>Base</u>									
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Pos	Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.0779	240.7790	202.52	205.21	2.70	49.94	12:32
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos B</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		50 ppmC		

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 5

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time	
◊	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/20 12:13
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	17.20	19.92	2.72	49.96	12:33
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos D</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		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%	2018/12/20 12:29	
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	16.53	19.20	2.67	49.98	12:30
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>		
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		

**Sample Type:** Check Standard --> LCS ER From Schedule Version 5

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time	
◊	2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity ( NA / NA )	20.6415 ppm (PASS)	0.0000 ppm	0%	2018/12/20 12:46
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
2	TOC	21.9 ppm	1	20.6415	206.4151	176.24	178.89	2.65	49.99	12:31
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos 2</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		21.9 ppmC		

Sample Type: Sample							From Schedule Version 5		
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
3	TOC	ICS	0.2428 ppm	0.0000 ppm	0.0000%	2018/12/20 13:02			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	0.2428	2.4278	18.82	21.60	2.78	50.00	12:33	
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
4	TOC	K1811658-004.01	3.8703 ppm	0.0531 ppm	1.3700%	2018/12/20 13:18			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	3.8327	38.3274	46.26	49.03	2.77	49.98	12:27	
2	TOC	3.9078	39.0782	46.84	49.59	2.76	50.00	12:25	
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
5	TOC	RB	0.0004 ppm	0.0006 ppm	141.4200%	2018/12/20 13:50			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	0.0008	0.0078	16.97	19.66	2.69	50.05	12:27	
2	TOC	0.0000	0.0000	15.66	18.25	2.59	50.03	12:27	
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
6	TOC	K1811888-002.01	2.7312 ppm	0.0057 ppm	0.2100%	2018/12/20 14:22			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	2.7352	27.3524	37.87	40.73	2.86	50.02	12:28	
2	TOC	2.7271	27.2713	37.81	40.62	2.81	50.08	12:24	
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
7	TOC	K1812001-001.01 10x	6.9117 ppm	0.0401 ppm	0.5800%	2018/12/20 14:54			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	



1	TOC	6.9401	69.4013	70.02	72.80	2.79	50.07	12:25
2	TOC	6.8834	68.8336	69.58	72.19	2.61	50.09	12:22

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
8	TOC	K1812001-001.01 ms 10x	31.6218 ppm	0.0000 ppm	0.0000%	2018/12/20 15:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	31.6218	316.2181	258.70	261.23	2.53	50.11	12:31

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
9	TOC	RB	0.1048 ppm	0.0000 ppm	0.0000%	2018/12/20 15:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1048	1.0477	17.76	20.50	2.74	50.11	12:31

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711 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 021711 [25 ppm]	0 / infinity (NA / NA)	24.0103 ppm (PASS)	0.0000 ppm	0%	2018/12/20 15:58

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.0103	240.1027	202.00	204.73	2.73	50.11	12:33

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)      **STD Conc - Pos B** 50 ppmC

~~**Sample Type:** Check Standard --> GCB 021711 From Schedule Version~~

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/20 16:14

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Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	17.00	19.74	2.75	50.14	12:31
<u>Completion State</u>		<u>Success Action</u>		<u>Method</u>		<u>Calibration</u>		<u>STD Conc - Pos D</u>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		0 ppmC		

<u>Sample Type: Sample</u>							From Schedule Version 5									
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time	Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
◊	10	TOC	K1811625-001.03 2x	4.0447 ppm	0.2857 ppm	7.0600%	2018/12/20 16:31	1	TOC	4.2468	42.4675	49.43	52.16	2.73	50.15	12:28
2	TOC	3.8427	38.4268	46.34	48.97	2.63	50.14	12:27								
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>										
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)										
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time										
◊	11	TOC	K1811625-001.03 ms 2x	29.1500 ppm	0.0000 ppm	0.0000%	2018/12/20 17:03	1	TOC	29.1500	291.5002	239.80	242.66	2.86	50.11	12:31
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>										
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)										
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time										
◊	12	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 17:19	1	TOC	0.0000	0.0000	14.64	17.28	2.63	50.16	12:29
2	TOC	0.0000	0.0000	14.52	17.37	2.85	50.16	12:26								
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>										
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)										
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time										
◊	13	TOC	K1811625-003.03	4.3494 ppm	0.1702 ppm	3.9100%	2018/12/20 17:51	1	TOC	4.4698	44.6978	51.13	53.85	2.72	50.20	12:30
2	TOC	4.2291	42.2909	49.29	51.80	2.51	50.15	12:23								

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
14	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 18:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	13.47	16.22	2.75	50.18	12:22
2	TOC	0.0000	0.0000	14.66	17.23	2.57	50.14	12:27

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
15	TOC	K1811728-001	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 18:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.67	17.32	2.65	50.14	12:26
2	TOC	0.0000	0.0000	14.89	17.48	2.58	50.12	12:26

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
16	TOC	K1811728-002	0.3981 ppm	0.5629 ppm	141.4200%	2018/12/20 19:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.71	17.40	2.68	50.14	12:27
2	TOC	0.7961	7.9611	23.05	25.78	2.73	50.12	12:27

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
17	TOC	K1811789-002.08	0.3032 ppm	0.1364 ppm	44.9900%	2018/12/20 19:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5064	5.0636	20.83	23.42	2.59	50.08	12:28
2	TOC	0.2565	2.5651	18.92	21.63	2.71	50.14	12:25
3	TOC	0.2160	2.1596	18.61	21.36	2.75	50.13	12:2
4	TOC	0.2341	2.3415	18.75	21.38	2.63	50.14	12:26

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Analysis	Std. Dev.

Pos	Type	Sample ID	Result (ppmC)	(ppmC)	RSD	Start Time
18	TOC	K1811789-002.08 ms	25.2126 ppm	0.0000 ppm	0.0000%	2018/12/20 21:01

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	25.2126	252.1263	209.70	212.25	2.55	50.12	12:30

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
19	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 21:17

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	16.94	19.63	2.68	50.10	12:31

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711      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 021711 [25 ppm]	0 / infinity (NA / NA)	24.0674 ppm (PASS)	0.0000 ppm	0%	2018/12/20 21:33

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.0674	240.6743	202.44	205.01	2.58	50.10	12:33

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)      **STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711      From Schedule Version 5

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/20 21:50

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	16.32	19.03	2.72	50.15	12:30

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)      **STD Conc - Pos D** 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%	2018/12/20 22:06				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	0.0000	0.0000	15.21	17.97	2.76	50.11	12:33		
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>				
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)				

Sample Type: Check Standard --> LCS ER										From Schedule Version 5	
Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time		
2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity (NA / NA)	20.6186 ppm (PASS)	0.0000 ppm	0%	2018/12/20 22:23		
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time	
2	TOC	21.9 ppm	1	20.6186	206.1862	176.07	178.69	2.62	50.07	12:31	
<u>Completion State</u>		<u>Success Action</u>		<u>Method</u>		<u>Calibration</u>		<u>STD Conc - Pos 2</u>			
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		21.9 ppmC			

Sample Type: Sample							From Schedule Version 5			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time				
21	TOC	K1811789-003.08	0.6115 ppm	0.0957 ppm	15.6500%	2018/12/20 22:39				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	0.7447	7.4470	22.65	25.41	2.75	50.03	12:29		
2	TOC	0.6046	6.0460	21.58	24.25	2.67	49.99	12:26		
3	TOC	0.5775	5.7752	21.38	23.89	2.51	49.91	12:24		
4	TOC	0.5192	5.1918	20.93	23.51	2.58	49.93	12:23		
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>				
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)				
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time				
22	TOC	K1811789-004.08	0.3582 ppm	0.4373 ppm	122.0700%	2018/12/20 23:42				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	0.1593	1.5932	18.18	20.90	2.72	49.89	12:24		

2	TOC	1.0099	10.0985	24.68	27.32	2.64	49.87	12:26
3	TOC	0.1908	1.9085	18.42	21.15	2.73	49.87	12:26
4	TOC	0.0729	0.7286	17.52	20.19	2.67	49.84	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
23	TOC	K1811789-005.08	0.6339 ppm	0.0893 ppm	14.0800%	2018/12/21 00:45

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7650	7.6497	22.81	25.45	2.65	49.83	12:24
2	TOC	0.5847	5.8472	21.43	24.13	2.70	49.81	12:25
3	TOC	0.5711	5.7111	21.33	24.07	2.74	49.79	12:24
4	TOC	0.6149	6.1493	21.66	24.35	2.68	49.78	12:25

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
24	TOC	K1811789-006.08	0.5329 ppm	0.0218 ppm	4.1000%	2018/12/21 01:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5515	5.5149	21.18	23.88	2.70	49.78	12:27
2	TOC	0.5332	5.3318	21.04	23.57	2.54	49.78	12:26
3	TOC	0.5022	5.0218	20.80	23.44	2.64	49.72	12:25
4	TOC	0.5447	5.4469	21.12	23.86	2.73	49.78	12:25

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
25	TOC	K1811789-008.08	0.2970 ppm	0.0830 ppm	27.9500%	2018/12/21 02:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3918	3.9177	19.96	22.52	2.56	49.74	12:28
2	TOC	0.3350	3.3500	19.52	22.21	2.69	49.74	12:24
3	TOC	0.2038	2.0380	18.52	21.29	2.77	49.72	12:27
4	TOC	0.2574	2.5743	18.93	21.62	2.69	49.72	12:24

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
26	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 03:54

Rep	Base	Adjusted	Baseline	Pressure	Run
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#	Analysis Type	ppm	µg	(Abs)	NDIR (Abs)	(Abs)	(psig)	Time
1	TOC	0.0000	0.0000	15.47	17.90	2.42	49.72	12:24
2	TOC	0.0000	0.0000	14.64	17.20	2.56	49.73	12:23

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
27	TOC	K1811849-001.04	1.2435 ppm	0.0105 ppm	0.8400%	2018/12/21 04:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.2362	12.3615	26.41	29.06	2.65	49.71	12:22
2	TOC	1.2509	12.5093	26.52	29.16	2.63	49.71	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
28	TOC	K1811849-001.04 ms	25.4293 ppm	0.0000 ppm	0.0000%	2018/12/21 04:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	25.4293	254.2925	211.36	213.95	2.59	49.70	12:30

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711 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 021711 [25 ppm]	0 / infinity (NA / NA)	24.2565 ppm (PASS)	0.0000 ppm	0%	2018/12/21 05:13

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.2565	242.5645	203.88	206.62	2.74	49.66	12:31

**Completion State** Success - Criteria met.  
**Success Action** Do Nothing  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)  
**STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 5

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/21 05:30

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	16.31	19.10	2.80	49.66	12:27

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)	<b>STD Conc - Pos D</b> 0 ppmC
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Sample Type: Sample

From Schedule Version 5

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
29	TOC	K1811849-002.04 4x	8.1359 ppm	0.1209 ppm	1.4900%	2018/12/21 05:46

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	8.2214	82.2142	79.81	82.70	2.89	49.69	12:23
2	TOC	8.0505	80.5045	78.50	81.19	2.69	49.68	12:24

<b>Dilution</b> 1:10	<b>Blank Contribution</b> (TC) 16.9610 (IC) (v1202)	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)
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Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
30	TOC	K1811849-003.04 4x	7.6636 ppm	0.1108 ppm	1.4500%	2018/12/21 06:18

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.7420	77.4200	76.15	78.89	2.75	49.68	12:26
2	TOC	7.5853	75.8529	74.95	77.63	2.68	49.71	12:23

<b>Dilution</b> 1:10	<b>Blank Contribution</b> (TC) 16.9610 (IC) (v1202)	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)
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Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
31	TOC	K1811849-004.04	0.9762 ppm	0.1639 ppm	16.7900%	2018/12/21 06:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0921	10.9213	25.31	27.99	2.68	49.67	12:28
2	TOC	0.8603	8.6033	23.54	26.17	2.64	49.67	12:29

<b>Dilution</b> 1:10	<b>Blank Contribution</b> (TC) 16.9610 (IC) (v1202)	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)
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Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
32	TOC	K1811849-005.04	5.2512 ppm	0.1272 ppm	2.4200%	2018/12/21 07:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.3411	53.4111	57.79	60.40	2.61	49.69	12:24
2	TOC	5.1612	51.6125	56.42	59.23	2.82	49.71	12:24



**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
33	TOC	RB	0.3241 ppm	0.4583 ppm	141.4200%	2018/12/21 07:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	16.09	18.66	2.57	49.67	12:29
2	TOC	0.6482	6.4816	21.92	24.59	2.67	49.61	12:27

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
34	TOC	K1811831-002.01	6.3814 ppm	0.5082 ppm	7.9600%	2018/12/21 08:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.7408	67.4078	68.49	71.00	2.51	49.71	12:27
2	TOC	6.0221	60.2211	63.00	65.39	2.40	49.90	12:28

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Sample

From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
35	TOC	K1811831-002.01 ms	31.0037 ppm	0.0000 ppm	0.0000%	2018/12/21 08:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	31.0037	310.0373	253.97	256.56	2.59	49.92	12:31

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Sample

From Schedule Version 7

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
36	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 09:13

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	13.45	16.02	2.57	49.95	12:24
2	TOC	0.0000	0.0000	13.80	16.48	2.67	49.92	12:23

**Dilution**      **Blank Contribution**      **Method**      **Calibration**

1:10 (TC) 16.9610 (IC) Extended Reaction 021711 (v3) Extended Reaction 021711 (v24)

**Sample Type:** Sample From Schedule Version 8

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
37	TOC	K1812101-001.02	16.0372 ppm	0.0155 ppm	0.1000%	2018/12/21 09:45

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	16.0482	160.4819	139.64	142.30	2.66	49.93	12:27
2	TOC	16.0262	160.2622	139.48	142.17	2.69	49.89	12:27

**Dilution** 1:10 **Blank Contribution** (TC) 16.9610 (IC) (v1202) **Method** Extended Reaction 021711 (v3) **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
38	TOC	K1812101-001.02 ms	40.7000 ppm	0.0000 ppm	0.0000%	2018/12/21 10:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	40.7000	407.0004	328.10	330.64	2.54	49.86	12:31

**Dilution** 1:10 **Blank Contribution** (TC) 16.9610 (IC) (v1202) **Method** Extended Reaction 021711 (v3) **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	24.0495 ppm (PASS)	0.0000 ppm	0%	2018/12/21 10:33

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.0495	240.4951	202.30	204.97	2.67	49.86	12:30

**Completion State** Success - Criteria met. **Success Action** Do Nothing **Method** Extended Reaction 021711 (v3) **Calibration** Extended Reaction 021711 (v24) **STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB-021711 From Schedule Version

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/21 10:49

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	15.93	18.55	2.62	49.84	12:29
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos D</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		0 ppmC		

**Sample Type:** Sample From Schedule Version 9

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time		
39	TOC	MB3	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 11:06		
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.88	17.48	2.60	50.04	12:31
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>		
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		

**Sample Type:** Check Standard --> LCS ER From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time	
2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity (NA / NA)	20.2644 ppm (PASS)	0.0000 ppm	0%	2018/12/21 11:22	
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
2	TOC	21.9 ppm	1	20.2644	202.6439	173.36	175.92	2.56	49.99	12:35
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos 2</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		21.9 ppmC		

**Sample Type:** Sample From Schedule Version 9

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time		
40	TOC	K1812154-001.01 50x	0.0965 ppm	0.1365 ppm	141.4200%	2018/12/21 11:39		
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1931	1.9307	18.44	21.05	2.61	49.95	12:28
2	TOC	0.0000	0.0000	16.89	19.63	2.74	49.95	12:27
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>		
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
41	TOC	K1812154-001.01 ms 50x	24.3267 ppm	0.0000 ppm	0.0000%	2018/12/21 12:11

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	24.3267	243.2665	202.93	205.49	2.56	49.93	12:33

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
42	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 12:27

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.90	17.47	2.57	49.92	12:27
2	TOC	0.0000	0.0000	13.95	16.42	2.47	49.95	12:21

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
43	TOC	K1812154-002.01	1.5973 ppm	0.1048 ppm	6.5600%	2018/12/21 12:59

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.6714	16.7136	29.74	32.52	2.78	49.93	12:27
2	TOC	1.5232	15.2315	28.60	31.41	2.81	49.97	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
44	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 13:31

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.83	17.44	2.61	49.98	12:26
2	TOC	0.0000	0.0000	13.52	16.27	2.75	49.99	12:25

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
45	TOC	K1812154-003.01	2.1735 ppm	0.0087 ppm	0.4000%	2018/12/21 14:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.1674	21.6739	33.53	36.21	2.68	49.99	12:27

2	TOC	2.1797	21.7969	33.62	36.23	2.60	49.96	12:25
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**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
46	TOC	K1812154-004.01 50x	17.5683 ppm	0.0074 ppm	0.0400%	2018/12/21 14:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	17.5736	175.7357	151.30	154.08	2.77	50.00	12:27
2	TOC	17.5631	175.6311	151.22	153.86	2.64	49.96	12:28

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
47	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 15:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	15.33	17.92	2.59	49.96	12:28
2	TOC	0.0000	0.0000	13.94	16.74	2.80	49.99	12:26

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	23.7161 ppm (PASS)	0.0000 ppm	0%	2018/12/21 15:37

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.7161	237.1608	199.75	202.36	2.62	50.01	12:29

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)      **STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/21 15:54

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	15.45	17.92	2.47	50.01	12:30
<u>Completion State</u>		<u>Success Action</u>		<u>Method</u>		<u>Calibration</u>		<u>STD Conc - Pos D</u>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		0 ppmC		

<u>Sample Type</u> : Sample							From Schedule Version 9								
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time	Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
48	TOC	K1812154-005.01.20x	0.0816 ppm	0.1112 ppm	136.2200%	2018/12/21 16:10	1	TOC	0.1602	1.6024	18.19	20.63	2.44	50.06	12:26
							2	TOC	0.0030	0.0300	16.98	19.62	2.63	50.02	12:25
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>									
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)									
49	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 16:42	1	TOC	0.0000	0.0000	14.08	16.76	2.68	50.06	12:24
							2	TOC	0.0000	0.0000	13.43	15.97	2.54	50.07	12:31
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>									
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)									
50	TOC	K1811928-001.01	0.0564 ppm	0.0642 ppm	113.8700%	2018/12/21 17:14	1	TOC	0.1018	1.0177	17.74	20.38	2.64	50.07	12:24
							2	TOC	0.0110	0.1098	17.05	19.66	2.62	50.06	12:25
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>									
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)									
51	TOC	K1811928-001.01 ms	24.4826 ppm	0.0000 ppm	0.0000%	2018/12/21 17:46	1	TOC	24.4826	244.8258	204.12	206.67	2.55	50.07	12:34

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
52	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 18:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	15.50	18.26	2.75	50.01	12:34

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
53	TOC	K1812278-001.01 50x	13.6190 ppm	0.1234 ppm	0.9100%	2018/12/21 18:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	13.7063	137.0630	121.74	124.53	2.79	49.97	12:26
2	TOC	13.5318	135.3180	120.41	123.06	2.65	49.99	12:25

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
54	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 18:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.98	17.57	2.59	50.00	12:29
2	TOC	0.0000	0.0000	14.14	16.73	2.59	49.98	12:24

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
55	TOC	K1812278-001.01 ms 50x	38.1173 ppm	0.0000 ppm	0.0000%	2018/12/21 19:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	38.1173	381.1732	308.36	311.11	2.76	50.03	12:33

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
56	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 19:38

Rep	Base	ppm	µg	Adjusted	NDIR (Abs)	Baseline	Pressure	Run
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#	Analysis Type			(Abs)		(Abs)	(psig)	Time
1	TOC	0.0000	0.0000	15.38	18.03	2.65	50.12	12:21
2	TOC	0.0000	0.0000	13.18	15.90	2.72	50.12	12:29
3	TOC	0.0000	0.0000	13.10	15.85	2.75	50.11	12:25
4	TOC	0.0000	0.0000	13.37	15.90	2.53	50.14	12:23

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 16.9610 (IC) (v1202)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
57	TOC	K1812278-003.02 4x	1.1389 ppm	0.0119 ppm	1.0500%	2018/12/21 20:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.1305	11.3046	25.60	28.30	2.69	50.14	12:28
2	TOC	1.1473	11.4733	25.73	28.49	2.76	50.17	12:27

Dilution	Blank Contribution	Method	Calibration
1:10	(TC) 16.9610 (IC) (v1202)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity ( NA / NA )	23.5524 ppm (PASS)	0.0000 ppm	0%	2018/12/21 21:13

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.5524	235.5243	198.50	201.17	2.67	50.15	12:31

Completion State	Success Action	Method	Calibration	STD Conc - Pos B
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)	50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/21 21:29

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	16.23	18.82	2.59	50.15	12:30

Completion State	Success Action	Method	Calibration	STD Conc - Pos D
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)	0 ppmC



Sample Type: Sample							From Schedule Version 9			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time				
58	TOC	MB4	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 21:46				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	0.0000	0.0000	14.51	17.24	2.74	50.15	12:29		
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>				
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)				

Sample Type: Check Standard --> LCS ER										From Schedule Version 9	
Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time		
2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity (NA / NA)	19.2260 ppm (PASS)	0.0000 ppm	0%	2018/12/21 22:02		
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time	
2	TOC	21.9 ppm	1	19.2260	192.2601	165.42	168.09	2.66	50.13	12:33	
<u>Completion State</u>		<u>Success Action</u>		<u>Method</u>		<u>Calibration</u>		<u>STD Conc - Pos 2</u>			
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		21.9 ppmC			

Sample Type: Sample							From Schedule Version 9			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time				
59	TOC	K1812278-002.01 50x	13.8400 ppm	0.2571 ppm	1.8600%	2018/12/21 22:19				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	14.0218	140.2181	124.15	126.95	2.79	50.10	12:23		
2	TOC	13.6582	136.5816	121.37	124.17	2.79	50.13	12:22		
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>				
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)				
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time				
60	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 22:50				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	0.0000	0.0000	14.44	17.22	2.77	50.12	12:27		
2	TOC	0.0000	0.0000	13.12	15.76	2.64	50.12	12:27		
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>				

1:10 (TC) 16.9610 (IC) Extended Reaction Extended Reaction  
(v1202) 021711 (v3) 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
61	TOC	K1812279-001.02	24.8410 ppm	0.1722 ppm	0.6900%	2018/12/21 23:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	24.7192	247.1921	205.93	208.61	2.68	50.12	12:24
2	TOC	24.9628	249.6278	207.79	210.56	2.77	50.10	12:27

Dilution 1:10 Blank Contribution (TC) 16.9610 (IC) (v1202) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
62	TOC	K1812279-001.02 ms	48.6019 ppm	0.0000 ppm	0.0000%	2018/12/21 23:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	48.6019	486.0190	388.51	391.29	2.78	50.13	12:29

Dilution 1:10 Blank Contribution (TC) 16.9610 (IC) (v1202) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
63	TOC	RB	0.3638 ppm	0.5145 ppm	141.4200%	2018/12/22 00:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7276	7.2756	22.52	25.36	2.84	50.13	12:25
2	TOC	0.0000	0.0000	16.69	19.45	2.76	50.14	12:24

Dilution 1:10 Blank Contribution (TC) 16.9610 (IC) (v1202) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
64	TOC	K1812272-001.01 4x	10.5041 ppm	0.0528 ppm	0.5000%	2018/12/22 00:42

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	10.5415	105.4147	97.55	100.17	2.62	50.14	12:27
2	TOC	10.4668	104.6678	96.98	99.78	2.81	50.13	12:26

Dilution 1:10 Blank Contribution (TC) 16.9610 (IC) (v1202) Method Extended Reaction 021711 (v3) Calibration Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
65	TOC	K1812272-001.01 ms 4x	36.0064 ppm	0.0000 ppm	0.0000%	2018/12/22 01:14

Rep	Base	Adjusted	Baseline	Pressure	Run
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#	Analysis Type	ppm	µg	(Abs)	NDIR (Abs)	(Abs)	(psig)	Time
1	TOC	36.0064	360.0644	292.22	294.86	2.64	50.13	12:31
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>		
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time		
66	TOC	RB	0.0221 ppm	0.0441 ppm	200.0000%	2018/12/22 01:30		
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0883	0.8829	17.64	20.45	2.81	50.10	12:26
2	TOC	0.0000	0.0000	15.76	18.39	2.63	50.11	12:26
3	TOC	0.0000	0.0000	14.56	17.38	2.82	50.12	12:26
4	TOC	0.0000	0.0000	14.00	16.68	2.68	50.13	12:23
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>		
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time	
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity ( NA / NA )	23.6288 ppm (PASS)	0.0000 ppm	0%	2018/12/22 02:33	
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.6288	236.2883	199.08	201.57	2.49	50.12	12:30
<u>Completion State</u>		<u>Success Action</u>		<u>Method</u>		<u>Calibration</u>		<u>STD Conc - Pos B</u>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		50 ppmC		

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time	
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/22 02:49	
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	15.09	17.75	2.66	50.13	12:30
<u>Completion State</u>		<u>Success Action</u>		<u>Method</u>		<u>Calibration</u>		<u>STD Conc - Pos D</u>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		0 ppmC		

Sample Type: Sample							From Schedule Version 9		
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
67	TOC	K1812272-002.01 100x	3.8476 ppm	0.0975 ppm	2.5300%	2018/12/22 03:06			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	3.9166	39.1659	46.90	49.50	2.60	50.12	12:28	
2	TOC	3.7787	37.7871	45.85	48.70	2.85	50.12	12:24	
Dilution		Blank Contribution		Method		Calibration			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
68	TOC	K1812272-003.01	3.9636 ppm	0.0156 ppm	0.3900%	2018/12/22 03:38			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	3.9747	39.7467	47.35	50.10	2.76	50.12	12:26	
2	TOC	3.9526	39.5256	47.18	49.88	2.70	50.11	12:27	
Dilution		Blank Contribution		Method		Calibration			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
69	TOC	K1812272-004.01	4.0087 ppm	0.0333 ppm	0.8300%	2018/12/22 04:09			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	4.0322	40.3222	47.79	50.48	2.69	50.10	12:29	
2	TOC	3.9851	39.8513	47.43	50.17	2.74	50.12	12:24	
Dilution		Blank Contribution		Method		Calibration			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
70	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/22 04:41			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	0.0000	0.0000	15.38	18.09	2.72	50.15	12:28	
2	TOC	0.0000	0.0000	14.56	17.22	2.66	50.14	12:23	
Dilution		Blank Contribution		Method		Calibration			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
71	TOC	K1811745-001.09	1.9426 ppm	0.5604 ppm	28.8500%	2018/12/22 05:13			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	

1	TOC	1.5463	15.4630	28.78	31.48	2.70	50.17	12:27
2	TOC	2.3389	23.3888	34.84	37.63	2.79	50.13	12:24

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
* 72	TOC	K1811745-001.09 ms	25.9104 ppm	0.3760 ppm	1.4500%	2018/12/22 05:45

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	26.1763	261.7631	217.07	219.81	2.74	50.12	12:24
2	TOC	25.6446	256.4457	213.00	215.81	2.81	50.13	12:25

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
* 73	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/22 06:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	15.93	18.61	2.68	50.12	12:23
2	TOC	0.0000	0.0000	14.21	17.02	2.81	50.10	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
* 74	TOC	K1811747-001.09	4.7084 ppm	0.0027 ppm	0.0600%	2018/12/22 06:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.7103	47.1034	52.97	55.91	2.94	50.11	12:24
2	TOC	4.7065	47.0655	52.94	55.63	2.69	50.12	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
* 75	TOC	K1811747-001.09 ms	29.2991 ppm	0.0000 ppm	0.0000%	2018/12/22 07:20

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	29.2991	292.9914	240.94	243.69	2.75	50.09	12:34

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711

From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity ( NA / NA )	23.8618 ppm (PASS)	0.0000 ppm	0%	2018/12/22 07:36

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.8618	238.6180	200.86	203.53	2.67	50.09	12:33

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)	<b>STD Conc - Pos B</b> 50 ppmC
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**Sample Type:** Check Standard --> CCB 021711

From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/22 07:53

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	14.88	17.69	2.81	50.09	12:31

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)	<b>STD Conc - Pos D</b> 0 ppmC
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**Sample Type:** Sample

From Schedule Version 9

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◊ 1	TOC	K1812416-035.01 doc	1.3602 ppm	0.1716 ppm	12.6100%	2018/12/22 08:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.2389	12.3890	26.43	29.31	2.88	50.08	12:27
2	TOC	1.4816	14.8155	28.29	31.38	3.09	50.10	12:29

<b>Dilution</b> 1:10	<b>Blank Contribution</b> (TC) 16.9610 (IC) (v1202)	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)
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Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◊ 3	TOC	K1812416-035.01 ms doc	24.3251 ppm	0.0000 ppm	0.0000%	2018/12/22 08:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	24.3251	243.2508	202.92	205.83	2.92	50.10	12:30

<b>Dilution</b> 1:10	<b>Blank Contribution</b> (TC) 16.9610 (IC) (v1202)	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)
-------------------------	---	---	---

Sample Type: Check Standard --&gt; CCV 021711

From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity ( NA / NA )	23.9324 ppm (PASS)	0.0000 ppm	0%	2018/12/22 08:58

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.9324	239.3244	201.40	204.23	2.82	50.11	12:31

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)	<b>STD Conc - Pos B</b> 50 ppmC
--	-------------------------------------	---	---	------------------------------------

Sample Type: Check Standard --&gt; CCB 021711

From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/22 09:14

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	16.24	18.97	2.73	50.12	12:31

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)	<b>STD Conc - Pos D</b> 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
v1201	2.2080	1.6200	0.0000	0.0000	0.0000	2018/12/17 20:18	Fusion1 (Fusion1)
v1202	1.7907	1.3090	0.0000	0.0000	0.0000	2018/12/20 11:40	Fusion1 (Fusion1)

#### Calibrations

**Name: Extended Reaction 021711 (TOC)**

Version: v24 Calibration curve formula: TOC:  $y = 7.645x + 18.448$   
 Ver Creation: 2018/11/26 18:53  $r^2$  value: TOC:  $r^2 = 0.99984$   
 Comment:  
 Operator: Fusion1 (Fusion1)  
 Basic Analysis Type: TOC

**Basic Analysis Type: TOC**

Sample ID	Y Raw Value	X Expected	Message	End Time
0.0 ppm	19.1720	0.0000		2018/11/26 17:15
0.50 ppm	23.8410	0.5000		2018/11/26 17:31
1.00 ppm	25.1300	1.0000		2018/11/26 17:47
5.00 ppm	53.5500	5.0000		2018/11/26 18:03
10.0 ppm	95.3860	10.0000		2018/11/26 18:20
25.0 ppm	211.7220	25.0000		2018/11/26 18:36
50.0 ppm	399.8190	50.0000		2018/11/26 18:52

**Methods****Name: Extended Reaction 021711 (TOC)**

Version: v3 Operator: Gen Chem Lab (Fusion1)  
 Ver Creation: 2013/02/04 11:44  
 Comment:

Parameter	Value	Advanced Parameter	Value
SampleVolume	10.0 mL	NeedleRinseVolume	5.0 ml
Dilution	1:10	VialPrimeVolume	2.0 ml
AcidVolume	0.5 ml	ICSamplePrimeVolume	2.0 ml
ReagentVolume	2.0 ml	ICSpurgeRinseVolume	12.0 ml
UVReactorPrerinse	Off	BaselineStabilizeTime	0.70 min
UVReactorPrerinseVolume	5.0	DetectorPressureFlow	150 ml/min
NumberOfUVReactorPrerinses	1	SyringeSpeedWaste	10
ICSpurgeTime	1.00 mins	SyringeSpeedAcid	7
DetectorSweepFlow	500 ml/min	SyringeSpeedReagent	7
PreSpurgeTime	4.00 mins	SyringeSpeedDIWater	7
SystemFlow	500 ml/min	NDIRPressurization	60 psig
		SyringeSpeedSampleDispense	5
		SyringeSpeedSampleAspirate	4
		SyringeSpeedUVDispense	7
		SyringeSpeedUVAspirate	5
		SyringeSpeedICDispense	7
		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
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**Report History**

**Report History**

Report Version	User Name	System Reason	User Reason	Date
1	Fusion1 (Fusion1)	Schedule completed	Schedule completed	2018/12/22 09:34



## Case Narrative

**Method:** 6850

**Analysis:** Perchlorate

**Analysis SOP:** LC-MS-CLO4

**ALS WO ID(s):** 1834583; 1834584; 1834586;  
1834591; 1834871

**Client:** ALS Laboratories (Houston, TX)

**Matrix:** Water

**ELMS Batch (HBN):** 2187 (229705)

**General Set Information:** There were fourteen 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  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** Field samples 1834584001/1834591003 were analyzed and reported from 1:1,000 dilutions. Field samples 1834591006/07 were analyzed and reported from 1:10 dilutions. Field samples 1834591008-10 were analyzed and reported from 1:100 dilutions. The reporting limits have been adjusted accordingly.

**Method QC data:** The method blank (LMB 633241) was less than 1/2 the CRDL. The recovery for the LCS (633242) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on sample 1834583001 (Client ID: LH18/24-SP650\_120618\_BIX). 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 Matrix Spike (MS – 633243) failed QC acceptance criteria for percent recovery, biased high. This is due to the fact that the unspiked sample result of 2.028µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected. The relative percent difference (RPD) 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  $(A) \times (B)$ ,

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.

Thomas Bosch                      December 21, 2018  
Analyst    Date



## ANALYTICAL REPORT

Report Date: December 21, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1834586**

Project ID: HS18120380

Purchase Order: HS18120380

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_120618_BIX	1834586001	12/06/18	12/11/18	



## ANALYTICAL REPORT

Workorder: 34-1834586

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP650_120618_BIX</b>	Sampling Site: NA	Collected: 12/06/2018				
Lab ID: 1834586001	Media: 125 mL Nalgene	Received: 12/11/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2187 (HBN: 229705) Analyzed: 12/19/2018 10:32	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
Perchlorate	2.2	1.0	2.0	4.0	1	J

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

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 12/20/2018 13:51	/S/ Stephen Brose 12/21/2018 13:13

## Laboratory Contact Information

ALS Environmental  
960 W Levoy Drive  
Salt Lake City, Utah 84123Phone: (801) 266-7700  
Email: als@alst.com  
Web: www.alst.com



## ANALYTICAL REPORT

Workorder: 34-1834586

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

**General Lab Comments**

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

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

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

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

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

**Result Symbol Definitions**

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

**Qualifier Symbol Definitions**

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



# Quality Control Sample Batch Report

00922444

## Analysis Information

**Workorder:** 1834586

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2187 (HBN: 229705)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 633241 <b>Analyzed:</b> 12/19/2018 09:08 <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 633242 <b>Analyzed:</b> 12/19/2018 09:22 <b>Dilution:</b> 1 <b>Units:</b> ug/L				
Analyte	Result	Target	% Rec	QC Limits
Perchlorate	4.68	5.00	93.6	78.8   123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1834583001 <b>Analyzed:</b> 12/19/2018 09:37 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MS:</b> 633243 <b>Analyzed:</b> 12/19/2018 09:50 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MSD:</b> 633244 <b>Analyzed:</b> 12/19/2018 10:04 <b>Dilution:</b> 1 <b>Units:</b> ug/L			
Analyte	Result	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Perchlorate	2.00	6.21	5 #	124	78.8   123.8	6.16	123	0.884	0.0   20.0

## Continuing Calibration Verification

<b>CCV:</b> 633238 <b>Analyzed:</b> 12/19/2018 08:25 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 633245 <b>Analyzed:</b> 12/19/2018 11:54 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 633247 <b>Analyzed:</b> 12/19/2018 14:26 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	25.5	25.0	102	26.1	25.0	104	26.2	25.0	105

## Interference Check Sample

<b>ICSA:</b> 633240 <b>Analyzed:</b> 12/19/2018 08:54 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	1.08	1.00	108

## Limit of Detection Verification

<b>LODV:</b> 633239 <b>Analyzed:</b> 12/19/2018 08:40 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 633246 <b>Analyzed:</b> 12/19/2018 12:08 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 633248 <b>Analyzed:</b> 12/19/2018 14:40 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.08	1.00	108	1.07	1.00	107	1.06	1.00	106



# Quality Control Sample Batch Report

00922445

## Analysis Information

**Workorder:** 1834586

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2187 (HBN: 229705)

**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 12/20/2018 13:51	/S/ Stephen Brose 12/21/2018 13:13

## Symbols and Definitions

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

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





18098/2

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



**Chain of Custody**

**COC ID: 10387**

1834586

**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:** HS18120380  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18120380-02	LH18/24-SP650_120618_BIX	Water	06 Dec 2018 14:00
SUB_Perch-6850			26 Dec 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: \_\_\_\_\_

Received By: *Jumoke M. Lawal*

Cooler ID(s): \_\_\_\_\_

Date/Time: 12/10/18 1800.

Date/Time: 12/11/18 8:45

Temperature(s): \_\_\_\_\_

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

**COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)**

1834584

Client Name: ALS Houston Project/Task/Site: \_\_\_\_\_  
 Date/Time of Receipt: 12-11-18 8:45 Number of Coolers Received: 1

Condition of Coolers: <u>Acceptable</u> /Unacceptable	Temperature Control: <u>Present</u> /Not Included
Cooler Custody Seals: <u>Present</u> /Absent/NA	Location Temp Taken: <u>Control</u> /Between Samples
Container Custody Seals: <u>Present</u> /Absent/NA	Are all temperatures within project specific guidelines? Yes/No/NA
Ice Present: <u>Yes</u> /No/NA	VOA Headspace Present? Yes/No/NA
pH Check Performed: Metals Yes/No/NA Cyanide Yes/No/NA Sulfide Yes/No/NA Ammonia Yes/No/NA	Total Phenolics Yes/No/NA TPH - 418.1 Yes/No/NA COD Yes/No/NA TKN Yes/No/NA
	NO3/NO2 Yes/No/NA Oil & Grease Yes/No/NA Total Phosphorous Yes/No/NA Gross A.B, Gamma Spec Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 9018	1 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Tammara Russell Signature Tammara Russell Printed Name 12-11-18 Date

**CLIENT-RELATED INFORMATION**

<input type="checkbox"/> Missing Cooler	<input type="checkbox"/> Missing Samples/Bottles	<input type="checkbox"/> Incorrect Preservation	<input type="checkbox"/> Insufficient Sample Volume
<input type="checkbox"/> Cooler Conditions	<input type="checkbox"/> Broken/Leaking Samples	<input type="checkbox"/> pH Criteria Not Met	<input type="checkbox"/> Chain of Custody Problems
<input type="checkbox"/> Missing Paperwork	<input type="checkbox"/> Incorrect Bottle Type	<input type="checkbox"/> Residual Chlorine Present	<input type="checkbox"/> Other:
<input type="checkbox"/> Missing/Incorrect Bottle Labels	<input type="checkbox"/> Cooler Temperatures Out of Range	<input type="checkbox"/> 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: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature



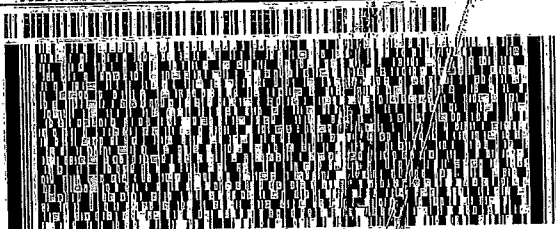
ORIGIN ID: 99RA (281) 530-5656  
SHIPPING DEPT  
ALS LABORATORY GROUP  
10450 STANCLIFF RD  
SUITE 210  
HOUSTON, TX 77099  
UNITED STATES US

SHIP DATE: 10DEC18  
ACTWT: 24.65 LB  
CAD: 300130/SAFE3211  
DIMS: 19x16x13 IN  
BILL THIRD PARTY

TO **SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
960 W. LEVOY DRIVE**

**SALT LAKE CITY UT 84123**

(801) 266-7700  
REF: HS18120375/79/80/98/437 - L/DW



**FedEx  
Express**



551C1/P/FE/104C

TRK# 4380 9535 4481  
0201

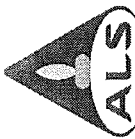
**TUE - 11 DEC 3:00P  
STANDARD OVERNIGHT**

**AX BTFA**

**84123  
UT-US SLC**







# Batch Worklist

HBN: 229705

Instrument:

Created: 12/18/2018 15:40



Status: WP

Analyst: T. Bosch

Batch: ELMS/ 2187  
 Rule: EPA 6850, DoD QSM Water

- Workorder: 1834583 [ENV\_LVL4]
- Workorder: 1834584 [ENV\_LVL4]
- Workorder: 1834586 [ENV\_LVL4]
- Workorder: 1834591 [ENV\_LVL4]
- Workorder: 1834871 [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	633238	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
2	633239	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	
3	633240	ICS for HBN 229705 [ELMS/2187]				ICS	3		E6850..D3Q	5311		12/26/2018	
4	633241	LMB for HBN 229705 [ELMS/2187]				LMB	3		E6850Q413Q	5311		12/26/2018	
5	633242	LCS for HBN 229705 [ELMS/2187]				LCS	3		E6850Q413Q	5311		12/26/2018	
6	1834583001	LH18/24-SP650_120618_BIX				SAMPLE	3	1834583001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
7	633243	LH18/24-SP650...(1834583001MS)				MS	3		E6850Q413Q	5311		12/26/2018	
8	633244	LH18/24-SP65..(1834583001MSD)				MSD	3		E6850Q413Q	5311		12/26/2018	
9	1834584001	LH18/24-SP140_120618				SAMPLE	3	1834584001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
10	1834586001	LH18/24-SP650_120618_BIX				SAMPLE	3	1834586001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
11	1834591001	MW-25-12062018				SAMPLE	3	1834591001-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
12	1834591002	MW-28-12062018				SAMPLE	3	1834591002-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
13	1834591003	MW-26-12062018				SAMPLE	3	1834591003-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
14	1834591004	MW-20-12062018				SAMPLE	3	1834591004-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
15	1834591005	MW-5-12062018				SAMPLE	3	1834591005-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
16	633245	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
17	633246	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	
18	1834591006	MW-19-12062018				SAMPLE	3	1834591006-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
19	1834591007	MW-8-12062018				SAMPLE	3	1834591007-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
20	1834591008	MW-6-12062018				SAMPLE	3	1834591008-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
21	1834591009	MW-12-12062018				SAMPLE	3	1834591009-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
22	1834591010	DUP-1A-12062018				FLDDUP	3	1834591010-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
23	1834871001	LH18/24-SP650_121218				SAMPLE	3	1834871001-A	E6850Q41.3	5480	1/9/2019	12/31/2018	
24	633247	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
25	633248	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**

ALS Work Order #'s & Sample #('): 1834583 (001); 1834584(001); 1834586(001);1834591(001-10);1834871 (001)  
 ELMS Batch/HBN ID: 2187 (229705)  
 Prep Date: 12/18/2018 Analysis Date: 12/19/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\DEC\19DEC18D.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 633242; Target = 5.0µg/L. ASTM type II water was used for LMB 633241.

**MS/MSD:** MS/MSD was performed on sample 1834483001 (Client ID: LH18/24-SP650\_120618\_BIX). 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 1834584001/1834591003 were analyzed and reported from 1:1,000 dilutions. Field samples 1834591006/07 were analyzed and reported from 1:10 dilutions. Field samples 1834591008-10 were analyzed and reported from 1:100 dilutions. The reporting limits have been adjusted accordingly. Sample 1834591005 failed the 50-150% method requirement for IS/D recovery. The sample was re-prepped, re-analyzed and reported.
- 2) All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike (MS - 633243) failed QC acceptance criteria for percent recovery, biased high. This is due to the fact that the unspiked sample result of 2.028µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.
- 3) Sample data can be viewed at two directories within the ALS system: \\ALS\TWS013\LCMS\LCMS04\2018\DEC\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- 4) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\229705-DoD-ALS-Hstn LCMS4 or through \\ALS\TWS013\DATAREVIEW\HBN#

### 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.**

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
Batch(es)/SDG: ELMS: 2187 HBN: 229705		
Sample Set IDs if Applicable: 1834591 / 1834871 1834583 / 1834584 / 1834586		
Calibration standards analyzed and meets criteria	TB	SB
Standards traceability checked and meets criteria	TB	SB
Standard curve coefficients evaluated and meet criteria	TB	SB
ICVs analyzed and meet acceptance criteria	TB	SB
CCVs analyzed and meet acceptance criteria	TB	SB
Method Blanks analyzed and meet acceptance criteria	TB	SB
Retention Time Windows checked	TB	SB
<b>For method 8081A, Endrin/DDT Breakdown is checked for compliance</b>	—	—
Surrogate recoveries checked and appropriately addressed	—	—
Method Preparation Blanks analyzed and meet acceptance criteria	TB	SB
MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed	TB	SB
RLVS analyzed	TB	SB
Preparation and analysis hold times met	TB	SB
Preparation deviations and re-preparations noted when performed	TB	SB
Analysis deviations and re-analyses noted when performed	TB	SB
Sample dilution factors noted on reports	TB	SB
Electronic records in HBN transcription accuracy and completeness checked	TB	SB
Preparation and analysis calculations checked	TB	SB
NCRs are completed as necessary NC/CAR# _____	—	—
Report forms are complete and accurate	TB	SB
Manual integrations checked	TB	SB





## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK			Description - 6850 WKG Std 100.ug/L		
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

### Constituent

#### Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL	
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020	
MFG Lot: 218065075		Usable: No	
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Constituent

## Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK			Description - 6850 QC WKG STD 100ug/L		
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				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		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



**STANDARD REPORT**  
**Constituent**

**Solvent Standard - ASTM H2O**

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description: 6850 QC Stock STD 1,000ug/mL	
Standard: 36748	Created By: Thomas Bosch	Amount: 100 mL	
MFG: Ultra Scientific	Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020	
MFG Lot: CP-0860		Usable: Yes	
Part ID: ICC-013		Lab Lot: CLO4 QC STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL





## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730	Created By: Thomas Bosch	Amount: 25 mL			
MFG: ALS/SLC	Create Date: 09/20/2018 09:09AM	Expires: 09/20/2019			
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes			
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK			
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK			Description - Perchlorate ISTD Stock
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL



# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

### Description:

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

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

Solvent: water (low TOC, < 50 ppb)

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

### Traceability:

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

### Estimation of Uncertainties:

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

### Homogeneity:

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

### Intended Use:

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

### Instructions for Use:

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

### Hazards:

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

### Expiration of Certification:

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





# Certificate of Analysis



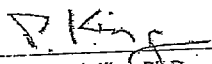
## ISO Guide 34 Reference Material

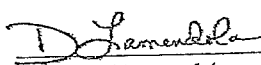
Product Number: ICC-013  
Lot Number: CP-0860

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. Lattendola  
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



43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> 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



Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

Quality Standards:

ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

## Product Information

Chemical Purity Specification:  $\geq 98\%$

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/NCSL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

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

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

Approved by: T. J. Eckersley

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

## Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# Raw Data

Batch Report: C:\HPCHEM\1\DATA\19DEC18D\19DEC18S.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	
*	633238	C	Vial 71	1	Control	1	3.23209e6	8.395	25.48210
*	633239	L	Vial 72	1	Control	2	1.11008e5	8.452	1.07645
*	633240	I	Vial 73	1	Control	3	8.52191e4	8.388	1.07598
*	633241	L	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	633242	Q	Vial 75	1	Control	5	6.02025e5	8.424	4.68168
*	1834583001		Vial 76	1	Sample	6	1.30682e5	8.299	2.02766
*	633243	3	Vial 77	1	Sample	7	4.18728e5	8.304	6.21365
*	633244	3	Vial 78	1	Sample	8	4.70343e5	8.301	6.15892
*	1834584001		Vial 79	1	Sample	9	7.55206e5	8.404	4863.44428
*	1834586001		Vial 80	1	Sample	10	1.47417e5	8.281	2.22125
*	1834591001		Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1834591002		Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1834591003		Vial 83	1	Sample	13	1.37283e6	8.422	9673.99580
*	1834591004		Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1834591005		Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	633245	C	Vial 71	1	Control	16	3.35351e6	8.368	26.12216
*	633246	L	Vial 72	1	Control	17	1.20917e5	8.389	1.07141
*	1834591006		Vial 86	1	Sample	18	4.86119e6	8.226	77.31931
*	1834591007		Vial 87	1	Sample	19	5.52738e5	8.384	390.11734
*	1834591008		Vial 88	1	Sample	20	1.22594e6	8.392	833.53348
*	1834591009		Vial 89	1	Sample	21	1.62460e6	8.383	1220.27143
*	1834591010		Vial 90	1	Sample	22	1.23659e6	8.394	941.30723
*	1834871001		Vial 91	1	Sample	23	1.62193e5	8.278	2.59996
*	1834591006		Vial 92	1	Sample	24	6.48996e5	8.319	66.51942
*	1834591007		Vial 93	1	Sample	25	5.68899e6	8.359	441.44711
*	1834591005		Vial 94	1	Sample	26	0.00000	0.000	0.00000
*	633247	C	Vial 71	1	Control	27	3.38788e6	8.356	26.21078
*	633248	L	Vial 72	1	Control	28	1.23908e5	8.361	1.05635

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount	
*	633238	C	Vial 71	1	Control	1	9.46861e5	8.411	24.76143
*	633239	L	Vial 72	1	Control	2	3.54461e4	8.472	1.02337
*	633240	I	Vial 73	1	Control	3	3.57771e4	8.394	1.31699
*	633241	L	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	633242	Q	Vial 75	1	Control	5	1.83470e5	8.442	4.68584
*	1834583001		Vial 76	1	Sample	6	4.76828e4	8.315	2.32808
*	633243	3	Vial 77	1	Sample	7	1.49048e5	8.323	7.27217
*	633244	3	Vial 78	1	Sample	8	1.68272e5	8.319	7.24272
*	1834584001		Vial 79	1	Sample	9	2.32386e5	8.423	4917.98483
*	1834586001		Vial 80	1	Sample	10	6.04057e4	8.295	2.86912
*	1834591001		Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1834591002		Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1834591003		Vial 83	1	Sample	13	4.08001e5	8.439	9548.26549
*	1834591004		Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1834591005		Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	633245	C	Vial 71	1	Control	16	9.69700e5	8.384	25.06771
*	633246	L	Vial 72	1	Control	17	4.07711e4	8.401	1.06998
*	1834591006		Vial 86	1	Sample	18	1.46824e6	8.243	75.52262
*	1834591007		Vial 87	1	Sample	19	1.68775e5	8.403	389.27218
*	1834591008		Vial 88	1	Sample	20	3.59153e5	8.407	810.38358
*	1834591009		Vial 89	1	Sample	21	4.78620e5	8.399	1195.44501
*	1834591010		Vial 90	1	Sample	22	3.63480e5	8.413	919.03518
*	1834871001		Vial 91	1	Sample	23	6.37608e4	8.286	3.25760
*	1834591006		Vial 92	1	Sample	24	1.99622e5	8.332	67.62522
*	1834591007		Vial 93	1	Sample	25	1.66211e6	8.375	424.57193
*	1834591005		Vial 94	1	Sample	26	0.00000	0.000	0.00000
*	633247	C	Vial 71	1	Control	27	9.85047e5	8.371	25.28254
*	633248	L	Vial 72	1	Control	28	4.31054e4	8.381	1.08344



Batch Report: C:\HPCHEM\1\DATA\19DEC18D\19DEC18S.B

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	633238	C	Vial 71	1	Control	1	3.78208e5	5.00000
*	633239	L	Vial 72	1	Control	2	3.94820e5	5.00000
*	633240	I	Vial 73	1	Control	3	3.03262e5	5.00000
*	633241	L	Vial 74	1	Control	4	4.07686e5	5.00000
*	633242	Q	Vial 75	1	Control	5	4.12803e5	5.00000
*	1834583001		Vial 76	1	Sample	6	2.21386e5	5.00000
*	633243	3	Vial 77	1	Sample	7	2.13289e5	5.00000
*	633244	3	Vial 78	1	Sample	8	2.41807e5	5.00000
*	1834584001		Vial 79	1	Sample	9	4.97457e5	5000.00000
*	1834586001		Vial 80	1	Sample	10	2.25638e5	5.00000
*	1834591001		Vial 81	1	Sample	11	1.98333e5	5.00000
*	1834591002		Vial 82	1	Sample	12	1.94131e5	5.00000
*	1834591003		Vial 83	1	Sample	13	4.40927e5	5000.00000
*	1834591004		Vial 84	1	Sample	14	2.66698e5	5.00000
*	1834591005		Vial 85	1	Sample	15	1.76359e5	5.00000
*	633245	C	Vial 71	1	Control	16	3.82304e5	5.00000
*	633246	L	Vial 72	1	Control	17	4.32578e5	5.00000
*	1834591006		Vial 86	1	Sample	18	1.71171e5	5.00000
*	1834591007		Vial 87	1	Sample	19	4.59757e5	500.00000
*	1834591008		Vial 88	1	Sample	20	4.59696e5	500.00000
*	1834591009		Vial 89	1	Sample	21	4.09950e5	500.00000
*	1834591010		Vial 90	1	Sample	22	4.08616e5	500.00000
*	1834871001		Vial 91	1	Sample	23	2.08799e5	5.00000
*	1834591006		Vial 92	1	Sample	24	3.07855e5	50.00000
*	1834591007		Vial 93	1	Sample	25	3.71021e5	50.00000
*	1834591005		Vial 94	1	Sample	26	2.29204e5	5.00000
*	633247	C	Vial 71	1	Control	27	3.84847e5	5.00000
*	633248	L	Vial 72	1	Control	28	4.51163e5	5.00000

\*\*\* End of Report \*\*\*

equence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\DEC\19DEC18D.S

Sequence Table:

Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
====	=====	=====	=====	===	=====	=====	=====
1	Vial 71	633238	CCV@25	CLO4-AQN	1		Ctrl Samp
2	Vial 72	633239	LODV@1.	CLO4-AQN	1		Ctrl Samp
3	Vial 73	633240	ICS@1.0	CLO4-AQN	1		Ctrl Samp
4	Vial 74	633241	LMB	CLO4-AQN	1		Ctrl Samp
5	Vial 75	633242	QC@5.0	CLO4-AQN	1		Ctrl Samp
6	Vial 76	1834583001		CLO4-AQN	1		Sample
7	Vial 77	633243	345831S	CLO4-AQN	1		Sample
8	Vial 78	633244	345831D	CLO4-AQN	1		Sample
9	Vial 79	1834584001	1K	CLO4-AQN	1		Sample
10	Vial 80	1834586001		CLO4-AQN	1		Sample
11	Vial 81	1834591001		CLO4-AQN	1		Sample
12	Vial 82	1834591002		CLO4-AQN	1		Sample
13	Vial 83	1834591003	1K	CLO4-AQN	1		Sample
14	Vial 84	1834591004		CLO4-AQN	1		Sample
15	Vial 85	1834591005		CLO4-AQN	1		Sample
16	Vial 71	633245	CCV@25	CLO4-AQN	1		Ctrl Samp
17	Vial 72	633246	LODV@1.	CLO4-AQN	1		Ctrl Samp
18	Vial 86	1834591006		CLO4-AQN	1		Sample
19	Vial 87	1834591007	100	CLO4-AQN	1		Sample
20	Vial 88	1834591008	100	CLO4-AQN	1		Sample
21	Vial 89	1834591009	100	CLO4-AQN	1		Sample
22	Vial 90	1834591010	100	CLO4-AQN	1		Sample
23	Vial 91	1834871001		CLO4-AQN	1		Sample
24	Vial 92	1834591006	10X	CLO4-AQN	1		Sample
25	Vial 93	1834591007	10X	CLO4-AQN	1		Sample
26	Vial 94	1834591005	RE	CLO4-AQN	1		Sample
27	Vial 71	633247	CCV@25	CLO4-AQN	1		Ctrl Samp
28	Vial 72	633248	LODV@1.	CLO4-AQN	1		Ctrl Samp

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD01.D

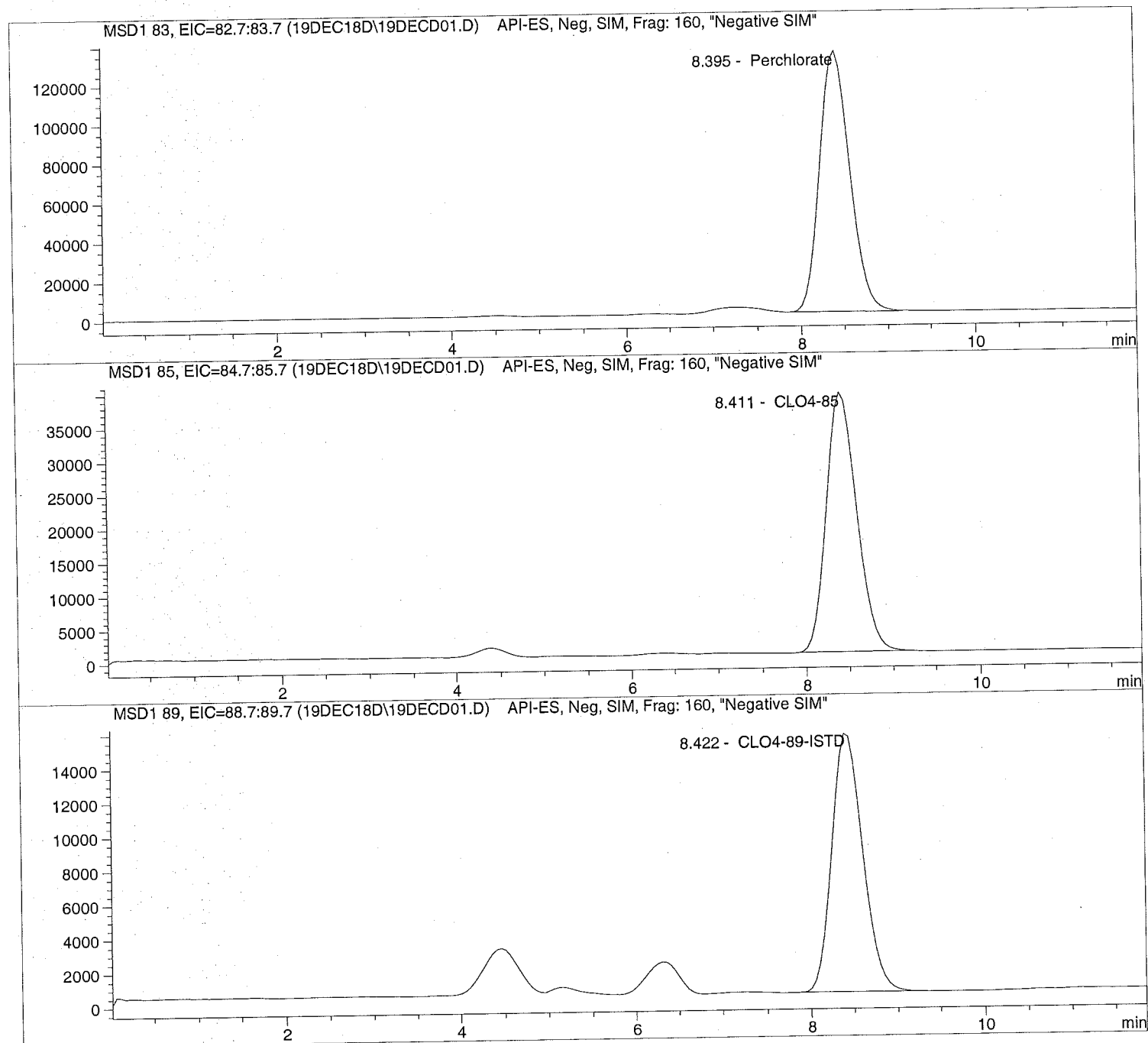
Sample Name: 633238 CCV@25

Injection Date: 12/19/2018 08:25:30  
Sample Name: 633238 CCV@25  
Acq Operator: TNB

Seq Line: 1  
Location: Vial 71  
Inj. No.: 1  
Inj. Vol.: 30  $\mu$ l

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\19DEC18D\19DECD01.D

Sample Name: 633238 CCV@25

```

=====
Injection Date: 12/19/2018 08:25:30      Seq Line: 1
Sample Name: 633238 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
8.395	VBA	3232085.0	25.4821	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.411	PBA	946861.3	24.7614	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.422	PBA	378208.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

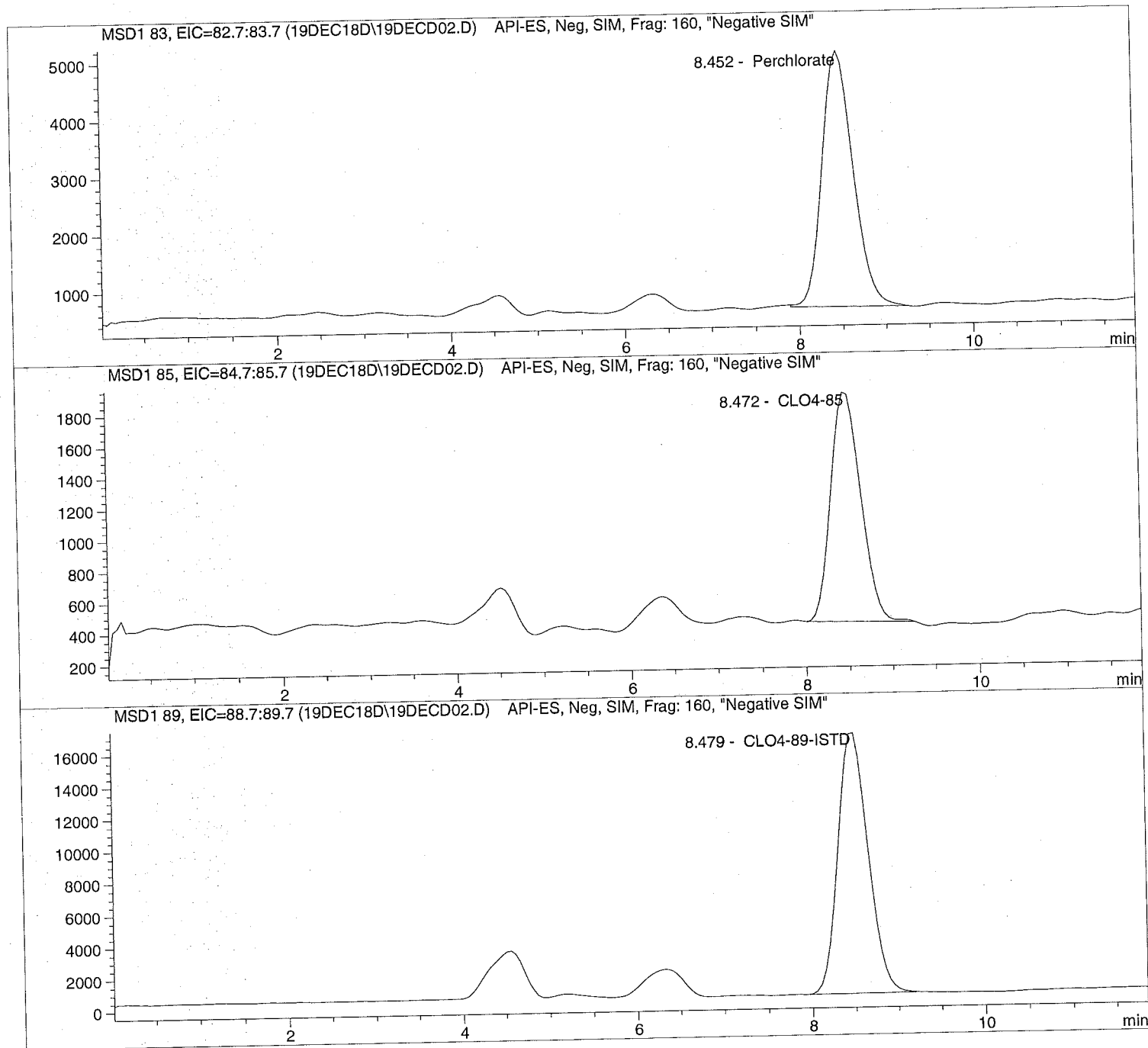
```

Injection Date: 12/19/2018 08:40:55  
Sample Name: 633239 LODV@1.  
Acq Operator: TNB

Seq Line: 2  
Location: Vial 72  
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



Injection Date: 12/19/2018 08:40:55      Seq Line: 2  
Sample Name: 633239 LODV@1.      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: 1.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.452	BBA	111007.7	1.0764	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.472	PBA	35446.1	1.0234	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.479	PBA	394819.7	5.0000	CLO4-89-ISTD

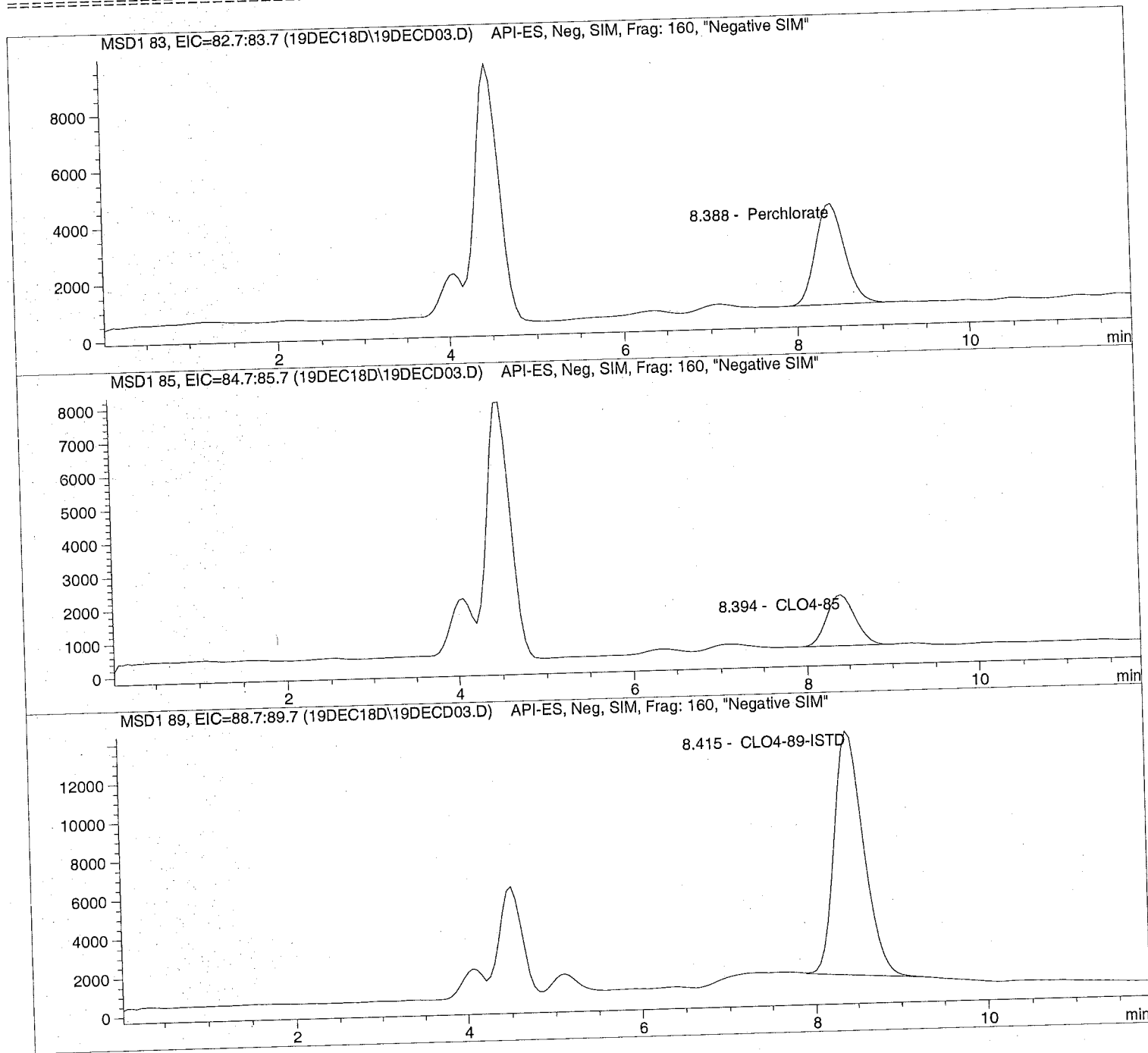
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 08:54:37  
Sample Name: 633240 ICS@1.0  
Acq Operator: TNB

Seq Line: 3  
Location: Vial 73  
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\19DEC18D\19DECD03.D

Sample Name: 633240 ICS@1.0

```

=====
Injection Date: 12/19/2018 08:54:37      Seq Line: 3
Sample Name: 633240 ICS@1.0              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: 1.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.388	PBA	85219.1	1.0760	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.394	PBA	35777.1	1.3170	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.415	BBA	303262.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD04.D

Sample Name: 633241 LMB

Injection Date: 12/19/2018 09:08:25

Seq Line: 4

Sample Name: 633241 LMB

Location: Vial 74

Acq Operator: TNB

Inj. No.: 1

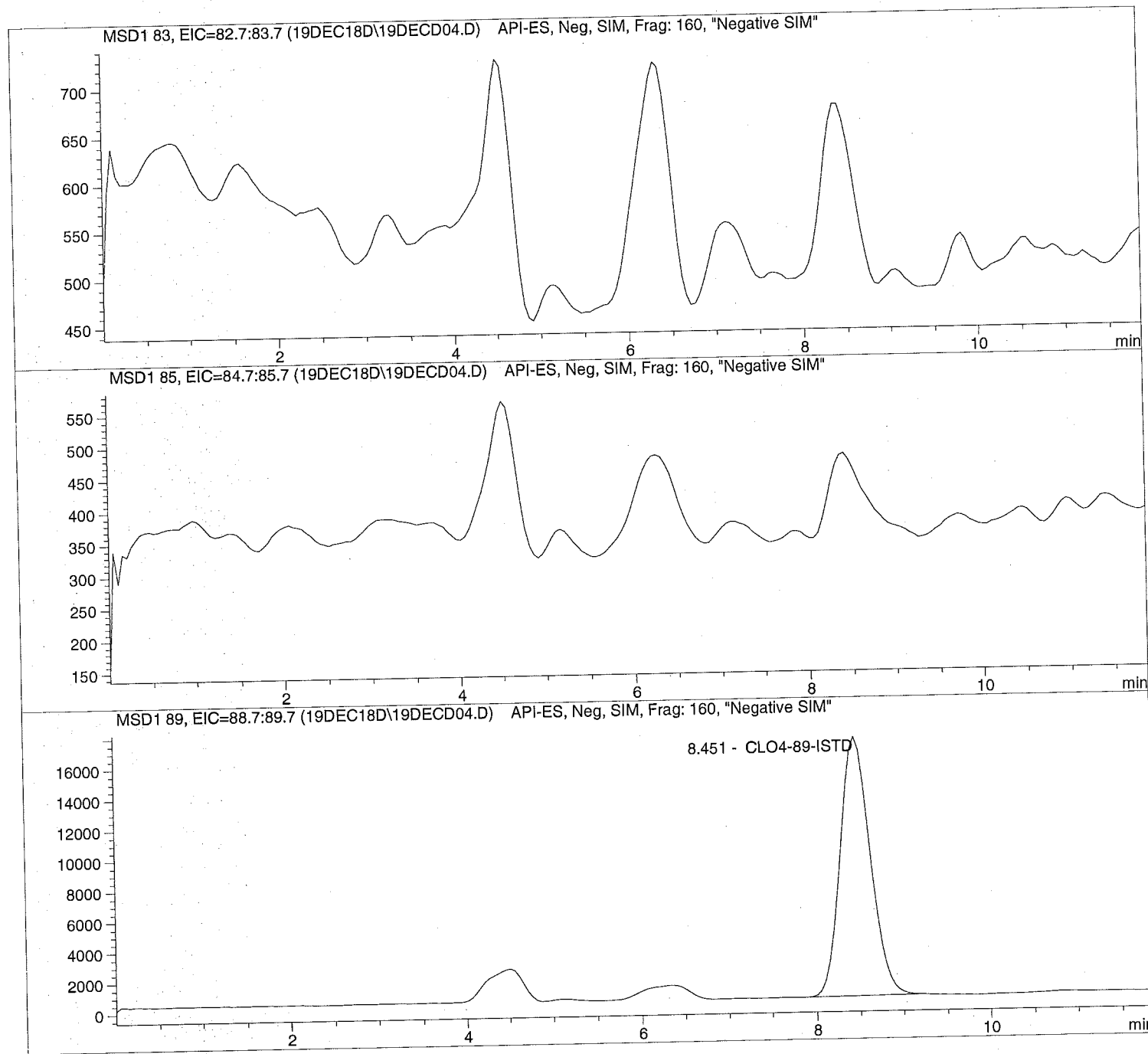
Inj. Vol.: 30 µl

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\19DEC18D\19DECD04.D

Sample Name: 633241 LMB

```

=====
Injection Date: 12/19/2018 09:08:25      Seq Line: 4
Sample Name: 633241 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
8.451	PBA	407685.9	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD05.D

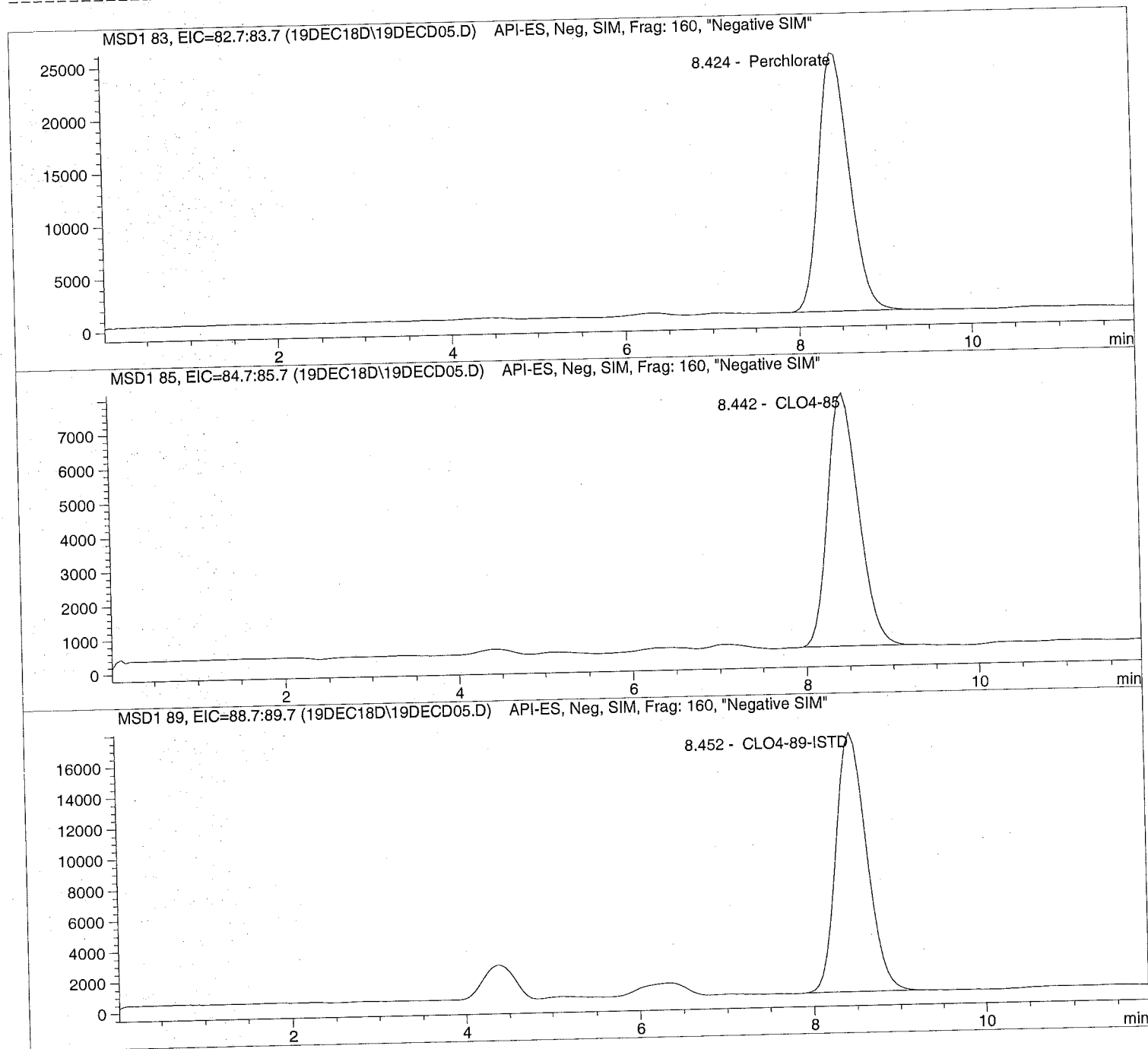
Sample Name: 633242 QC@5.0

Injection Date: 12/19/2018 09:22:11  
Sample Name: 633242 QC@5.0  
Acq Operator: TNB

Seq Line: 5  
Location: Vial 75  
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\19DEC18D\19DECD05.D Sample Name: 633242 QC@5.0

Injection Date: 12/19/2018 09:22:11 Seq Line: 5  
 Sample Name: 633242 QC@5.0 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: 5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.424	PBA	602025.1	4.6817	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.442	BBA	183470.3	4.6858	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.452	BBA	412803.3	5.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD06.D

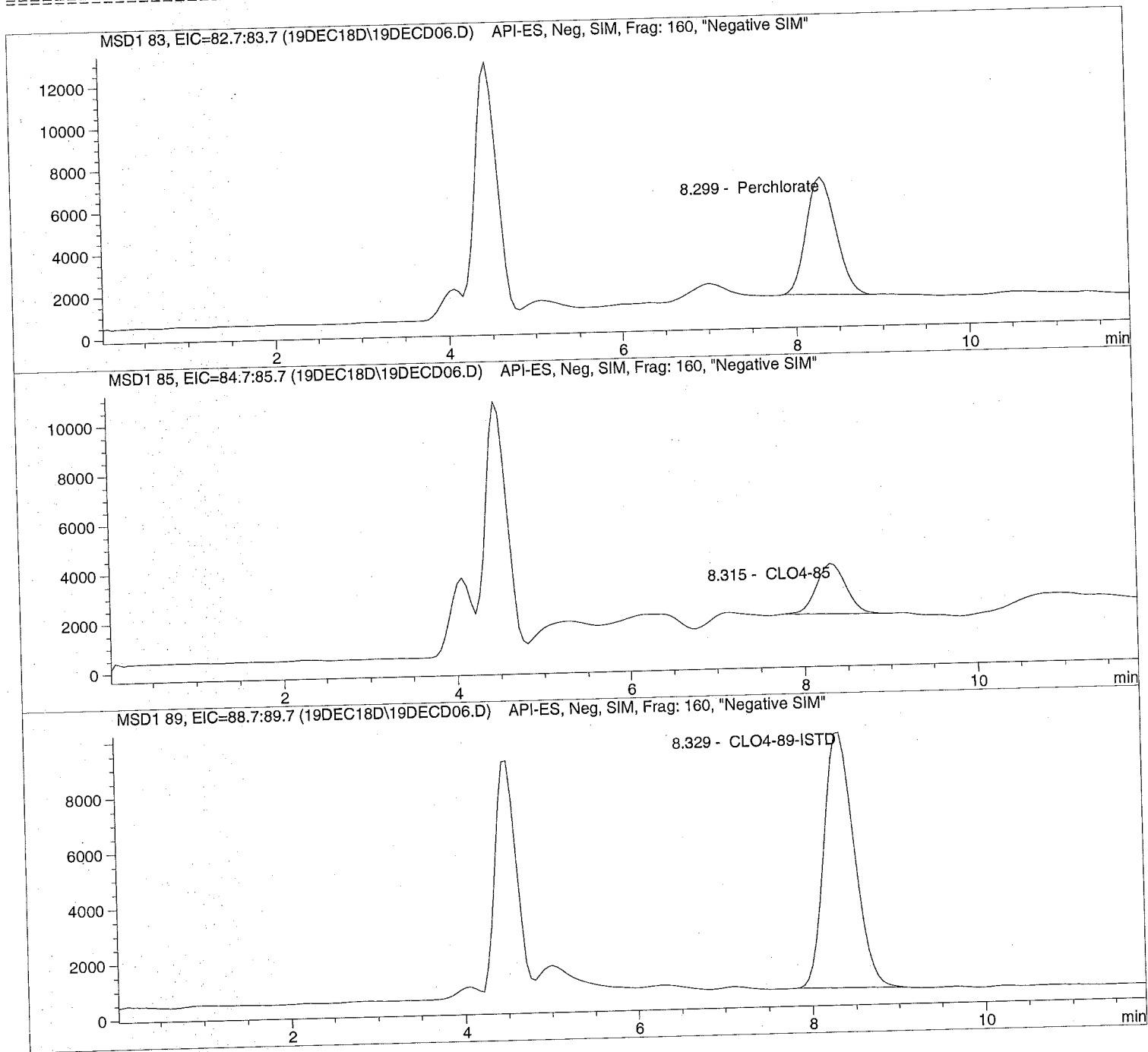
Sample Name: 1834583001

Injection Date: 12/19/2018 09:37:12  
Sample Name: 1834583001  
Acq Operator: TNB

Seq Line: 6  
Location: Vial 76  
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\19DEC18D\19DECD06.D

Sample Name: 1834583001

```

=====
Injection Date: 12/19/2018 09:37:12      Seq Line:          6
Sample Name:   1834583001                 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
8.299	PBA	130682.0	2.0277	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.315	BBA	47682.8	2.3281	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	221385.7	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD07.D

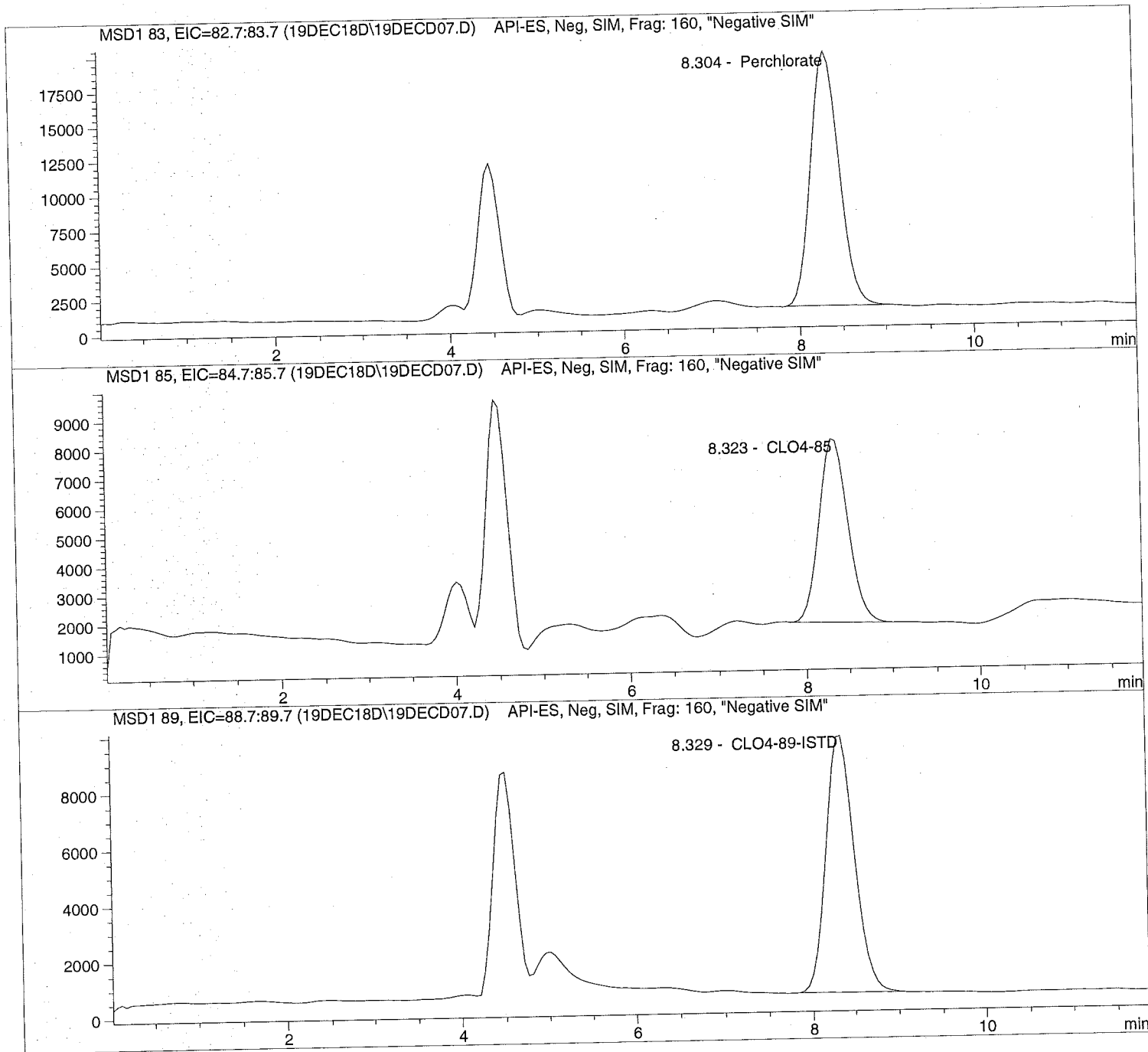
Sample Name: 633243 345831S

Injection Date: 12/19/2018 09:50:58  
Sample Name: 633243 345831S  
Acq Operator: TNB

Seq Line: 7  
Location: Vial 77  
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\19DEC18D\19DECD07.D

Sample Name: 633243 345831S

```

=====
Injection Date: 12/19/2018 09:50:58      Seq Line: 7
Sample Name: 633243 345831S             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
8.304	PBA	418727.5	6.2136	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.323	BBA	149047.9	7.2722	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	213288.8	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***

```



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD08.D

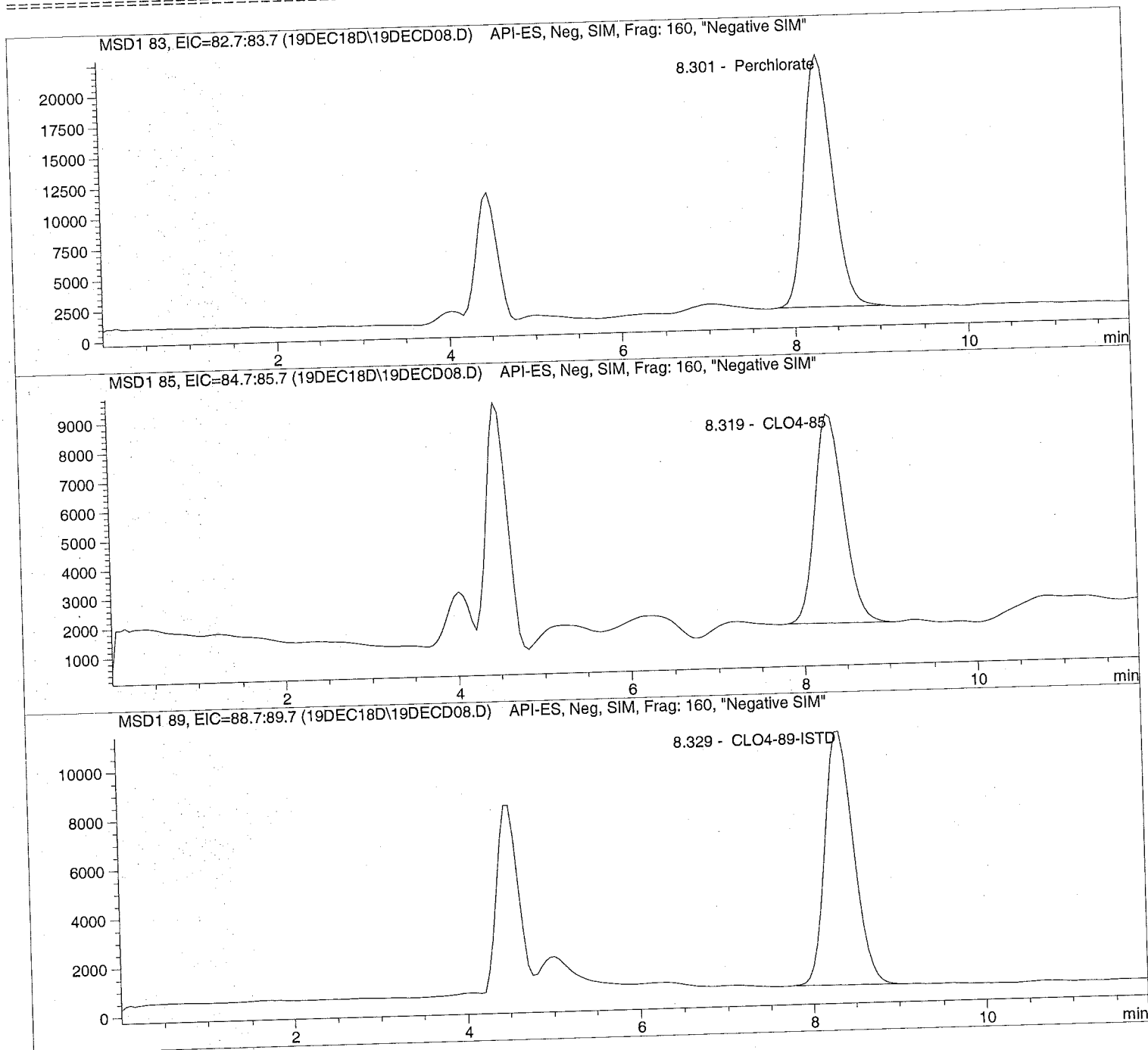
Sample Name: 633244 345831D

Injection Date: 12/19/2018 10:04:44  
Sample Name: 633244 345831D  
Acq Operator: TNB

Seq Line: 8  
Location: Vial 78  
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



Injection Date: 12/19/2018 10:04:44 Seq Line: 8  
Sample Name: 633244 345831D 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
8.301	PBA	470343.0	6.1589	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.319	PBA	168272.1	7.2427	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	241807.3	5.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD09.D

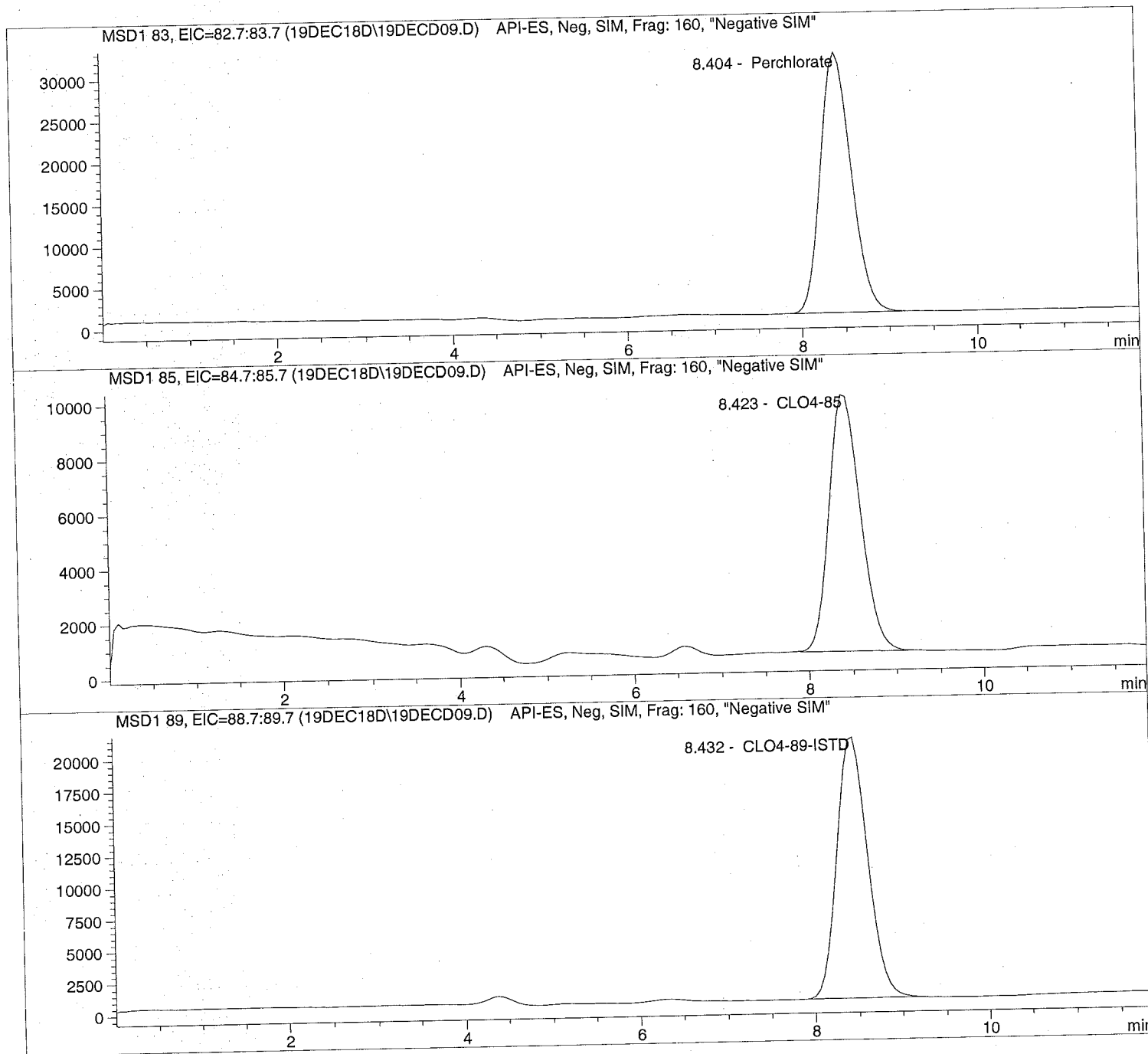
Sample Name: 1834584001 1K

Injection Date: 12/19/2018 10:18:30  
Sample Name: 1834584001 1K  
Acq Operator: TNB

Seq Line: 9  
Location: Vial 79  
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\19DEC18D\19DECD09.D

Sample Name: 1834584001 1K

```

=====
Injection Date: 12/19/2018 10:18:30      Seq Line:          9
Sample Name:    1834584001 1K             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:       1000.000000
Sample Amount:  0.000
=====

```

```

=====
                          LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.404	PBA	755206.2	4863.4443	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.423	BBA	232386.3	4917.9848	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.432	PBA	497457.1	5000.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

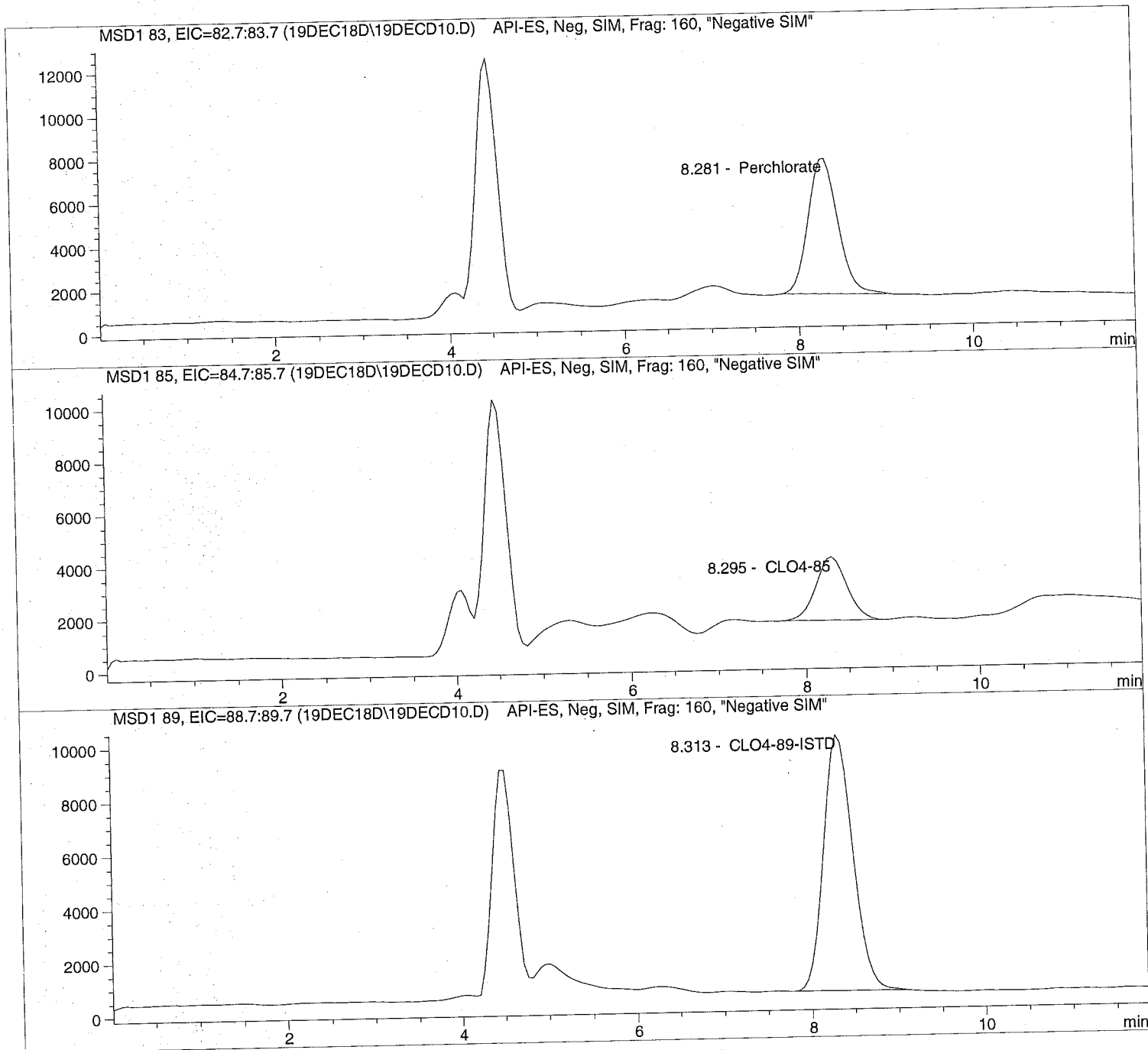
```

Injection Date: 12/19/2018 10:32:20  
Sample Name: 1834586001  
Acq Operator: TNB

Seq Line: 10  
Location: Vial 80  
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\19DEC18\19DECD10.D

Sample Name: 1834586001

```

=====
Injection Date: 12/19/2018 10:32:20      Seq Line:          10
Sample Name:   1834586001                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
8.281	PBA	147417.2	2.2212	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.295	PBA	60405.7	2.8691	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.313	PBA	225638.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD11.D

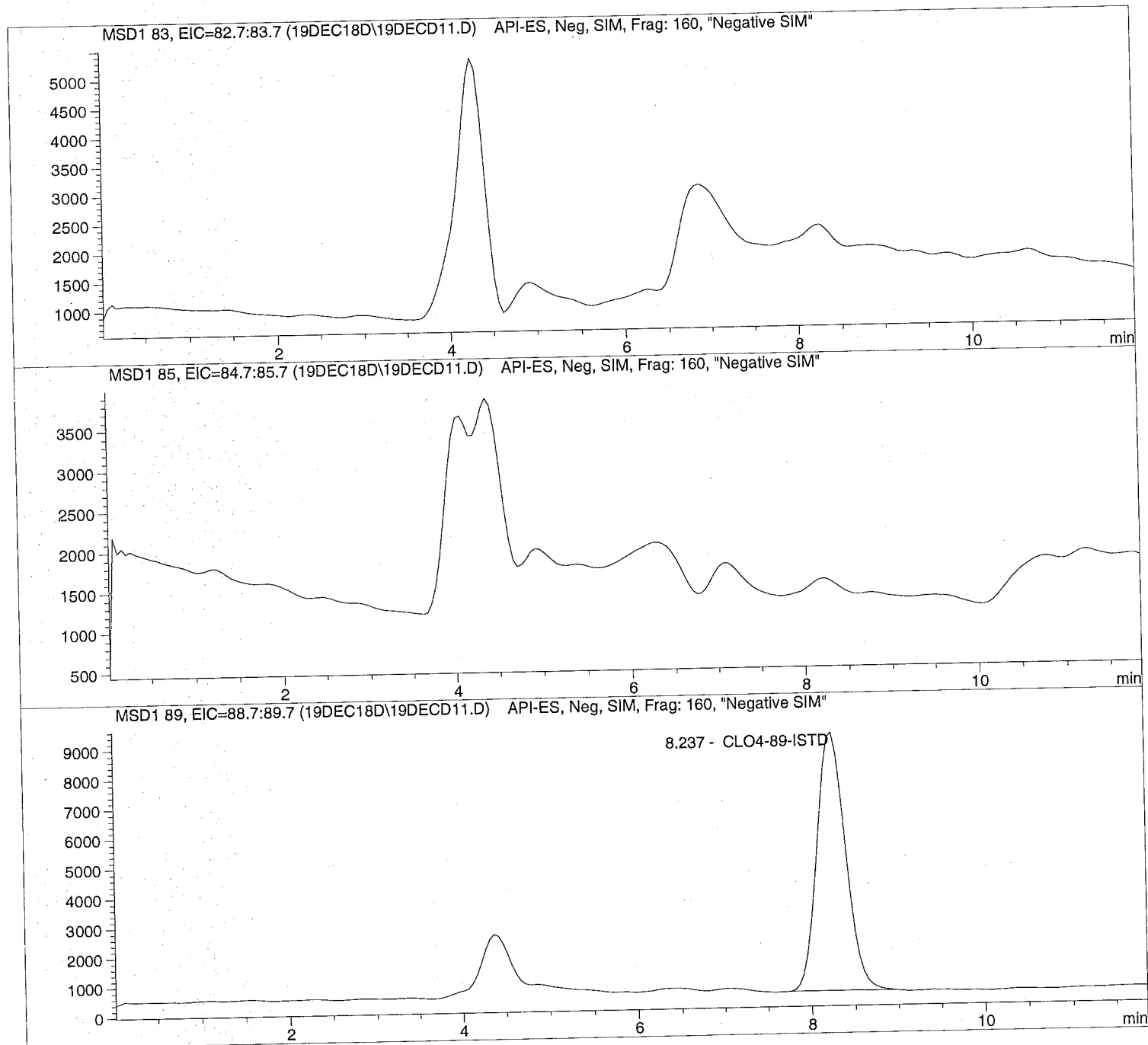
Sample Name: 1834591001

Injection Date: 12/19/2018 10:46:05  
Sample Name: 1834591001  
Acq Operator: TNB

Seq Line: 11  
Location: Vial 81  
Inj. No.: 1  
Inj. Vol.: 30  $\mu$ l

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\19DEC18D\19DECD11.D

Sample Name: 1834591001

```

=====
Injection Date: 12/19/2018 10:46:05      Seq Line:          11
Sample Name:    1834591001                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:       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
8.237	PBA	198333.0	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD12.D

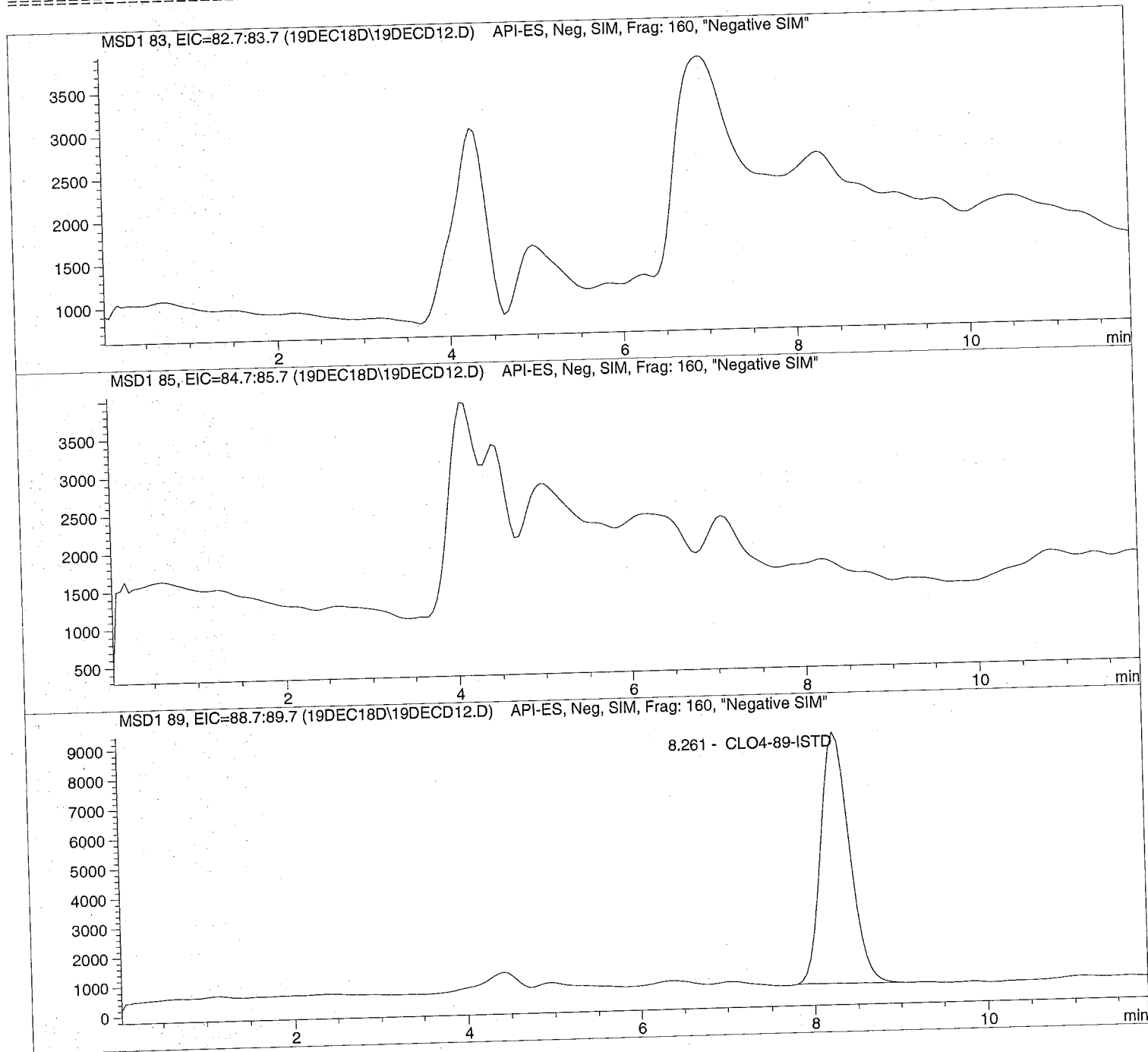
Sample Name: 1834591002

Injection Date: 12/19/2018 10:59:50  
Sample Name: 1834591002  
Acq Operator: TNB

Seq Line: 12  
Location: Vial 82  
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\19DEC18D\19DECD12.D

Sample Name: 1834591002

```

=====
Injection Date: 12/19/2018 10:59:50      Seq Line:          12
Sample Name:    1834591002                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
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
8.261	PBA	194131.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

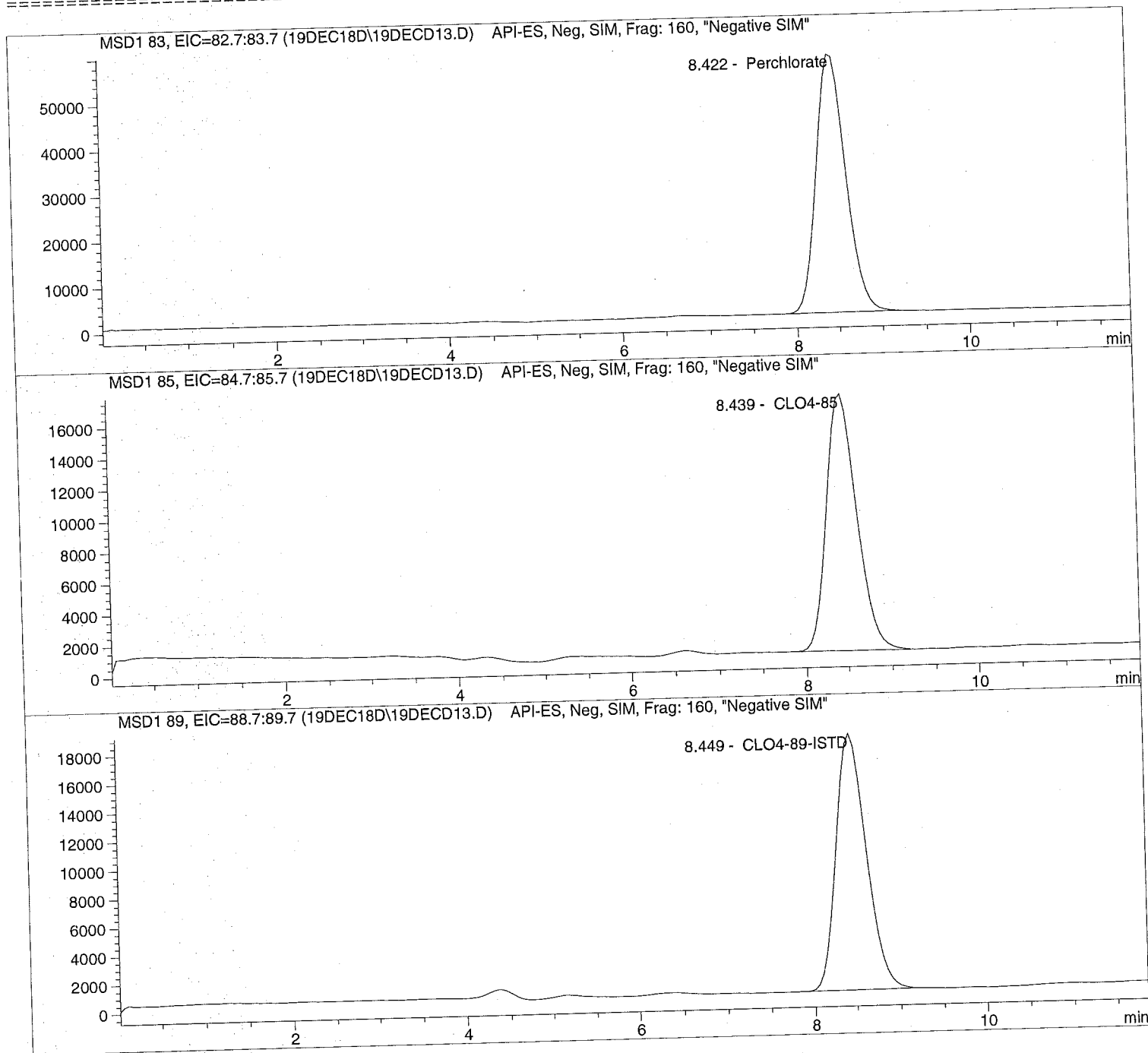
```

Injection Date: 12/19/2018 11:13:33  
Sample Name: 1834591003 1K  
Acq Operator: TNB

Seq Line: 13  
Location: Vial 83  
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



Injection Date: 12/19/2018 11:13:33 Seq Line: 13  
Sample Name: 1834591003 1K 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: 1000.000000  
Sample Amount: 0.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.422	PBA	1372828.2	9673.9958	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.439	BBA	408001.0	9548.2655	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.449	PBA	440927.1	5000.0000	CLO4-89-ISTD

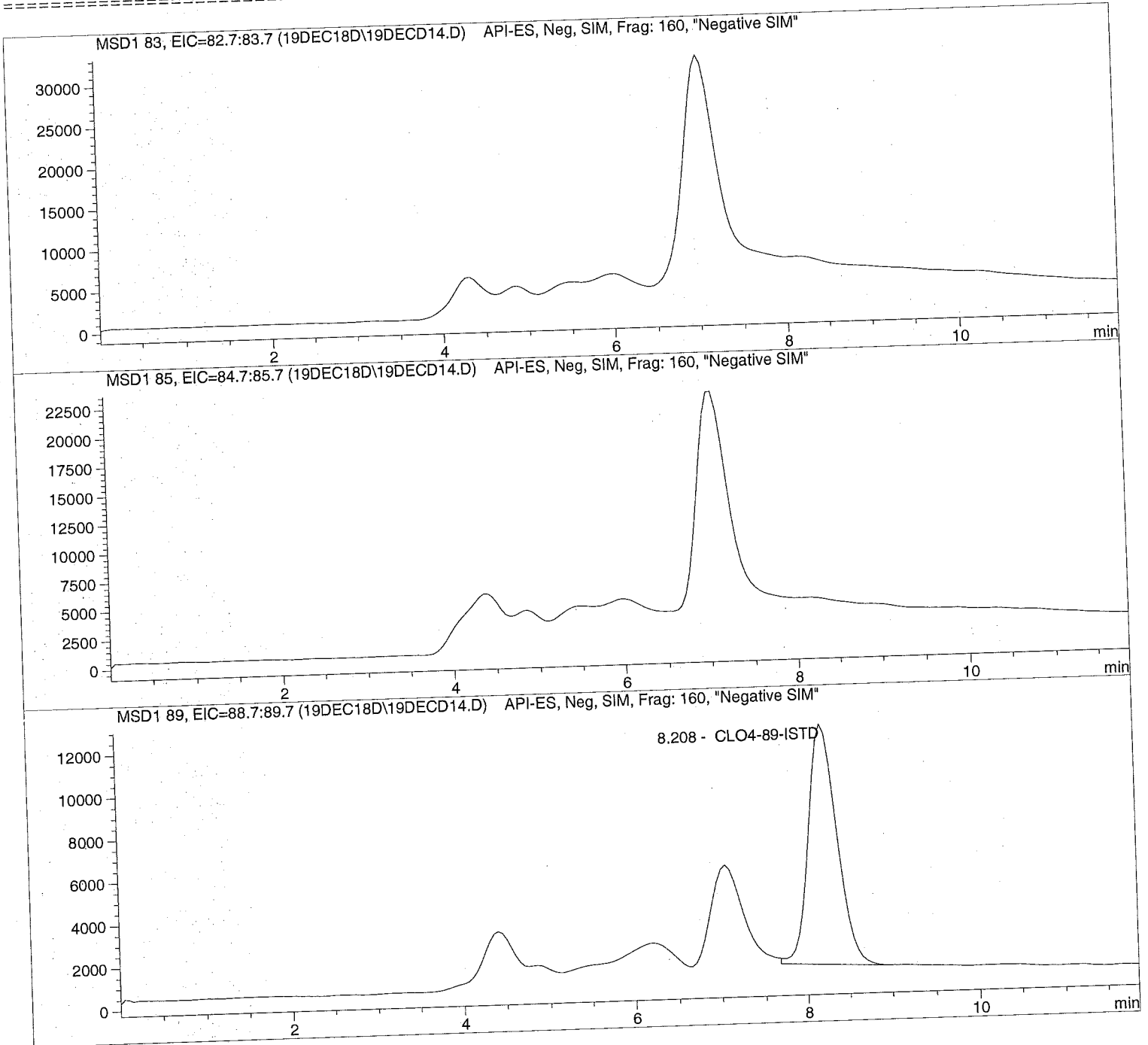
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 11:27:19  
Sample Name: 1834591004  
Acq Operator: TNB

Seq Line: 14  
Location: Vial 84  
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\19DEC18D\19DECD14.D

Sample Name: 1834591004

```

=====
Injection Date: 12/19/2018 11:27:19      Seq Line: 14
Sample Name: 1834591004                  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: 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
8.208	BBA	266698.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

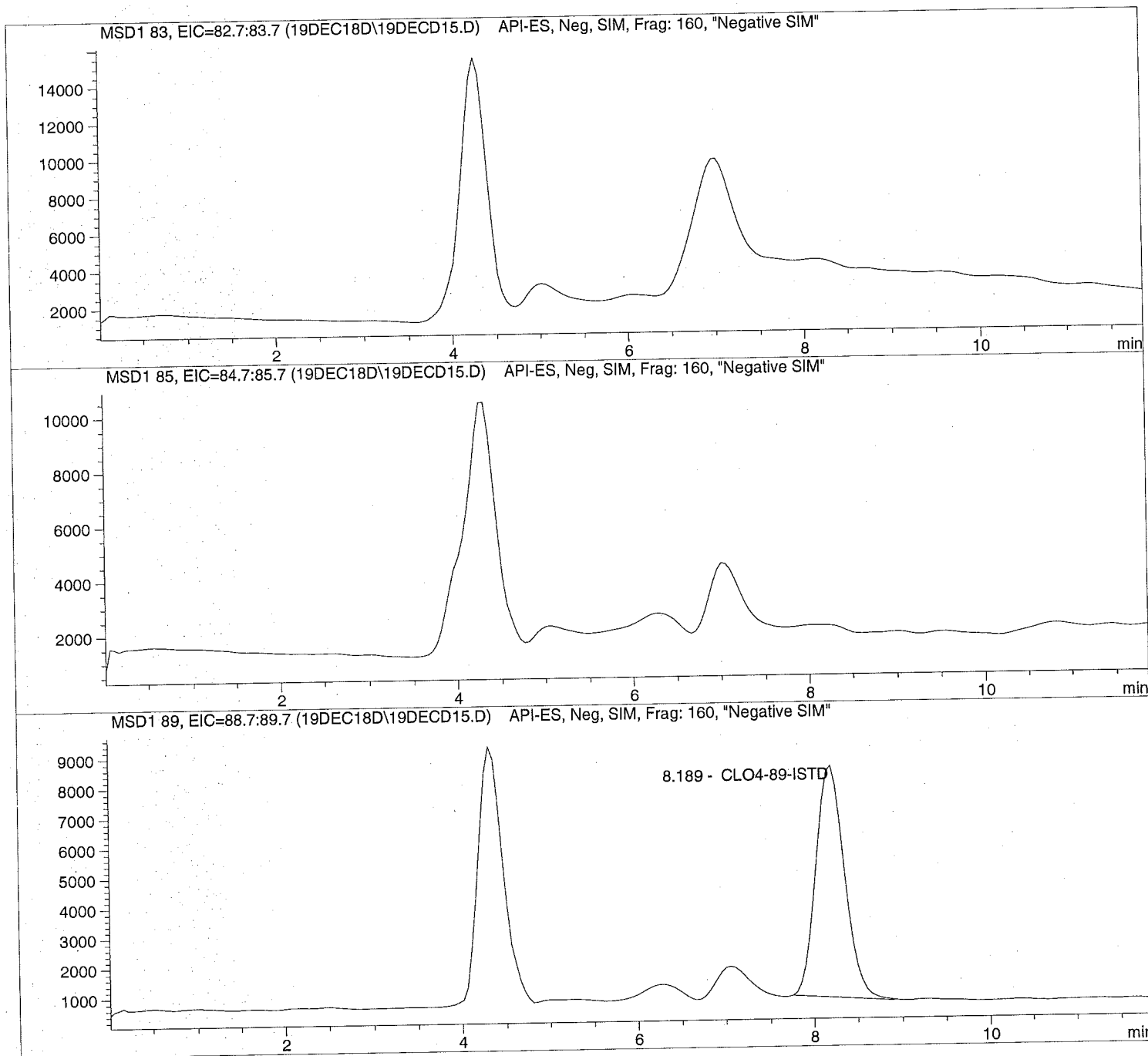
```

Injection Date: 12/19/2018 11:41:03  
Sample Name: 1834591005  
Acq Operator: TNB

Seq Line: 15  
Location: Vial 85  
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\19DEC18D\19DECD15.D

Sample Name: 1834591005

Injection Date: 12/19/2018 11:41:03  
 Sample Name: 1834591005  
 Acq Operator: TNB

Seq Line: 15  
 Location: Vial 85  
 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
8.189	PBA	176359.5	5.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

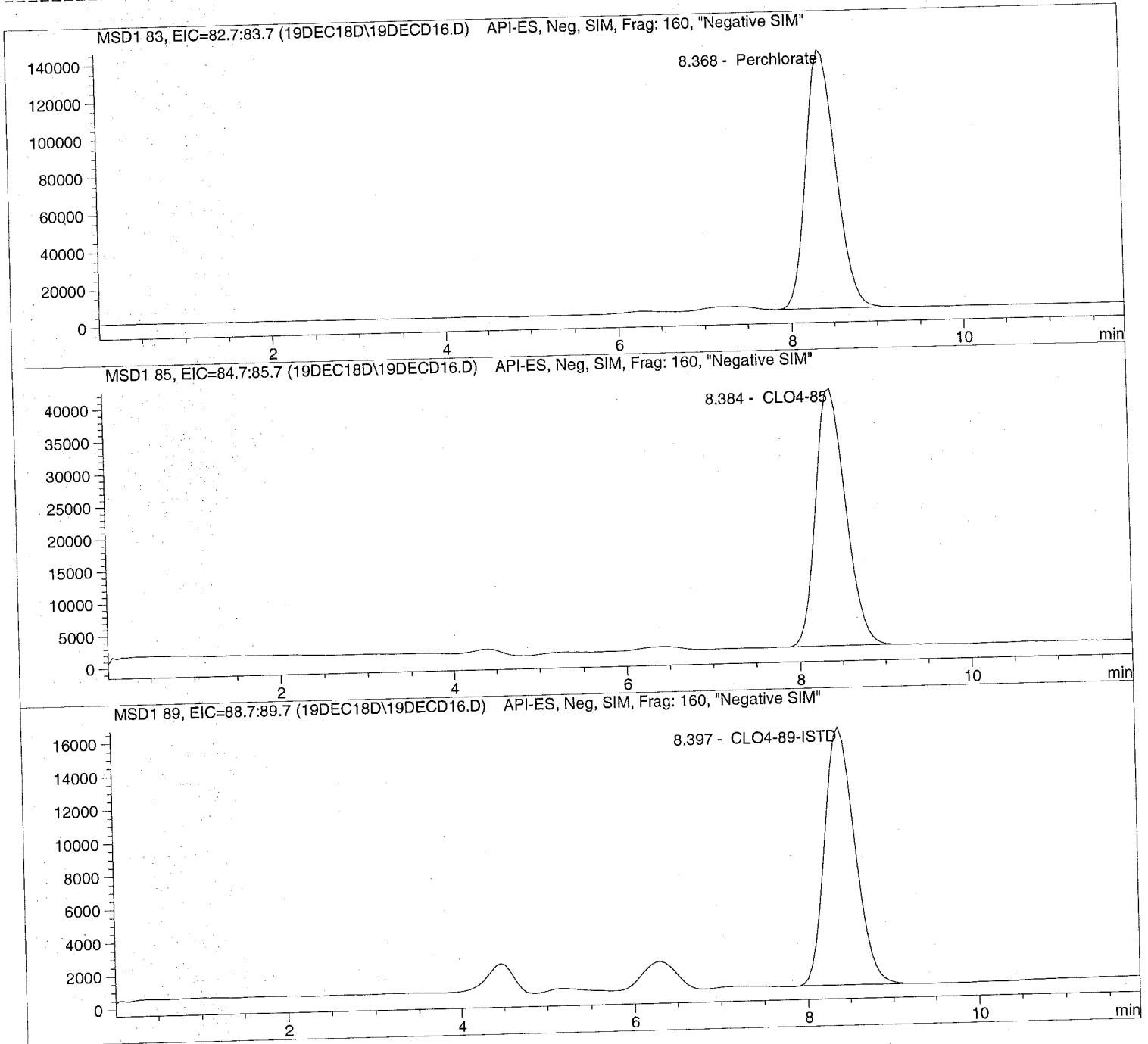


Injection Date: 12/19/2018 11:54:49  
Sample Name: 633245 CCV@25  
Acq Operator: TNB

Seq Line: 16  
Location: Vial 71  
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\19DEC18D\19DECD16.D

Sample Name: 633245 CCV@25

Injection Date: 12/19/2018 11:54:49  
 Sample Name: 633245 CCV@25  
 Acq Operator: TNB

Seq Line: 16  
 Location: Vial 71  
 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
8.368	VBA	3353514.5	26.1222	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.384	PBA	969700.1	25.0677	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.397	PBA	382303.9	5.0000	CLO4-89-ISTD

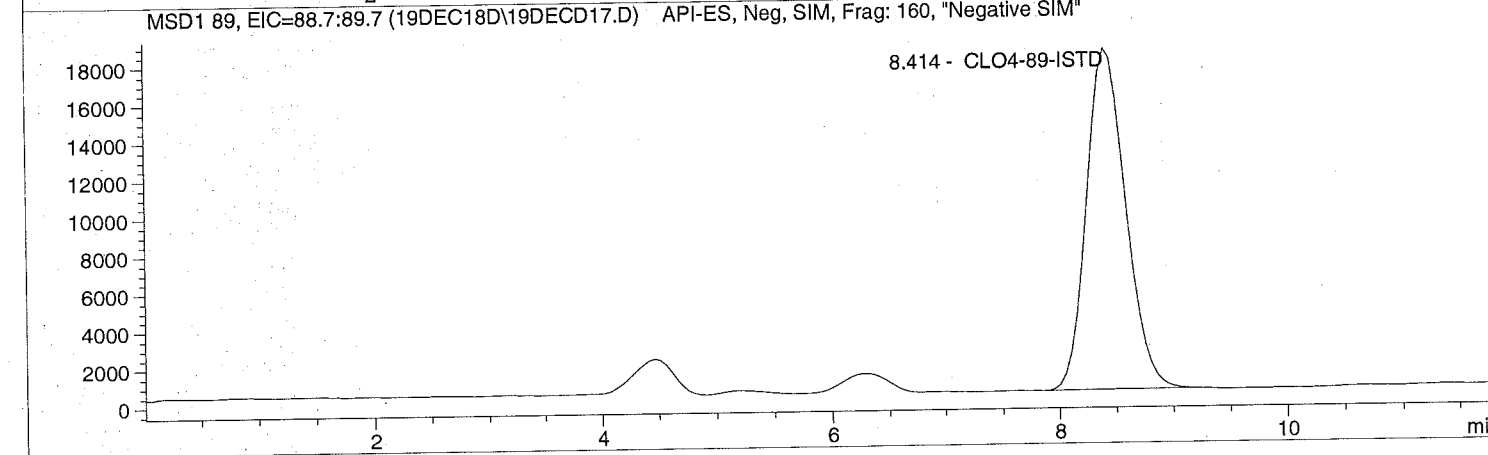
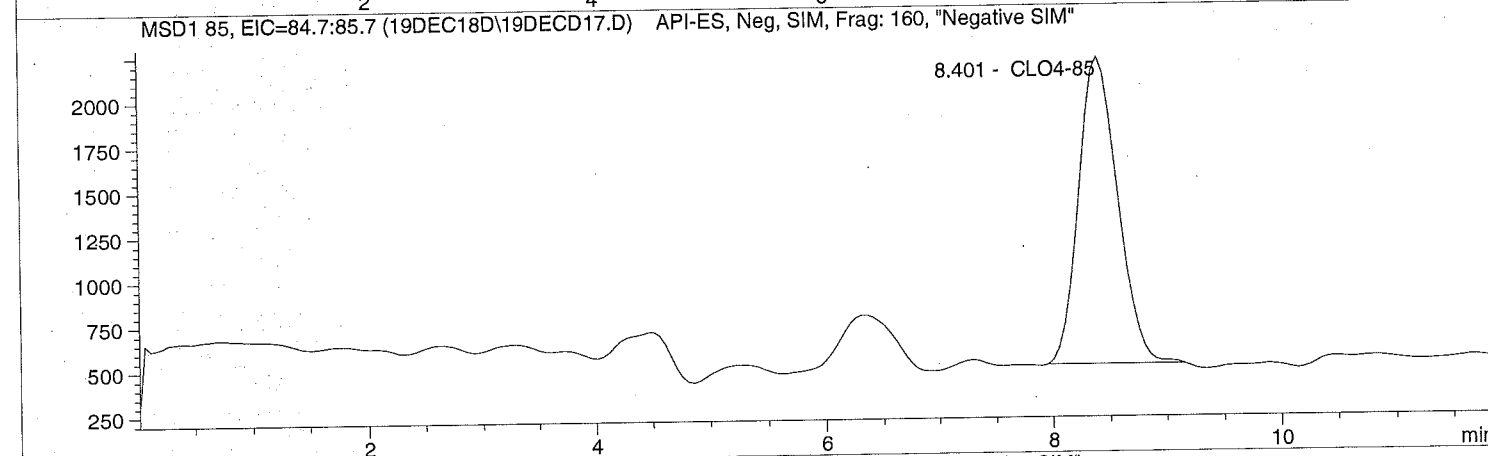
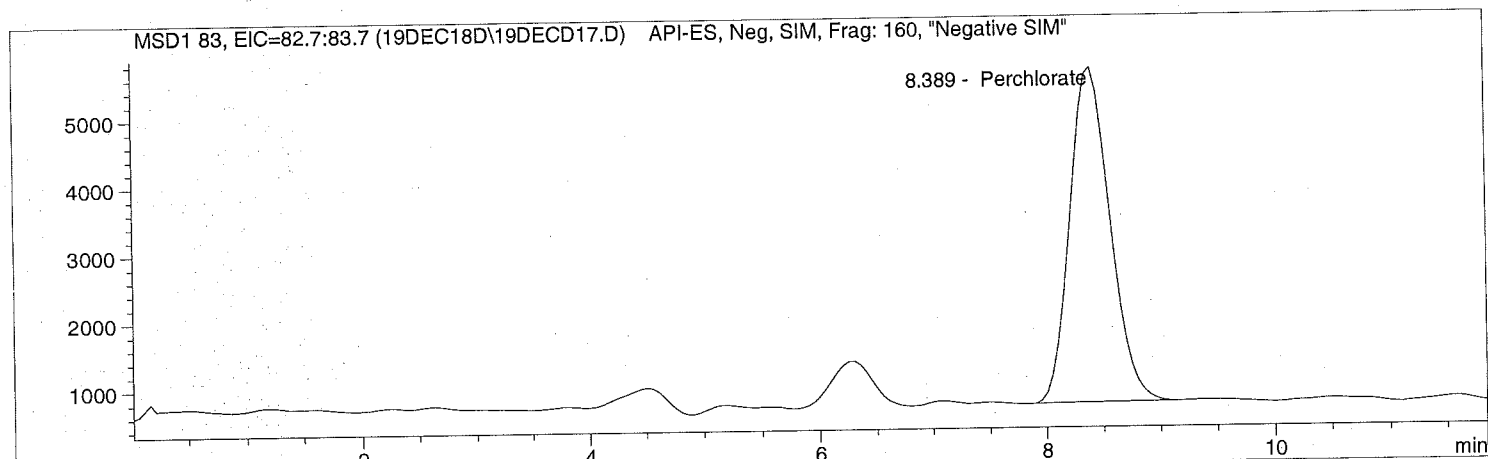
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 12:08:33  
Sample Name: 633246 LODV@1.  
Acq Operator: TNB

Seq Line: 17  
Location: Vial 72  
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\19DEC18D\19DECD17.D Sample Name: 633246 LODV@1.

Injection Date: 12/19/2018 12:08:33 Seq Line: 17  
 Sample Name: 633246 LODV@1. Location: Vial 72  
 Acq Operator: TNB Inj. No.: 1  
 Inj. Vol.: 30  $\mu$ l

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: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.389	PBA	120916.8	1.0714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.401	PBA	40771.1	1.0700	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.414	PBA	432577.5	5.0000	CLO4-89-ISTD

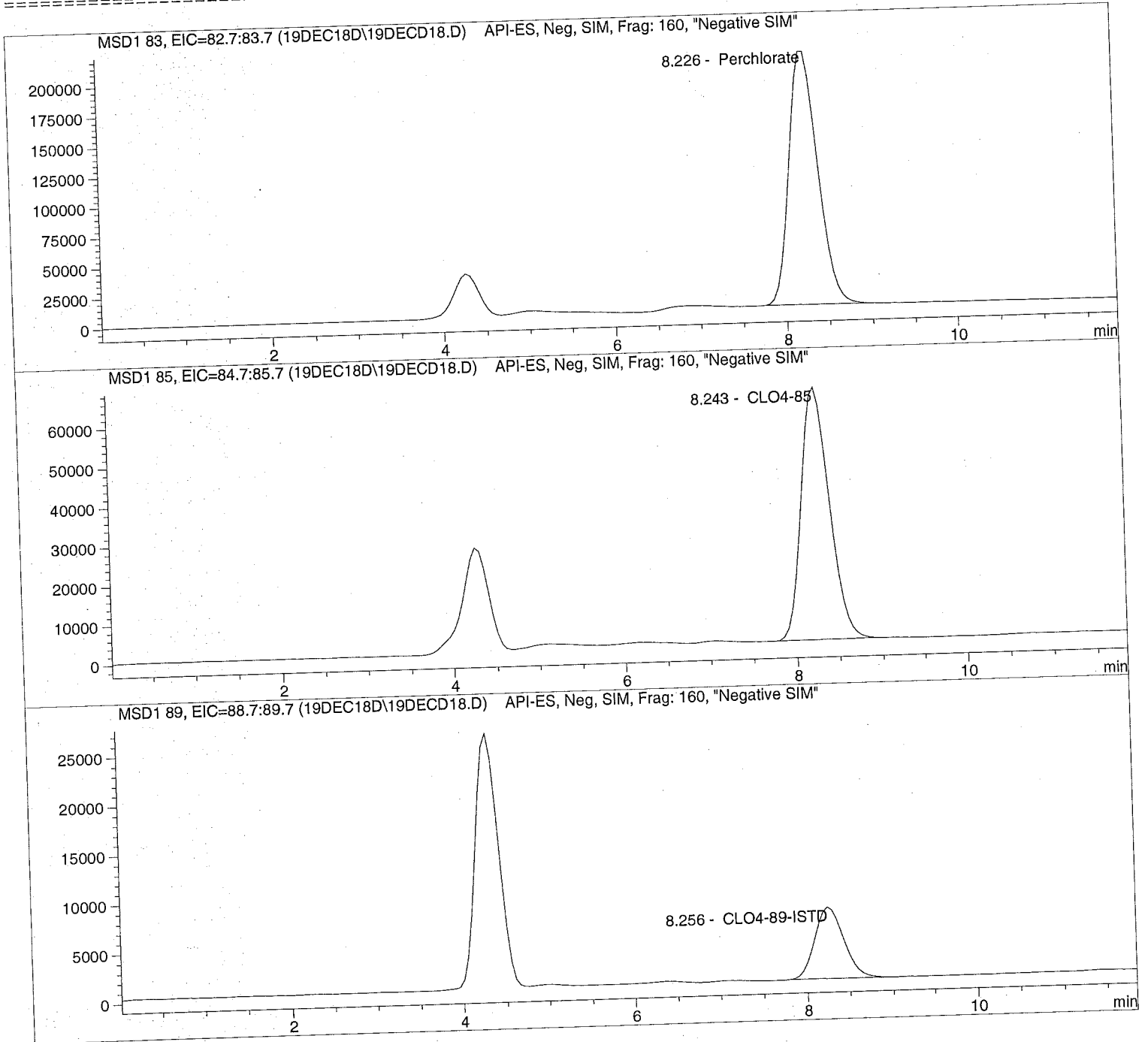
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 12:22:19  
Sample Name: 1834591006  
Acq Operator: TNB

Seq Line: 18  
Location: Vial 86  
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\19DEC18D\19DECD18.D

Sample Name: 1834591006

```

=====
Injection Date: 12/19/2018 12:22:19      Seq Line: 18
Sample Name: 1834591006                  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
8.226	PBA	4861195.0	77.3193	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.243	PBA	1468235.9	75.5226	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.256	PBA	171171.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

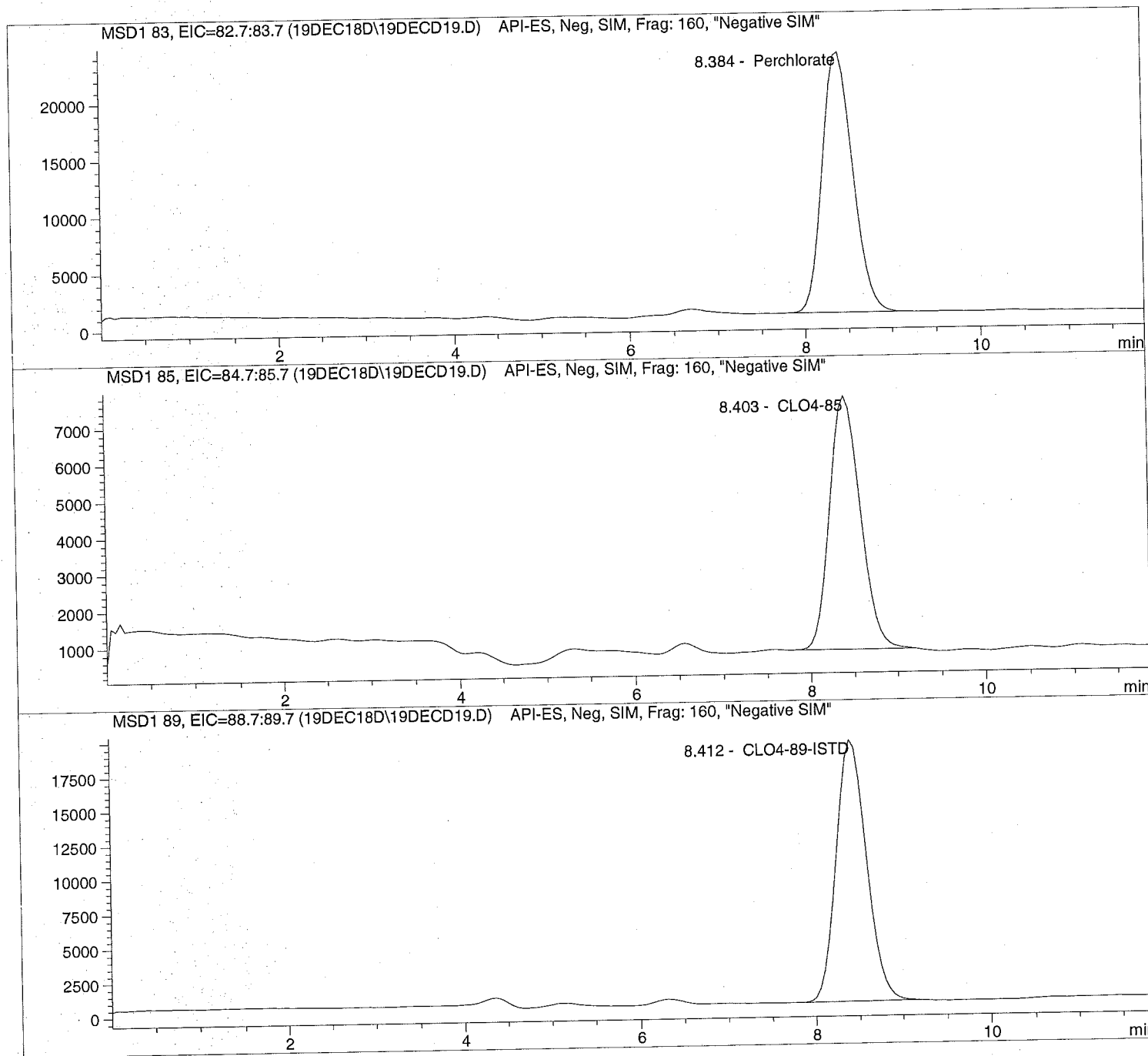
```

Injection Date: 12/19/2018 12:36:05  
Sample Name: 1834591007 100  
Acq Operator: TNB

Seq Line: 19  
Location: Vial 87  
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



Injection Date: 12/19/2018 12:36:05      Seq Line: 19  
Sample Name: 1834591007 100      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: 100.000000  
Sample Amount: 0.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.384	PBA	552737.7	390.1173	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.403	BBA	168774.7	389.2722	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.412	PBA	459757.1	500.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD20.D

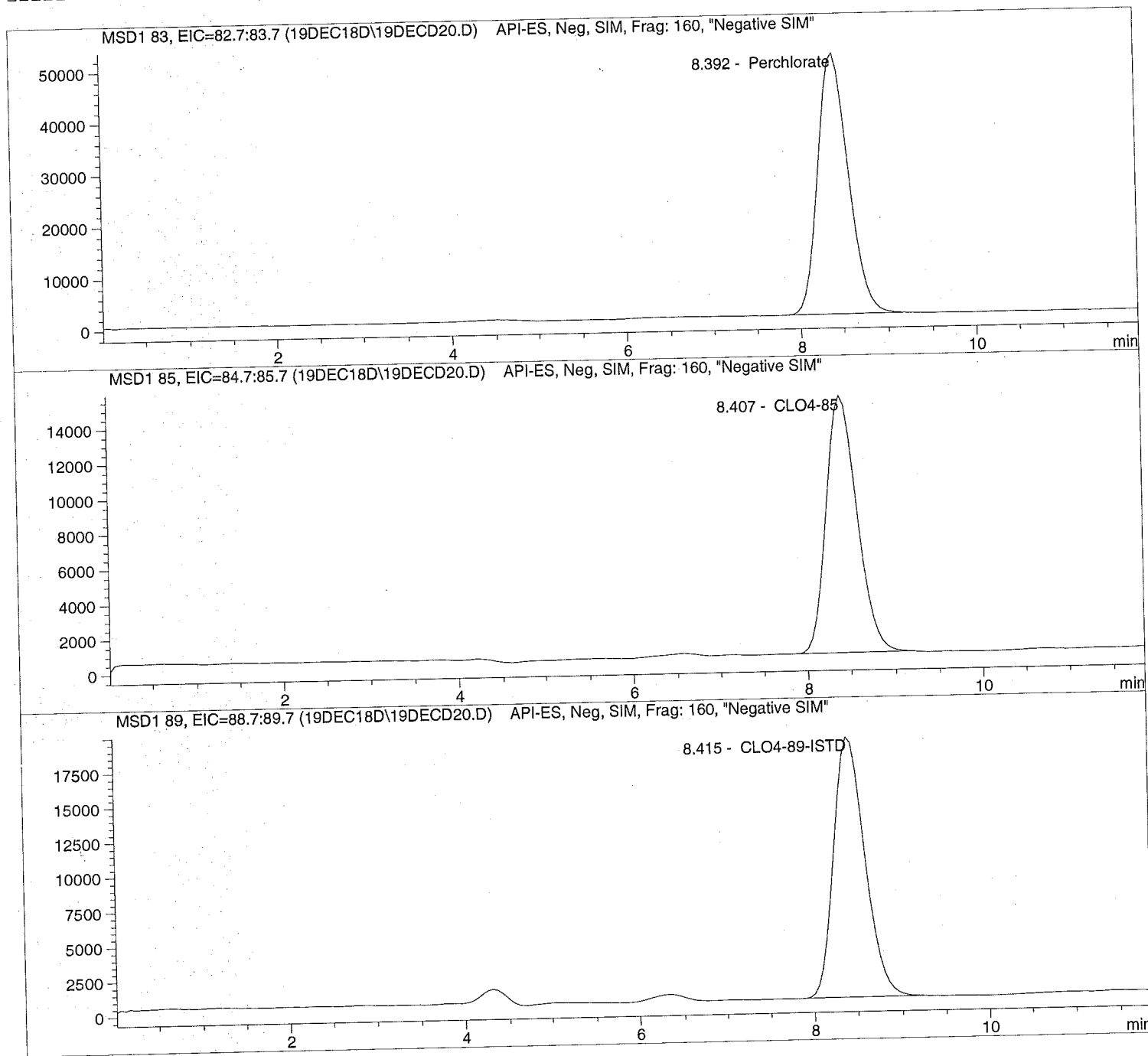
Sample Name: 1834591008 100

Injection Date: 12/19/2018 12:49:52  
Sample Name: 1834591008 100  
Acq Operator: TNB

Seq Line: 20  
Location: Vial 88  
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



```
=====
Injection Date: 12/19/2018 12:49:52      Seq Line:          20
Sample Name:    1834591008 100           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:       100.000000
Sample Amount:  0.000
```

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.392	PBA	1225937.5	833.5335	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.407	PBA	359153.4	810.3836	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.415	PBA	459695.6	500.0000	CLO4-89-ISTD

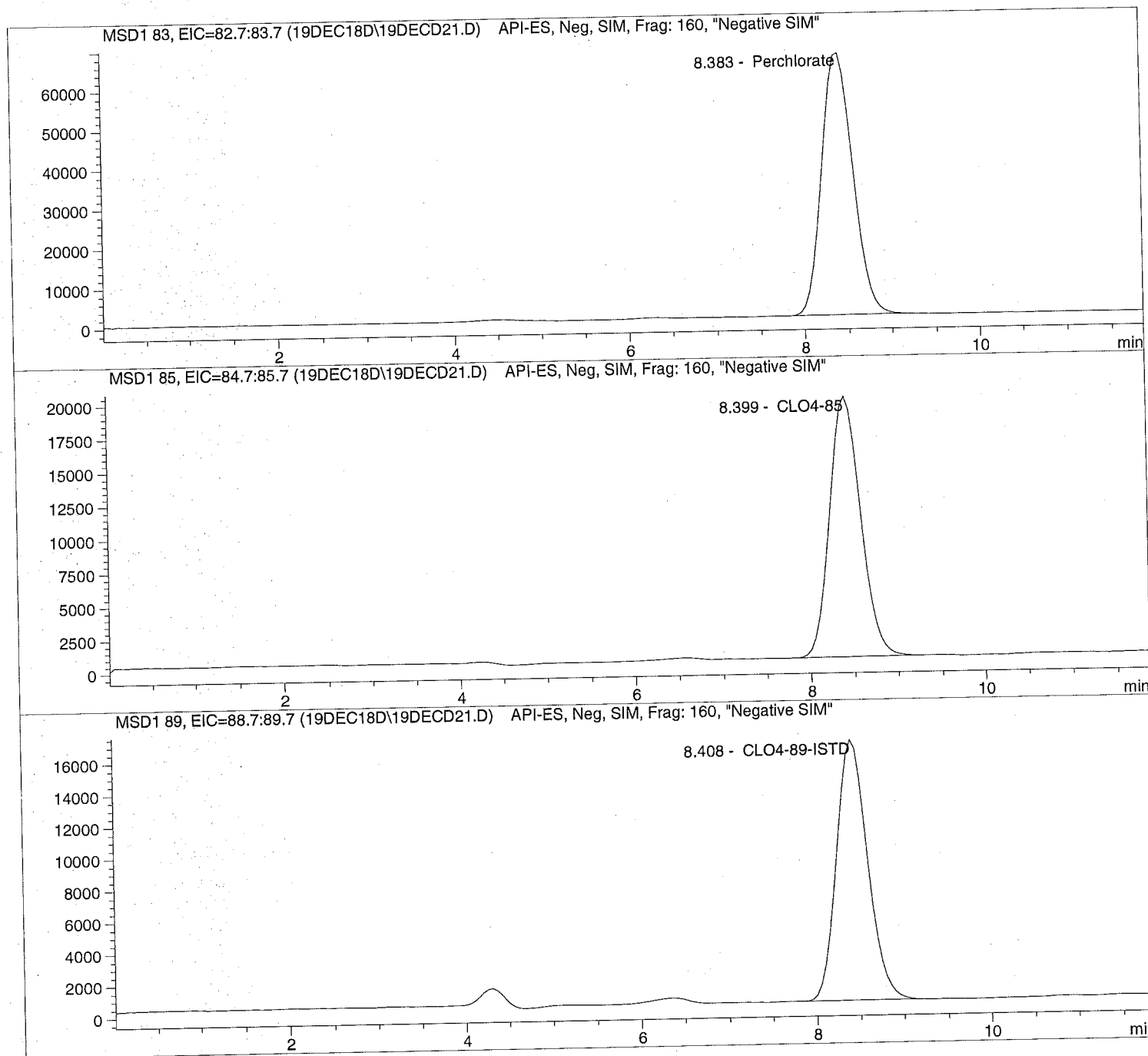
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 13:03:38  
Sample Name: 1834591009 100  
Acq Operator: TNB

Seq Line: 21  
Location: Vial 89  
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



Injection Date: 12/19/2018 13:03:38      Seq Line: 21  
Sample Name: 1834591009 100      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: 100.000000  
Sample Amount: 0.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.383	PBA	1624602.3	1220.2714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.399	BBA	478619.9	1195.4450	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.408	BBA	409950.0	500.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD22.D

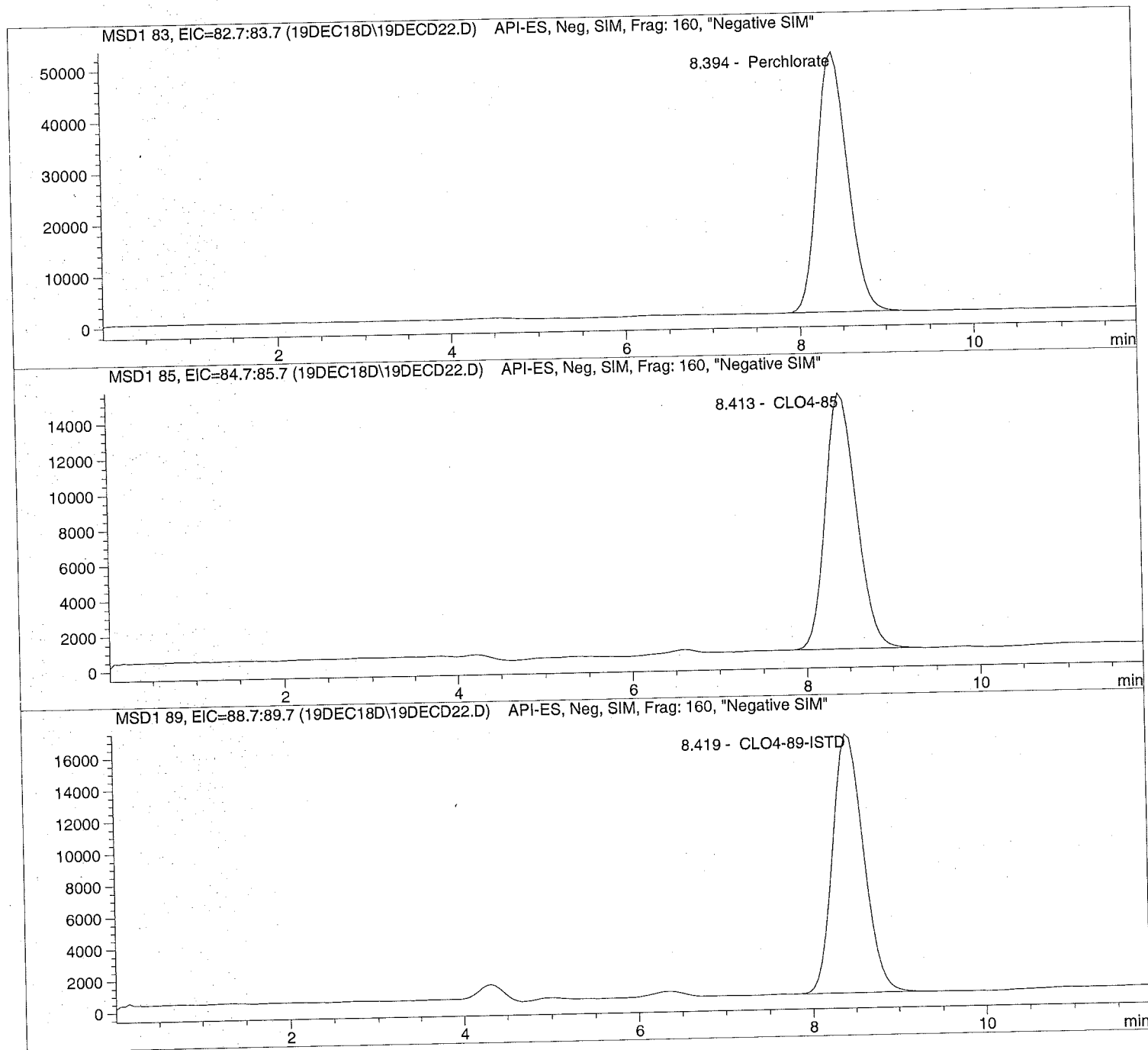
Sample Name: 1834591010 100

Injection Date: 12/19/2018 13:17:30  
Sample Name: 1834591010 100  
Acq Operator: TNB

Seq Line: 22  
Location: Vial 90  
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\19DEC18D\19DECD22.D

Sample Name: 1834591010 100

```

=====
Injection Date: 12/19/2018 13:17:30      Seq Line:          22
Sample Name:    1834591010 100           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:       100.000000
Sample Amount:  0.000
=====

```

```

=====
                          LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.394	PBA	1236587.0	941.3072	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.413	PBA	363480.3	919.0352	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.419	BBA	408616.1	500.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD23.D

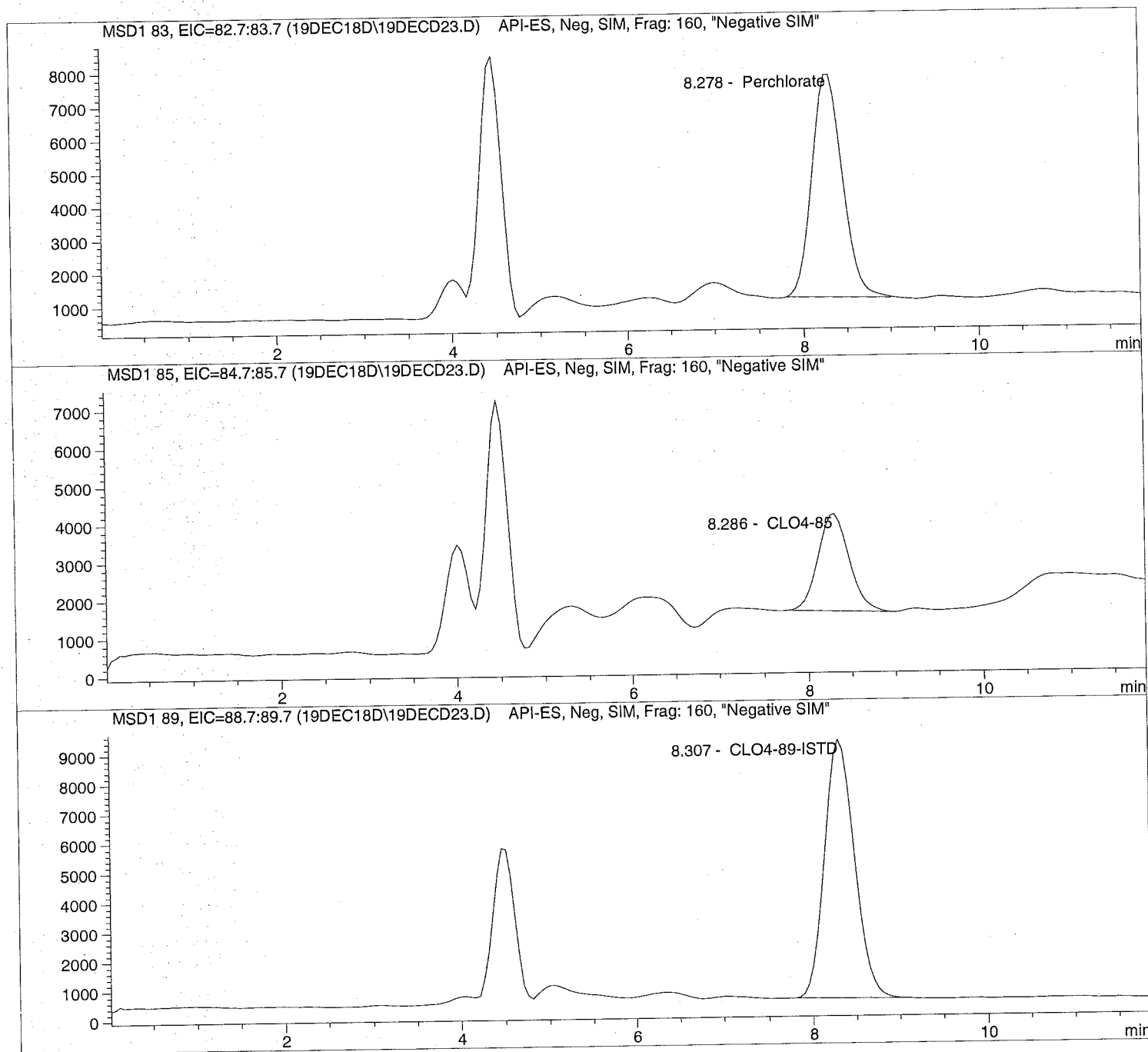
Sample Name: 1834871001

Injection Date: 12/19/2018 13:31:20  
Sample Name: 1834871001  
Acq Operator: TNB

Seq Line: 23  
Location: Vial 91  
Inj. No.: 1  
Inj. Vol.: 30  $\mu$ l

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\19DEC18D\19DECD23.D

Sample Name: 1834871001

```

=====
Injection Date: 12/19/2018 13:31:20      Seq Line:          23
Sample Name:    1834871001                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:       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
8.278	PBA	162192.9	2.6000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.286	PBA	63760.8	3.2576	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.307	PBA	208798.9	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

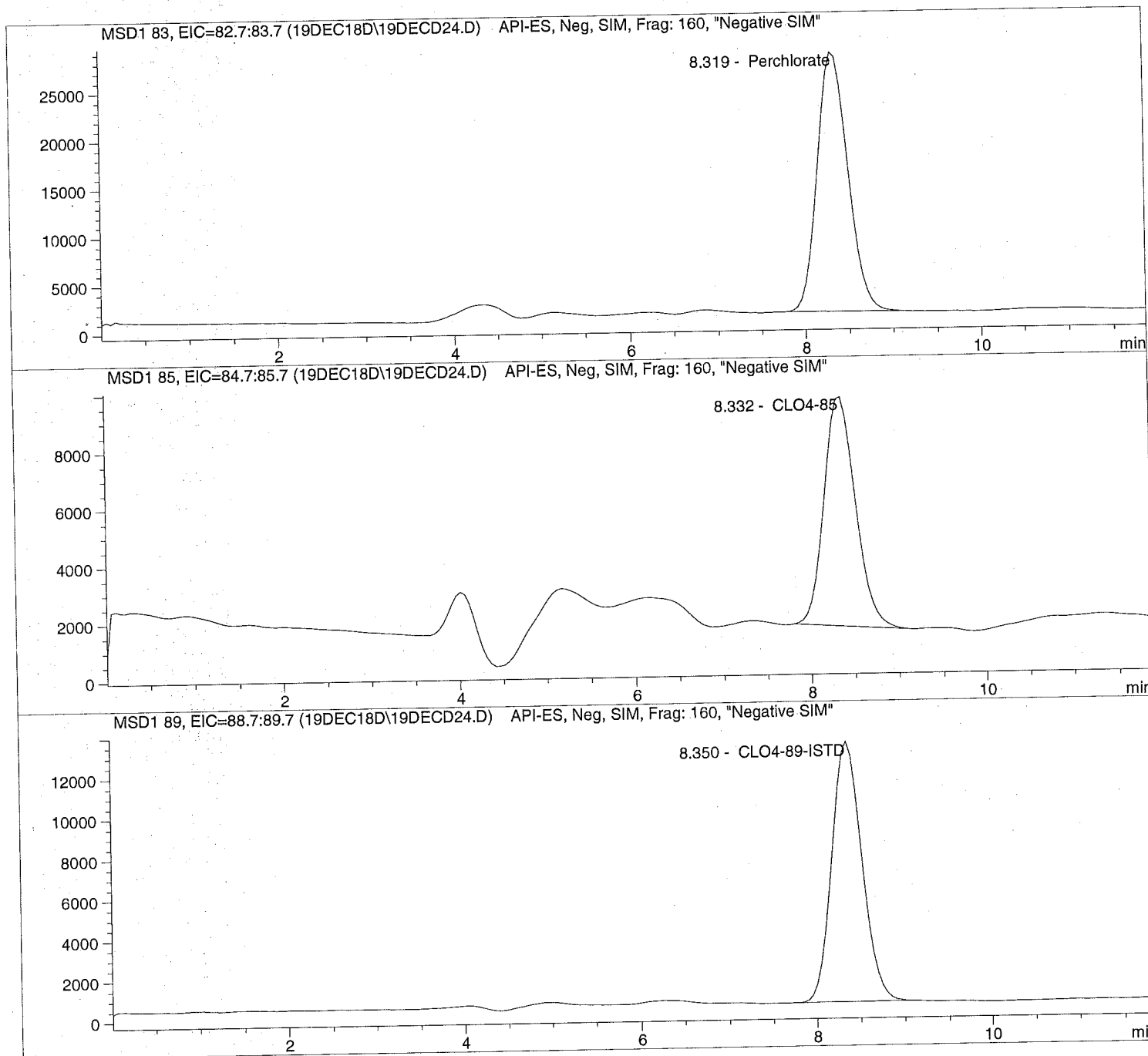


Injection Date: 12/19/2018 13:45:08  
Sample Name: 1834591006 10X  
Acq Operator: TNB

Seq Line: 24  
Location: Vial 92  
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\19DEC18D\19DECD24.D Sample Name: 1834591006 10X

```

=====
Injection Date: 12/19/2018 13:45:08      Seq Line:          24
Sample Name:   1834591006 10X           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-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
8.319	BBA	648996.5	66.5194	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.332	PBA	199622.2	67.6252	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.350	PBA	307854.8	50.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

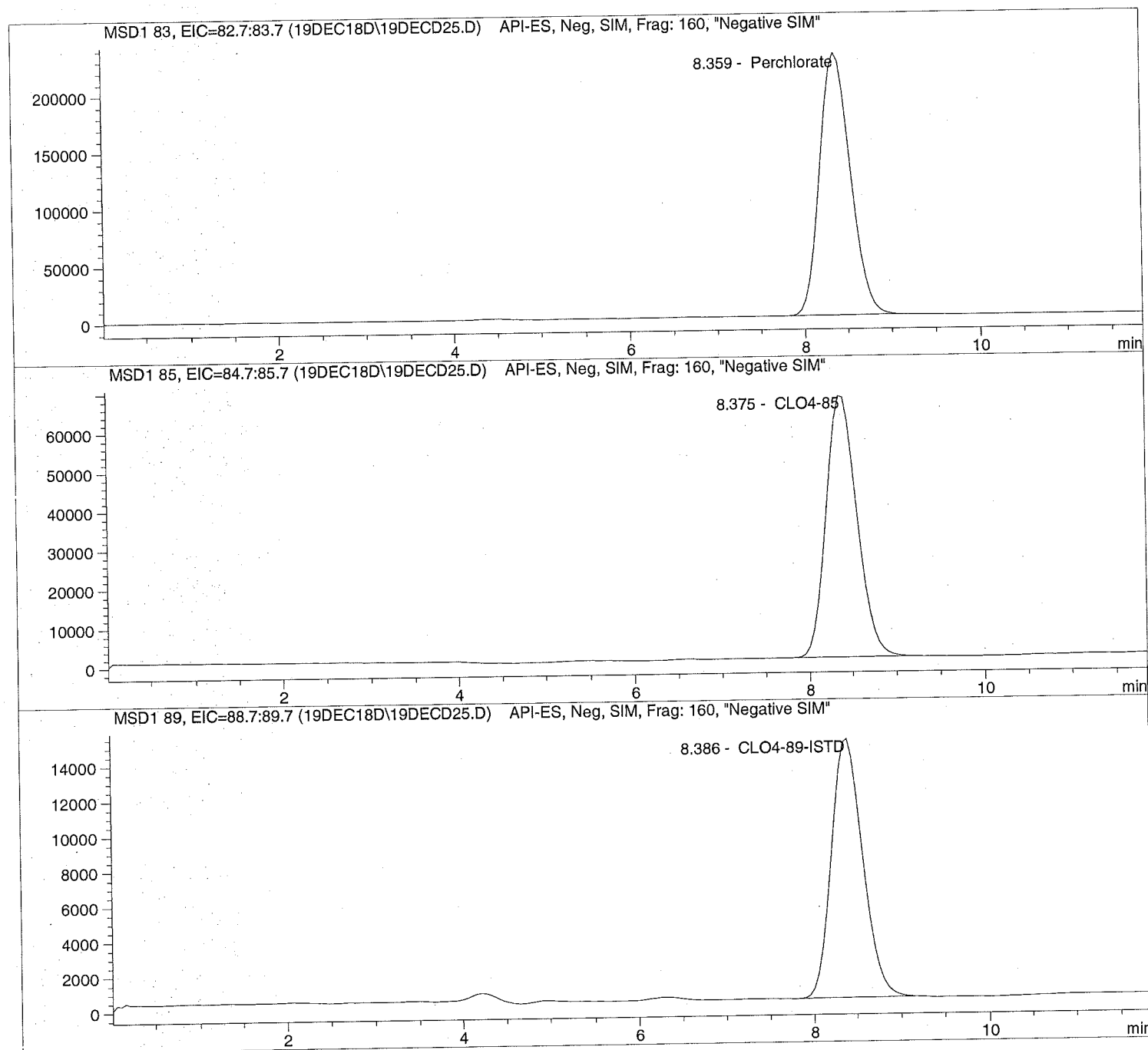
```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD25.D Sample Name: 1834591007 10X

```
=====
Injection Date: 12/19/2018 13:58:54      Seq Line:          25
Sample Name:    1834591007 10X           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-DPR.M
Last Changed:   12/3/2018 12:46:06
```

## Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD25.D Sample Name: 1834591007 10X

=====  
 Injection Date: 12/19/2018 13:58:54 Seq Line: 25  
 Sample Name: 1834591007 10X 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-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
8.359	PBA	5688991.5	441.4471	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.375	PBA	1662108.8	424.5719	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.386	PBA	371021.2	50.0000	CLO4-89-ISTD

=====  
 \*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD26.D

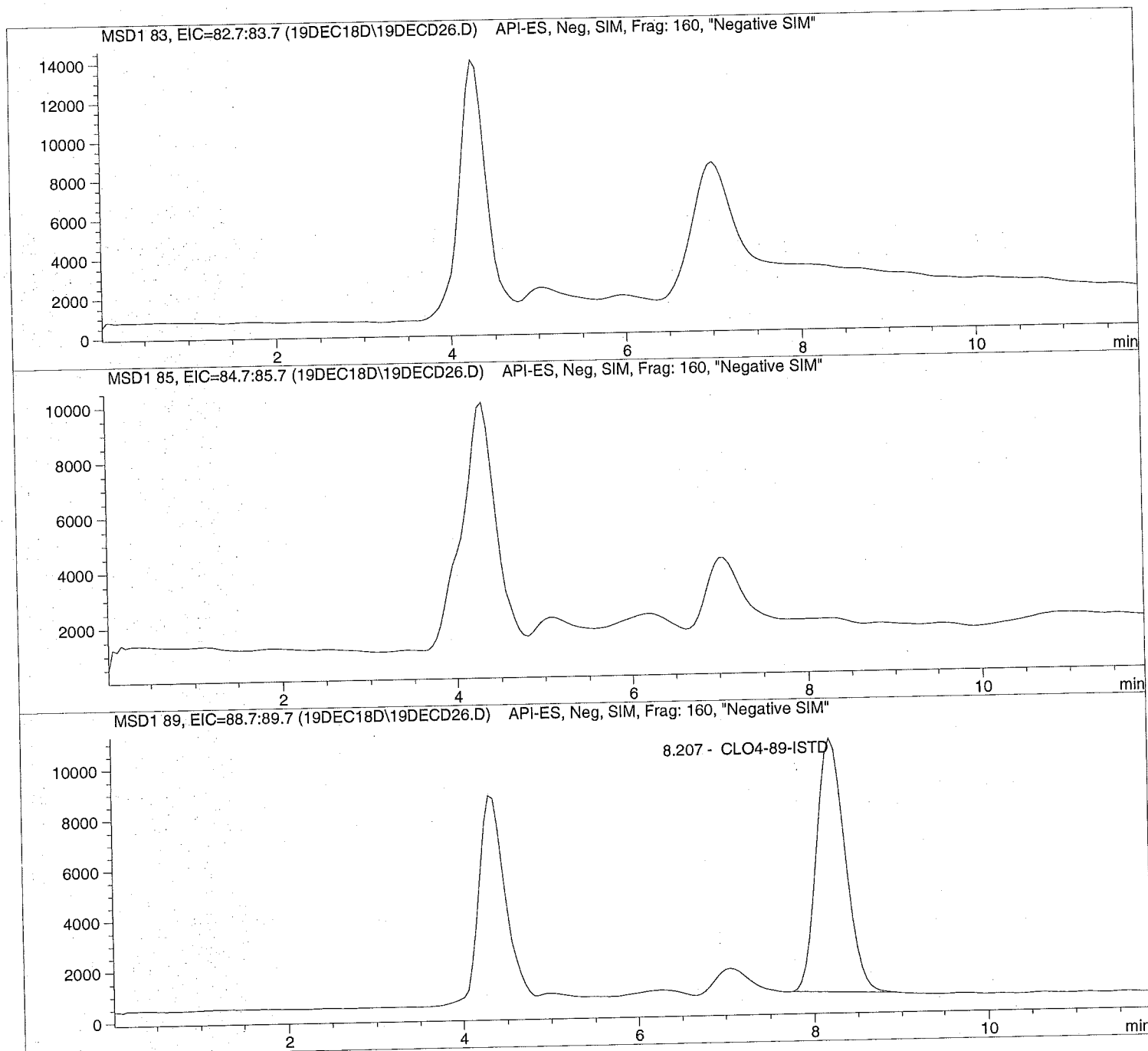
Sample Name: 1834591005 RE

Injection Date: 12/19/2018 14:12:47  
Sample Name: 1834591005 RE  
Acq Operator: TNB

Seq Line: 26  
Location: Vial 94  
Inj. No.: 1  
Inj. Vol.: 30  $\mu$ l

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\19DEC18D\19DECD26.D

Sample Name: 1834591005 RE

```

=====
Injection Date: 12/19/2018 14:12:47      Seq Line:          26
Sample Name:    1834591005 RE             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-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
8.207	PBA	229203.5	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD27.D

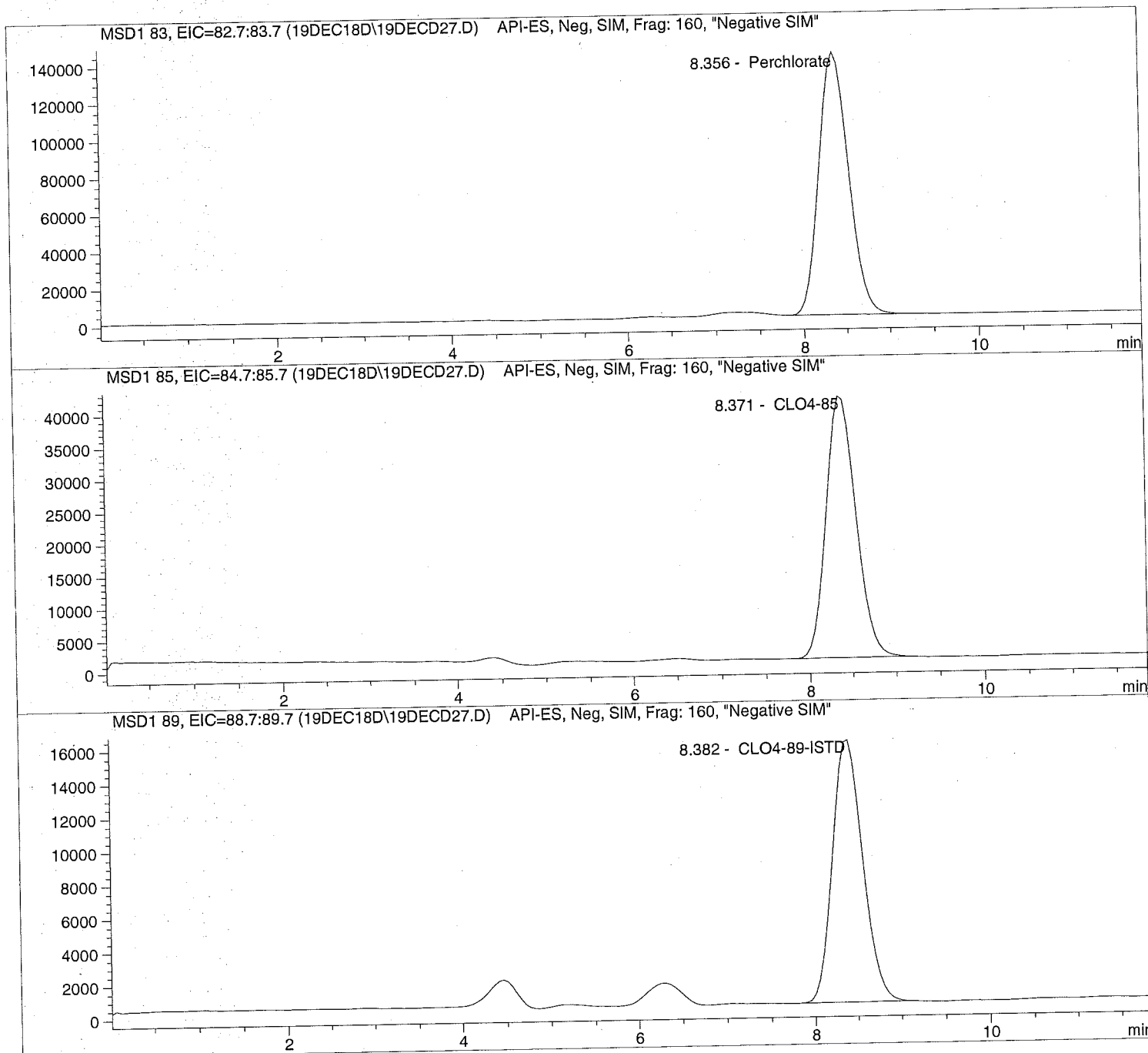
Sample Name: 633247 CCV@25

Injection Date: 12/19/2018 14:26:31  
Sample Name: 633247 CCV@25  
Acq Operator: TNB

Seq Line: 27  
Location: Vial 71  
Inj. No.: 1  
Inj. Vol.: 30  $\mu$ l

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\19DEC18D\19DECD27.D

Sample Name: 633247 CCV@25

```

=====
Injection Date: 12/19/2018 14:26:31      Seq Line:          27
Sample Name:    633247    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
8.356	VBA	3387879.3	26.2108	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.371	PBA	985046.6	25.2825	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.382	PBA	384846.7	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```



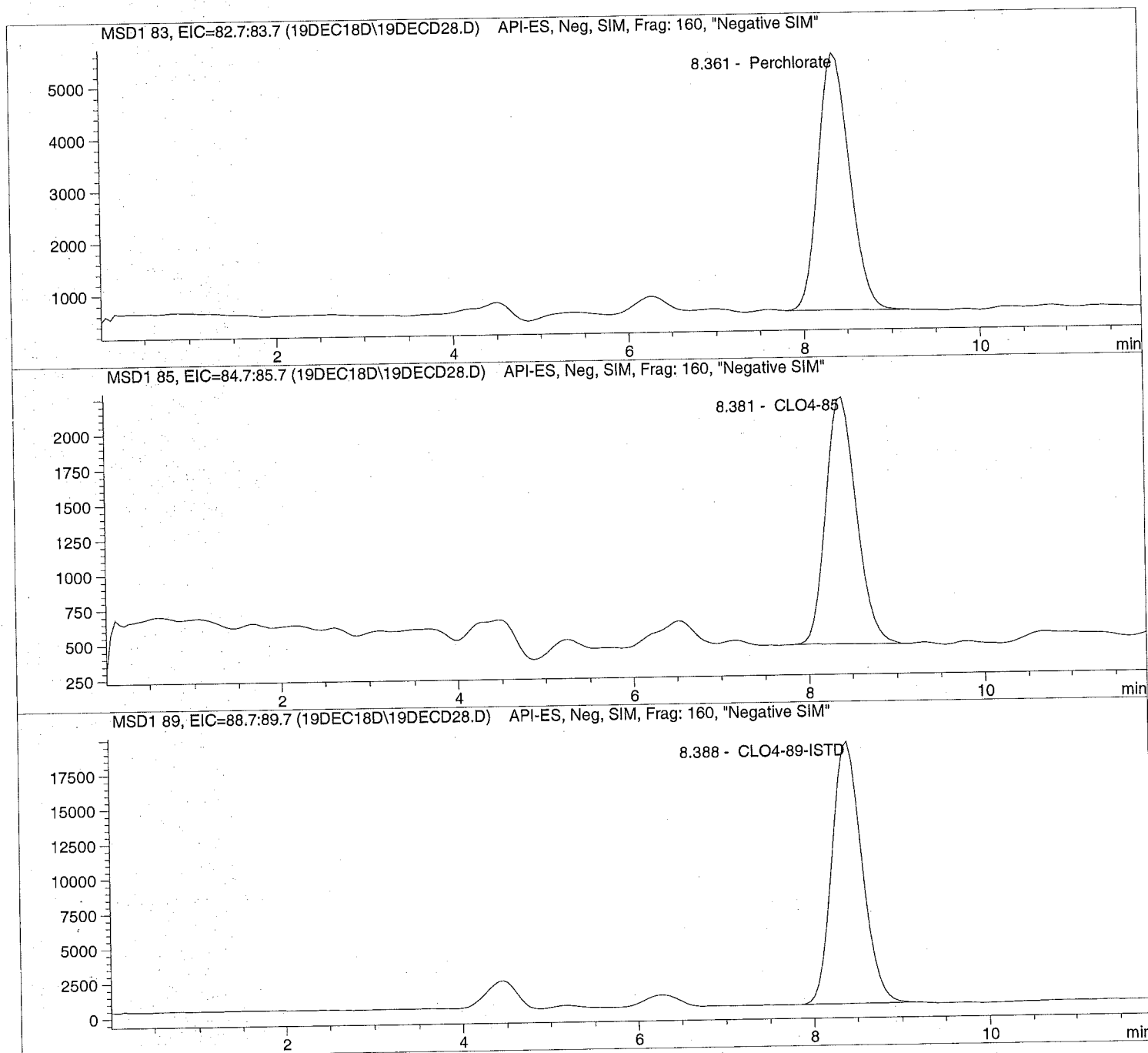
Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD28.D

Sample Name: 633248 LODV@1.

=====  
Injection Date: 12/19/2018 14:40:17  
Sample Name: 633248 LODV@1.  
Acq Operator: TNB

Seq Line: 28  
Location: Vial 72  
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\19DEC18D\19DECD28.D Sample Name: 633248 LODV@1.

=====  
 Injection Date: 12/19/2018 14:40:17 Seq Line: 28  
 Sample Name: 633248 LODV@1. 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: 1.000

=====  
 LCMS Results  
 =====

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.361	PBA	123908.4	1.0564	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.381	PBA	43105.4	1.0834	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.388	PBA	451163.4	5.0000	CLO4-89-ISTD

=====  
 \*\*\* End of Report \*\*\*



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Raw Data**

**Initial  
Calibration**

## Batch Review Method:

C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==&gt; Run has not been reprocessed with Batch Review Method

['\*' ==&gt; 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 Verfe	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 Verfe	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 Verfe	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 &amp; 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
9.287	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	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	1.00000	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		

ethod C:\HPCHEM\1\METHODS\CLO4-DPR.M

RetTime [min]	Lvl Sig	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

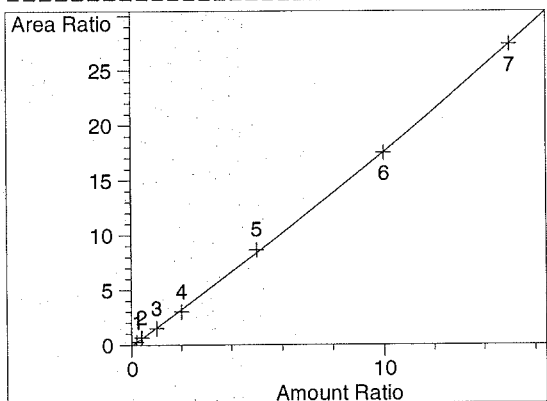
Calibration Level Weights:/

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

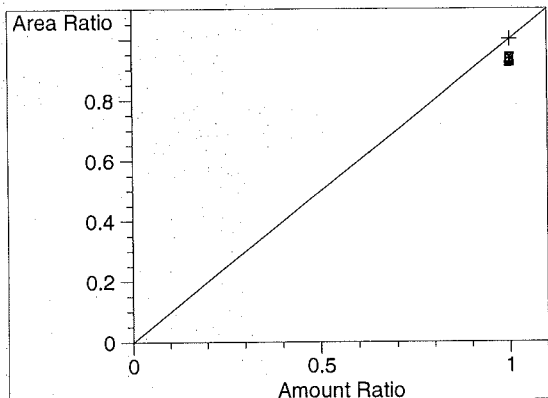
=====  
Peak Sum Table  
=====

\*\*\*No Entries in table\*\*\*  
=====

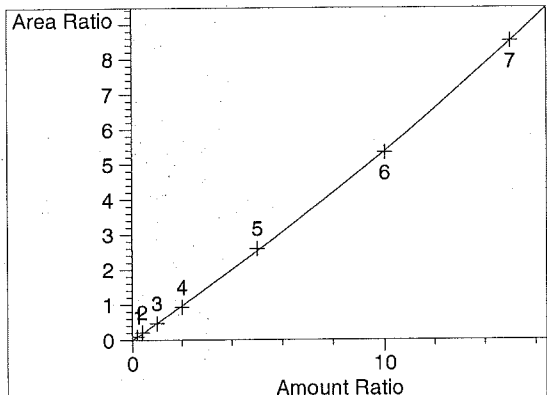
=====  
 Calibration Curves  
 =====



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

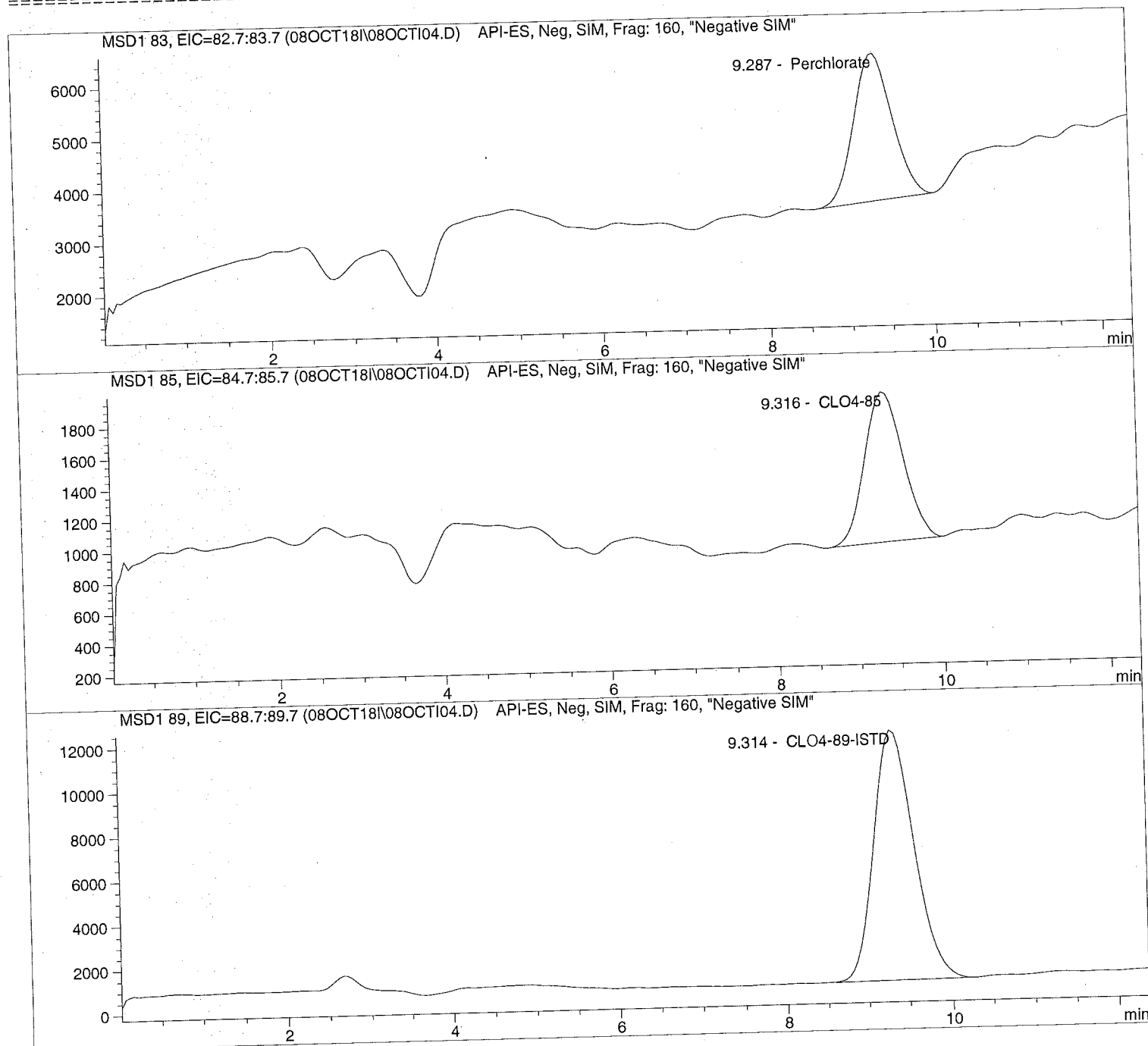
Sample Name: CLO4@ 1.0ug/L

Injection Date: 10/08/2018 11:37:35  
Sample Name: CLO4@ 1.0ug/L  
Acq Operator: TNB

Seq Line: 4  
Location: Vial 74  
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

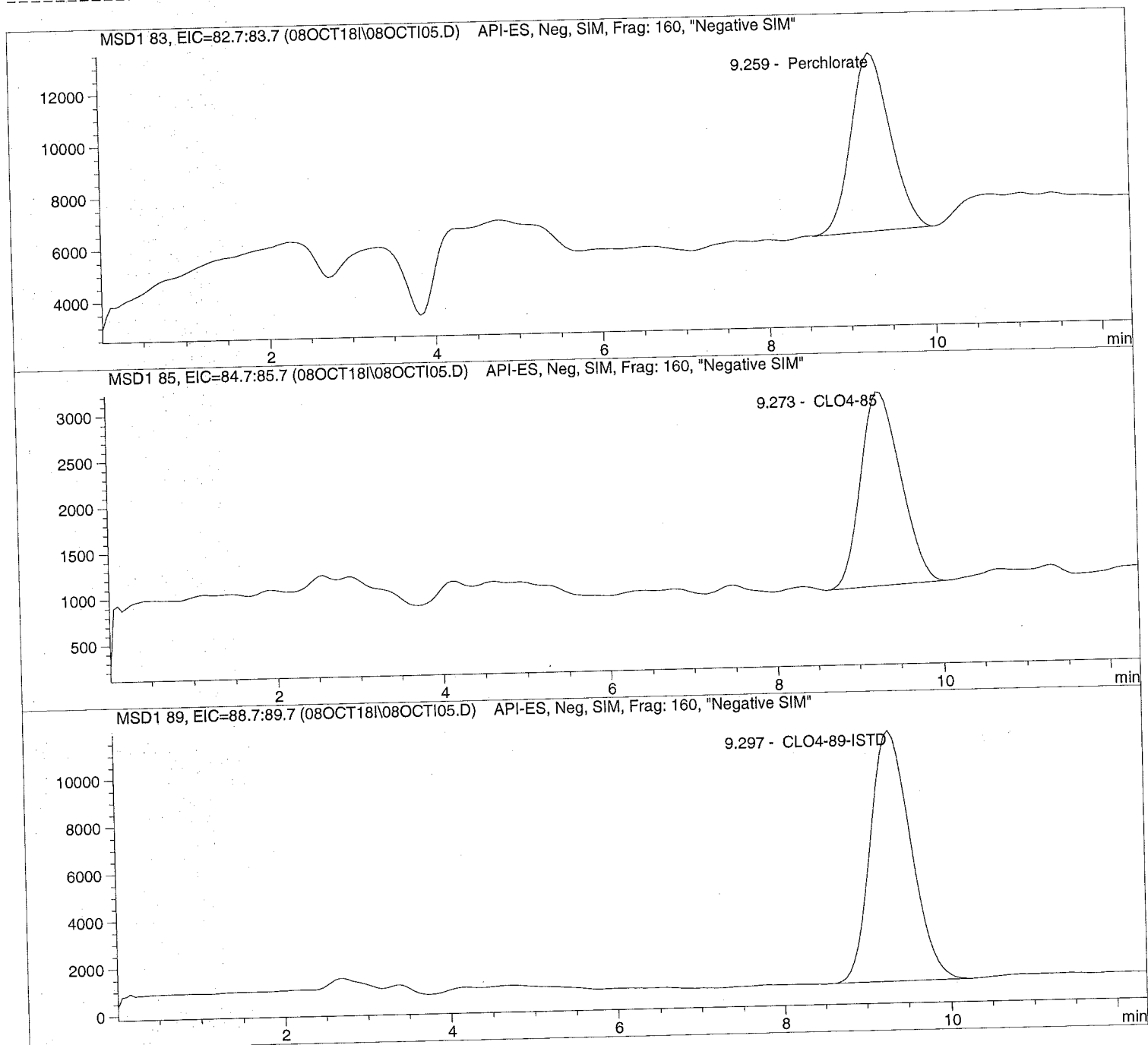
Sample Name: CLO4@ 2.0ug/L

Injection Date: 10/08/2018 11:51:45  
Sample Name: CLO4@ 2.0ug/L  
Acq Operator: TNB

Seq Line: 5  
Location: Vial 75  
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

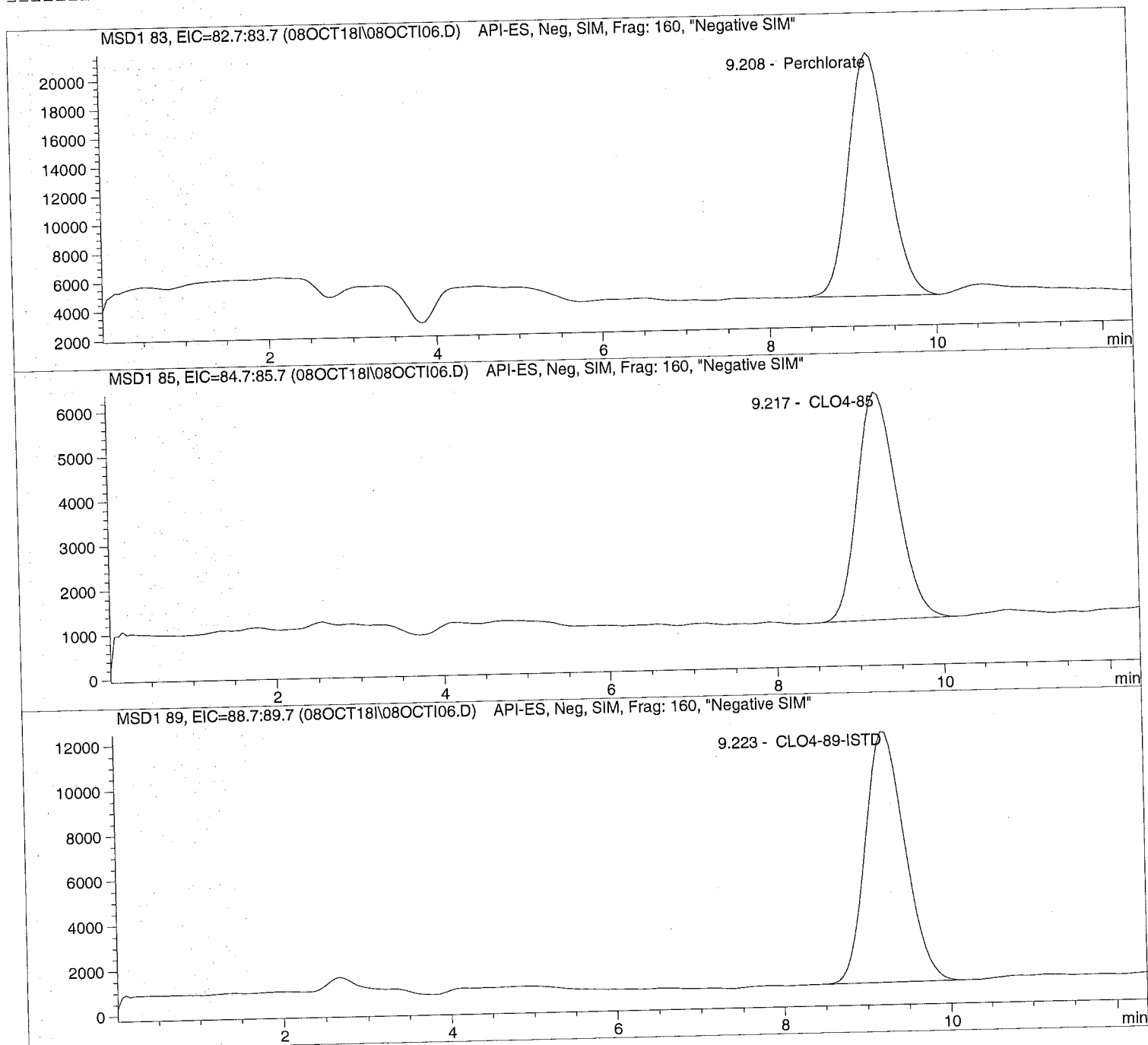
Sample Name: CLO4@ 5.0ug/L

Injection Date: 10/08/2018 12:05:59  
Sample Name: CLO4@ 5.0ug/L  
Acq Operator: TNB

Seq Line: 6  
Location: Vial 76  
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



```
=====
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

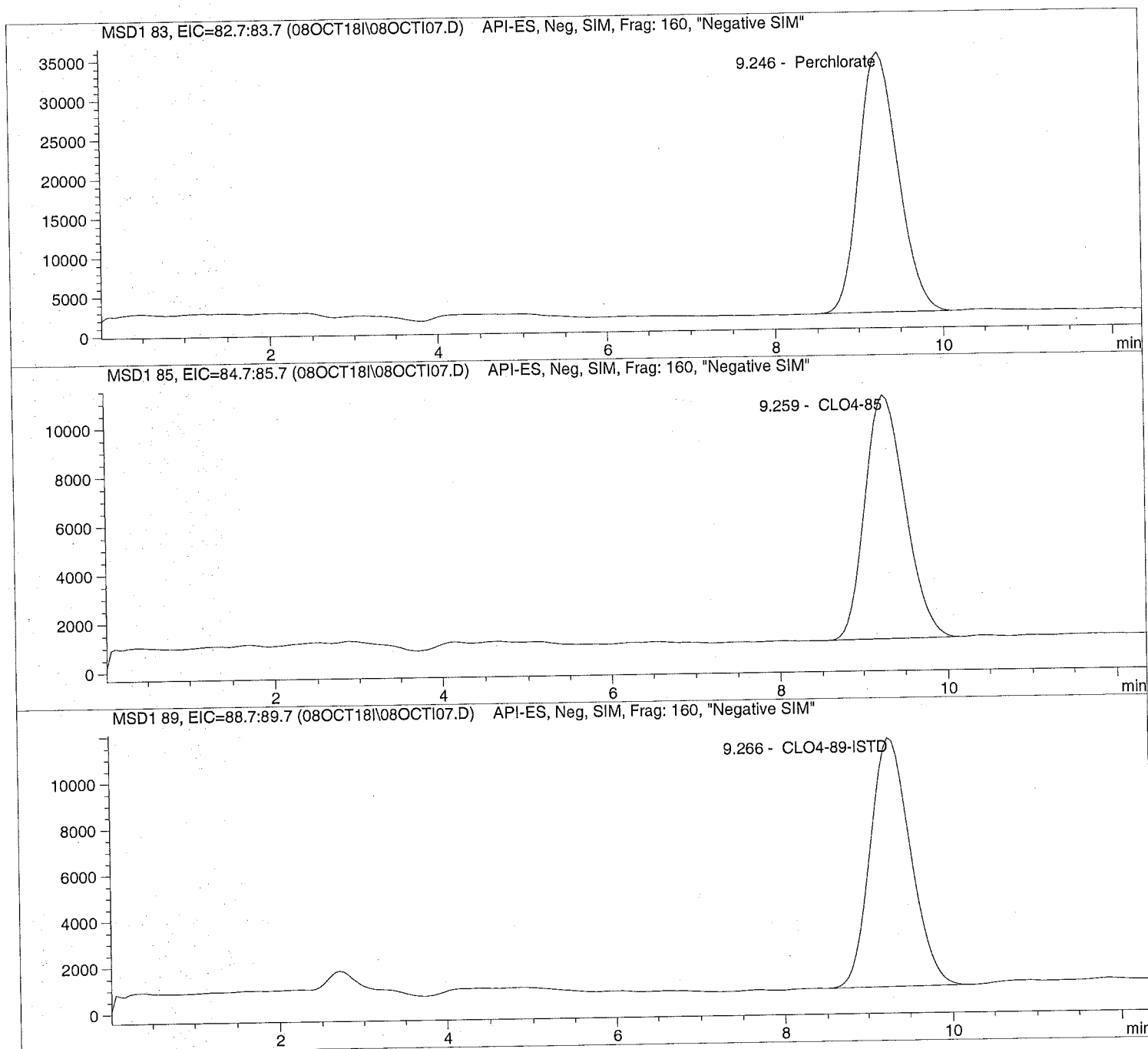
Sample Name: CLO4@ 10.ug/L

Injection Date: 10/08/2018 12:20:10  
Sample Name: CLO4@ 10.ug/L  
Acq Operator: TNB

Seq Line: 7  
Location: Vial 77  
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

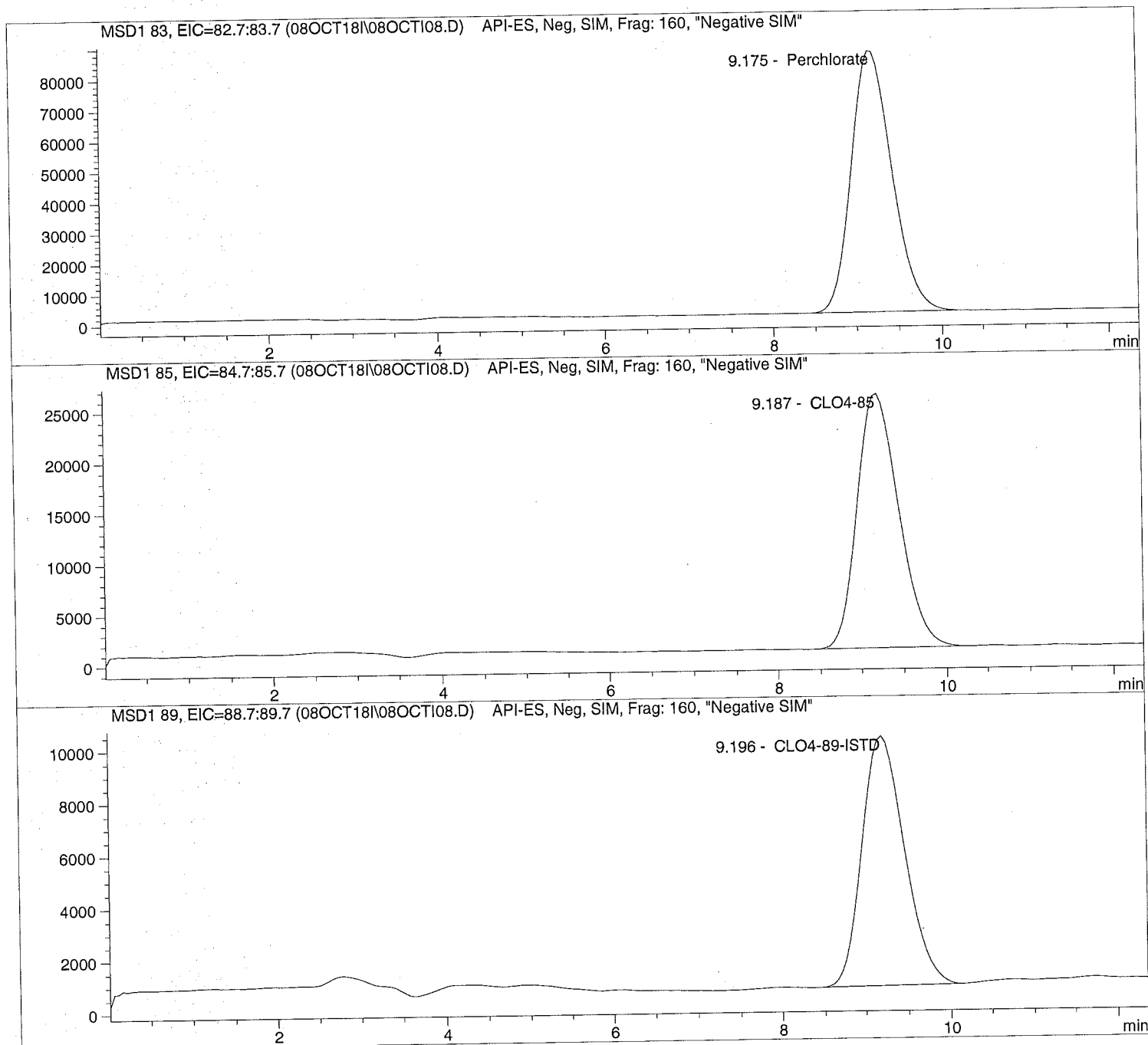
Sample Name: CLO4@ 25.ug/L

Injection Date: 10/08/2018 12:34:24  
Sample Name: CLO4@ 25.ug/L  
Acq Operator: TNB

Seq Line: 8  
Location: Vial 78  
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

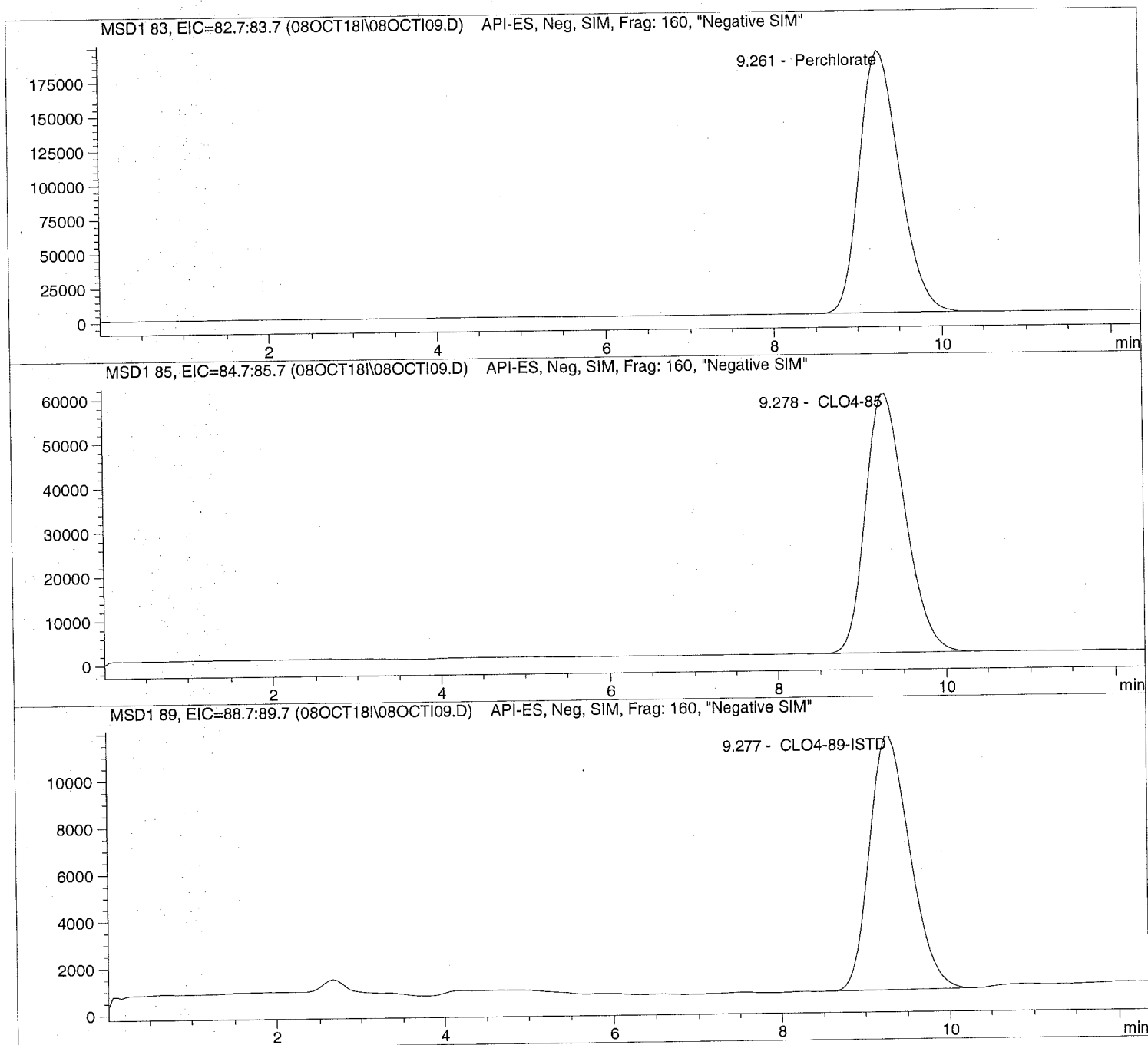
Sample Name: CLO4@ 50.ug/L

Injection Date: 10/08/2018 12:48:34  
Sample Name: CLO4@ 50.ug/L  
Acq Operator: TNB

Seq Line: 9  
Location: Vial 79  
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

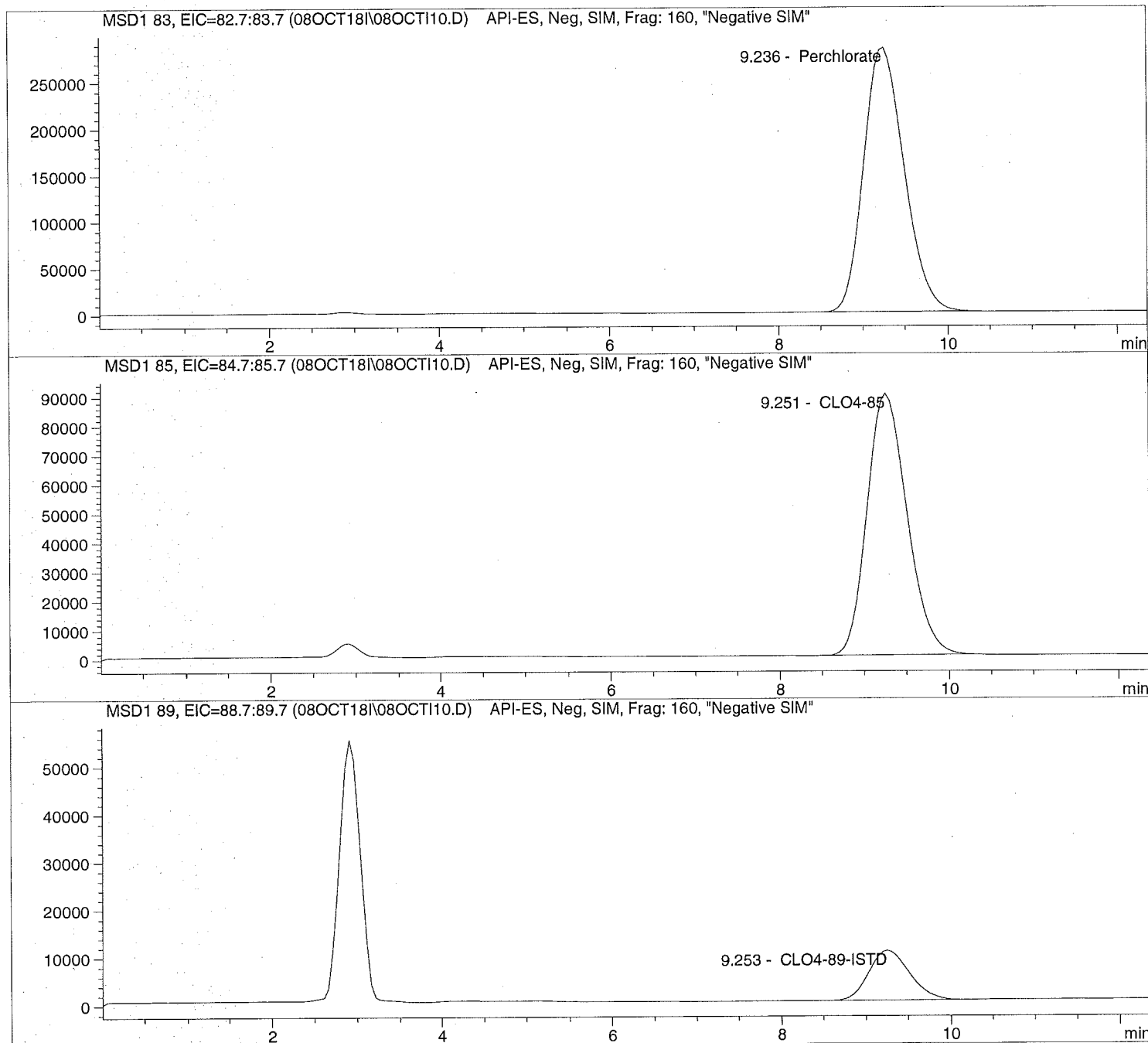
Sample Name: CLO4@ 75.ug/L

Injection Date: 10/08/2018 13:02:48  
Sample Name: CLO4@ 75.ug/L  
Acq Operator: TNB

Seq Line: 10  
Location: Vial 80  
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 ***
=====

```

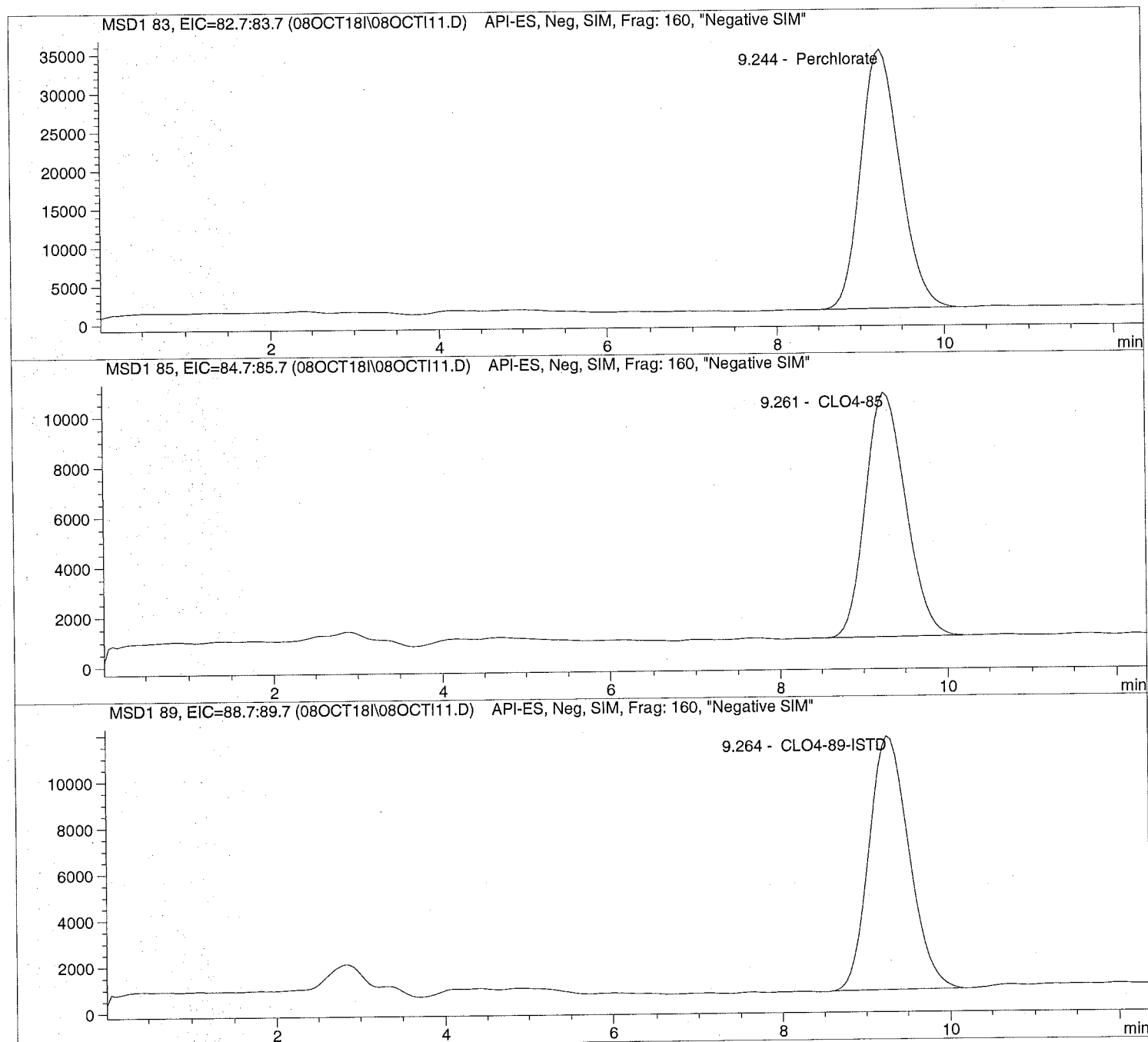
Data file: C:\HPCHEM\1\DATA\08OCT18\08OCTI11.D

Sample Name: ICAL Verf@10ug/L

=====  
Injection Date: 10/08/2018 13:17:00  
Sample Name: ICAL Verf@10ug/L  
Acq Operator: TNB

Seq Line: 11  
Location: Vial 81  
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 \*\*\*





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

December 28, 2018

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

Work Order: **HS18120731**

Laboratory Results for: **Groundwater Treatment Plant Weekly Samples**

Dear Marcia,

ALS Environmental received 1 sample(s) on Dec 13, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Raj. P. Modashia', enclosed in a simple oval.

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

**ALS Houston, US**

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18120731

**SAMPLE SUMMARY**

---

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120731-01	LH18/24-SP650_121218	Water		12-Dec-2018 14:00	13-Dec-2018 09:35	<input type="checkbox"/>

---

ALS Houston, US

Date: 28-Dec-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:**

---

**CASE NARRATIVE**

---

**Work Order Comments**

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

**Work Order Comments**

- The analysis for TOC was subcontracted to ALS Kelso, WA. Final report attached.
- 

**WetChemistry by Method E350.3****Batch ID: R329976**

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

**WetChemistry by Method E365.3****Batch ID: R329305****Sample ID: LH18/24-SP650\_121218 (HS18120731-01MS)**

- The recovery of the Matrix Spike (MS) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The recovery of the MS may be due to sample matrix interference.

**Sample ID: LH18/24-SP650\_121218 (HS18120731-01MSD)**

- The recovery of the Matrix Spike Duplicate (MSD) associated to this analyte was outside of the established control limits. However, the LCS was within control limits. The failed recovery of the MSD may be due to sample matrix interference.
-

## ALS Houston, US

Date: 28-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: Groundwater Treatment Plant Weekly Samples  
 Sample ID: LH18/24-SP650\_121218  
 Collection Date: 12-Dec-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18120731  
 Lab ID:HS18120731-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>AMMONIA AS N BY E350.3(ISE)</b>								Analyst: MZD
	<b>Method:E350.3</b>							
Nitrogen, Ammonia (As N)	14		0.20	0.50	0.20	mg/L	1	26-Dec-2018 17:00
<b>ORTHO PHOSPHATE (PO4) AS P BY E365.3</b>								Analyst: MZD
	<b>Method:E365.3</b>							
Phosphorus, Total Orthophosphate (As P)	2.23		0.100	0.400	0.250	mg/L	10	14-Dec-2018 13:45
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>								Analyst: SUB
	<b>Method:NA</b>							
Subcontract Analysis	See Attached		0	0		NA	1	26-Dec-2018 12:21
<b>SUBCONTRACT ANALYSIS - TOC ANALYSIS</b>								Analyst: SUBK
	<b>Method:NA</b>							
Subcontract Analysis	See Attached		0	0		NA	1	28-Dec-2018 10:25

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

ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120731

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R329305	<b>Test Name :</b> ORTHO PHOSPHATE (PO4) AS P BY E365.3		<b>Matrix:</b> Water			
HS18120731-01	LH18/24-SP650_121218	12 Dec 2018 14:00			14 Dec 2018 13:45	10
<b>Batch ID</b> R329912	<b>Test Name :</b> SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18120731-01	LH18/24-SP650_121218	12 Dec 2018 14:00			26 Dec 2018 12:21	1
<b>Batch ID</b> R329976	<b>Test Name :</b> AMMONIA AS N BY E350.3(ISE)		<b>Matrix:</b> Water			
HS18120731-01	LH18/24-SP650_121218	12 Dec 2018 14:00			26 Dec 2018 17:00	1
<b>Batch ID</b> R330084	<b>Test Name :</b> SUBCONTRACT ANALYSIS - TOC ANALYSIS		<b>Matrix:</b> Water			
HS18120731-01	LH18/24-SP650_121218	12 Dec 2018 14:00			28 Dec 2018 10:25	1

ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120731

**QC BATCH REPORT**

Batch ID: R329305		Instrument: UV-2450		Method: E365.3						
<b>MBLK</b>	Sample ID: <b>MBLK-329305</b>	Units: <b>mg/L</b>		Analysis Date: <b>14-Dec-2018 13:45</b>						
Client ID:	Run ID: <b>UV-2450_329305</b>	SeqNo: <b>4866292</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.0400	0.0250							U	
<b>LCS</b>	Sample ID: <b>LCS-329305</b>	Units: <b>mg/L</b>		Analysis Date: <b>14-Dec-2018 13:45</b>						
Client ID:	Run ID: <b>UV-2450_329305</b>	SeqNo: <b>4866293</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.251	0.0250	0.25	0	100	85 - 115				
<b>MS</b>	Sample ID: <b>HS18120731-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>14-Dec-2018 13:45</b>						
Client ID: <b>LH18/24-SP650_121218</b>	Run ID: <b>UV-2450_329305</b>	SeqNo: <b>4866295</b>		PrepDate:			DF: <b>10</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	3.77	0.250	2.5	2.23	61.6	80 - 120			S	
<b>MSD</b>	Sample ID: <b>HS18120731-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>14-Dec-2018 13:45</b>						
Client ID: <b>LH18/24-SP650_121218</b>	Run ID: <b>UV-2450_329305</b>	SeqNo: <b>4866296</b>		PrepDate:			DF: <b>10</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	3.52	0.250	2.5	2.23	51.6	80 - 120	3.77	6.86	20 S	

The following samples were analyzed in this batch: HS18120731-01

ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120731

**QC BATCH REPORT**

Batch ID: R329976		Instrument: WetChem_HS		Method: E350.3	
<b>MBLK</b>	Sample ID: <b>MBLK-329976</b>	Units: <b>mg/L</b>		Analysis Date: <b>26-Dec-2018 17:00</b>	
Client ID:	Run ID: <b>WetChem_HS_329976</b>	SeqNo: <b>4882782</b>	PrepDate:	DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC Control Limit RPD Ref Value %RPD RPD Limit Qual
Nitrogen, Ammonia (As N)	0.50	0.20			U
<b>LCS</b>	Sample ID: <b>LCS-329976</b>	Units: <b>mg/L</b>		Analysis Date: <b>26-Dec-2018 17:00</b>	
Client ID:	Run ID: <b>WetChem_HS_329976</b>	SeqNo: <b>4882783</b>	PrepDate:	DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC Control Limit RPD Ref Value %RPD RPD Limit Qual
Nitrogen, Ammonia (As N)	9.989	0.20	10	0	99.9 80 - 120
<b>MS</b>	Sample ID: <b>HS18120977-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>26-Dec-2018 17:00</b>	
Client ID:	Run ID: <b>WetChem_HS_329976</b>	SeqNo: <b>4882786</b>	PrepDate:	DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC Control Limit RPD Ref Value %RPD RPD Limit Qual
Nitrogen, Ammonia (As N)	12.59	0.20	10	2.957	96.3 80 - 120
<b>MSD</b>	Sample ID: <b>HS18120977-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>26-Dec-2018 17:00</b>	
Client ID:	Run ID: <b>WetChem_HS_329976</b>	SeqNo: <b>4882787</b>	PrepDate:	DF: <b>1</b>	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC Control Limit RPD Ref Value %RPD RPD Limit Qual
Nitrogen, Ammonia (As N)	12.6	0.20	10	2.957	96.4 80 - 120 12.59 0.0794 20

The following samples were analyzed in this batch: HS18120731-01

**ALS Houston, US**

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**WorkOrder:** HS18120731

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program



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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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

ALS Houston, US

Date: 28-Dec-18

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** Groundwater Treatment Plant Weekly Samples  
**Work Order:** HS18120731

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**SAMPLE TRACKING**


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Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18120731-01	LH18/24-SP650_121218	Login	12/13/2018 10:51:05 AM	JRM	WET257
HS18120731-01	LH18/24-SP650_121218	Login	12/13/2018 10:51:05 AM	JRM	WET257
HS18120731-01	LH18/24-SP650_121218	Login	12/13/2018 10:51:05 AM	JRM	Sub

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 <b>ALS</b> 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax +1 281 530 5887	<b>CUSTODY SEAL</b>		Seal Broken By: SM
	Date: 12/12/18 Time: 14:30 Name: Scott Beesinger Company: SGA		

24895  
DEC 13 2018

Must Deliver Next Business Day  
Time and Temperature Sensitive!



24895

ORIGIN ID: SGRA (903) 930-6199  
 SCOTT BEESINGER  
 APTIM ENVIRONMENTAL & INFRASTRUCTURE  
 1203-B EAST GRAND AVE  
 PMB 202  
 MARSHALL, TX 75670  
 UNITED STATES US

SHIP DATE: 25APR18  
 ACTWGT: 1.00 LB MAN  
 CAD: 300130/LPFE3111  
 DIMS: 26x14x14 IN

10 CLIENT SERVICES  
 ALS LABORATORY GROUP  
 10450 STANCLIFF ROAD  
 SUITE 210  
 HOUSTON TX 77099

(281) 530-6888  
 REF: LHAAP-50-RJ

RNA: |||11111



FedEx  
EXPRESS



FedEx  
TRK# 0221 4380 9528 5124

THU - 13 DEC 10:30A  
 PRIORITY OVERNIGHT

AB SGRA

77099  
TX-US  
14





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ALS Environmental  
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[www.alsglobal.com](http://www.alsglobal.com)

December 28, 2018

**Analytical Report for Service Request No: K1812279**

RJ Modashia  
ALS Laboratory Group  
10450 Stancliff Road  
Suite 210  
Houston, TX 77099-4338

**RE: HS18120731 / HS18120731**

Dear RJ,

Enclosed are the results of the sample(s) submitted to our laboratory December 14, 2018  
For your reference, these analyses have been assigned our service request number **K1812279**.

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](http://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](mailto:Kelley.Lovejoy@alsglobal.com).

Respectfully submitted,

**ALS Group USA, Corp. dba ALS Environmental**

for Kelley Lovejoy  
Project Manager



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## Table of Contents

Acronyms

Qualifiers

State Certifications, Accreditations, And Licenses

Case Narrative

Chain of Custody

General Chemistry

Raw Data

    General Chemistry

## 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**

<b>Agency</b>	<b>Web Site</b>	<b>Number</b>
Alaska DEH	<a href="http://dec.alaska.gov/eh/lab/cs/csapproval.htm">http://dec.alaska.gov/eh/lab/cs/csapproval.htm</a>	UST-040
Arizona DHS	<a href="http://www.azdhs.gov/lab/license/env.htm">http://www.azdhs.gov/lab/license/env.htm</a>	AZ0339
Arkansas - DEQ	<a href="http://www.adeq.state.ar.us/techsvs/labcert.htm">http://www.adeq.state.ar.us/techsvs/labcert.htm</a>	88-0637
California DHS (ELAP)	<a href="http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx">http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx</a>	2795
DOD ELAP	<a href="http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm">http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm</a>	L16-58-R4
Florida DOH	<a href="http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm">http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm</a>	E87412
Hawaii DOH	<a href="http://health.hawaii.gov/">http://health.hawaii.gov/</a>	-
ISO 17025	<a href="http://www.pjllabs.com/">http://www.pjllabs.com/</a>	L16-57
Louisiana DEQ	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	03016
Maine DHS	<a href="http://www.maine.gov/dhhs/">http://www.maine.gov/dhhs/</a>	WA01276
Minnesota DOH	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	053-999-457
Nevada DEP	<a href="http://ndep.nv.gov/bsdw/labservice.htm">http://ndep.nv.gov/bsdw/labservice.htm</a>	WA01276
New Jersey DEP	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	WA005
New York - DOH	<a href="https://www.wadsworth.org/regulatory/elap">https://www.wadsworth.org/regulatory/elap</a>	12060
North Carolina DEQ	<a href="https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification">https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification</a>	605
Oklahoma DEQ	<a href="http://www.deq.state.ok.us/CSDnew/labcert.htm">http://www.deq.state.ok.us/CSDnew/labcert.htm</a>	9801
Oregon – DEQ (NELAP)	<a href="http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	WA100010
South Carolina DHEC	<a href="http://www.scdhec.gov/environment/EnvironmentalLabCertification/">http://www.scdhec.gov/environment/EnvironmentalLabCertification/</a>	61002
Texas CEQ	<a href="http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html</a>	T104704427
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C544
Wyoming (EPA Region 8)	<a href="https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water">https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water</a>	-
Kelso Laboratory Website	<a href="http://www.alsglobal.com">www.alsglobal.com</a>	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](http://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/analyte 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](http://www.alsglobal.com)



**Client:** ALS Environmental - US  
**Project:** HS18120731  
**Sample Matrix:** Water

**Service Request:** K1812279  
**Date Received:** 12/14/2018

#### CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

#### Sample Receipt:

One water sample was received for analysis at ALS Environmental on 12/14/2018. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

#### General Chemistry:

No significant anomalies were noted with this analysis.

Approved by

Nael D. Odeh

Date

12/28/2018



# 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](http://www.alsglobal.com)



K1812279

00922571

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: 10429

**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:** HS18120731  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18120731-01	LH18/24-SP650_121218	Water	12 Dec 2018 14:00
TOC Analysis for DOD Level IV			28 Dec 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: R Cige  
Received By: \_\_\_\_\_  
Cooler ID(s): \_\_\_\_\_

Date/Time: 12/13/18 1800  
Date/Time: 12/14/18 0950  
Temperature(s): \_\_\_\_\_

(ALS)

PC RL

**Cooler Receipt and Preservation Form**

Client ALS/Houston Service Request K18 12279  
 Received: 12/14/18 Opened: 12/14/18 By: [Signature] Unloaded: 12/14/18 By: [Signature]

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 + back  
 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	NA	Filed
0.2	0.1	1.8	1.7	-0.1	381	10432	4380 9535 4370		
						10419			
						10429			

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	Out of	Head-	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
	Bottle Type	Temp	space							

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](http://www.alsglobal.com)



Analytical Report

**Client:** ALS Environmental - US  
**Project:** HS18120731/HS18120731  
**Sample Matrix:** Water  
**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Service Request:** K1812279  
**Date Collected:** 12/12/18  
**Date Received:** 12/14/18  
**Units:** mg/L  
**Basis:** NA

**Carbon, Total Organic**

Sample Name	Lab Code	Result	LOQ	LOD	MDL	Dil.	Date Analyzed	Q
LH18/24-SP650_121218	K1812279-001	24.7	0.50	0.20	0.07	1	12/21/18 23:22	
Method Blank	K1812279-MB	ND U	0.50	0.20	0.07	1	12/21/18 11:06	

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18120731/HS18120731  
**Sample Matrix:** Water

**Service Request:** K1812279  
**Date Analyzed:** 12/21/18  
**Date Extracted:** NA

**Lab Control Sample Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C  
**Prep Method:** None

**Units:** mg/L  
**Basis:** NA  
**Analysis Lot:** 619810

<b>Sample Name</b>	<b>Lab Code</b>	<b>Result</b>	<b>Spike Amount</b>	<b>% Rec</b>	<b>% Rec Limits</b>
Lab Control Sample	K1812279-LCS	20.3	21.9	93	83-117

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18120731/HS18120731

**Service Request:** K1812279

### Continuing Calibration Verification (CCV) Summary

#### Carbon, Total Organic

**Analysis Method:** SM 5310 C

**Units:** mg/L

	Analysis		Date	True	Measured	Percent	Acceptance
	Lot	Lab Code	Analyzed	Value	Value	Recovery	Limits
CCV1	619810	KQ1818709-28	12/21/18 05:13	25.0	24.3	97	90-110
CCV2	619810	KQ1818709-29	12/21/18 10:33	25.0	24.0	96	90-110
CCV3	619810	KQ1818709-30	12/21/18 15:37	25.0	23.7	95	90-110
CCV4	619810	KQ1818709-31	12/21/18 21:13	25.0	23.6	94	90-110
CCV5	619810	KQ1818709-32	12/22/18 02:33	25.0	23.6	95	90-110
CCV6	619810	KQ1818709-33	12/22/18 07:36	25.0	23.9	95	90-110

ALS Group USA, Corp.  
dba ALS Environmental

QA/QC Report

**Client:** ALS Environmental - US  
**Project:** HS18120731/HS18120731

**Service Request:**K1812279

**Continuing Calibration Blank (CCB) Summary**  
**Carbon, Total Organic**

**Analysis Method:** SM 5310 C

**Units:**mg/L

	<b>Analysis Lot</b>	<b>Lab Code</b>	<b>Date Analyzed</b>	<b>LOQ</b>	<b>LOD</b>	<b>MDL</b>	<b>Result</b>	<b>Q</b>
CCB1	619810	KQ1818709-34	12/21/18 05:30	0.50	0.20	0.07	ND	U
CCB2	619810	KQ1818709-35	12/21/18 10:49	0.50	0.20	0.07	ND	U
CCB3	619810	KQ1818709-36	12/21/18 15:54	0.50	0.20	0.07	ND	U
CCB4	619810	KQ1818709-37	12/21/18 21:29	0.50	0.20	0.07	ND	U
CCB5	619810	KQ1818709-38	12/22/18 02:49	0.50	0.20	0.07	ND	U
CCB6	619810	KQ1818709-39	12/22/18 07:53	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](http://www.alsglobal.com)



## General Chemistry

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Work Request # (Original) K18/1658, 1888, 2001, 1625, 1728, 1789, 1849, 1831, 2101, 2154  
 Tier: II IV IV I I IV II II IV IV  
 Date Analyzed: 12/20/18 1928, 2278, 2279, 2272, 1745, 1747, 2416  
 Analyst: CES Run # TOC: 619808,  
 Analysis: TOC/DOC 619810  
DOC: 620105

**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  $\geq 0.995$ ? 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:**

1789-2, 3, 4, 5, 8, 1849-4, 2416-35 RPD not within acceptance limits. The sample results are less than 5x the MRL.  
 RA 2154-1, 2154-5 - over diluted.  
 1831-2, 1745-1 RPD not within acceptance limits - samples contain sediment - non homogeneous.

Final Approved by: [Signature] Date: 12/26/18 DQREPORT



## Analytical Results Summary

Instrument Name: K-TOC-03

Analyst: CSETHE

Analysis Lot: 619808 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
K1811625-001	Carbon, Total Organic	N/A		Ground Water	4.25 mg/L	10 ml	8.5 mg/L	2	0.2	1.0			12/20/18 16:31	N	I
K1811625-003	Carbon, Total Organic	N/A		Ground Water	4.47 mg/L	10 ml	4.47 mg/L	1	0.07	0.50			12/20/18 17:51	N	I
K1811658-004	Carbon, Total Organic	N/A		Water	3.83 mg/L	10 ml	3.83 mg/L	1	0.07	0.50			12/20/18 13:18	N	II
K1811728-001	Carbon, Total Organic	N/A		Reagent Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/20/18 18:54	N	I
K1811728-002	Carbon, Total Organic	N/A		Reagent Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/20/18 19:26	N	I
K1811789-002	Carbon, Total Organic	N/A		Ground Water	0.51 mg/L	10 ml	0.51 mg/L	1	0.07	0.50			12/20/18 19:58	N	IV
K1811789-003	Carbon, Total Organic	N/A		Ground Water	0.74 mg/L	10 ml	0.74 mg/L	1	0.07	0.50			12/20/18 22:39	N	IV
K1811789-004	Carbon, Total Organic	N/A		Ground Water	0.16 mg/L	10 ml	0.16 mg/L	J 1	0.07	0.50			12/20/18 23:42	N	IV
K1811789-005	Carbon, Total Organic	N/A		Ground Water	0.77 mg/L	10 ml	0.77 mg/L	1	0.07	0.50			12/21/18 00:45	N	IV
K1811789-006	Carbon, Total Organic	N/A		Ground Water	0.55 mg/L	10 ml	0.55 mg/L	1	0.07	0.50			12/21/18 01:48	N	IV
K1811789-008	Carbon, Total Organic	N/A		Ground Water	0.39 mg/L	10 ml	0.39 mg/L	J 1	0.07	0.50			12/21/18 02:51	N	IV
K1811831-002	Carbon, Total Organic	N/A		Water	6.74 mg/L	10 ml	6.74 mg/L	1	0.07	0.50			12/21/18 08:25	N	II
K1811849-001	Carbon, Total Organic	N/A		Water	1.24 mg/L	10 ml	1.24 mg/L	1	0.07	0.50			12/21/18 04:25	N	II
K1811849-002	Carbon, Total Organic	N/A		Water	8.22 mg/L	10 ml	32.9 mg/L	4	0.3	2.0			12/21/18 05:46	N	II
K1811849-003	Carbon, Total Organic	N/A		Water	7.74 mg/L	10 ml	31.0 mg/L	4	0.3	2.0			12/21/18 06:18	N	II
K1811849-004	Carbon, Total Organic	N/A		Water	1.09 mg/L	10 ml	1.09 mg/L	1	0.07	0.50			12/21/18 06:50	N	II
K1811849-005	Carbon, Total Organic	N/A		Water	5.34 mg/L	10 ml	5.34 mg/L	1	0.07	0.50			12/21/18 07:22	N	II
K1811888-002	Carbon, Total Organic	N/A		Water	2.74 mg/L	10 ml	2.74 mg/L	1	0.07	0.50			12/20/18 14:22	N	IV
K1812001-001	Carbon, Total Organic	N/A		Water	6.94 mg/L	10 ml	69.4 mg/L	10	0.7	5.0			12/20/18 14:54	N	IV
KQ1818705-01	Carbon, Total Organic	DUP	K1811658-004	Water	3.91 mg/L	10 ml	3.91 mg/L	1	0.07	0.50		2	12/20/18 13:18	N	II
KQ1818705-02	Carbon, Total Organic	DUP	K1811888-002	Water	2.73 mg/L	10 ml	2.73 mg/L	1	0.07	0.50		<1	12/20/18 14:22	N	IV
KQ1818705-03	Carbon, Total Organic	MS	K1812001-001	Water	31.62 mg/L	10 ml	316 mg/L	10	0.7	5.0	99		12/20/18 15:25	N	IV
KQ1818705-04	Carbon, Total Organic	DUP	K1812001-001	Water	6.88 mg/L	10 ml	68.8 mg/L	10	0.7	5.0		<1	12/20/18 14:54	N	IV
KQ1818705-05	Carbon, Total Organic	MS	K1811625-001	Ground Water	29.15 mg/L	10 ml	58.3 mg/L	2	0.2	1.0	100		12/20/18 17:03	N	I
KQ1818705-06	Carbon, Total Organic	DUP	K1811625-001	Ground Water	3.84 mg/L	10 ml	7.7 mg/L	2	0.2	1.0		10	12/20/18 16:31	N	I
KQ1818705-07	Carbon, Total Organic	DUP	K1811625-003	Ground Water	4.23 mg/L	10 ml	4.23 mg/L	1	0.07	0.50		6	12/20/18 17:51	N	I
KQ1818705-08	Carbon, Total Organic	DUP	K1811728-001	Reagent Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50		NC	12/20/18 18:54	N	I
KQ1818705-09	Carbon, Total Organic	DUP	K1811728-002	Reagent Water	0.80 mg/L	10 ml	0.80 mg/L	1	0.07	0.50		NC	12/20/18 19:26	N	I

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.



## Analytical Results Summary

Instrument Name: K-TOC-03			Analyst: CSETHE		Analysis Lot: 619808		Method/Testcode: 9060/TOC T								
Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	POL	% Rec	% RSD	Date Analyzed	QC?	Tier
KQ1818705-10	Carbon, Total Organic	MS	K1811789-002	Ground Water	25.21 mg/L	10 ml	25.2 mg/L	1	0.07	0.50	99		12/20/18 21:01	N	IV
KQ1818705-11	Carbon, Total Organic	DUP	K1811789-002	Ground Water	0.26 mg/L	10 ml	0.26 mg/L	J 1	0.07	0.50		66*	12/20/18 19:58	N	IV
KQ1818705-12	Carbon, Total Organic	TRP	K1811789-002	Ground Water	0.22 mg/L	10 ml	0.22 mg/L	J 1	0.07	0.50		48*	12/20/18 19:58	N	IV
KQ1818705-13	Carbon, Total Organic	QUAD	K1811789-002	Ground Water	0.23 mg/L	10 ml	0.23 mg/L	J 1	0.07	0.50		45*	12/20/18 19:58	N	IV
KQ1818705-14	Carbon, Total Organic	DUP	K1811789-003	Ground Water	0.60 mg/L	10 ml	0.60 mg/L	1	0.07	0.50		21*	12/20/18 22:39	N	IV
KQ1818705-15	Carbon, Total Organic	TRP	K1811789-003	Ground Water	0.58 mg/L	10 ml	0.58 mg/L	1	0.07	0.50		14	12/20/18 22:39	N	IV
KQ1818705-16	Carbon, Total Organic	QUAD	K1811789-003	Ground Water	0.52 mg/L	10 ml	0.52 mg/L	1	0.07	0.50		16	12/20/18 22:39	N	IV
KQ1818705-17	Carbon, Total Organic	DUP	K1811789-004	Ground Water	1.01 mg/L	10 ml	1.01 mg/L	1	0.07	0.50		146*	12/20/18 23:42	N	IV
KQ1818705-18	Carbon, Total Organic	TRP	K1811789-004	Ground Water	0.19 mg/L	10 ml	0.19 mg/L	J 1	0.07	0.50		106*	12/20/18 23:42	N	IV
KQ1818705-19	Carbon, Total Organic	QUAD	K1811789-004	Ground Water	0.07 mg/L	10 ml	0.07 mg/L	J 1	0.07	0.50		122*	12/20/18 23:42	N	IV
KQ1818705-20	Carbon, Total Organic	DUP	K1811789-005	Ground Water	0.58 mg/L	10 ml	0.58 mg/L	1	0.07	0.50		27*	12/21/18 00:45	N	IV
KQ1818705-21	Carbon, Total Organic	TRP	K1811789-005	Ground Water	0.57 mg/L	10 ml	0.57 mg/L	1	0.07	0.50		17	12/21/18 00:45	N	IV
KQ1818705-22	Carbon, Total Organic	QUAD	K1811789-005	Ground Water	0.61 mg/L	10 ml	0.61 mg/L	1	0.07	0.50		14	12/21/18 00:45	N	IV
KQ1818705-23	Carbon, Total Organic	DUP	K1811789-006	Ground Water	0.53 mg/L	10 ml	0.53 mg/L	1	0.07	0.50		3	12/21/18 01:48	N	IV
KQ1818705-24	Carbon, Total Organic	TRP	K1811789-006	Ground Water	0.50 mg/L	10 ml	0.50 mg/L	1	0.07	0.50		5	12/21/18 01:48	N	IV
KQ1818705-25	Carbon, Total Organic	QUAD	K1811789-006	Ground Water	0.54 mg/L	10 ml	0.54 mg/L	1	0.07	0.50		4	12/21/18 01:48	N	IV
KQ1818705-26	Carbon, Total Organic	DUP	K1811789-008	Ground Water	0.34 mg/L	10 ml	0.34 mg/L	J 1	0.07	0.50		16	12/21/18 02:51	N	IV
KQ1818705-27	Carbon, Total Organic	TRP	K1811789-008	Ground Water	0.20 mg/L	10 ml	0.20 mg/L	J 1	0.07	0.50		31*	12/21/18 02:51	N	IV
KQ1818705-28	Carbon, Total Organic	QUAD	K1811789-008	Ground Water	0.26 mg/L	10 ml	0.26 mg/L	J 1	0.07	0.50		28*	12/21/18 02:51	N	IV
KQ1818705-29	Carbon, Total Organic	MS	K1811849-001	Water	25.43 mg/L	10 ml	25.4 mg/L	1	0.07	0.50	97		12/21/18 04:57	N	II
KQ1818705-30	Carbon, Total Organic	DUP	K1811849-001	Water	1.25 mg/L	10 ml	1.25 mg/L	1	0.07	0.50		1	12/21/18 04:25	N	II
KQ1818705-31	Carbon, Total Organic	DUP	K1811849-002	Water	8.05 mg/L	10 ml	32.2 mg/L	4	0.3	2.0		2	12/21/18 05:46	N	II
KQ1818705-32	Carbon, Total Organic	DUP	K1811849-003	Water	7.59 mg/L	10 ml	30.3 mg/L	4	0.3	2.0		2	12/21/18 06:18	N	II
KQ1818705-33	Carbon, Total Organic	DUP	K1811849-004	Water	0.86 mg/L	10 ml	0.86 mg/L	1	0.07	0.50		24*	12/21/18 06:50	N	II
KQ1818705-34	Carbon, Total Organic	DUP	K1811849-005	Water	5.16 mg/L	10 ml	5.16 mg/L	1	0.07	0.50		3	12/21/18 07:22	N	II
KQ1818705-35	Carbon, Total Organic	MS	K1811831-002	Water	31.00 mg/L	10 ml	31.0 mg/L	1	0.07	0.50	97		12/21/18 08:57	N	II

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

# Analytical Results Summary

00922583

Instrument Name: K-TOC-03

Analyst: CSETHE

Analysis Lot: 619808 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
KQ1818705-36	Carbon, Total Organic	DUP	K1811831-002	Water	6.02 mg/L	10 ml	6.02 mg/L	1	0.07	0.50		11*	12/21/18 08:25	N	II
KQ1818705-37	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 12:29	N	II
KQ1818705-37	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 12:29	N	II
KQ1818705-38	Carbon, Total Organic	LCS		Water	20.64 mg/L	10 ml	20.6 mg/L	1	0.07	0.50	94		12/20/18 12:46	N	II
KQ1818705-38	Carbon, Total Organic	LCS		Water	20.64 mg/L	10 ml	20.6 mg/L	1	0.07	0.50	94		12/20/18 12:46	N	II
KQ1818705-39	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 22:06	N	II
KQ1818705-39	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 22:06	N	II
KQ1818705-40	Carbon, Total Organic	LCS		Water	20.62 mg/L	10 ml	20.6 mg/L	1	0.07	0.50	94		12/20/18 22:23	N	II
KQ1818705-40	Carbon, Total Organic	LCS		Water	20.62 mg/L	10 ml	20.6 mg/L	1	0.07	0.50	94		12/20/18 22:23	N	II
KQ1818705-41	Carbon, Total Organic	CCV		Water	24.08 mg/L	10 ml	24.1 mg/L	1			96		12/20/18 11:56	N	II
KQ1818705-41	Carbon, Total Organic	CCV		Water	24.08 mg/L	10 ml	24.1 mg/L	1			96		12/20/18 11:56	N	II
KQ1818705-42	Carbon, Total Organic	CCV		Water	24.01 mg/L	10 ml	24.0 mg/L	1			96		12/20/18 15:58	N	II
KQ1818705-42	Carbon, Total Organic	CCV		Water	24.01 mg/L	10 ml	24.0 mg/L	1			96		12/20/18 15:58	N	II
KQ1818705-43	Carbon, Total Organic	CCV		Water	24.07 mg/L	10 ml	24.1 mg/L	1			96		12/20/18 21:33	N	II
KQ1818705-43	Carbon, Total Organic	CCV		Water	24.07 mg/L	10 ml	24.1 mg/L	1			96		12/20/18 21:33	N	II
KQ1818705-44	Carbon, Total Organic	CCV		Water	24.26 mg/L	10 ml	24.3 mg/L	1			97		12/21/18 05:13	N	II
KQ1818705-44	Carbon, Total Organic	CCV		Water	24.26 mg/L	10 ml	24.3 mg/L	1			97		12/21/18 05:13	N	II
KQ1818705-45	Carbon, Total Organic	CCV		Water	24.05 mg/L	10 ml	24.0 mg/L	1			96		12/21/18 10:33	N	II
KQ1818705-45	Carbon, Total Organic	CCV		Water	24.05 mg/L	10 ml	24.0 mg/L	1			96		12/21/18 10:33	N	II
KQ1818705-46	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 12:13	N	II
KQ1818705-46	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 12:13	N	II
KQ1818705-47	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 16:14	N	II
KQ1818705-47	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 16:14	N	II
KQ1818705-48	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 21:50	N	II
KQ1818705-48	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/20/18 21:50	N	II
KQ1818705-49	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 05:30	N	II
KQ1818705-49	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 05:30	N	II
KQ1818705-49	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 05:30	N	II
KQ1818705-50	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 10:49	N	II
KQ1818705-50	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 10:49	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: CSETHE

Analysis Lot: 619810 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?	Tier
K1811745-001	Carbon, Total Organic	N/A		Water	1.55 mg/L	10 ml	1.55 mg/L	1	0.07	0.50			12/22/18 05:13	N	IV
K1811747-001	Carbon, Total Organic	N/A		Water	4.71 mg/L	10 ml	4.71 mg/L	1	0.07	0.50			12/22/18 06:48	N	IV
K1811928-001	Carbon, Total Organic	N/A		Drinking Water	0.10 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 17:14	N	II
K1812101-001	Carbon, Total Organic	N/A		Water	16.05 mg/L	10 ml	16.0 mg/L	1	0.07	0.50			12/21/18 09:45	N	IV
K1812154-001	Carbon, Total Organic	N/A		Ground Water	0.19 mg/L	10 ml	10 mg/L J	50	4	25			12/21/18 11:39	N	IV
K1812154-002	Carbon, Total Organic	N/A		Ground Water	1.67 mg/L	10 ml	1.67 mg/L	1	0.07	0.50			12/21/18 12:59	N	IV
K1812154-003	Carbon, Total Organic	N/A		Ground Water	2.17 mg/L	10 ml	2.17 mg/L	1	0.07	0.50			12/21/18 14:02	N	IV
K1812154-004	Carbon, Total Organic	N/A		Ground Water	17.57 mg/L	10 ml	879 mg/L	50	4	25			12/21/18 14:34	N	IV
K1812154-005	Carbon, Total Organic	N/A		Ground Water	0.16 mg/L	10 ml	3 mg/L J	20	2	10			12/21/18 16:10	N	IV
K1812272-001	Carbon, Total Organic	N/A		Ground Water	10.54 mg/L	10 ml	42.2 mg/L	4	0.3	2.0			12/22/18 00:42	N	IV
K1812272-002	Carbon, Total Organic	N/A		Ground Water	3.92 mg/L	10 ml	392 mg/L	100	7	50			12/22/18 03:06	N	IV
K1812272-003	Carbon, Total Organic	N/A		Ground Water	3.97 mg/L	10 ml	3.97 mg/L	1	0.07	0.50			12/22/18 03:38	N	IV
K1812272-004	Carbon, Total Organic	N/A		Ground Water	4.03 mg/L	10 ml	4.03 mg/L	1	0.07	0.50			12/22/18 04:09	N	IV
K1812278-001	Carbon, Total Organic	N/A		Ground Water	13.71 mg/L	10 ml	685 mg/L	50	4	25			12/21/18 18:19	N	IV
K1812278-002	Carbon, Total Organic	N/A		Ground Water	14.02 mg/L	10 ml	701 mg/L	50	4	25			12/21/18 22:19	N	IV
K1812278-003	Carbon, Total Organic	N/A		Ground Water	1.13 mg/L	10 ml	4.5 mg/L	4	0.3	2.0			12/21/18 20:41	N	IV
K1812279-001	Carbon, Total Organic	N/A		Water	24.72 mg/L	10 ml	24.7 mg/L	1	0.07	0.50			12/21/18 23:22	N	IV
KQ1818709-01	Carbon, Total Organic	MS	K1812101-001	Water	40.70 mg/L	10 ml	40.7 mg/L	1	0.07	0.50	99		12/21/18 10:16	N	IV
KQ1818709-02	Carbon, Total Organic	DUP	K1812101-001	Water	16.03 mg/L	10 ml	16.0 mg/L	1	0.07	0.50		<1	12/21/18 09:45	N	IV
KQ1818709-03	Carbon, Total Organic	MS	K1812154-001	Ground Water	24.33 mg/L	10 ml	1220 mg/L	50	4	25	97		12/21/18 12:11	N	IV
KQ1818709-04	Carbon, Total Organic	DUP	K1812154-001	Ground Water	0.00 mg/L	10 ml	25 mg/L U	50	4	25		NC	12/21/18 11:39	N	IV
KQ1818709-05	Carbon, Total Organic	DUP	K1812154-002	Ground Water	1.52 mg/L	10 ml	1.52 mg/L	1	0.07	0.50		9	12/21/18 12:59	N	IV
KQ1818709-06	Carbon, Total Organic	DUP	K1812154-003	Ground Water	2.18 mg/L	10 ml	2.18 mg/L	1	0.07	0.50		<1	12/21/18 14:02	N	IV
KQ1818709-07	Carbon, Total Organic	DUP	K1812154-004	Ground Water	17.56 mg/L	10 ml	878 mg/L	50	4	25		<1	12/21/18 14:34	N	IV
KQ1818709-08	Carbon, Total Organic	DUP	K1812154-005	Ground Water	0.00 mg/L	10 ml	10 mg/L U	20	2	10		NC	12/21/18 16:10	N	IV
KQ1818709-09	Carbon, Total Organic	MS	K1811928-001	Drinking Water	24.48 mg/L	10 ml	24.5 mg/L	1	0.07	0.50	98		12/21/18 17:46	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: CSETHE

Analysis Lot: 619810 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
KQ1818709-10	Carbon, Total Organic	DUP	K1811928-001	Drinking Water	0.01 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50		NC	12/21/18 17:14	N	II
KQ1818709-11	Carbon, Total Organic	MS	K1812278-001	Ground Water	38.12 mg/L	10 ml	1910 mg/L	50	4	25	98		12/21/18 19:22	N	IV
KQ1818709-12	Carbon, Total Organic	DUP	K1812278-001	Ground Water	13.53 mg/L	10 ml	677 mg/L	50	4	25		1	12/21/18 18:19	N	IV
KQ1818709-13	Carbon, Total Organic	DUP	K1812278-002	Ground Water	13.66 mg/L	10 ml	683 mg/L	50	4	25		3	12/21/18 22:19	N	IV
KQ1818709-14	Carbon, Total Organic	DUP	K1812278-003	Ground Water	1.15 mg/L	10 ml	4.6 mg/L	4	0.3	2.0		1	12/21/18 20:41	N	IV
KQ1818709-15	Carbon, Total Organic	MS	K1812279-001	Water	48.60 mg/L	10 ml	48.6 mg/L	1	0.07	0.50	96		12/21/18 23:54	N	IV
KQ1818709-16	Carbon, Total Organic	DUP	K1812279-001	Water	24.96 mg/L	10 ml	25.0 mg/L	1	0.07	0.50		<1	12/21/18 23:22	N	IV
KQ1818709-17	Carbon, Total Organic	MS	K1812272-001	Ground Water	36.01 mg/L	10 ml	144 mg/L	4	0.3	2.0	102		12/22/18 01:14	N	IV
KQ1818709-18	Carbon, Total Organic	DUP	K1812272-001	Ground Water	10.47 mg/L	10 ml	41.9 mg/L	4	0.3	2.0		<1	12/22/18 00:42	N	IV
KQ1818709-19	Carbon, Total Organic	DUP	K1812272-002	Ground Water	3.78 mg/L	10 ml	378 mg/L	100	7	50		4	12/22/18 03:06	N	IV
KQ1818709-20	Carbon, Total Organic	DUP	K1812272-003	Ground Water	3.95 mg/L	10 ml	3.95 mg/L	1	0.07	0.50		<1	12/22/18 03:38	N	IV
KQ1818709-21	Carbon, Total Organic	DUP	K1812272-004	Ground Water	3.99 mg/L	10 ml	3.99 mg/L	1	0.07	0.50		1	12/22/18 04:09	N	IV
KQ1818709-23	Carbon, Total Organic	DUP	K1811745-001	Water	2.34 mg/L	10 ml	2.34 mg/L	1	0.07	0.50		41*	12/22/18 05:13	N	IV
KQ1818709-24	Carbon, Total Organic	MS	K1811747-001	Water	29.30 mg/L	10 ml	29.3 mg/L	1	0.07	0.50	98		12/22/18 07:20	N	IV
KQ1818709-25	Carbon, Total Organic	DUP	K1811747-001	Water	4.71 mg/L	10 ml	4.71 mg/L	1	0.07	0.50		<1	12/22/18 06:48	N	IV
KQ1818709-26	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 11:06	N	IV
KQ1818709-26	Carbon, Total Organic	MB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 11:06	N	IV
KQ1818709-27	Carbon, Total Organic	LCS		Water	20.26 mg/L	10 ml	20.3 mg/L	1	0.07	0.50	93		12/21/18 11:22	N	IV
KQ1818709-27	Carbon, Total Organic	LCS		Water	20.26 mg/L	10 ml	20.3 mg/L	1	0.07	0.50	93		12/21/18 11:22	N	IV
KQ1818709-28	Carbon, Total Organic	CCV		Water	24.26 mg/L	10 ml	24.3 mg/L	1			97		12/21/18 05:13	N	IV
KQ1818709-28	Carbon, Total Organic	CCV		Water	24.26 mg/L	10 ml	24.3 mg/L	1			97		12/21/18 05:13	N	IV
KQ1818709-29	Carbon, Total Organic	CCV		Water	24.05 mg/L	10 ml	24.0 mg/L	1			96		12/21/18 10:33	N	IV
KQ1818709-29	Carbon, Total Organic	CCV		Water	24.05 mg/L	10 ml	24.0 mg/L	1			96		12/21/18 10:33	N	IV
KQ1818709-30	Carbon, Total Organic	CCV		Water	23.72 mg/L	10 ml	23.7 mg/L	1			95		12/21/18 15:37	N	IV
KQ1818709-30	Carbon, Total Organic	CCV		Water	23.72 mg/L	10 ml	23.7 mg/L	1			95		12/21/18 15:37	N	IV
KQ1818709-31	Carbon, Total Organic	CCV		Water	23.55 mg/L	10 ml	23.6 mg/L	1			94		12/21/18 21:13	N	IV
KQ1818709-31	Carbon, Total Organic	CCV		Water	23.55 mg/L	10 ml	23.6 mg/L	1			94		12/21/18 21:13	N	IV
KQ1818709-32	Carbon, Total Organic	CCV		Water	23.63 mg/L	10 ml	23.6 mg/L	1			94		12/22/18 02:33	N	IV
KQ1818709-32	Carbon, Total Organic	CCV		Water	23.63 mg/L	10 ml	23.6 mg/L	1			94		12/22/18 02:33	N	IV
KQ1818709-33	Carbon, Total Organic	CCV		Water	23.86 mg/L	10 ml	23.9 mg/L	1			96		12/22/18 07:36	N	IV
KQ1818709-33	Carbon, Total Organic	CCV		Water	23.86 mg/L	10 ml	23.9 mg/L	1			96		12/22/18 07:36	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: CSETHE

Analysis Lot: 619810 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
KQ1818709-34	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 05:30	N	IV
KQ1818709-34	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 05:30	N	IV
KQ1818709-35	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 10:49	N	IV
KQ1818709-35	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 10:49	N	IV
KQ1818709-36	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 15:54	N	IV
KQ1818709-36	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 15:54	N	IV
KQ1818709-37	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 21:29	N	IV
KQ1818709-37	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/21/18 21:29	N	IV
KQ1818709-38	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/22/18 02:49	N	IV
KQ1818709-38	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/22/18 02:49	N	IV
KQ1818709-39	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/22/18 07:53	N	IV
KQ1818709-39	Carbon, Total Organic	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L U	1	0.07	0.50			12/22/18 07:53	N	IV
KQ1818709-40	Carbon, Total Organic	MS	K1811745-001	Water	26.18 mg/L	10 ml	26.2 mg/L	1	0.07	0.50	99		12/22/18 05:45	N	IV
KQ1818709-41	Carbon, Total Organic	DMS	K1811745-001	Water	25.64 mg/L	10 ml	25.6 mg/L	1	0.07	0.50	96		12/22/18 05:45	N	IV

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.

# Analytical Results Summary

00922587

Instrument Name: K-TOC-03

Analyst: CSETHE

Analysis Lot: 620105 Method/Testcode: SM 5310 C/TOC D

Lab Code	Target Analytes	QC	Parent Sample	Matrix	Raw Result	Sample Amt.	Final Result	Dil	MDL	PQL	% Rec	% RSD	Date Analyzed	QC?	Tier
K1812416-035	Carbon, Dissolved Organic (DOC)	N/A		Water	1.24 mg/L	10 ml	1.24 mg/L	1	0.07	0.50			12/22/18 08:10	N	II
KQ1818712-01	Carbon, Dissolved Organic (DOC)	MS	K1812416-035	Water	24.33 mg/L	10 ml	24.3 mg/L	1	0.07	0.50	92		12/22/18 08:41	N	II
KQ1818712-02	Carbon, Dissolved Organic (DOC)	DUP	K1812416-035	Water	1.48 mg/L	10 ml	1.48 mg/L	1	0.07	0.50		18*	12/22/18 08:10	N	II
KQ1818712-03	Carbon, Dissolved Organic (DOC)	MB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/21/18 21:46	N	II
KQ1818712-04	Carbon, Dissolved Organic (DOC)	LCS		Water	19.23 mg/L	10 ml	19.2 mg/L	1	0.07	0.50	88		12/21/18 22:02	N	II
KQ1818712-05	Carbon, Dissolved Organic (DOC)	CCV		Water	23.55 mg/L	10 ml	23.6 mg/L	1					12/21/18 21:13	N	II
KQ1818712-06	Carbon, Dissolved Organic (DOC)	CCV		Water	23.63 mg/L	10 ml	23.6 mg/L	1					12/22/18 02:33	N	II
KQ1818712-07	Carbon, Dissolved Organic (DOC)	CCV		Water	23.86 mg/L	10 ml	23.9 mg/L	1					12/22/18 07:36	N	II
KQ1818712-08	Carbon, Dissolved Organic (DOC)	CCV		Water	23.93 mg/L	10 ml	23.9 mg/L	1					12/22/18 08:58	N	II
KQ1818712-09	Carbon, Dissolved Organic (DOC)	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/21/18 21:29	N	II
KQ1818712-10	Carbon, Dissolved Organic (DOC)	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/22/18 02:49	N	II
KQ1818712-11	Carbon, Dissolved Organic (DOC)	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/22/18 07:53	N	II
KQ1818712-12	Carbon, Dissolved Organic (DOC)	CCB		Water	0.00 mg/L	10 ml	0.50 mg/L	U 1	0.07	0.50			12/22/18 09:14	N	II

94  
94  
96  
96

C25 12/26/18

# indicates Final Result is not yet adjusted for Solids because it has not yet been determined.



StarLIMS Run: 619808, 619810, 620105  
 Analysis: TOC  
 Method: SM 5310 C, 9060, 415.1

CCV: 11-GEN-05-73F 50 ppm      LCS: 11-GEN-05-73C 21.9 ppm

ICAL Date: 11/26/18

ICAL ID: 11-GEN-05-72J

ICS ID: 11-GEN-05-73B

ICS TV: 25.0 ppm      ICS % R < 1

Spike ID: 11-GEN-05-700      0.05 ml of 5000 ppm stock ---> 10.0 ml = 25.0 ppm x dilution factor

Sodium Persulfate: 11-GEN-05-73J

21 % H3PO4: 11-GEN-05-73I

Equipment ID: K-TOC-03

PIPETTE ID: 124276B, Marge, 129001F, N11314F

FILTER ID: NA

Analyzed By: <u>CES</u>	Date Analyzed: <u>12/20/18</u>
Reviewed By: <u>[Signature]</u>	Date Reviewed: <u>12/26/18</u>



TOC: 619808,  
619810  
DOC: 620105

## Schedule: 12202018

Version: 9

Instrument: Fusion1

Last Saved by: Fusion1 (Fusion1)

Last Saved on: 2018/12/21 10:33 - Friday

Position	Sample Type	Sample ID	Method ID (Calibration ID)	Reps
(Clean)	Clean	Clean		1
D	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
(Clean)	Clean	Clean		1
D	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
(Clean)	Clean	Clean		1
D	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
(Blank)	Blank	Reagent/Acid Blank		1
D	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
1	Sample	MB1	Extended Reaction 021711 (Extended Reaction 021711)	1
2	Check Standard	[TOC] LCS ER [21.9 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
3	Sample	ICS	Extended Reaction 021711 (Extended Reaction 021711)	1
4	Sample	K1811658-004.01	Extended Reaction 021711 (Extended Reaction 021711)	2
5	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
6	Sample	K1811888-002.01	Extended Reaction 021711 (Extended Reaction 021711)	2
7	Sample	K1812001-001.01 10x	Extended Reaction 021711 (Extended Reaction 021711)	2
8	Sample	K1812001-001.01 ms 10x	Extended Reaction 021711 (Extended Reaction 021711)	1
9	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
10	Sample	K1811625-001.03 2x	Extended Reaction 021711 (Extended Reaction 021711)	2
11	Sample	K1811625-001.03 ms 2x	Extended Reaction 021711 (Extended Reaction 021711)	1
12	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
13	Sample	K1811625-003.03	Extended Reaction 021711 (Extended Reaction 021711)	2
14	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
15	Sample	K1811728-001	Extended Reaction 021711 (Extended Reaction 021711)	2
16	Sample	K1811728-002	Extended Reaction 021711 (Extended Reaction 021711)	2
17	Sample	K1811789-002.08	Extended Reaction 021711 (Extended Reaction 021711)	4
18	Sample	K1811789-002.08 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
19	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
20	Sample	MB2	Extended Reaction 021711 (Extended Reaction 021711)	1
2	Check Standard	[TOC] LCS ER [21.9 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
21	Sample	K1811789-003.08	Extended Reaction 021711 (Extended Reaction 021711)	4
22	Sample	K1811789-004.08	Extended Reaction 021711 (Extended Reaction 021711)	4
23	Sample	K1811789-005.08	Extended Reaction 021711 (Extended Reaction 021711)	4
24	Sample	K1811789-006.08	Extended Reaction 021711 (Extended Reaction 021711)	4
25	Sample	K1811789-008.08	Extended Reaction 021711 (Extended Reaction 021711)	4
26	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
27	Sample	K1811849-001.04	Extended Reaction 021711 (Extended Reaction 021711)	2
28	Sample	K1811849-001.04 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
B	Check Standard	[TOC] CCV 021711 [25 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
D	Check Standard	[TOC] CCB 021711 [0.0 ppm]	Extended Reaction 021711 (Extended Reaction 021711)	1
29	Sample	K1811849-002.04 4x	Extended Reaction 021711 (Extended Reaction 021711)	2
30	Sample	K1811849-003.04 4x	Extended Reaction 021711 (Extended Reaction 021711)	2
31	Sample	K1811849-004.04	Extended Reaction 021711 (Extended Reaction 021711)	2
32	Sample	K1811849-005.04	Extended Reaction 021711 (Extended Reaction 021711)	2
33	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
34	Sample	K1811831-002.01	Extended Reaction 021711 (Extended Reaction 021711)	2
35	Sample	K1811831-002.01 ms	Extended Reaction 021711 (Extended Reaction 021711)	1
36	Sample	RB	Extended Reaction 021711 (Extended Reaction 021711)	2
37	Sample	K1812101-001.02	Extended Reaction 021711 (Extended Reaction 021711)	2

Printed on: December 26, 2018 11:38:18

Page 1





# Fusion Report - 12202018

## Thursday, December 20, 2018 08:21 AM

(View - Repts, Unused Repts, Meta-Data, Signature, History)  
Printed on 2018/12/26 11:38 -  
Wednesday

### Report Summary Information

Company Location: Gen Chem Lab  
 Schedule Name: 12202018  
 Instrument Name: Fusion1  
 Report Version: 1 of 1  
 Report Creation by Operators (schedule version): Fusion1 (Fusion1) (v1)  
 Fusion1 (Fusion1) (v2)  
 Fusion1 (Fusion1) (v3)  
 Fusion1 (Fusion1) (v5)  
 Fusion1 (Fusion1) (v6)  
 Fusion1 (Fusion1) (v7)  
 Fusion1 (Fusion1) (v8)  
 Fusion1 (Fusion1) (v9)

Engine Version: 1.1.5.1  
 Firmware Version: 1.2.0696  
 Connection: RS232 COM1

Comment:

### Report Results

Sample Type: Clean							From Schedule Version 1
Pos	Analysis Type	Sample ID			Start Time		
* (clean)		Clean			2018/12/20 08:21		
Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	IC Clean	12.04	16.47	4.43	49.47	05:34	
2	TC Clean	8.60	11.29	2.69	49.71	07:15	
3	TC Clean	2.48	5.22	2.74	49.77	07:01	
4	TC Clean	1.83	4.57	2.75	49.73	07:03	

Sample Type: Sample							From Schedule Version 1	
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time		
* D	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 08:53		
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	13.50	16.00	2.50	49.87	12:34

Dilution

Blank Contribution

Method

Calibration

1:10 (TC) 17.0445 (IC) Extended Reaction Extended Reaction  
(v1201) 021711 (v3) 021711 (v24)

Sample Type: Clean							From Schedule Version 1
Pos	Analysis Type	Sample ID			Start Time		
◊ (clean)		Clean			2018/12/20 09:09		
Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	IC Clean	10.06	13.45	3.39	49.37	07:59	
2	TC Clean	5.19	7.86	2.67	49.71	07:17	
3	TC Clean	3.04	5.66	2.63	49.76	07:01	
4	TC Clean	1.91	4.53	2.62	49.76	07:03	

Sample Type: Sample							From Schedule Version 1	
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time		
◊ D	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 09:43		
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	13.36	15.83	2.47	49.86	12:30
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>		
1:10		(TC) 17.0445 (IC) (v1201)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		

Sample Type: Clean							From Schedule Version 1
Pos	Analysis Type	Sample ID			Start Time		
◊ (clean)		Clean			2018/12/20 10:00		
Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	IC Clean	10.15	13.24	3.09	49.44	08:00	
2	TC Clean	4.75	7.44	2.69	49.80	07:17	
3	TC Clean	1.82	4.43	2.62	49.83	07:02	
4	TC Clean	1.43	4.08	2.65	49.84	07:02	

Sample Type: Sample							From Schedule Version 2
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time	

◆	D	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 10:34		
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	0.0000	0.0000	13.13	15.68	2.54	49.91	12:32	
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>			
1:10		(TC) 17.0445 (IC) (v1201)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			

**Sample Type:** Blank (Creating v1202) From Schedule Version 3

Pos	Analysis Type	Sample ID	Start Time
◆ (blank)		Reagent/Acid Blank	2018/12/20 10:50

Rep #	Base Analysis Type	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	IC Clean	10.18	13.18	3.00	49.42	07:58
2	TC Clean	4.60	7.15	2.55	49.76	07:16
3	TC Clean	1.96	4.47	2.51	49.84	07:03
4	TC Clean	1.49	4.08	2.59	49.85	07:01
5	Reagent Blank	5.37	8.01	2.63	49.80	08:12
6	Acid Blank	1.31	3.85	2.54	49.49	05:40

**Sample Type:** Sample From Schedule Version 5

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
◆ D	TOC	RB	0.7100 ppm	0.0000 ppm	0.0000%	2018/12/20 11:40

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7100	7.1003	22.39	25.22	2.83	49.95	12:32

<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>		
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		

**Sample Type:** Check Standard -> CCV-021711 From Schedule Version

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◆ B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	24.0779 ppm (PASS)	0.0000 ppm	0%	2018/12/20 11:56

<b>Base</b>									
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Pos	Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.0779	240.7790	202.52	205.21	2.70	49.94	12:32
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos B</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		50 ppmC		

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 5

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time	
♦	D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/20 12:13
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	17.20	19.92	2.72	49.96	12:33
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos D</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		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%	2018/12/20 12:29	
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	16.53	19.20	2.67	49.98	12:30
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>		
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		

**Sample Type:** Check Standard --> LCS ER From Schedule Version 5

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time	
♦	2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity ( NA / NA )	20.6415 ppm (PASS)	0.0000 ppm	0%	2018/12/20 12:46
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
2	TOC	21.9 ppm	1	20.6415	206.4151	176.24	178.89	2.65	49.99	12:31
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos 2</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		21.9 ppmC		

Sample Type: Sample							From Schedule Version 5		
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
3	TOC	ICS	0.2428 ppm	0.0000 ppm	0.0000%	2018/12/20 13:02			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	0.2428	2.4278	18.82	21.60	2.78	50.00	12:33	
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
4	TOC	K1811658-004.01	3.8703 ppm	0.0531 ppm	1.3700%	2018/12/20 13:18			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	3.8327	38.3274	46.26	49.03	2.77	49.98	12:27	
2	TOC	3.9078	39.0782	46.84	49.59	2.76	50.00	12:25	
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
5	TOC	RB	0.0004 ppm	0.0006 ppm	141.4200%	2018/12/20 13:50			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	0.0008	0.0078	16.97	19.66	2.69	50.05	12:27	
2	TOC	0.0000	0.0000	15.66	18.25	2.59	50.03	12:27	
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
6	TOC	K1811888-002.01	2.7312 ppm	0.0057 ppm	0.2100%	2018/12/20 14:22			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	2.7352	27.3524	37.87	40.73	2.86	50.02	12:28	
2	TOC	2.7271	27.2713	37.81	40.62	2.81	50.08	12:24	
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
7	TOC	K1812001-001.01 10x	6.9117 ppm	0.0401 ppm	0.5800%	2018/12/20 14:54			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	

1	TOC	6.9401	69.4013	70.02	72.80	2.79	50.07	12:25
2	TOC	6.8834	68.8336	69.58	72.19	2.61	50.09	12:22

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
8	TOC	K1812001-001.01 ms 10x	31.6218 ppm	0.0000 ppm	0.0000%	2018/12/20 15:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	31.6218	316.2181	258.70	261.23	2.53	50.11	12:31

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
9	TOC	RB	0.1048 ppm	0.0000 ppm	0.0000%	2018/12/20 15:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1048	1.0477	17.76	20.50	2.74	50.11	12:31

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711 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 021711 [25 ppm]	0 / infinity (NA / NA)	24.0103 ppm (PASS)	0.0000 ppm	0%	2018/12/20 15:58

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.0103	240.1027	202.00	204.73	2.73	50.11	12:33

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)      **STD Conc - Pos B** 50 ppmC

~~**Sample Type:** Check Standard --> GCB 021711 From Schedule Version~~

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/20 16:14

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	17.00	19.74	2.75	50.14	12:31
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos D</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		0 ppmC		

Sample Type: Sample							From Schedule Version 5								
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time	Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
10	TOC	K1811625-001.03 2x	4.0447 ppm	0.2857 ppm	7.0600%	2018/12/20 16:31	1	TOC	4.2468	42.4675	49.43	52.16	2.73	50.15	12:28
							2	TOC	3.8427	38.4268	46.34	48.97	2.63	50.14	12:27
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>									
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)									
11	TOC	K1811625-001.03 ms 2x	29.1500 ppm	0.0000 ppm	0.0000%	2018/12/20 17:03	1	TOC	29.1500	291.5002	239.80	242.66	2.86	50.11	12:31
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>									
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)									
12	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 17:19	1	TOC	0.0000	0.0000	14.64	17.28	2.63	50.16	12:29
							2	TOC	0.0000	0.0000	14.52	17.37	2.85	50.16	12:26
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>									
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)									
13	TOC	K1811625-003.03	4.3494 ppm	0.1702 ppm	3.9100%	2018/12/20 17:51	1	TOC	4.4698	44.6978	51.13	53.85	2.72	50.20	12:30
							2	TOC	4.2291	42.2909	49.29	51.80	2.51	50.15	12:23
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>									
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)									



**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
14	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 18:23

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	13.47	16.22	2.75	50.18	12:22
2	TOC	0.0000	0.0000	14.66	17.23	2.57	50.14	12:27

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
15	TOC	K1811728-001	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 18:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.67	17.32	2.65	50.14	12:26
2	TOC	0.0000	0.0000	14.89	17.48	2.58	50.12	12:26

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
16	TOC	K1811728-002	0.3981 ppm	0.5629 ppm	141.4200%	2018/12/20 19:26

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.71	17.40	2.68	50.14	12:27
2	TOC	0.7961	7.9611	23.05	25.78	2.73	50.12	12:27

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
17	TOC	K1811789-002.08	0.3032 ppm	0.1364 ppm	44.9900%	2018/12/20 19:58

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5064	5.0636	20.83	23.42	2.59	50.08	12:28
2	TOC	0.2565	2.5651	18.92	21.63	2.71	50.14	12:25
3	TOC	0.2160	2.1596	18.61	21.36	2.75	50.13	12:2
4	TOC	0.2341	2.3415	18.75	21.38	2.63	50.14	12:26

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Analysis	Std. Dev.

Pos	Type	Sample ID	Result (ppmC)	(ppmC)	RSD	Start Time
18	TOC	K1811789-002.08 ms	25.2126 ppm	0.0000 ppm	0.0000%	2018/12/20 21:01

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	25.2126	252.1263	209.70	212.25	2.55	50.12	12:30

Dilution 1:10     
 Blank Contribution (TC) 16.9610 (IC) (v1202)     
 Method Extended Reaction 021711 (v3)     
 Calibration Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
19	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/20 21:17

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	16.94	19.63	2.68	50.10	12:31

Dilution 1:10     
 Blank Contribution (TC) 16.9610 (IC) (v1202)     
 Method Extended Reaction 021711 (v3)     
 Calibration Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711 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 021711 [25 ppm]	0 / infinity (NA / NA)	24.0674 ppm (PASS)	0.0000 ppm	0%	2018/12/20 21:33

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.0674	240.6743	202.44	205.01	2.58	50.10	12:33

Completion State Success - Criteria met.     
 Success Action Do Nothing     
 Method Extended Reaction 021711 (v3)     
 Calibration Extended Reaction 021711 (v24)     
 STD Conc - Pos B 50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 5

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/20 21:50

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	16.32	19.03	2.72	50.15	12:30

Completion State Success - Criteria met.     
 Success Action Do Nothing     
 Method Extended Reaction 021711 (v3)     
 Calibration Extended Reaction 021711 (v24)     
 STD Conc - Pos D 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%	2018/12/20 22:06			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	0.0000	0.0000	15.21	17.97	2.76	50.11	12:33	
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			

Sample Type: Check Standard --> LCS ER										From Schedule Version 5	
Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time		
2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity (NA / NA)	20.6186 ppm (PASS)	0.0000 ppm	0%	2018/12/20 22:23		
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time	
2	TOC	21.9 ppm	1	20.6186	206.1862	176.07	178.69	2.62	50.07	12:31	
<u>Completion State</u>		<u>Success Action</u>		<u>Method</u>		<u>Calibration</u>		<u>STD Conc - Pos 2</u>			
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		21.9 ppmC			

Sample Type: Sample							From Schedule Version 5			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time				
21	TOC	K1811789-003.08	0.6115 ppm	0.0957 ppm	15.6500%	2018/12/20 22:39				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	0.7447	7.4470	22.65	25.41	2.75	50.03	12:29		
2	TOC	0.6046	6.0460	21.58	24.25	2.67	49.99	12:26		
3	TOC	0.5775	5.7752	21.38	23.89	2.51	49.91	12:24		
4	TOC	0.5192	5.1918	20.93	23.51	2.58	49.93	12:23		
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>				
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)				
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time				
22	TOC	K1811789-004.08	0.3582 ppm	0.4373 ppm	122.0700%	2018/12/20 23:42				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	0.1593	1.5932	18.18	20.90	2.72	49.89	12:24		

2	TOC	1.0099	10.0985	24.68	27.32	2.64	49.87	12:26
3	TOC	0.1908	1.9085	18.42	21.15	2.73	49.87	12:26
4	TOC	0.0729	0.7286	17.52	20.19	2.67	49.84	12:26

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
23	TOC	K1811789-005.08	0.6339 ppm	0.0893 ppm	14.0800%	2018/12/21 00:45

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7650	7.6497	22.81	25.45	2.65	49.83	12:24
2	TOC	0.5847	5.8472	21.43	24.13	2.70	49.81	12:25
3	TOC	0.5711	5.7111	21.33	24.07	2.74	49.79	12:24
4	TOC	0.6149	6.1493	21.66	24.35	2.68	49.78	12:25

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
24	TOC	K1811789-006.08	0.5329 ppm	0.0218 ppm	4.1000%	2018/12/21 01:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.5515	5.5149	21.18	23.88	2.70	49.78	12:27
2	TOC	0.5332	5.3318	21.04	23.57	2.54	49.78	12:26
3	TOC	0.5022	5.0218	20.80	23.44	2.64	49.72	12:25
4	TOC	0.5447	5.4469	21.12	23.86	2.73	49.78	12:25

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
25	TOC	K1811789-008.08	0.2970 ppm	0.0830 ppm	27.9500%	2018/12/21 02:51

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.3918	3.9177	19.96	22.52	2.56	49.74	12:28
2	TOC	0.3350	3.3500	19.52	22.21	2.69	49.74	12:24
3	TOC	0.2038	2.0380	18.52	21.29	2.77	49.72	12:27
4	TOC	0.2574	2.5743	18.93	21.62	2.69	49.72	12:24

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
26	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 03:54

Rep	Base	Adjusted	Baseline	Pressure	Run
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#	Analysis Type	ppm	µg	(Abs)	NDIR (Abs)	(Abs)	(psig)	Time
1	TOC	0.0000	0.0000	15.47	17.90	2.42	49.72	12:24
2	TOC	0.0000	0.0000	14.64	17.20	2.56	49.73	12:23

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
27	TOC	K1811849-001.04	1.2435 ppm	0.0105 ppm	0.8400%	2018/12/21 04:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.2362	12.3615	26.41	29.06	2.65	49.71	12:22
2	TOC	1.2509	12.5093	26.52	29.16	2.63	49.71	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
28	TOC	K1811849-001.04 ms	25.4293 ppm	0.0000 ppm	0.0000%	2018/12/21 04:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	25.4293	254.2925	211.36	213.95	2.59	49.70	12:30

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711

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 021711 [25 ppm]	0 / infinity (NA / NA)	24.2565 ppm (PASS)	0.0000 ppm	0%	2018/12/21 05:13

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.2565	242.5645	203.88	206.62	2.74	49.66	12:31

**Completion State** Success - Criteria met.  
**Success Action** Do Nothing  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)  
**STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711

From Schedule Version 5

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/21 05:30

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	16.31	19.10	2.80	49.66	12:27

<b>Completion State</b>	<b>Success Action</b>	<b>Method</b>	<b>Calibration</b>	<b>STD Conc - Pos D</b>
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)	0 ppmC

Sample Type: Sample

From Schedule Version 5

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
29	TOC	K1811849-002.04 4x	8.1359 ppm	0.1209 ppm	1.4900%	2018/12/21 05:46

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	8.2214	82.2142	79.81	82.70	2.89	49.69	12:23
2	TOC	8.0505	80.5045	78.50	81.19	2.69	49.68	12:24

<b>Dilution</b>	<b>Blank Contribution</b>	<b>Method</b>	<b>Calibration</b>
1:10	(TC) 16.9610 (IC) (v1202)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
30	TOC	K1811849-003.04 4x	7.6636 ppm	0.1108 ppm	1.4500%	2018/12/21 06:18

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	7.7420	77.4200	76.15	78.89	2.75	49.68	12:26
2	TOC	7.5853	75.8529	74.95	77.63	2.68	49.71	12:23

<b>Dilution</b>	<b>Blank Contribution</b>	<b>Method</b>	<b>Calibration</b>
1:10	(TC) 16.9610 (IC) (v1202)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
31	TOC	K1811849-004.04	0.9762 ppm	0.1639 ppm	16.7900%	2018/12/21 06:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.0921	10.9213	25.31	27.99	2.68	49.67	12:28
2	TOC	0.8603	8.6033	23.54	26.17	2.64	49.67	12:29

<b>Dilution</b>	<b>Blank Contribution</b>	<b>Method</b>	<b>Calibration</b>
1:10	(TC) 16.9610 (IC) (v1202)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
32	TOC	K1811849-005.04	5.2512 ppm	0.1272 ppm	2.4200%	2018/12/21 07:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	5.3411	53.4111	57.79	60.40	2.61	49.69	12:24
2	TOC	5.1612	51.6125	56.42	59.23	2.82	49.71	12:24

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
33	TOC	RB	0.3241 ppm	0.4583 ppm	141.4200%	2018/12/21 07:53

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	16.09	18.66	2.57	49.67	12:29
2	TOC	0.6482	6.4816	21.92	24.59	2.67	49.61	12:27

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
34	TOC	K1811831-002.01	6.3814 ppm	0.5082 ppm	7.9600%	2018/12/21 08:25

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	6.7408	67.4078	68.49	71.00	2.51	49.71	12:27
2	TOC	6.0221	60.2211	63.00	65.39	2.40	49.90	12:28

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Sample

From Schedule Version 6

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
35	TOC	K1811831-002.01 ms	31.0037 ppm	0.0000 ppm	0.0000%	2018/12/21 08:57

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	31.0037	310.0373	253.97	256.56	2.59	49.92	12:31

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Sample

From Schedule Version 7

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
36	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 09:13

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	13.45	16.02	2.57	49.95	12:24
2	TOC	0.0000	0.0000	13.80	16.48	2.67	49.92	12:23

**Dilution**      **Blank Contribution**      **Method**      **Calibration**

1:10 (TC) 16.9610 (IC) Extended Reaction 021711 (v3) Extended Reaction 021711 (v24)

**Sample Type:** Sample From Schedule Version 8

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
37	TOC	K1812101-001.02	16.0372 ppm	0.0155 ppm	0.1000%	2018/12/21 09:45

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	16.0482	160.4819	139.64	142.30	2.66	49.93	12:27
2	TOC	16.0262	160.2622	139.48	142.17	2.69	49.89	12:27

**Dilution** 1:10 **Blank Contribution** (TC) 16.9610 (IC) (v1202) **Method** Extended Reaction 021711 (v3) **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
38	TOC	K1812101-001.02 ms	40.7000 ppm	0.0000 ppm	0.0000%	2018/12/21 10:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	40.7000	407.0004	328.10	330.64	2.54	49.86	12:31

**Dilution** 1:10 **Blank Contribution** (TC) 16.9610 (IC) (v1202) **Method** Extended Reaction 021711 (v3) **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	24.0495 ppm (PASS)	0.0000 ppm	0%	2018/12/21 10:33

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	24.0495	240.4951	202.30	204.97	2.67	49.86	12:30

**Completion State** Success - Criteria met. **Success Action** Do Nothing **Method** Extended Reaction 021711 (v3) **Calibration** Extended Reaction 021711 (v24) **STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/21 10:49



Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	15.93	18.55	2.62	49.84	12:29

**Completion State**      **Success Action**      **Method**      **Calibration**      **STD Conc - Pos D**  
 Success - Criteria met.      Do Nothing      Extended Reaction 021711 (v3)      Extended Reaction 021711 (v24)      0 ppmC

**Sample Type:** Sample From Schedule Version 9

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
39	TOC	MB3	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 11:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.88	17.48	2.60	50.04	12:31

**Dilution**      **Blank Contribution**      **Method**      **Calibration**  
 1:10      (TC) 16.9610 (IC) (v1202)      Extended Reaction 021711 (v3)      Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> LCS ER From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity (NA / NA)	20.2644 ppm (PASS)	0.0000 ppm	0%	2018/12/21 11:22

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
2	TOC	21.9 ppm	1	20.2644	202.6439	173.36	175.92	2.56	49.99	12:35

**Completion State**      **Success Action**      **Method**      **Calibration**      **STD Conc - Pos 2**  
 Success - Criteria met.      Do Nothing      Extended Reaction 021711 (v3)      Extended Reaction 021711 (v24)      21.9 ppmC

**Sample Type:** Sample From Schedule Version 9

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
40	TOC	K1812154-001.01 50x	0.0965 ppm	0.1365 ppm	141.4200%	2018/12/21 11:39

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.1931	1.9307	18.44	21.05	2.61	49.95	12:28
2	TOC	0.0000	0.0000	16.89	19.63	2.74	49.95	12:27

**Dilution**      **Blank Contribution**      **Method**      **Calibration**  
 1:10      (TC) 16.9610 (IC) (v1202)      Extended Reaction 021711 (v3)      Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
41	TOC	K1812154-001.01 ms 50x	24.3267 ppm	0.0000 ppm	0.0000%	2018/12/21 12:11

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	24.3267	243.2665	202.93	205.49	2.56	49.93	12:33

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
42	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 12:27

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.90	17.47	2.57	49.92	12:27
2	TOC	0.0000	0.0000	13.95	16.42	2.47	49.95	12:21

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
43	TOC	K1812154-002.01	1.5973 ppm	0.1048 ppm	6.5600%	2018/12/21 12:59

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.6714	16.7136	29.74	32.52	2.78	49.93	12:27
2	TOC	1.5232	15.2315	28.60	31.41	2.81	49.97	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
44	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 13:31

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.83	17.44	2.61	49.98	12:26
2	TOC	0.0000	0.0000	13.52	16.27	2.75	49.99	12:25

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
45	TOC	K1812154-003.01	2.1735 ppm	0.0087 ppm	0.4000%	2018/12/21 14:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	2.1674	21.6739	33.53	36.21	2.68	49.99	12:27

2	TOC	2.1797	21.7969	33.62	36.23	2.60	49.96	12:25
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**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
46	TOC	K1812154-004.01 50x	17.5683 ppm	0.0074 ppm	0.0400%	2018/12/21 14:34

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	17.5736	175.7357	151.30	154.08	2.77	50.00	12:27
2	TOC	17.5631	175.6311	151.22	153.86	2.64	49.96	12:28

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
47	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 15:06

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	15.33	17.92	2.59	49.96	12:28
2	TOC	0.0000	0.0000	13.94	16.74	2.80	49.99	12:26

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	23.7161 ppm (PASS)	0.0000 ppm	0%	2018/12/21 15:37

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.7161	237.1608	199.75	202.36	2.62	50.01	12:29

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)      **STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/21 15:54

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	15.45	17.92	2.47	50.01	12:30
<u>Completion State</u>		<u>Success Action</u>		<u>Method</u>		<u>Calibration</u>		<u>STD Conc - Pos D</u>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		0 ppmC		

<u>Sample Type</u> : Sample							From Schedule Version 9								
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time	Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
48	TOC	K1812154-005.01.20x	0.0816 ppm	0.1112 ppm	136.2200%	2018/12/21 16:10	1	TOC	0.1602	1.6024	18.19	20.63	2.44	50.06	12:26
							2	TOC	0.0030	0.0300	16.98	19.62	2.63	50.02	12:25
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>									
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)									
49	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 16:42	1	TOC	0.0000	0.0000	14.08	16.76	2.68	50.06	12:24
							2	TOC	0.0000	0.0000	13.43	15.97	2.54	50.07	12:31
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>									
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)									
50	TOC	K1811928-001.01	0.0564 ppm	0.0642 ppm	113.8700%	2018/12/21 17:14	1	TOC	0.1018	1.0177	17.74	20.38	2.64	50.07	12:24
							2	TOC	0.0110	0.1098	17.05	19.66	2.62	50.06	12:25
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>									
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)									
51	TOC	K1811928-001.01 ms	24.4826 ppm	0.0000 ppm	0.0000%	2018/12/21 17:46	1	TOC	24.4826	244.8258	204.12	206.67	2.55	50.07	12:34

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
52	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 18:02

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	15.50	18.26	2.75	50.01	12:34

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
53	TOC	K1812278-001.01 50x	13.6190 ppm	0.1234 ppm	0.9100%	2018/12/21 18:19

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	13.7063	137.0630	121.74	124.53	2.79	49.97	12:26
2	TOC	13.5318	135.3180	120.41	123.06	2.65	49.99	12:25

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
54	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 18:50

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	14.98	17.57	2.59	50.00	12:29
2	TOC	0.0000	0.0000	14.14	16.73	2.59	49.98	12:24

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
55	TOC	K1812278-001.01 ms 50x	38.1173 ppm	0.0000 ppm	0.0000%	2018/12/21 19:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	38.1173	381.1732	308.36	311.11	2.76	50.03	12:33

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
56	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 19:38

Rep	Base	ppm	µg	Adjusted	NDIR (Abs)	Baseline	Pressure	Run

#	Analysis Type			(Abs)		(Abs)	(psig)	Time
1	TOC	0.0000	0.0000	15.38	18.03	2.65	50.12	12:21
2	TOC	0.0000	0.0000	13.18	15.90	2.72	50.12	12:29
3	TOC	0.0000	0.0000	13.10	15.85	2.75	50.11	12:25
4	TOC	0.0000	0.0000	13.37	15.90	2.53	50.14	12:23

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
57	TOC	K1812278-003.02 4x	1.1389 ppm	0.0119 ppm	1.0500%	2018/12/21 20:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.1305	11.3046	25.60	28.30	2.69	50.14	12:28
2	TOC	1.1473	11.4733	25.73	28.49	2.76	50.17	12:27

**Dilution** 1:10      **Blank Contribution** (TC) 16.9610 (IC) (v1202)      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711

From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity ( NA / NA )	23.5524 ppm (PASS)	0.0000 ppm	0%	2018/12/21 21:13

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.5524	235.5243	198.50	201.17	2.67	50.15	12:31

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)      **STD Conc - Pos B** 50 ppmC

**Sample Type:** Check Standard --> CCB 021711

From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/21 21:29

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	16.23	18.82	2.59	50.15	12:30

**Completion State** Success - Criteria met.      **Success Action** Do Nothing      **Method** Extended Reaction 021711 (v3)      **Calibration** Extended Reaction 021711 (v24)      **STD Conc - Pos D** 0 ppmC

Sample Type: Sample							From Schedule Version 9			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time				
58	TOC	MB4	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 21:46				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	0.0000	0.0000	14.51	17.24	2.74	50.15	12:29		
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>				
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)				

Sample Type: Check Standard --> LCS ER										From Schedule Version 9	
Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time		
2	TOC	21.9000	1:1	[TOC] LCS ER [21.9 ppm]	0 / infinity (NA / NA)	19.2260 ppm (PASS)	0.0000 ppm	0%	2018/12/21 22:02		
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time	
2	TOC	21.9 ppm	1	19.2260	192.2601	165.42	168.09	2.66	50.13	12:33	
<u>Completion State</u>		<u>Success Action</u>		<u>Method</u>		<u>Calibration</u>		<u>STD Conc - Pos 2</u>			
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		21.9 ppmC			

Sample Type: Sample							From Schedule Version 9			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time				
59	TOC	K1812278-002.01 50x	13.8400 ppm	0.2571 ppm	1.8600%	2018/12/21 22:19				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	14.0218	140.2181	124.15	126.95	2.79	50.10	12:23		
2	TOC	13.6582	136.5816	121.37	124.17	2.79	50.13	12:22		
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>				
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)				
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time				
60	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/21 22:50				
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time		
1	TOC	0.0000	0.0000	14.44	17.22	2.77	50.12	12:27		
2	TOC	0.0000	0.0000	13.12	15.76	2.64	50.12	12:27		
<u>Dilution</u>		<u>Blank Contribution</u>		<u>Method</u>		<u>Calibration</u>				

1:10 (TC) 16.9610 (IC) Extended Reaction Extended Reaction  
(v1202) 021711 (v3) 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
61	TOC	K1812279-001.02	24.8410 ppm	0.1722 ppm	0.6900%	2018/12/21 23:22

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	24.7192	247.1921	205.93	208.61	2.68	50.12	12:24
2	TOC	24.9628	249.6278	207.79	210.56	2.77	50.10	12:27

Dilution 1:10 Blank Contribution (TC) 16.9610 (IC) Method Extended Reaction Calibration Extended Reaction  
(v1202) 021711 (v3) 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
62	TOC	K1812279-001.02 ms	48.6019 ppm	0.0000 ppm	0.0000%	2018/12/21 23:54

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	48.6019	486.0190	388.51	391.29	2.78	50.13	12:29

Dilution 1:10 Blank Contribution (TC) 16.9610 (IC) Method Extended Reaction Calibration Extended Reaction  
(v1202) 021711 (v3) 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
63	TOC	RB	0.3638 ppm	0.5145 ppm	141.4200%	2018/12/22 00:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.7276	7.2756	22.52	25.36	2.84	50.13	12:25
2	TOC	0.0000	0.0000	16.69	19.45	2.76	50.14	12:24

Dilution 1:10 Blank Contribution (TC) 16.9610 (IC) Method Extended Reaction Calibration Extended Reaction  
(v1202) 021711 (v3) 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
64	TOC	K1812272-001.01 4x	10.5041 ppm	0.0528 ppm	0.5000%	2018/12/22 00:42

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	10.5415	105.4147	97.55	100.17	2.62	50.14	12:27
2	TOC	10.4668	104.6678	96.98	99.78	2.81	50.13	12:26

Dilution 1:10 Blank Contribution (TC) 16.9610 (IC) Method Extended Reaction Calibration Extended Reaction  
(v1202) 021711 (v3) 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
65	TOC	K1812272-001.01 ms 4x	36.0064 ppm	0.0000 ppm	0.0000%	2018/12/22 01:14

Rep	Base	Adjusted	Baseline	Pressure	Run
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#	Analysis Type	ppm	µg	(Abs)	NDIR (Abs)	(Abs)	(psig)	Time
1	TOC	36.0064	360.0644	292.22	294.86	2.64	50.13	12:31
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>		
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time		
66	TOC	RB	0.0221 ppm	0.0441 ppm	200.0000%	2018/12/22 01:30		
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0883	0.8829	17.64	20.45	2.81	50.10	12:26
2	TOC	0.0000	0.0000	15.76	18.39	2.63	50.11	12:26
3	TOC	0.0000	0.0000	14.56	17.38	2.82	50.12	12:26
4	TOC	0.0000	0.0000	14.00	16.68	2.68	50.13	12:23
<b>Dilution</b>		<b>Blank Contribution</b>		<b>Method</b>		<b>Calibration</b>		
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		

**Sample Type:** Check Standard --> CCV 021711 From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time	
B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity (NA / NA)	23.6288 ppm (PASS)	0.0000 ppm	0%	2018/12/22 02:33	
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.6288	236.2883	199.08	201.57	2.49	50.12	12:30
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos B</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		50 ppmC		

**Sample Type:** Check Standard --> CCB 021711 From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time	
D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity (NA / NA)	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/22 02:49	
Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	15.09	17.75	2.66	50.13	12:30
<b>Completion State</b>		<b>Success Action</b>		<b>Method</b>		<b>Calibration</b>		<b>STD Conc - Pos D</b>		
Success - Criteria met.		Do Nothing		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)		0 ppmC		

Sample Type: Sample							From Schedule Version 9		
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
67	TOC	K1812272-002.01 100x	3.8476 ppm	0.0975 ppm	2.5300%	2018/12/22 03:06			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	3.9166	39.1659	46.90	49.50	2.60	50.12	12:28	
2	TOC	3.7787	37.7871	45.85	48.70	2.85	50.12	12:24	
Dilution		Blank Contribution		Method		Calibration			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
68	TOC	K1812272-003.01	3.9636 ppm	0.0156 ppm	0.3900%	2018/12/22 03:38			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	3.9747	39.7467	47.35	50.10	2.76	50.12	12:26	
2	TOC	3.9526	39.5256	47.18	49.88	2.70	50.11	12:27	
Dilution		Blank Contribution		Method		Calibration			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
69	TOC	K1812272-004.01	4.0087 ppm	0.0333 ppm	0.8300%	2018/12/22 04:09			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	4.0322	40.3222	47.79	50.48	2.69	50.10	12:29	
2	TOC	3.9851	39.8513	47.43	50.17	2.74	50.12	12:24	
Dilution		Blank Contribution		Method		Calibration			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
70	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/22 04:41			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	
1	TOC	0.0000	0.0000	15.38	18.09	2.72	50.15	12:28	
2	TOC	0.0000	0.0000	14.56	17.22	2.66	50.14	12:23	
Dilution		Blank Contribution		Method		Calibration			
1:10		(TC) 16.9610 (IC) (v1202)		Extended Reaction 021711 (v3)		Extended Reaction 021711 (v24)			
Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time			
71	TOC	K1811745-001.09	1.9426 ppm	0.5604 ppm	28.8500%	2018/12/22 05:13			
Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time	

1	TOC	1.5463	15.4630	28.78	31.48	2.70	50.17	12:27
2	TOC	2.3389	23.3888	34.84	37.63	2.79	50.13	12:24

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
72	TOC	K1811745-001.09 ms	25.9104 ppm	0.3760 ppm	1.4500%	2018/12/22 05:45

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	26.1763	261.7631	217.07	219.81	2.74	50.12	12:24
2	TOC	25.6446	256.4457	213.00	215.81	2.81	50.13	12:25

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
73	TOC	RB	0.0000 ppm	0.0000 ppm	0.0000%	2018/12/22 06:16

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	0.0000	0.0000	15.93	18.61	2.68	50.12	12:23
2	TOC	0.0000	0.0000	14.21	17.02	2.81	50.10	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
74	TOC	K1811747-001.09	4.7084 ppm	0.0027 ppm	0.0600%	2018/12/22 06:48

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	4.7103	47.1034	52.97	55.91	2.94	50.11	12:24
2	TOC	4.7065	47.0655	52.94	55.63	2.69	50.12	12:26

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time
75	TOC	K1811747-001.09 ms	29.2991 ppm	0.0000 ppm	0.0000%	2018/12/22 07:20

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	29.2991	292.9914	240.94	243.69	2.75	50.09	12:34

**Dilution** 1:10  
**Blank Contribution** (TC) 16.9610 (IC) (v1202)  
**Method** Extended Reaction 021711 (v3)  
**Calibration** Extended Reaction 021711 (v24)

**Sample Type:** Check Standard --> CCV 021711

From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊	B	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity ( NA / NA )	23.8618 ppm (PASS)	0.0000 ppm	0%	2018/12/22 07:36

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.8618	238.6180	200.86	203.53	2.67	50.09	12:33

<u>Completion State</u>	<u>Success Action</u>	<u>Method</u>	<u>Calibration</u>	<u>STD Conc - Pos B</u>
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)	50 ppmC

**Sample Type:** Check Standard --> CCB 021711

From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊	D	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/22 07:53

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	14.88	17.69	2.81	50.09	12:31

<u>Completion State</u>	<u>Success Action</u>	<u>Method</u>	<u>Calibration</u>	<u>STD Conc - Pos D</u>
Success - Criteria met.	Do Nothing	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)	0 ppmC

**Sample Type:** Sample

From Schedule Version 9

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time	
◊	1	TOC	K1812416-035.01 doc	1.3602 ppm	0.1716 ppm	12.6100%	2018/12/22 08:10

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	1.2389	12.3890	26.43	29.31	2.88	50.08	12:27
2	TOC	1.4816	14.8155	28.29	31.38	3.09	50.10	12:29

<u>Dilution</u>	<u>Blank Contribution</u>	<u>Method</u>	<u>Calibration</u>
1:10	(TC) 16.9610 (IC) (v1202)	Extended Reaction 021711 (v3)	Extended Reaction 021711 (v24)

Pos	Analysis Type	Sample ID	Result (ppmC)	Std. Dev. (ppmC)	RSD	Start Time	
◊	3	TOC	K1812416-035.01 ms doc	24.3251 ppm	0.0000 ppm	0.0000%	2018/12/22 08:41

Rep #	Base Analysis Type	ppm	µg	Adjusted (Abs)	NDIR (Abs)	Baseline (Abs)	Pressure (psig)	Run Time
1	TOC	24.3251	243.2508	202.92	205.83	2.92	50.10	12:30

<b>Dilution</b> 1:10	<b>Blank Contribution</b> (TC) 16.9610 (IC) (v1202)	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)
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Sample Type: Check Standard --&gt; CCV 021711

From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ B	TOC	25.0000	1:2	[TOC] CCV 021711 [25 ppm]	0 / infinity ( NA / NA )	23.9324 ppm (PASS)	0.0000 ppm	0%	2018/12/22 08:58

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
B	TOC	25 ppm	1	23.9324	239.3244	201.40	204.23	2.82	50.11	12:31

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)	<b>STD Conc - Pos B</b> 50 ppmC
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Sample Type: Check Standard --&gt; CCB 021711

From Schedule Version 9

Pos	BAT	Concentration (ppm)	Dil	Sample ID	Min / Max (% dev)	Result	Std. Dev.	RSD	Start Time
◊ D	TOC	0.0000	1:2	[TOC] CCB 021711 [0.0 ppm]	0 / infinity ( NA / NA )	0.0000 ppm (PASS)	0.0000 ppm	0%	2018/12/22 09:14

Pos	Base Analysis Type	ID	Rep #	ppm	µg	Adjusted	NDIR	Baseline	Pressure	Run Time
D	TOC	0.0 ppm	1	0.0000	0.0000	16.24	18.97	2.73	50.12	12:31

<b>Completion State</b> Success - Criteria met.	<b>Success Action</b> Do Nothing	<b>Method</b> Extended Reaction 021711 (v3)	<b>Calibration</b> Extended Reaction 021711 (v24)	<b>STD Conc - Pos D</b> 0 ppmC
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### Meta Data Used in this Report

#### Blanks

Version	Reagent (Abs)	Acid (Abs)	DI IC (Abs)	DI TC (Abs)	DI TOC (Abs)	Save Time	Operator
v1201	2.2080	1.6200	0.0000	0.0000	0.0000	2018/12/17 20:18	Fusion1 (Fusion1)
v1202	1.7907	1.3090	0.0000	0.0000	0.0000	2018/12/20 11:40	Fusion1 (Fusion1)

#### Calibrations

**Name: Extended Reaction 021711 (TOC)**

Version: v24 Calibration curve formula: TOC:  $y = 7.645x + 18.448$   
 Ver Creation: 2018/11/26 18:53  $r^2$  value: TOC:  $r^2 = 0.99984$   
 Comment:  
 Operator: Fusion1 (Fusion1)  
 Basic Analysis Type TOC

**Basic Analysis Type: TOC**

Sample ID	Y Raw Value	X Expected	Message	End Time
0.0 ppm	19.1720	0.0000		2018/11/26 17:15
0.50 ppm	23.8410	0.5000		2018/11/26 17:31
1.00 ppm	25.1300	1.0000		2018/11/26 17:47
5.00 ppm	53.5500	5.0000		2018/11/26 18:03
10.0 ppm	95.3860	10.0000		2018/11/26 18:20
25.0 ppm	211.7220	25.0000		2018/11/26 18:36
50.0 ppm	399.8190	50.0000		2018/11/26 18:52

**Methods****Name: Extended Reaction 021711 (TOC)**

Version: v3 Operator: Gen Chem Lab (Fusion1)  
 Ver Creation: 2013/02/04 11:44  
 Comment:

Parameter	Value	Advanced Parameter	Value
SampleVolume	10.0 mL	NeedleRinseVolume	5.0 ml
Dilution	1:10	VialPrimeVolume	2.0 ml
AcidVolume	0.5 ml	ICSamplePrimeVolume	2.0 ml
ReagentVolume	2.0 ml	ICSpargeRinseVolume	12.0 ml
UVReactorPrerinse	Off	BaselineStabilizeTime	0.70 min
UVReactorPrerinseVolume	5.0	DetectorPressureFlow	150 ml/min
NumberOfUVReactorPrerinses	1	SyringeSpeedWaste	10
ICSpargeTime	1.00 mins	SyringeSpeedAcid	7
DetectorSweepFlow	500 ml/min	SyringeSpeedReagent	7
PreSpargeTime	4.00 mins	SyringeSpeedDIWater	7
SystemFlow	500 ml/min	NDIRPressurization	60 psig
		SyringeSpeedSampleDispense	5
		SyringeSpeedSampleAspirate	4
		SyringeSpeedUVDispense	7
		SyringeSpeedUVAspirate	5
		SyringeSpeedICDispense	7
		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
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### Report History

#### Report History

Report Version	User Name	System Reason	User Reason	Date
1	Fusion1 (Fusion1)	Schedule completed	Schedule completed	2018/12/22 09:34



## Case Narrative

**Method:** 6850  
**Analysis:** Perchlorate  
**Analysis SOP:** LC-MS-CLO4  
**ALS WO ID(s):** 1834583; 1834584; 1834586;  
1834591; 1834871

**Client:** ALS Laboratories (Houston, TX)  
**Matrix:** Water  
**ELMS Batch (HBN):** 2187 (229705)

**General Set Information:** There were fourteen 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  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** Field samples 1834584001/1834591003 were analyzed and reported from 1:1,000 dilutions. Field samples 1834591006/07 were analyzed and reported from 1:10 dilutions. Field samples 1834591008-10 were analyzed and reported from 1:100 dilutions. The reporting limits have been adjusted accordingly.

**Method QC data:** The method blank (LMB 633241) was less than 1/2 the CRDL. The recovery for the LCS (633242) was within acceptable parameters.





**MS/MSD Analysis:** MS/MSD was performed on sample 1834583001 (Client ID: LH18/24-SP650\_120618\_BIX). 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 Matrix Spike (MS – 633243) failed QC acceptance criteria for percent recovery, biased high. This is due to the fact that the unspiked sample result of 2.028µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected. The relative percent difference (RPD) 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  $(A) \times (B)$ ,

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.

Thomas Bosch                      December 21, 2018  
Analyst    Date



# ANALYTICAL REPORT

Report Date: December 21, 2018

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

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1834871**

Project ID: HS18120731

Purchase Order: HS18120731

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_121218	1834871001	12/12/18	12/14/18	



## ANALYTICAL REPORT

Workorder: 34-1834871

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP650_121218</b>	Sampling Site: NA	Collected: 12/12/2018				
Lab ID: 1834871001	Media: 125 mL Nalgene	Received: 12/14/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2187 (HBN: 229705) Analyzed: 12/19/2018 13:31	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
Perchlorate	2.6	1.0	2.0	4.0	1	J

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

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 12/20/2018 13:51	/S/ Stephen Brose 12/21/2018 13:13

## Laboratory Contact Information

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

Phone: (801) 266-7700  
Email: als@alst.com  
Web: www.alst.com



## ANALYTICAL REPORT

**Workorder:** 34-1834871

**Client:** ALS Environmental  
(Houston)

**Project Manager:** Kevin W. Griffiths

### General Lab Comments

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

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

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

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

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

### Result Symbol Definitions

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

### Qualifier Symbol Definitions

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



# Quality Control Sample Batch Report

00922626

## Analysis Information

**Workorder:** 1834871

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2187 (HBN: 229705)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 633241 <b>Analyzed:</b> 12/19/2018 09:08 <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 633242 <b>Analyzed:</b> 12/19/2018 09:22 <b>Dilution:</b> 1 <b>Units:</b> ug/L				
Analyte	Result	Target	% Rec	QC Limits
Perchlorate	4.68	5.00	93.6	78.8   123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1834583001 <b>Analyzed:</b> 12/19/2018 09:37 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MS:</b> 633243 <b>Analyzed:</b> 12/19/2018 09:50 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MSD:</b> 633244 <b>Analyzed:</b> 12/19/2018 10:04 <b>Dilution:</b> 1 <b>Units:</b> ug/L			
Analyte	Result	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Perchlorate	2.00	6.21	5 #	124	78.8   123.8	6.16	123	0.884	0.0   20.0

## Continuing Calibration Verification

<b>CCV:</b> 633238 <b>Analyzed:</b> 12/19/2018 08:25 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 633245 <b>Analyzed:</b> 12/19/2018 11:54 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 633247 <b>Analyzed:</b> 12/19/2018 14:26 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	25.5	25.0	102	26.1	25.0	104	26.2	25.0	105

## Interference Check Sample

<b>ICSA:</b> 633240 <b>Analyzed:</b> 12/19/2018 08:54 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	1.08	1.00	108

## Limit of Detection Verification

<b>LODV:</b> 633239 <b>Analyzed:</b> 12/19/2018 08:40 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 633246 <b>Analyzed:</b> 12/19/2018 12:08 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 633248 <b>Analyzed:</b> 12/19/2018 14:40 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.08	1.00	108	1.07	1.00	107	1.06	1.00	106



# Quality Control Sample Batch Report

00922627

## Analysis Information

**Workorder:** 1834871

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2187 (HBN: 229705)

**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 12/20/2018 13:51	/S/ Stephen Brose 12/21/2018 13:13

## Symbols and Definitions

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

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



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### Contract Chain of Custody

COC ID: 10430

1834871

#### 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  
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**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:** HS18120731  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18120731-01	LH18/24-SP650_121218	Water	12 Dec 2018 14:00
SUB_Perch-6850			28 Dec 2018

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

**QC Level:** DOD IV (DoD Data Package)

Relinquished By: R Cuga  
Received By: Danielle Winnings  
Cooler ID(s): \_\_\_\_\_

Date/Time: 12/13/18 18:00  
Date/Time: 12/14/2018 8:20  
Temperature(s): \_\_\_\_\_

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

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

1834871

Client Name: ALS Houston Project/Task/Site: HS18120731-01 10430  
 Date/Time of Receipt: 12/14/2018 8:20 Number of Coolers Received: 1

Condition of Coolers: Acceptable/Unacceptable  
 Cooler Custody Seals: Present/Absent/NA  
 Intact/Broken/NA  
 Container Custody Seals: Present/Absent/NA  
 Intact/Broken/NA  
 Ice Present: Yes/No/NA  
Frozen/Melted/NA

Temperature Control: Present/Not Included  
 Location Temp Taken: Control/Between Samples  
 Are all temperatures within project specific guidelines? Yes/No/NA  
 VOA Headspace Present? Yes/No/NA

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

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 9033	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Desiree Hill Signature Desiree Hill Printed Name 12/14/2018 Date

CLIENT-RELATED INFORMATION

- |  |   |  |   |
|--|---|--|---|
| <input type="checkbox"/> Missing Cooler                  | <input type="checkbox"/> Missing Samples/Bottles          | <input type="checkbox"/> Incorrect Preservation    | <input type="checkbox"/> Insufficient Sample Volume |
| <input type="checkbox"/> Cooler Conditions               | <input type="checkbox"/> Broken/Leaking Samples           | <input type="checkbox"/> pH Criteria Not Met       | <input type="checkbox"/> Chain of Custody Problems  |
| <input type="checkbox"/> Missing Paperwork               | <input type="checkbox"/> Incorrect Bottle Type            | <input type="checkbox"/> Residual Chlorine Present | <input type="checkbox"/> Other:                     |
| <input type="checkbox"/> Missing/Incorrect Bottle Labels | <input type="checkbox"/> Cooler Temperatures Out of Range | <input type="checkbox"/> 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: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature



RT 907  
ST 8  
5  
15:00  
6360  
12:14  
A

ALS  
10450 Stancliff  
Houston, TX 77057  
Tel. +1 281 530 56  
Fax. +1 281 530 5



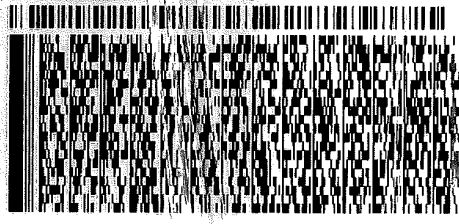
ORIGIN ID: SGRA (281) 530-5656  
SHIPPING DEPT  
ALS LABORATORY GROUP  
10450 STANCLIFF RD  
SUITE 210  
HOUSTON, TX 77099  
UNITED STATES US

SHIP  
ACTW DATE: 13DEC18  
CAD: WT: 5.70 LB  
DIMS: 300130/CAFE3211  
14x11x10 IN  
BILL  
THIRD PARTY

TO SAMPLE RECEIVING  
ALS ENVIRONMENTAL  
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123

(801) 266-7700  
REF: HS18120731 RJ - HOU



FedEx  
Express

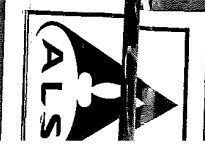


TRK# 4380 9535 6360  
0201

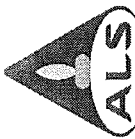
FR - 14 DEC 3:00P  
STANDARD OVERNIGHT

AX BTFA

84123  
UT-US SLC







# Batch Worklist

HBN: 229705

Instrument:

Created: 12/18/2018 15:40



Status: WP

Analyst: T. Bosch

Batch: ELMS/ 2187  
 Rule: EPA 6850, DoD QSM Water

- Workorder: 1834583 [ENV\_LVL4]
- Workorder: 1834584 [ENV\_LVL4]
- Workorder: 1834586 [ENV\_LVL4]
- Workorder: 1834591 [ENV\_LVL4]
- Workorder: 1834871 [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	633238	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
2	633239	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	
3	633240	ICS for HBN 229705 [ELMS/2187]				ICS	3		E6850..D3Q	5311		12/26/2018	
4	633241	LMB for HBN 229705 [ELMS/2187]				LMB	3		E6850Q413Q	5311		12/26/2018	
5	633242	LCS for HBN 229705 [ELMS/2187]				LCS	3		E6850Q413Q	5311		12/26/2018	
6	1834583001	LH18/24-SP650_120618_BIX				SAMPLE	3	1834583001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
7	633243	LH18/24-SP650...(1834583001MS)				MS	3		E6850Q413Q	5311		12/26/2018	
8	633244	LH18/24-SP65...(1834583001MSD)				MSD	3		E6850Q413Q	5311		12/26/2018	
9	1834584001	LH18/24-SP140_120618				SAMPLE	3	1834584001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
10	1834586001	LH18/24-SP650_120618_BIX				SAMPLE	3	1834586001-A	E6850Q41.3	5480	1/3/2019	12/26/2018	
11	1834591001	MW-25-12062018				SAMPLE	3	1834591001-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
12	1834591002	MW-28-12062018				SAMPLE	3	1834591002-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
13	1834591003	MW-26-12062018				SAMPLE	3	1834591003-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
14	1834591004	MW-20-12062018				SAMPLE	3	1834591004-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
15	1834591005	MW-5-12062018				SAMPLE	3	1834591005-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
16	633245	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
17	633246	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	
18	1834591006	MW-19-12062018				SAMPLE	3	1834591006-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
19	1834591007	MW-8-12062018				SAMPLE	3	1834591007-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
20	1834591008	MW-6-12062018				SAMPLE	3	1834591008-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
21	1834591009	MW-12-12062018				SAMPLE	3	1834591009-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
22	1834591010	DUP-1A-12062018				FLDDUP	3	1834591010-A	E6850Q41.3	5480	1/3/2019	12/27/2018	
23	1834871001	LH18/24-SP650_121218				SAMPLE	3	1834871001-A	E6850Q41.3	5480	1/9/2019	12/31/2018	
24	633247	CCV for HBN 229705 [ELMS/2187]				CCV	3		E685041C3Q	5311		12/26/2018	
25	633248	LODV for HBN 229705 [ELMS/2187]				LODV	3		E6850..D3Q	5311		12/26/2018	



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**

ALS Work Order #'s & Sample #('): 1834583 (001); 1834584(001); 1834586(001);1834591(001-10);1834871 (001)  
 ELMS Batch/HBN ID: 2187 (229705)  
 Prep Date: 12/18/2018 Analysis Date: 12/19/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\DEC\19DEC18D.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 633242; Target = 5.0µg/L. ASTM type II water was used for LMB 633241.

**MS/MSD:** MS/MSD was performed on sample 1834483001 (Client ID: LH18/24-SP650\_120618\_BIX). 5.0µl of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

**COMMENTS:**

- Results reported in µg/L. Field samples 1834584001/1834591003 were analyzed and reported from 1:1,000 dilutions. Field samples 1834591006/07 were analyzed and reported from 1:10 dilutions. Field samples 1834591008-10 were analyzed and reported from 1:100 dilutions. The reporting limits have been adjusted accordingly. Sample 1834591005 failed the 50-150% method requirement for ISTD recovery. The sample was re-prepped, re-analyzed and reported.
- All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike (MS – 633243) failed QC acceptance criteria for percent recovery, biased high. This is due to the fact that the unspiked sample result of 2.028µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.
- Sample data can be viewed at two directories within the ALS system: \\ALS\TWS013\LCMS\LCMS04\2018\DEC\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\229705-DoD-ALS-Hstn LCMS4 or through \\ALS\TWS013\DATAREVIEW\HBN#

### 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.**

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
Batch(es)/SDG: ELMS: 2187 HBN: 229705		
Sample Set IDs if Applicable: 1834591 / 1834871 1834583 / 1834584 / 1834586		
<u>Calibration standards analyzed and meets criteria</u>	TB	SB
<u>Standards traceability checked and meets criteria</u>	TB	SB
<u>Standard curve coefficients evaluated and meet criteria</u>	TB	SB
<u>ICVs analyzed and meet acceptance criteria</u>	TB	SB
<u>CCVs analyzed and meet acceptance criteria</u>	TB	SB
<u>Method Blanks analyzed and meet acceptance criteria</u>	TB	SB
<u>Retention Time Windows checked</u>	TB	SB
<u>For method 8081A, Endrin/DDT Breakdown is checked for compliance</u>	—	—
<u>Surrogate recoveries checked and appropriately addressed</u>	—	—
<u>Method Preparation Blanks analyzed and meet acceptance criteria</u>	TB	SB
<u>MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed</u>	TB	SB
<u>RLVS analyzed</u>	TB	SB
<u>Preparation and analysis hold times met</u>	TB	SB
<u>Preparation deviations and re-preparations noted when performed</u>	TB	SB
<u>Analysis deviations and re-analyses noted when performed</u>	TB	SB
<u>Sample dilution factors noted on reports</u>	TB	SB
<u>Electronic records in HBN transcription accuracy and completeness checked</u>	TB	SB
<u>Preparation and analysis calculations checked</u>	TB	SB
<u>NCRs are completed as necessary NC/CAR#</u>	—	—
<u>Report forms are complete and accurate</u>	TB	SB
<u>Manual integrations checked</u>	TB	SB



## STANDARD REPORT

## Working Standard - CLO4 WRK

CLO4 WRK			Description - 6850 WKG Std 100.ug/L		
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL	
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020	
MFG Lot: 218065075		Usable: No	
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL





## STANDARD REPORT

## Constituent

## Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

## Constituent

## Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020



## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK			Description - 6850 QC WKG STD 100ug/L		
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				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**

<b>CLO4 QC INT</b>		<b>Description - 6850 QC Intrmdt Std-QC 10ug/mL</b>			
Standard: 41830		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
<b>Composition</b>					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



**STANDARD REPORT**  
**Constituent**

**Solvent Standard - ASTM H2O**

<b>ASTM H2O</b>		<b>Description - ASTM Type II Water</b>	
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	Created By: Thomas Bosch	Amount: 100 mL	
MFG: Ultra Scientific	Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020	
MFG Lot: CP-0860		Usable: Yes	
Part ID: ICC-013		Lab Lot: CLO4 QC STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730	Created By: Thomas Bosch	Amount: 25 mL			
MFG: ALS/SLC	Create Date: 09/20/2018 09:09AM	Expires: 09/20/2019			
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes			
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK			
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK			Description - Perchlorate ISTD Stock
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL





# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

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

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

Solvent: water (low TOC, < 50 ppb)

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

### Traceability:

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

### Estimation of Uncertainties:

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

### Homogeneity:

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

### Intended Use:

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

### Instructions for Use:

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

### Hazards:

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

### Expiration of Certification:

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





# Certificate of Analysis



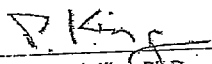
## ISO Guide 34 Reference Material

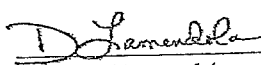
Product Number: ICC-013  
Lot Number: CP-0860

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. Lattendola  
Director of QA/RA



125 Market Street  
New Haven, CT 06513  
USA



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

# CERTIFICATE OF ANALYSIS



43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> 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, Inorganic QC Manager



Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

Quality Standards:

ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

## Product Information

Chemical Purity Specification:  $\geq 98\%$

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/NCSL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

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

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

Approved by: T. J. Eckersley

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

## Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LCMS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# Raw Data

Batch Report: C:\HPCHEM\1\DATA\19DEC18D\19DEC18S.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	
*	633238	C	Vial 71	1	Control	1	3.23209e6	8.395	25.48210
*	633239	L	Vial 72	1	Control	2	1.11008e5	8.452	1.07645
*	633240	I	Vial 73	1	Control	3	8.52191e4	8.388	1.07598
*	633241	L	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	633242	Q	Vial 75	1	Control	5	6.02025e5	8.424	4.68168
*	1834583001		Vial 76	1	Sample	6	1.30682e5	8.299	2.02766
*	633243	3	Vial 77	1	Sample	7	4.18728e5	8.304	6.21365
*	633244	3	Vial 78	1	Sample	8	4.70343e5	8.301	6.15892
*	1834584001		Vial 79	1	Sample	9	7.55206e5	8.404	4863.44428
*	1834586001		Vial 80	1	Sample	10	1.47417e5	8.281	2.22125
*	1834591001		Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1834591002		Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1834591003		Vial 83	1	Sample	13	1.37283e6	8.422	9673.99580
*	1834591004		Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1834591005		Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	633245	C	Vial 71	1	Control	16	3.35351e6	8.368	26.12216
*	633246	L	Vial 72	1	Control	17	1.20917e5	8.389	1.07141
*	1834591006		Vial 86	1	Sample	18	4.86119e6	8.226	77.31931
*	1834591007		Vial 87	1	Sample	19	5.52738e5	8.384	390.11734
*	1834591008		Vial 88	1	Sample	20	1.22594e6	8.392	833.53348
*	1834591009		Vial 89	1	Sample	21	1.62460e6	8.383	1220.27143
*	1834591010		Vial 90	1	Sample	22	1.23659e6	8.394	941.30723
*	1834871001		Vial 91	1	Sample	23	1.62193e5	8.278	2.59996
*	1834591006		Vial 92	1	Sample	24	6.48996e5	8.319	66.51942
*	1834591007		Vial 93	1	Sample	25	5.68899e6	8.359	441.44711
*	1834591005		Vial 94	1	Sample	26	0.00000	0.000	0.00000
*	633247	C	Vial 71	1	Control	27	3.38788e6	8.356	26.21078
*	633248	L	Vial 72	1	Control	28	1.23908e5	8.361	1.05635

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount	
*	633238	C	Vial 71	1	Control	1	9.46861e5	8.411	24.76143
*	633239	L	Vial 72	1	Control	2	3.54461e4	8.472	1.02337
*	633240	I	Vial 73	1	Control	3	3.57771e4	8.394	1.31699
*	633241	L	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	633242	Q	Vial 75	1	Control	5	1.83470e5	8.442	4.68584
*	1834583001		Vial 76	1	Sample	6	4.76828e4	8.315	2.32808
*	633243	3	Vial 77	1	Sample	7	1.49048e5	8.323	7.27217
*	633244	3	Vial 78	1	Sample	8	1.68272e5	8.319	7.24272
*	1834584001		Vial 79	1	Sample	9	2.32386e5	8.423	4917.98483
*	1834586001		Vial 80	1	Sample	10	6.04057e4	8.295	2.86912
*	1834591001		Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1834591002		Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1834591003		Vial 83	1	Sample	13	4.08001e5	8.439	9548.26549
*	1834591004		Vial 84	1	Sample	14	0.00000	0.000	0.00000
*	1834591005		Vial 85	1	Sample	15	0.00000	0.000	0.00000
*	633245	C	Vial 71	1	Control	16	9.69700e5	8.384	25.06771
*	633246	L	Vial 72	1	Control	17	4.07711e4	8.401	1.06998
*	1834591006		Vial 86	1	Sample	18	1.46824e6	8.243	75.52262
*	1834591007		Vial 87	1	Sample	19	1.68775e5	8.403	389.27218
*	1834591008		Vial 88	1	Sample	20	3.59153e5	8.407	810.38358
*	1834591009		Vial 89	1	Sample	21	4.78620e5	8.399	1195.44501
*	1834591010		Vial 90	1	Sample	22	3.63480e5	8.413	919.03518
*	1834871001		Vial 91	1	Sample	23	6.37608e4	8.286	3.25760
*	1834591006		Vial 92	1	Sample	24	1.99622e5	8.332	67.62522
*	1834591007		Vial 93	1	Sample	25	1.66211e6	8.375	424.57193
*	1834591005		Vial 94	1	Sample	26	0.00000	0.000	0.00000
*	633247	C	Vial 71	1	Control	27	9.85047e5	8.371	25.28254
*	633248	L	Vial 72	1	Control	28	4.31054e4	8.381	1.08344

Batch Report: C:\HPCHEM\1\DATA\19DEC18D\19DEC18S.B

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	633238	C	Vial 71	1	Control	1	3.78208e5	5.00000
*	633239	L	Vial 72	1	Control	2	3.94820e5	5.00000
*	633240	I	Vial 73	1	Control	3	3.03262e5	5.00000
*	633241	L	Vial 74	1	Control	4	4.07686e5	5.00000
*	633242	Q	Vial 75	1	Control	5	4.12803e5	5.00000
*	1834583001		Vial 76	1	Sample	6	2.21386e5	5.00000
*	633243	3	Vial 77	1	Sample	7	2.13289e5	5.00000
*	633244	3	Vial 78	1	Sample	8	2.41807e5	5.00000
*	1834584001		Vial 79	1	Sample	9	4.97457e5	5000.00000
*	1834586001		Vial 80	1	Sample	10	2.25638e5	5.00000
*	1834591001		Vial 81	1	Sample	11	1.98333e5	5.00000
*	1834591002		Vial 82	1	Sample	12	1.94131e5	5.00000
*	1834591003		Vial 83	1	Sample	13	4.40927e5	5000.00000
*	1834591004		Vial 84	1	Sample	14	2.66698e5	5.00000
*	1834591005		Vial 85	1	Sample	15	1.76359e5	5.00000
*	633245	C	Vial 71	1	Control	16	3.82304e5	5.00000
*	633246	L	Vial 72	1	Control	17	4.32578e5	5.00000
*	1834591006		Vial 86	1	Sample	18	1.71171e5	5.00000
*	1834591007		Vial 87	1	Sample	19	4.59757e5	500.00000
*	1834591008		Vial 88	1	Sample	20	4.59696e5	500.00000
*	1834591009		Vial 89	1	Sample	21	4.09950e5	500.00000
*	1834591010		Vial 90	1	Sample	22	4.08616e5	500.00000
*	1834871001		Vial 91	1	Sample	23	2.08799e5	5.00000
*	1834591006		Vial 92	1	Sample	24	3.07855e5	50.00000
*	1834591007		Vial 93	1	Sample	25	3.71021e5	50.00000
*	1834591005		Vial 94	1	Sample	26	2.29204e5	5.00000
*	633247	C	Vial 71	1	Control	27	3.84847e5	5.00000
*	633248	L	Vial 72	1	Control	28	4.51163e5	5.00000

\*\*\* End of Report \*\*\*

equence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\DEC\19DEC18D.S

Sequence Table:

Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
====	=====	=====	=====	===	=====	=====	=====
1	Vial 71	633238	CCV@25	CLO4-AQN	1		Ctrl Samp
2	Vial 72	633239	LODV@1.	CLO4-AQN	1		Ctrl Samp
3	Vial 73	633240	ICS@1.0	CLO4-AQN	1		Ctrl Samp
4	Vial 74	633241	LMB	CLO4-AQN	1		Ctrl Samp
5	Vial 75	633242	QC@5.0	CLO4-AQN	1		Ctrl Samp
6	Vial 76	1834583001		CLO4-AQN	1		Sample
7	Vial 77	633243	345831S	CLO4-AQN	1		Sample
8	Vial 78	633244	345831D	CLO4-AQN	1		Sample
9	Vial 79	1834584001	1K	CLO4-AQN	1		Sample
10	Vial 80	1834586001		CLO4-AQN	1		Sample
11	Vial 81	1834591001		CLO4-AQN	1		Sample
12	Vial 82	1834591002		CLO4-AQN	1		Sample
13	Vial 83	1834591003	1K	CLO4-AQN	1		Sample
14	Vial 84	1834591004		CLO4-AQN	1		Sample
15	Vial 85	1834591005		CLO4-AQN	1		Sample
16	Vial 71	633245	CCV@25	CLO4-AQN	1		Ctrl Samp
17	Vial 72	633246	LODV@1.	CLO4-AQN	1		Ctrl Samp
18	Vial 86	1834591006		CLO4-AQN	1		Sample
19	Vial 87	1834591007	100	CLO4-AQN	1		Sample
20	Vial 88	1834591008	100	CLO4-AQN	1		Sample
21	Vial 89	1834591009	100	CLO4-AQN	1		Sample
22	Vial 90	1834591010	100	CLO4-AQN	1		Sample
23	Vial 91	1834871001		CLO4-AQN	1		Sample
24	Vial 92	1834591006	10X	CLO4-AQN	1		Sample
25	Vial 93	1834591007	10X	CLO4-AQN	1		Sample
26	Vial 94	1834591005	RE	CLO4-AQN	1		Sample
27	Vial 71	633247	CCV@25	CLO4-AQN	1		Ctrl Samp
28	Vial 72	633248	LODV@1.	CLO4-AQN	1		Ctrl Samp



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD01.D

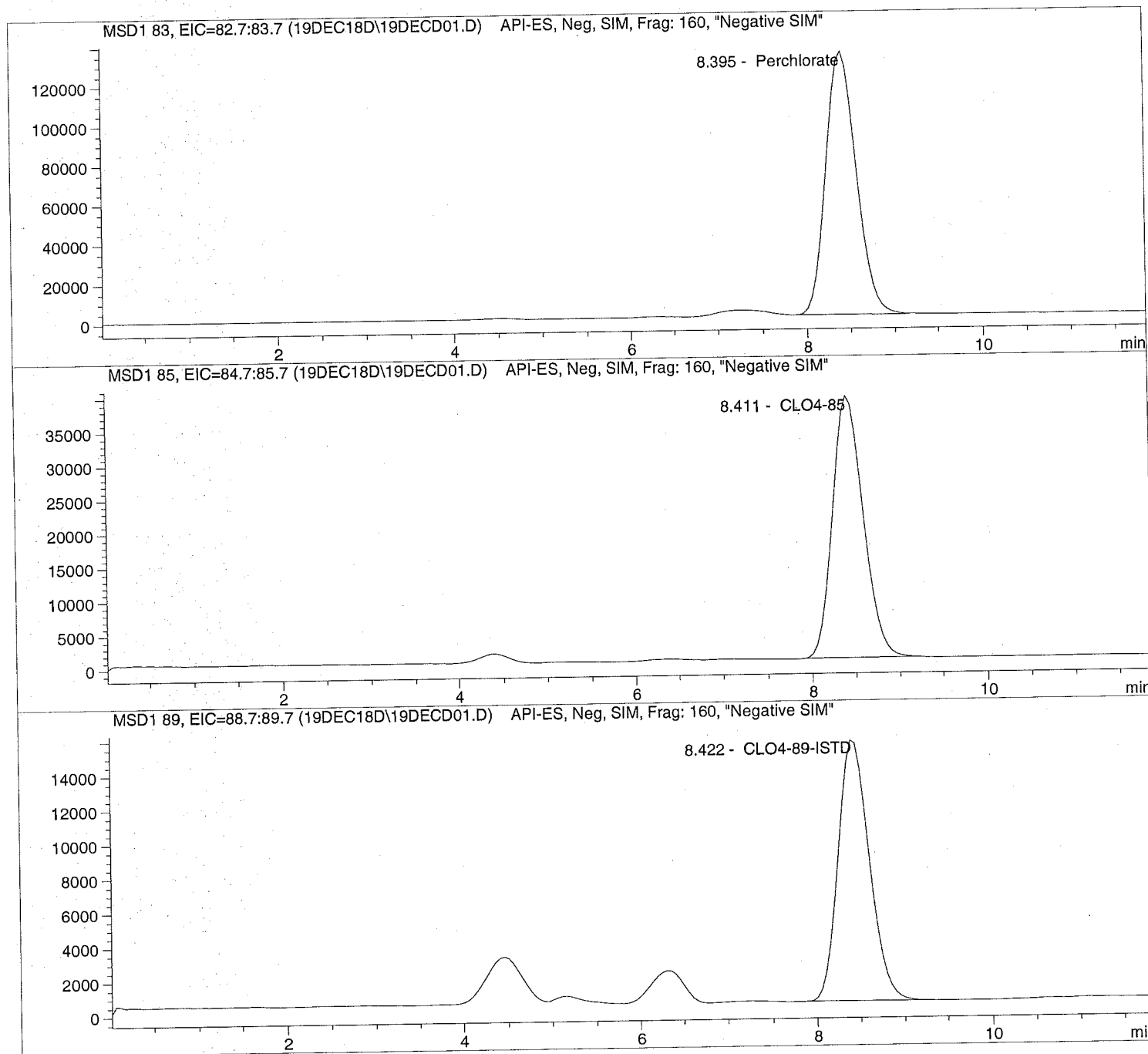
Sample Name: 633238 CCV@25

Injection Date: 12/19/2018 08:25:30  
Sample Name: 633238 CCV@25  
Acq Operator: TNB

Seq Line: 1  
Location: Vial 71  
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\19DEC18D\19DECD01.D

Sample Name: 633238 CCV@25

```

=====
Injection Date: 12/19/2018 08:25:30      Seq Line: 1
Sample Name: 633238 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
8.395	VBA	3232085.0	25.4821	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.411	PBA	946861.3	24.7614	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.422	PBA	378208.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

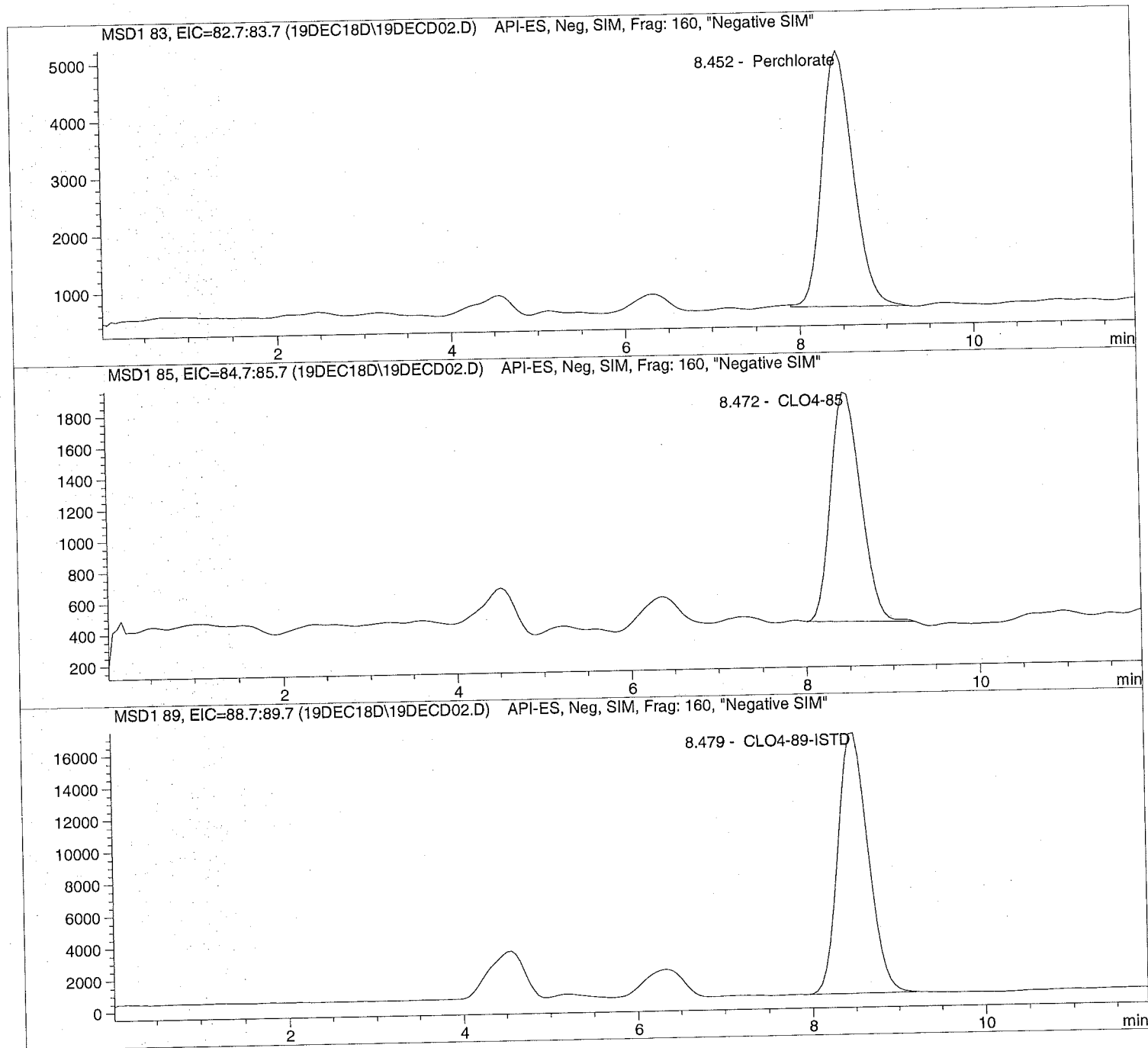
```

Injection Date: 12/19/2018 08:40:55  
Sample Name: 633239 LODV@1.  
Acq Operator: TNB

Seq Line: 2  
Location: Vial 72  
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



```

=====
Injection Date: 12/19/2018 08:40:55      Seq Line:          2
Sample Name:    633239  LODV@1.           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:  1.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.452	BBA	111007.7	1.0764	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.472	PBA	35446.1	1.0234	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.479	PBA	394819.7	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

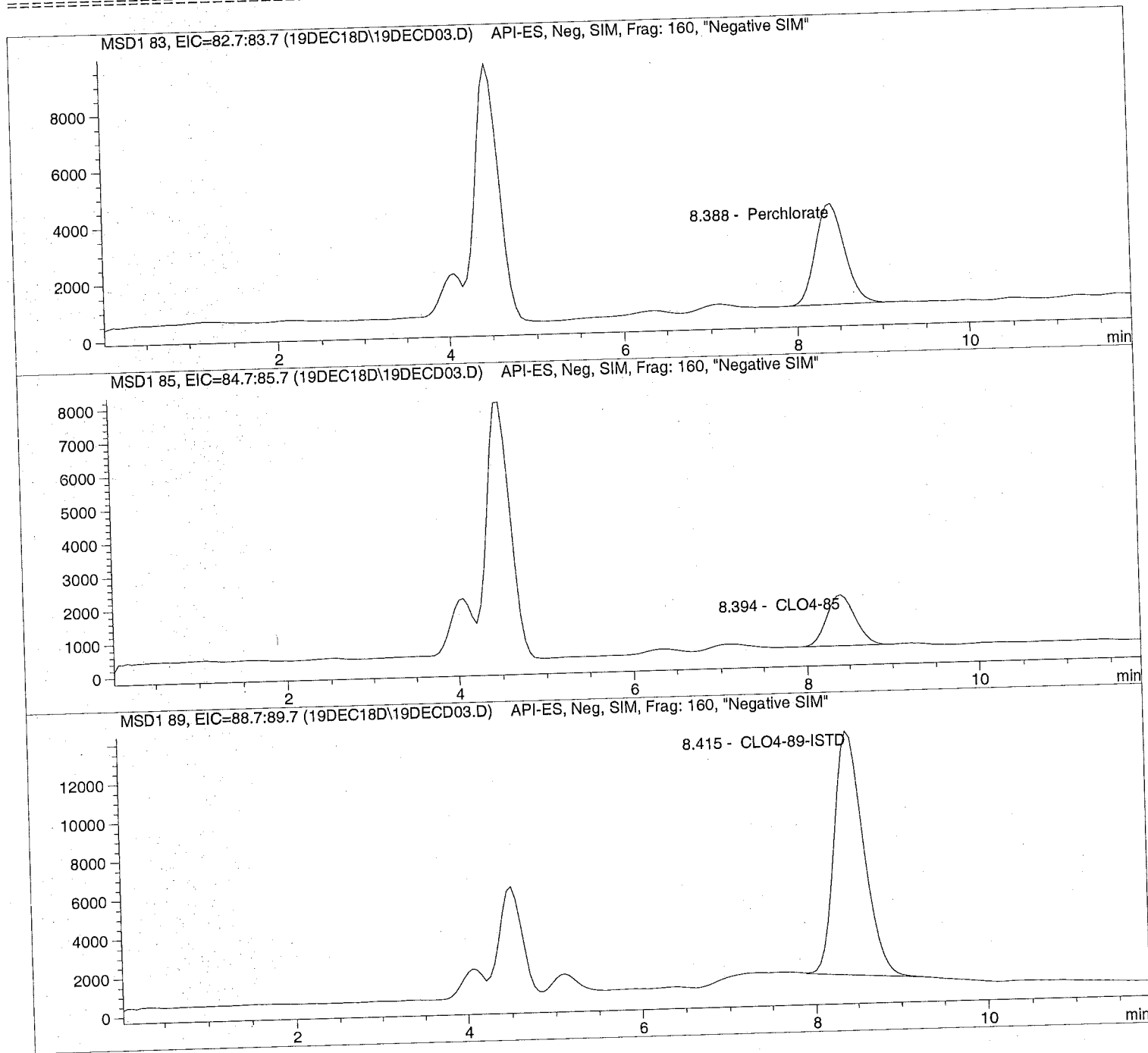
```

Injection Date: 12/19/2018 08:54:37  
Sample Name: 633240 ICS@1.0  
Acq Operator: TNB

Seq Line: 3  
Location: Vial 73  
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\19DEC18D\19DECD03.D

Sample Name: 633240 ICS@1.0

```

=====
Injection Date: 12/19/2018 08:54:37      Seq Line: 3
Sample Name: 633240 ICS@1.0             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: 1.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.388	PBA	85219.1	1.0760	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.394	PBA	35777.1	1.3170	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.415	BBA	303262.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD04.D

Sample Name: 633241 LMB

Injection Date: 12/19/2018 09:08:25

Seq Line: 4

Sample Name: 633241 LMB

Location: Vial 74

Acq Operator: TNB

Inj. No.: 1

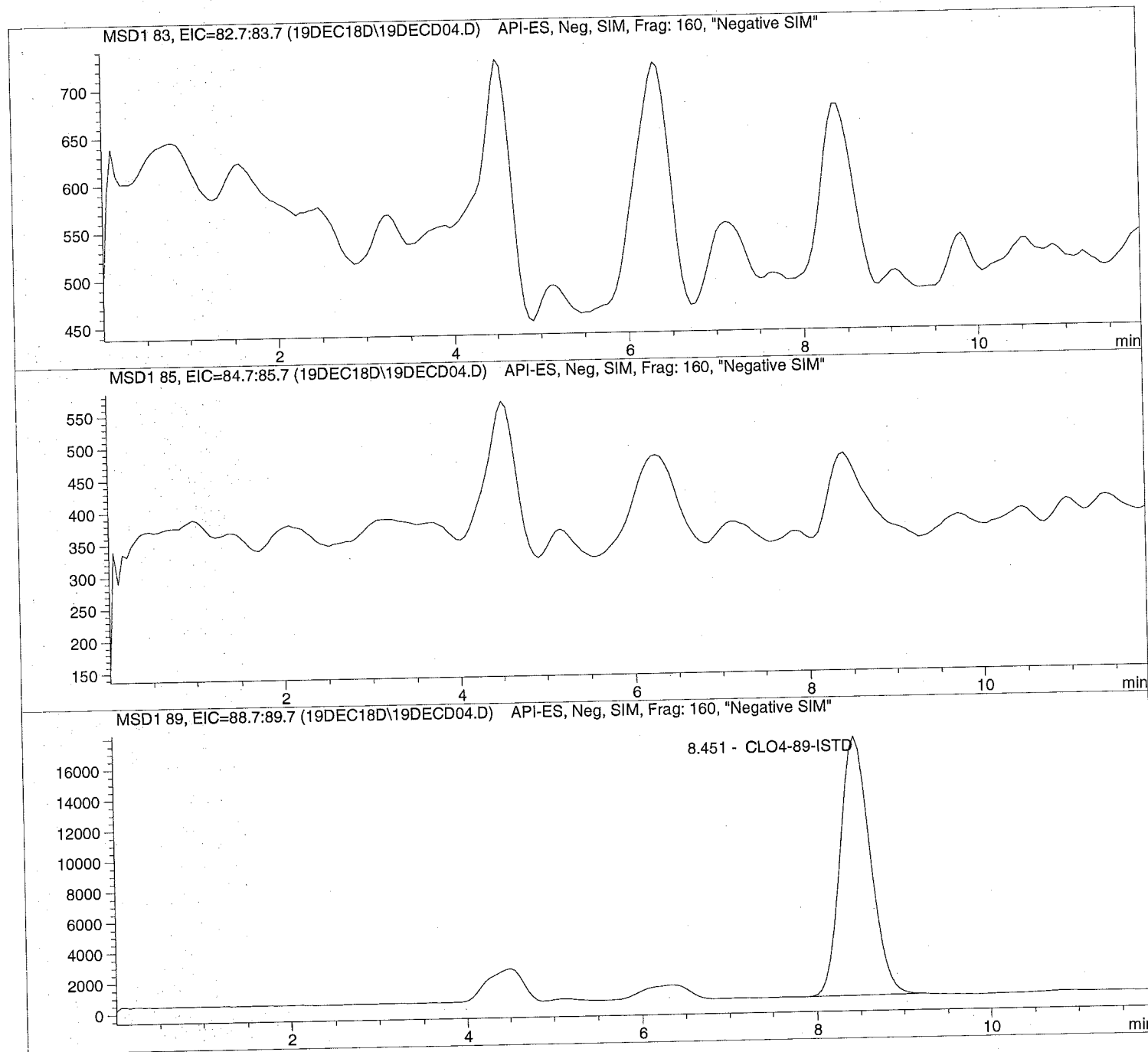
Inj. Vol.: 30 µl

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\19DEC18D\19DECD04.D

Sample Name: 633241 LMB

```

=====
Injection Date: 12/19/2018 09:08:25      Seq Line: 4
Sample Name: 633241 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
8.451	PBA	407685.9	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD05.D

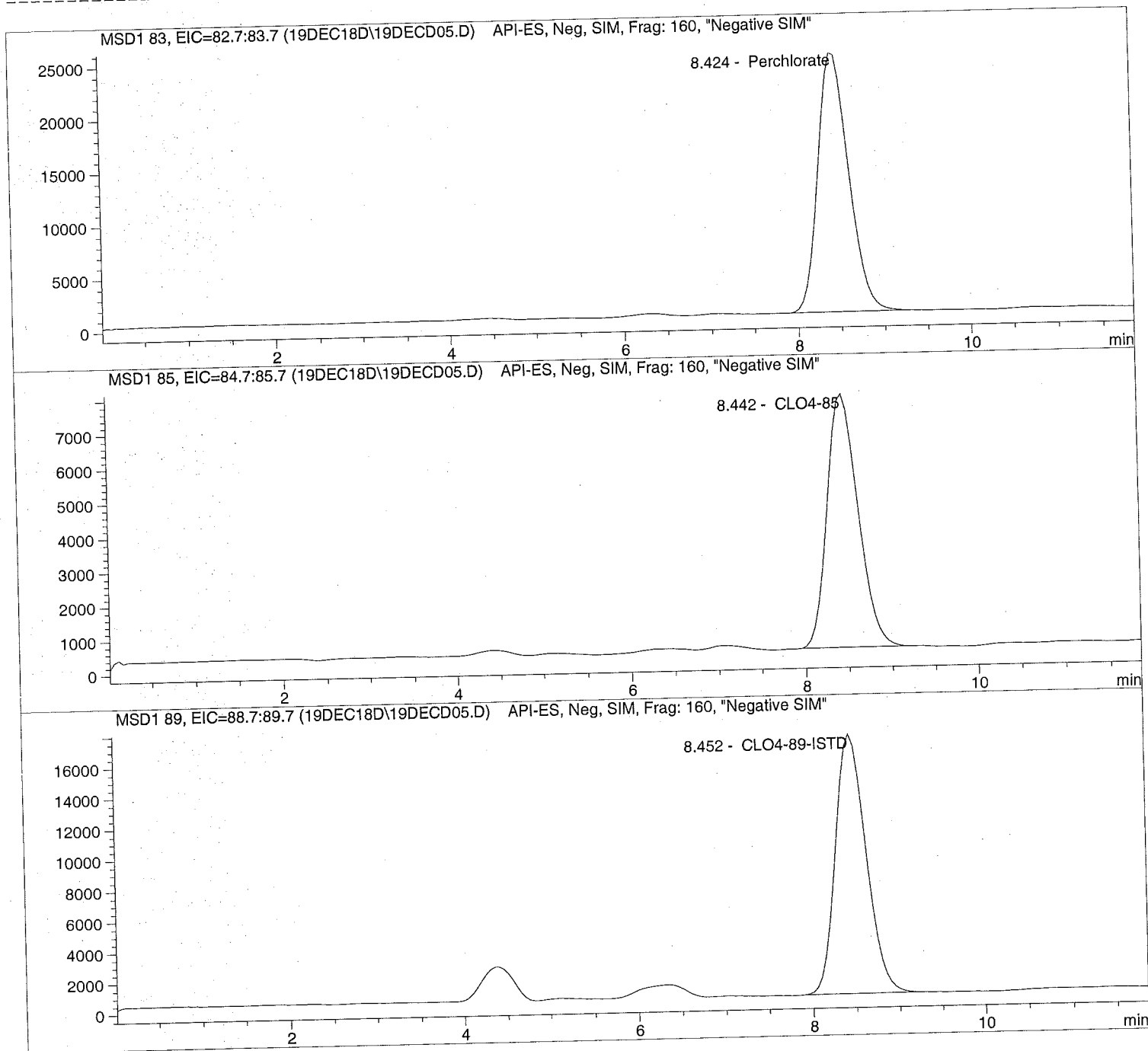
Sample Name: 633242 QC@5.0

Injection Date: 12/19/2018 09:22:11  
Sample Name: 633242 QC@5.0  
Acq Operator: TNB

Seq Line: 5  
Location: Vial 75  
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\19DEC18D\19DECD05.D

Sample Name: 633242 QC@5.0

```

=====
Injection Date: 12/19/2018 09:22:11      Seq Line: 5
Sample Name: 633242 QC@5.0              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: 5.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.424	PBA	602025.1	4.6817	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.442	BBA	183470.3	4.6858	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.452	BBA	412803.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD06.D

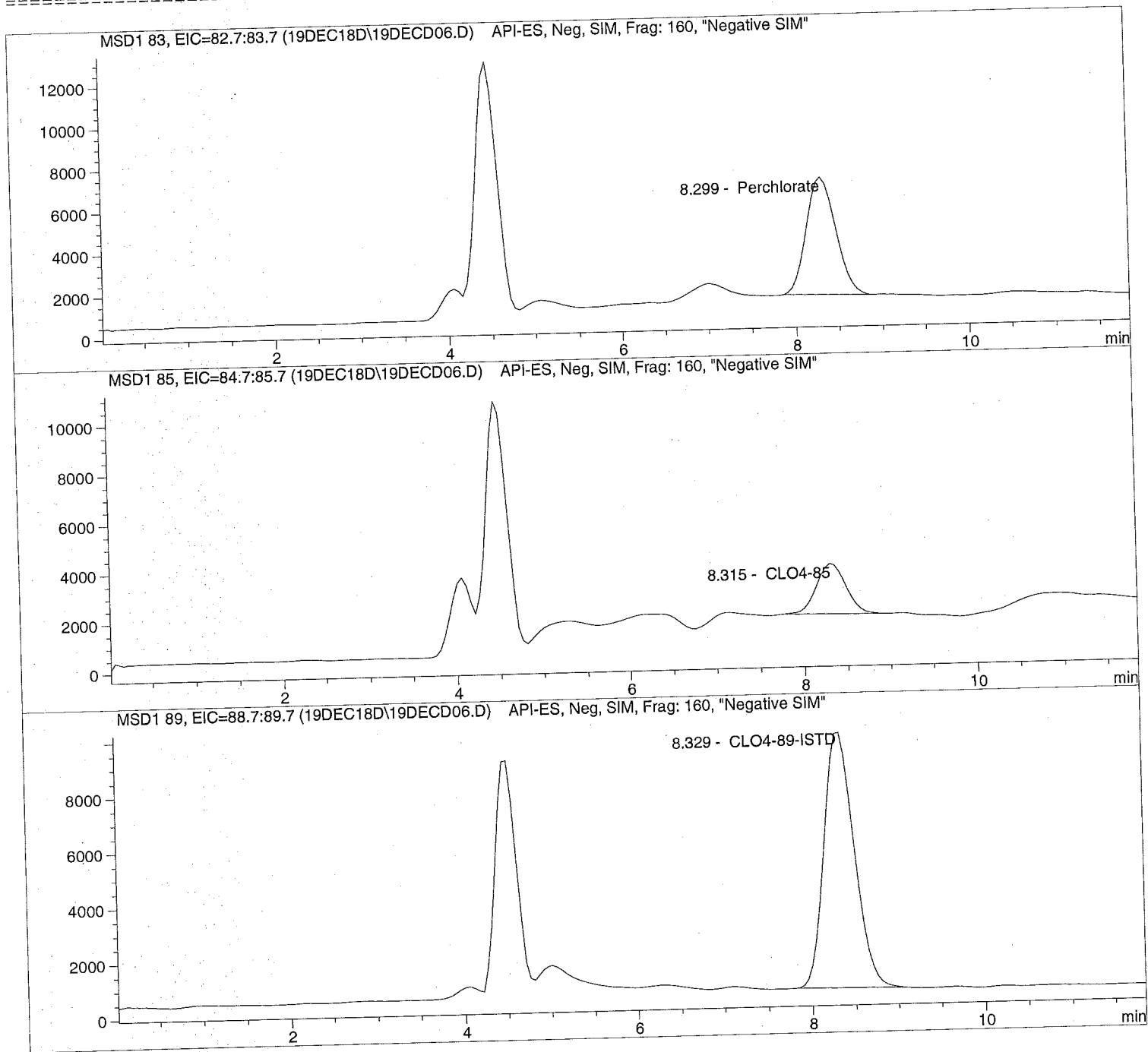
Sample Name: 1834583001

Injection Date: 12/19/2018 09:37:12  
Sample Name: 1834583001  
Acq Operator: TNB

Seq Line: 6  
Location: Vial 76  
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\19DEC18D\19DECD06.D

Sample Name: 1834583001

```

=====
Injection Date: 12/19/2018 09:37:12      Seq Line:          6
Sample Name:    1834583001                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
8.299	PBA	130682.0	2.0277	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.315	BBA	47682.8	2.3281	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	221385.7	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD07.D

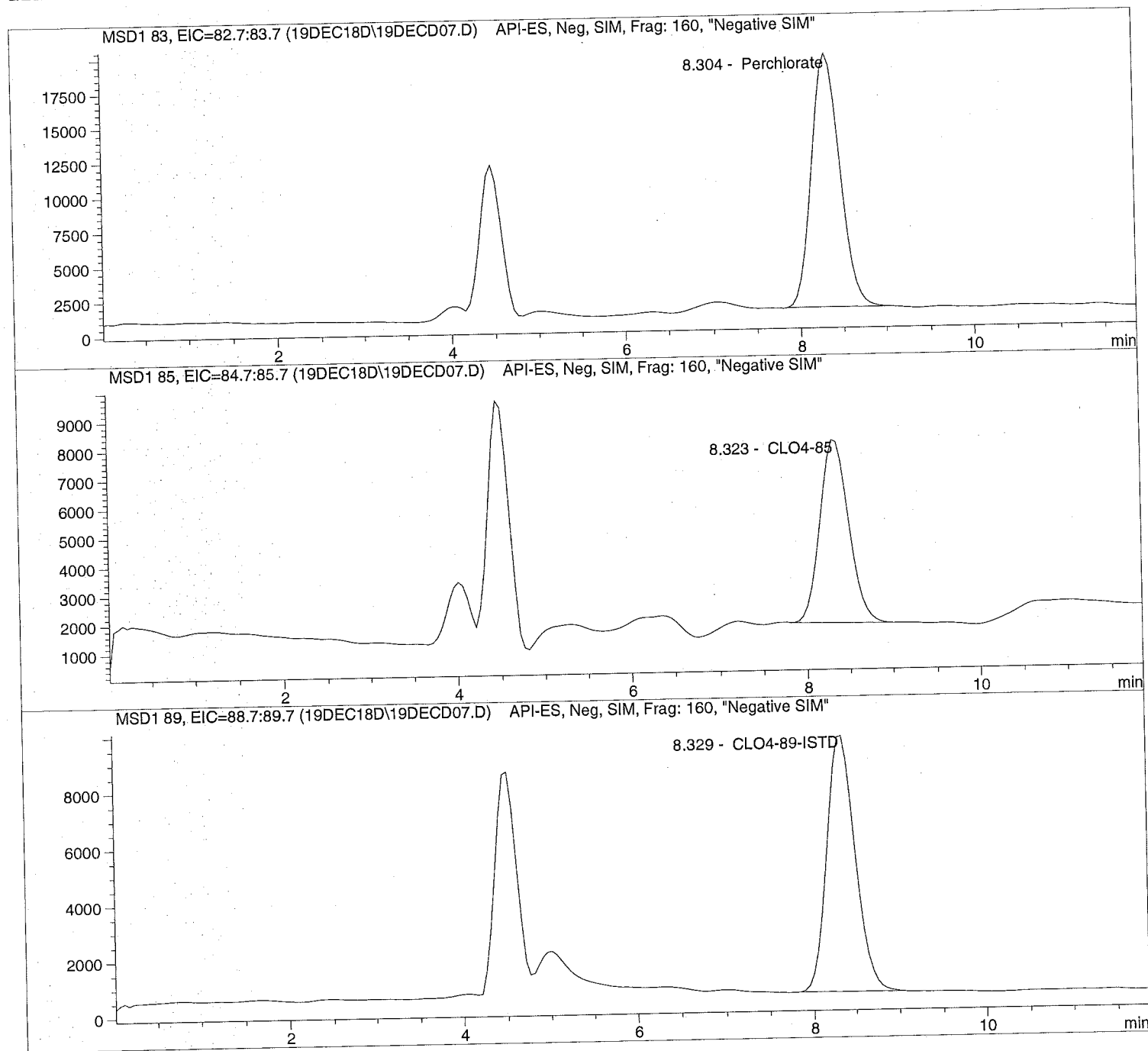
Sample Name: 633243 345831S

Injection Date: 12/19/2018 09:50:58  
Sample Name: 633243 345831S  
Acq Operator: TNB

Seq Line: 7  
Location: Vial 77  
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\19DEC18D\19DECD07.D

Sample Name: 633243 345831S

```

=====
Injection Date: 12/19/2018 09:50:58      Seq Line: 7
Sample Name: 633243 345831S              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
8.304	PBA	418727.5	6.2136	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.323	BBA	149047.9	7.2722	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	213288.8	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD08.D

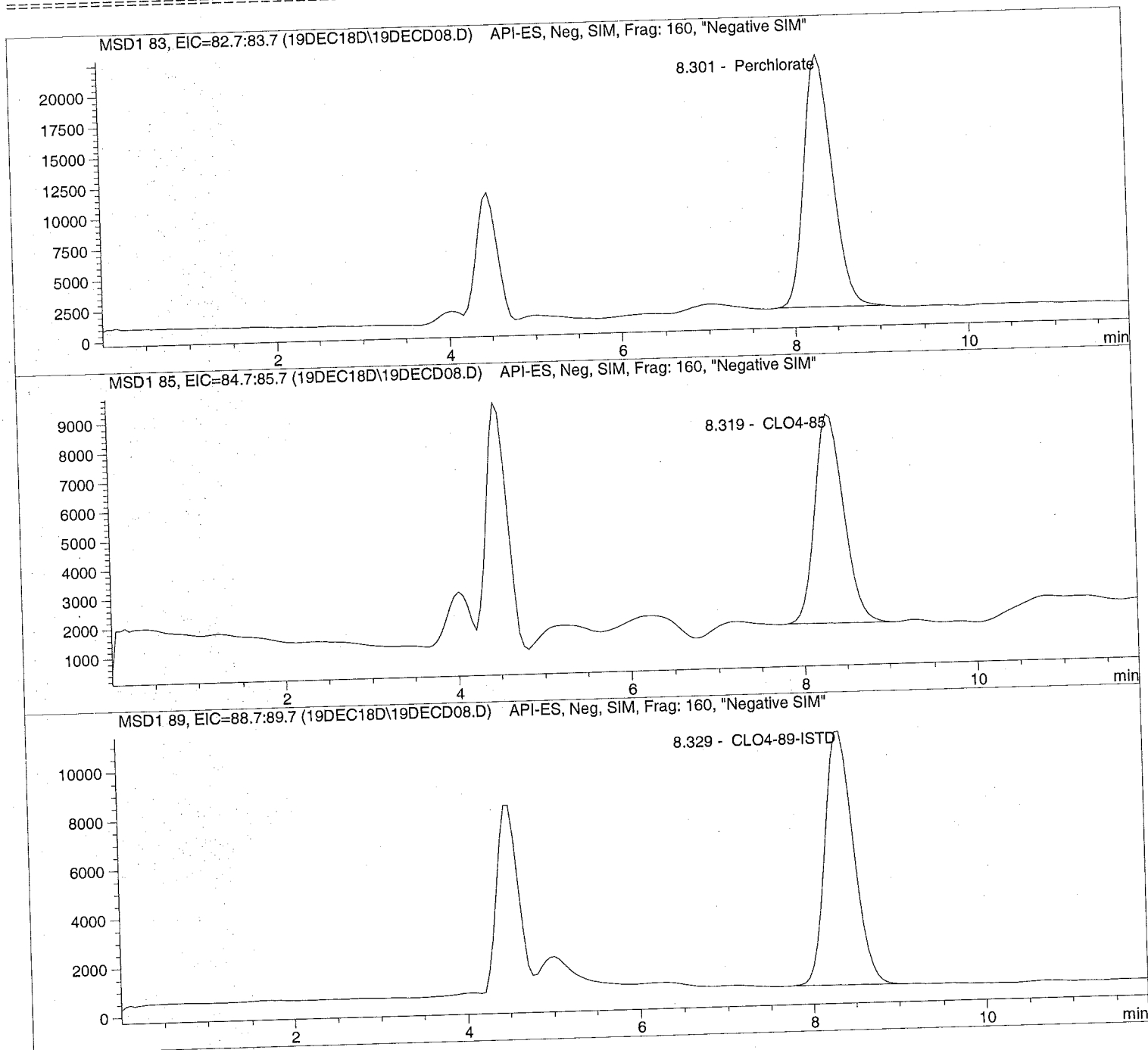
Sample Name: 633244 345831D

Injection Date: 12/19/2018 10:04:44  
Sample Name: 633244 345831D  
Acq Operator: TNB

Seq Line: 8  
Location: Vial 78  
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\19DEC18D\19DECD08.D Sample Name: 633244 345831D

Injection Date: 12/19/2018 10:04:44 Seq Line: 8  
 Sample Name: 633244 345831D 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
8.301	PBA	470343.0	6.1589	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.319	PBA	168272.1	7.2427	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.329	PBA	241807.3	5.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD09.D

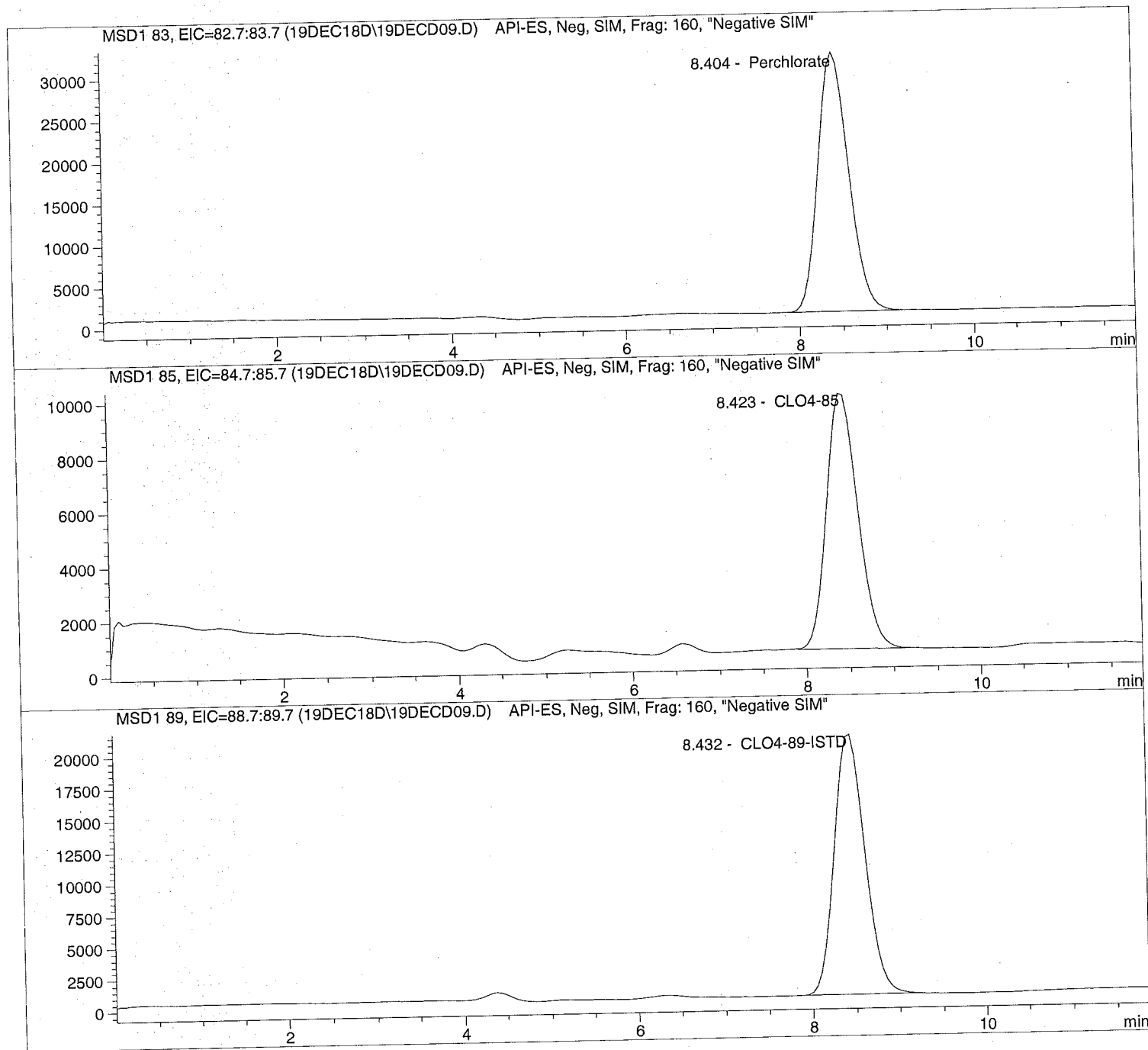
Sample Name: 1834584001 1K

Injection Date: 12/19/2018 10:18:30  
Sample Name: 1834584001 1K  
Acq Operator: TNB

Seq Line: 9  
Location: Vial 79  
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\19DEC18D\19DECD09.D

Sample Name: 1834584001 1K

```

=====
Injection Date: 12/19/2018 10:18:30      Seq Line:          9
Sample Name:    1834584001 1K             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:       1000.000000
Sample Amount:  0.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.404	PBA	755206.2	4863.4443	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.423	BBA	232386.3	4917.9848	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.432	PBA	497457.1	5000.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

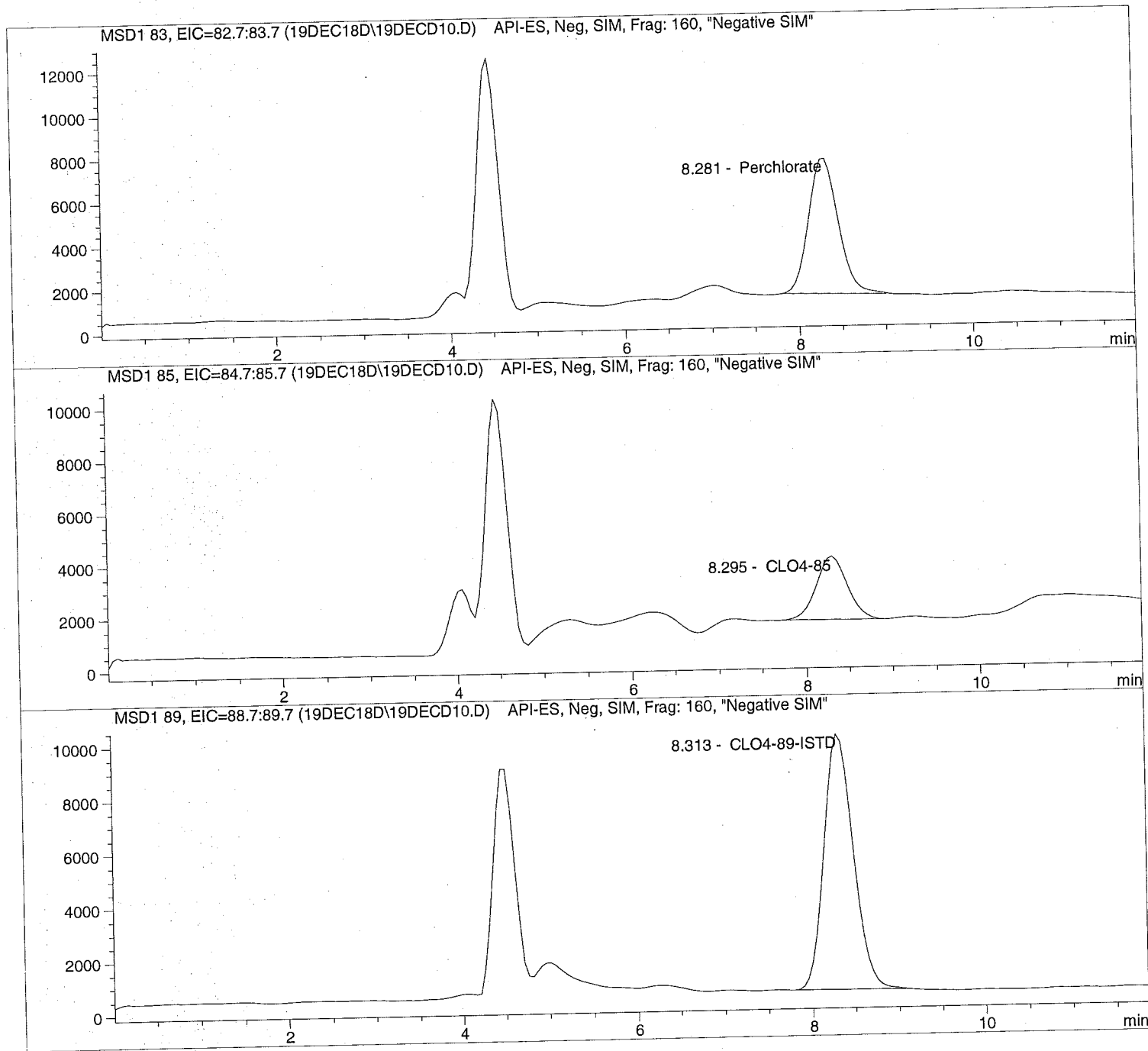
```

Injection Date: 12/19/2018 10:32:20  
Sample Name: 1834586001  
Acq Operator: TNB

Seq Line: 10  
Location: Vial 80  
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\19DEC18\19DECD10.D

Sample Name: 1834586001

```

=====
Injection Date: 12/19/2018 10:32:20      Seq Line:          10
Sample Name:    1834586001                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
8.281	PBA	147417.2	2.2212	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.295	PBA	60405.7	2.8691	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.313	PBA	225638.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD11.D

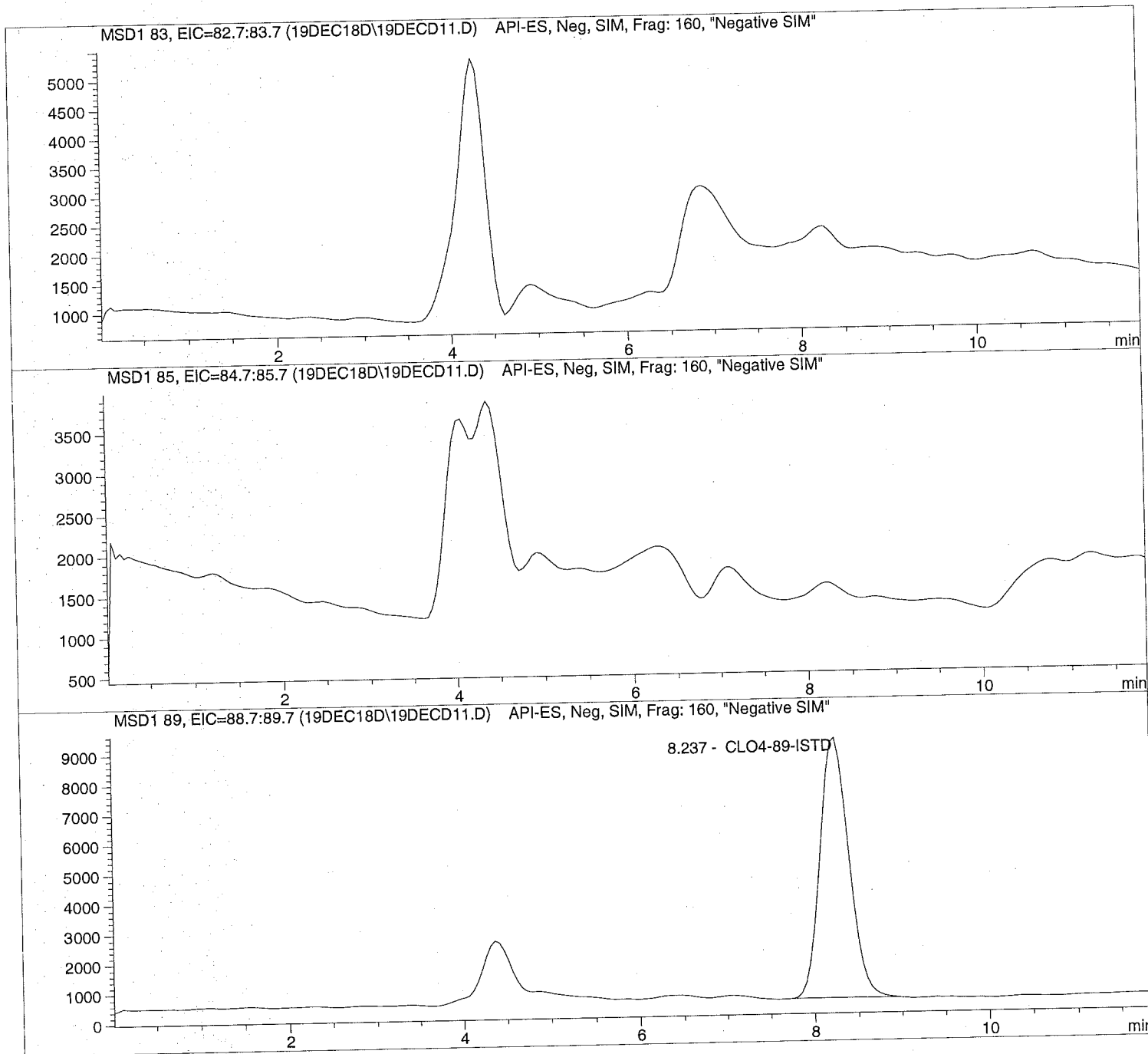
Sample Name: 1834591001

Injection Date: 12/19/2018 10:46:05  
Sample Name: 1834591001  
Acq Operator: TNB

Seq Line: 11  
Location: Vial 81  
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\19DEC18D\19DECD11.D

Sample Name: 1834591001

```

=====
Injection Date: 12/19/2018 10:46:05      Seq Line:          11
Sample Name:    1834591001                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:       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
8.237	PBA	198333.0	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD12.D

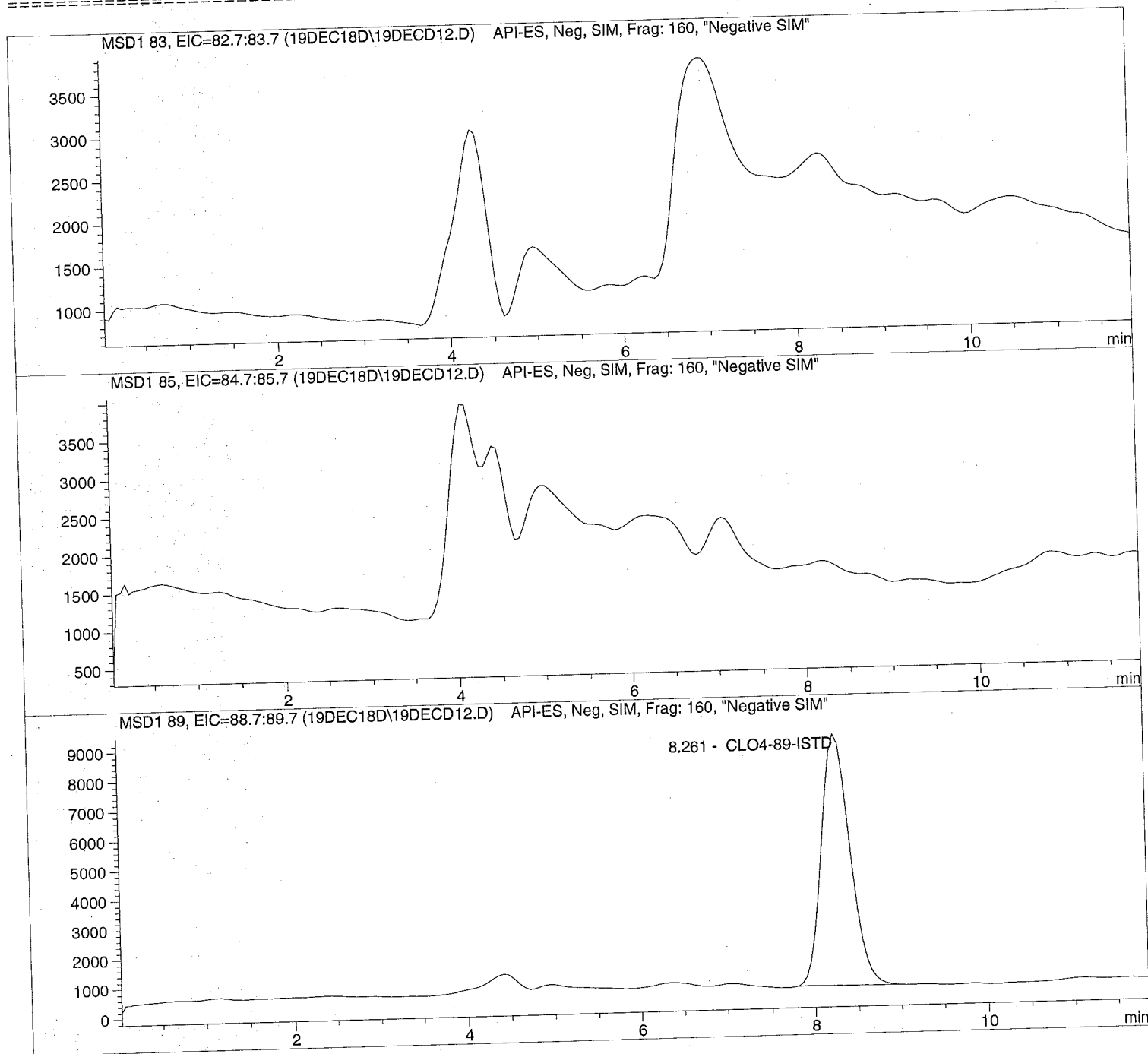
Sample Name: 1834591002

Injection Date: 12/19/2018 10:59:50  
Sample Name: 1834591002  
Acq Operator: TNB

Seq Line: 12  
Location: Vial 82  
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\19DEC18D\19DECD12.D

Sample Name: 1834591002

```

=====
Injection Date: 12/19/2018 10:59:50      Seq Line:          12
Sample Name:    1834591002                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
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
8.261	PBA	194131.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

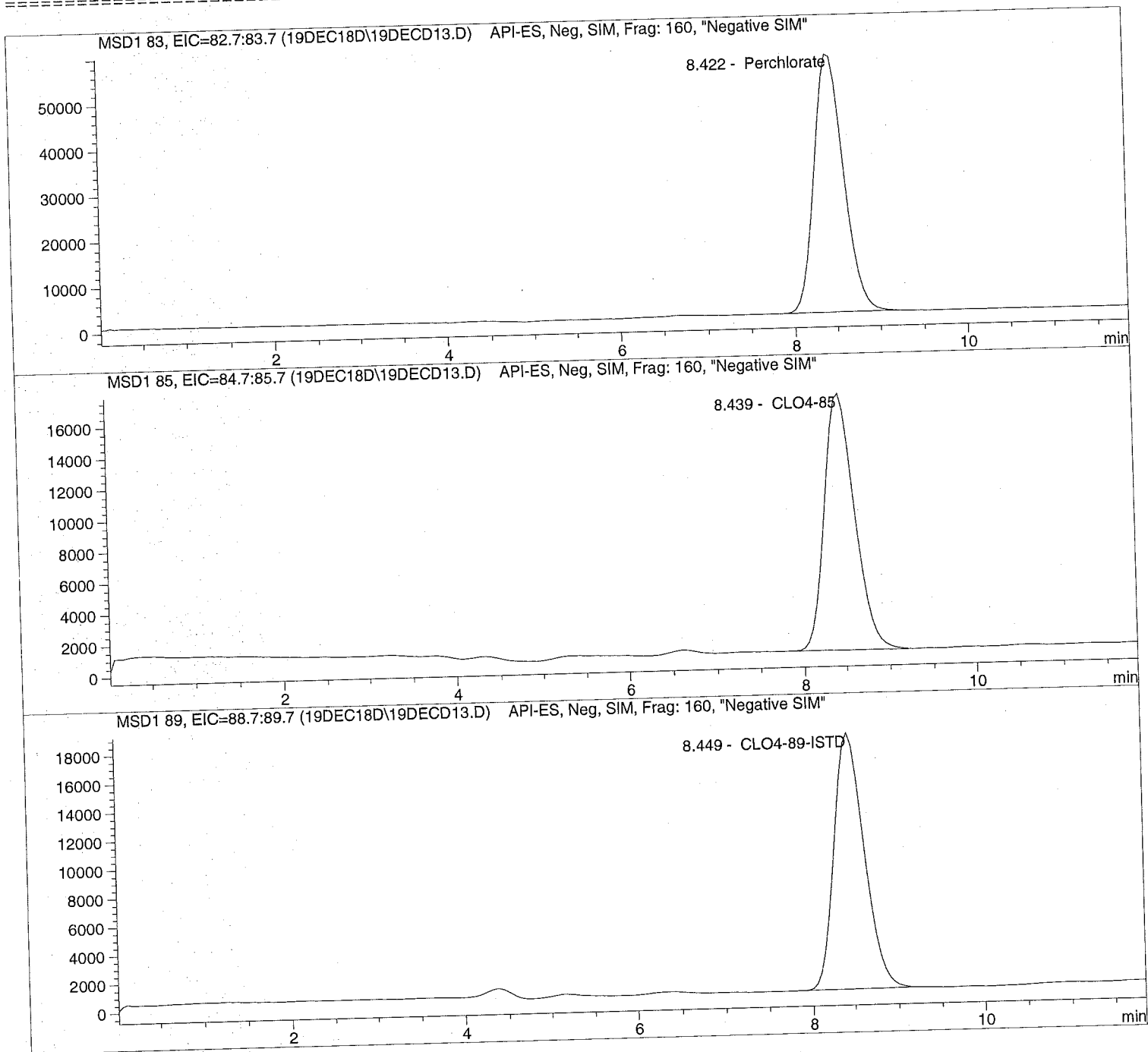


Injection Date: 12/19/2018 11:13:33  
Sample Name: 1834591003 1K  
Acq Operator: TNB

Seq Line: 13  
Location: Vial 83  
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



Injection Date: 12/19/2018 11:13:33 Seq Line: 13  
Sample Name: 1834591003 1K 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: 1000.000000  
Sample Amount: 0.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.422	PBA	1372828.2	9673.9958	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.439	BBA	408001.0	9548.2655	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.449	PBA	440927.1	5000.0000	CLO4-89-ISTD

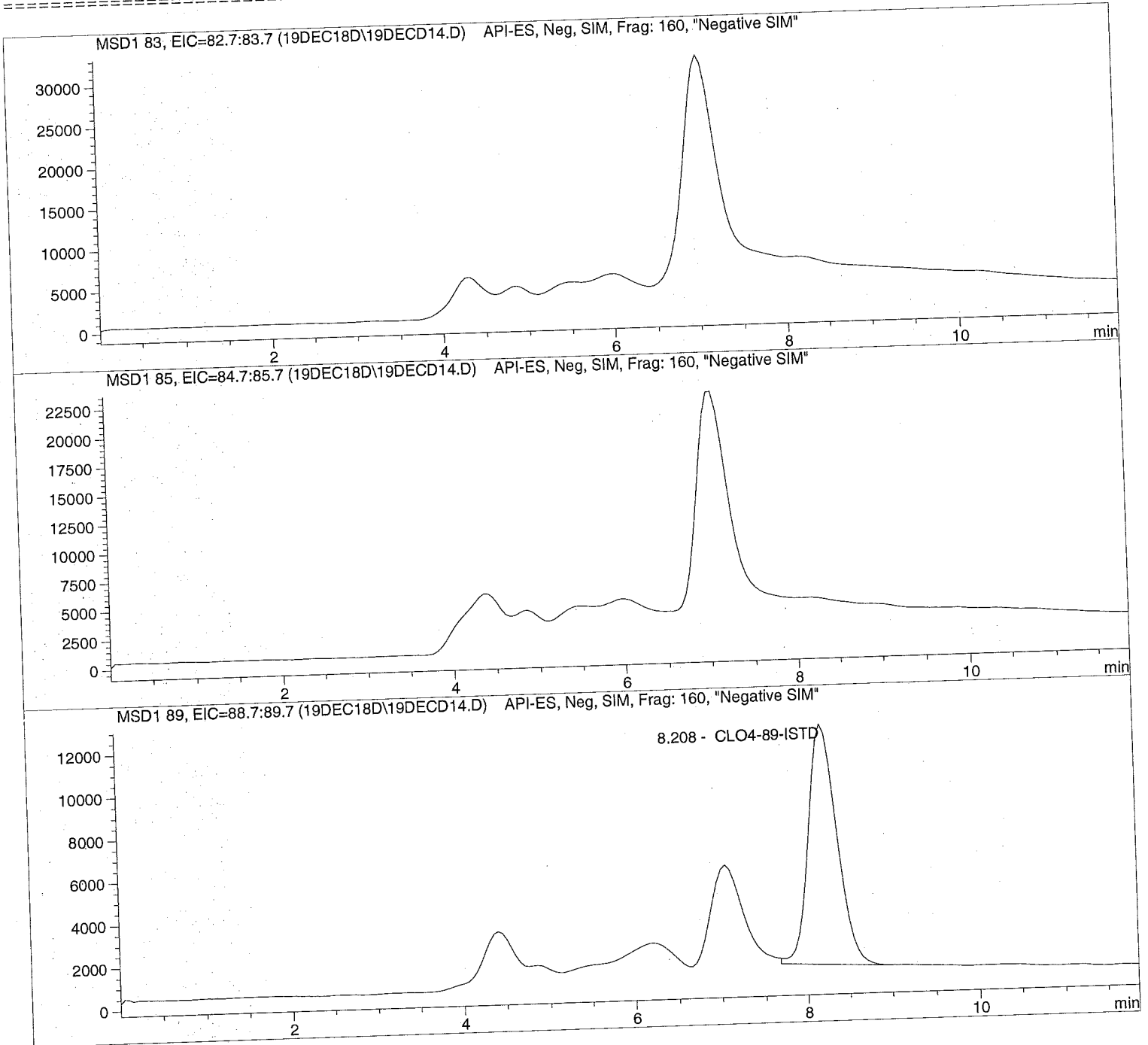
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 11:27:19  
Sample Name: 1834591004  
Acq Operator: TNB

Seq Line: 14  
Location: Vial 84  
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\19DEC18D\19DECD14.D

Sample Name: 1834591004

```

=====
Injection Date: 12/19/2018 11:27:19      Seq Line: 14
Sample Name: 1834591004                 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: 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
8.208	BBA	266698.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

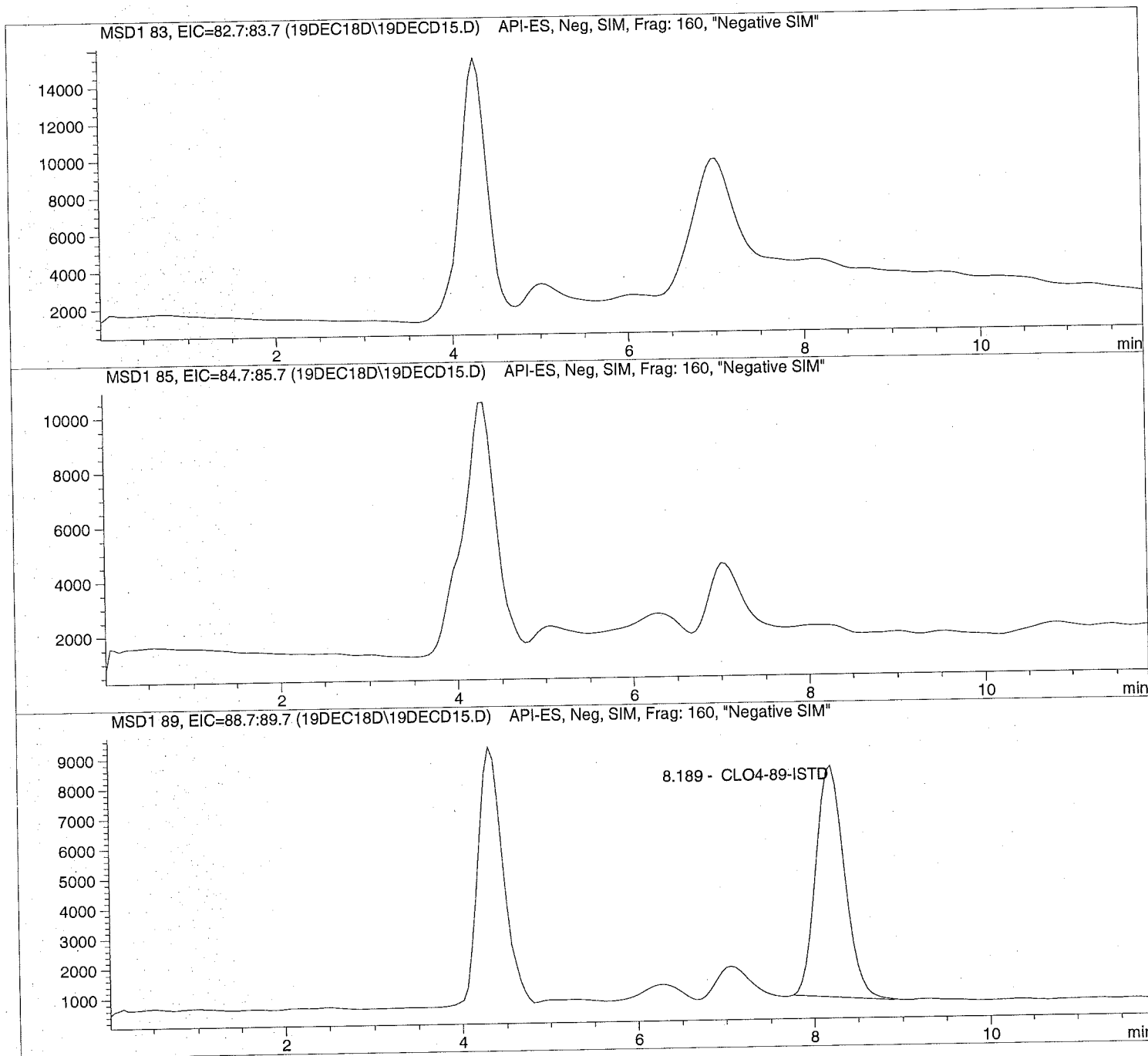
```

Injection Date: 12/19/2018 11:41:03  
Sample Name: 1834591005  
Acq Operator: TNB

Seq Line: 15  
Location: Vial 85  
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\19DEC18D\19DECD15.D

Sample Name: 1834591005

Injection Date: 12/19/2018 11:41:03  
 Sample Name: 1834591005  
 Acq Operator: TNB

Seq Line: 15  
 Location: Vial 85  
 Inj. No.: 1  
 Inj. Vol.: 30  $\mu$ l

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
8.189	PBA	176359.5	5.0000	CLO4-89-ISTD

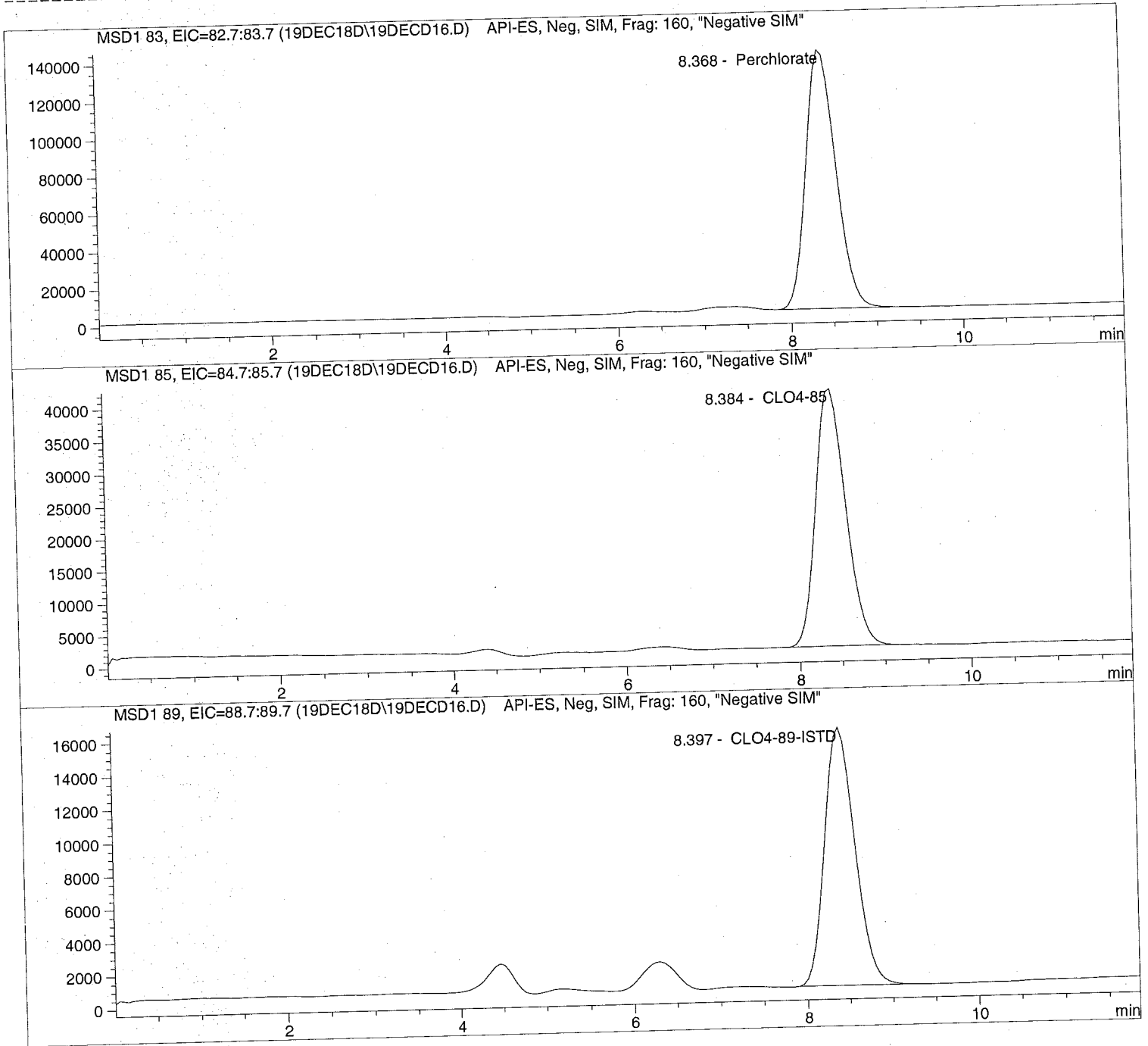
\*\*\* End of Report \*\*\*

Injection Date: 12/19/2018 11:54:49  
Sample Name: 633245 CCV@25  
Acq Operator: TNB

Seq Line: 16  
Location: Vial 71  
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\19DEC18D\19DECD16.D Sample Name: 633245 CCV@25

Injection Date: 12/19/2018 11:54:49 Seq Line: 16  
 Sample Name: 633245 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
8.368	VBA	3353514.5	26.1222	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.384	PBA	969700.1	25.0677	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.397	PBA	382303.9	5.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

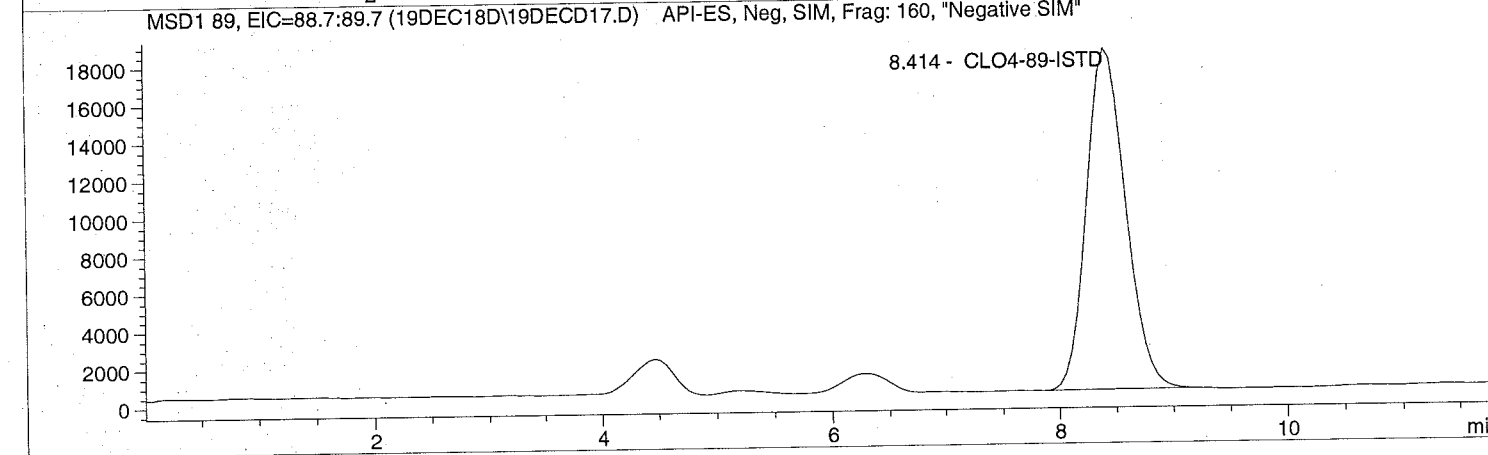
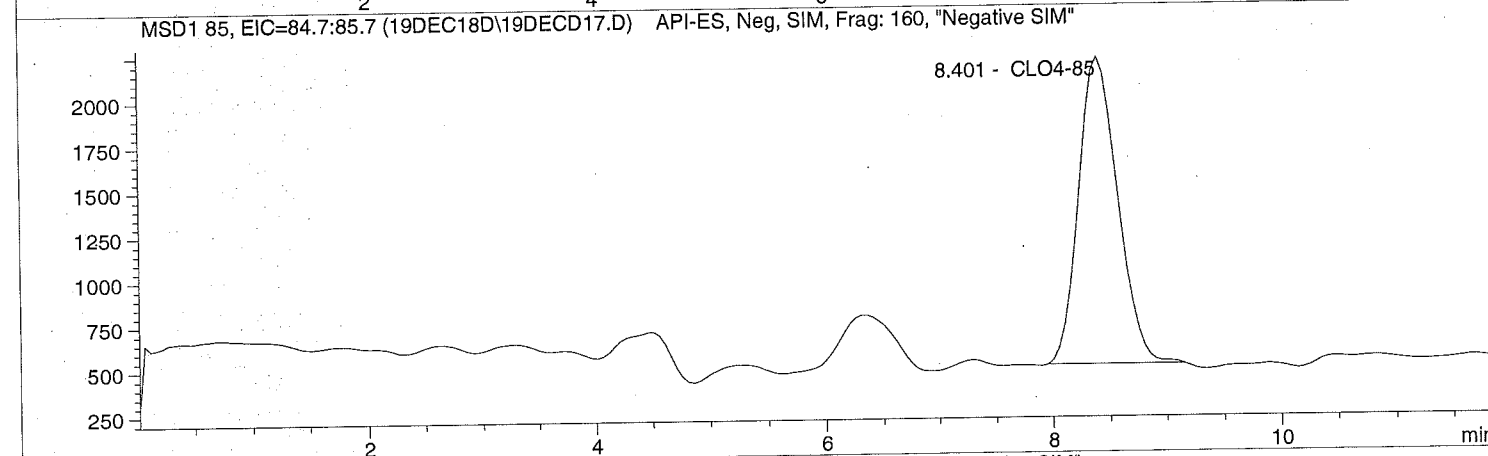
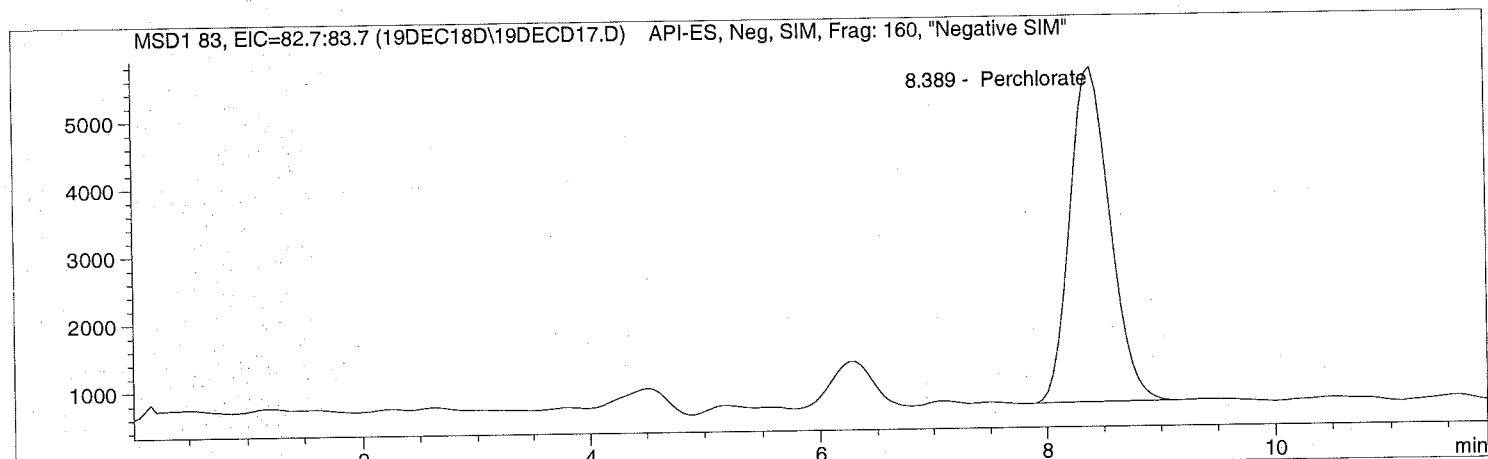


Injection Date: 12/19/2018 12:08:33  
Sample Name: 633246 LODV@1.  
Acq Operator: TNB

Seq Line: 17  
Location: Vial 72  
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\19DEC18D\19DECD17.D Sample Name: 633246 LODV@1.

```

=====
Injection Date: 12/19/2018 12:08:33      Seq Line:          17
Sample Name:    633246  LODV@1.          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: 1.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.389	PBA	120916.8	1.0714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.401	PBA	40771.1	1.0700	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.414	PBA	432577.5	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

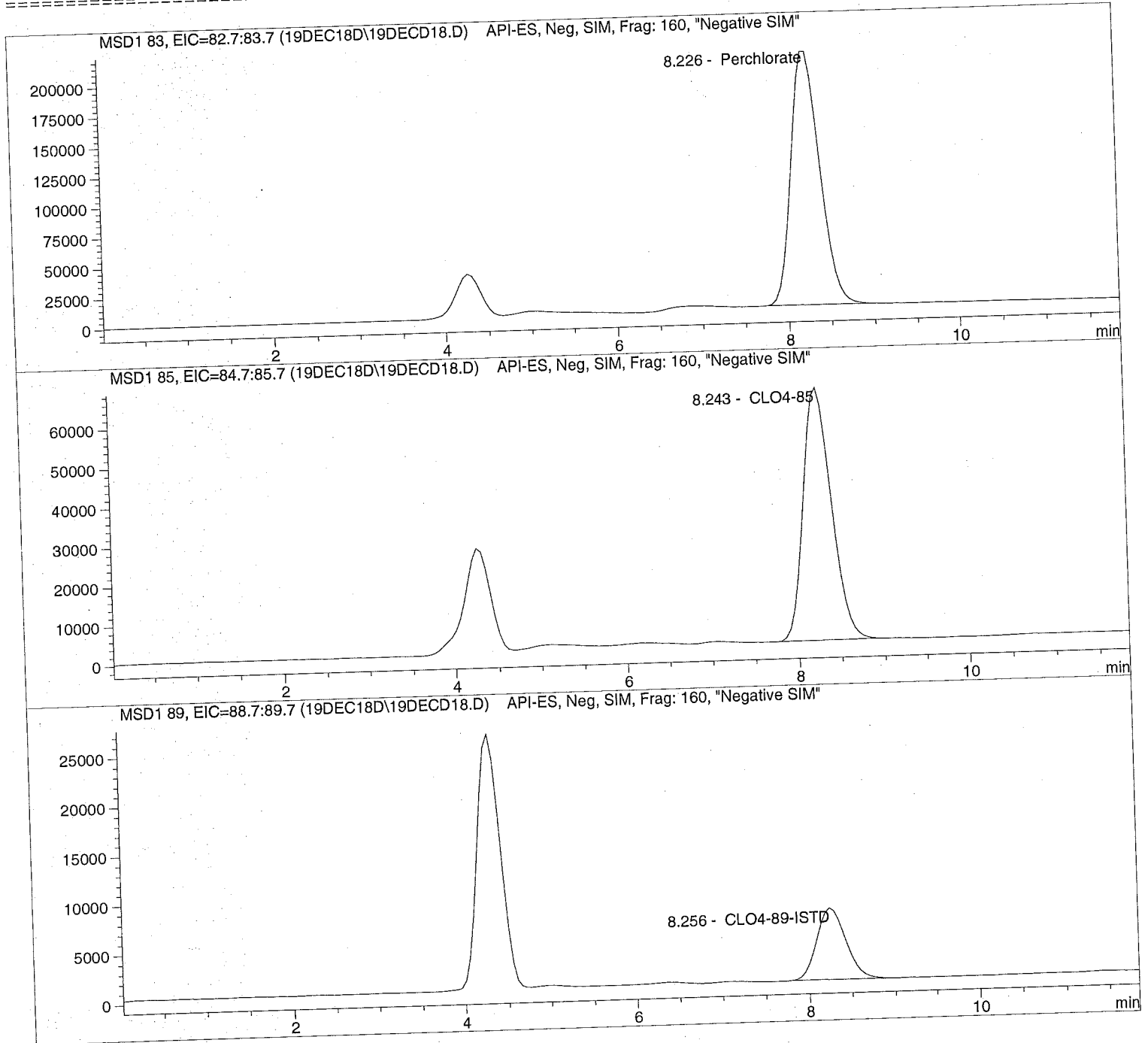
```

Injection Date: 12/19/2018 12:22:19  
Sample Name: 1834591006  
Acq Operator: TNB

Seq Line: 18  
Location: Vial 86  
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\19DEC18D\19DECD18.D

Sample Name: 1834591006

```

=====
Injection Date: 12/19/2018 12:22:19      Seq Line: 18
Sample Name: 1834591006                  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
8.226	PBA	4861195.0	77.3193	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.243	PBA	1468235.9	75.5226	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.256	PBA	171171.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

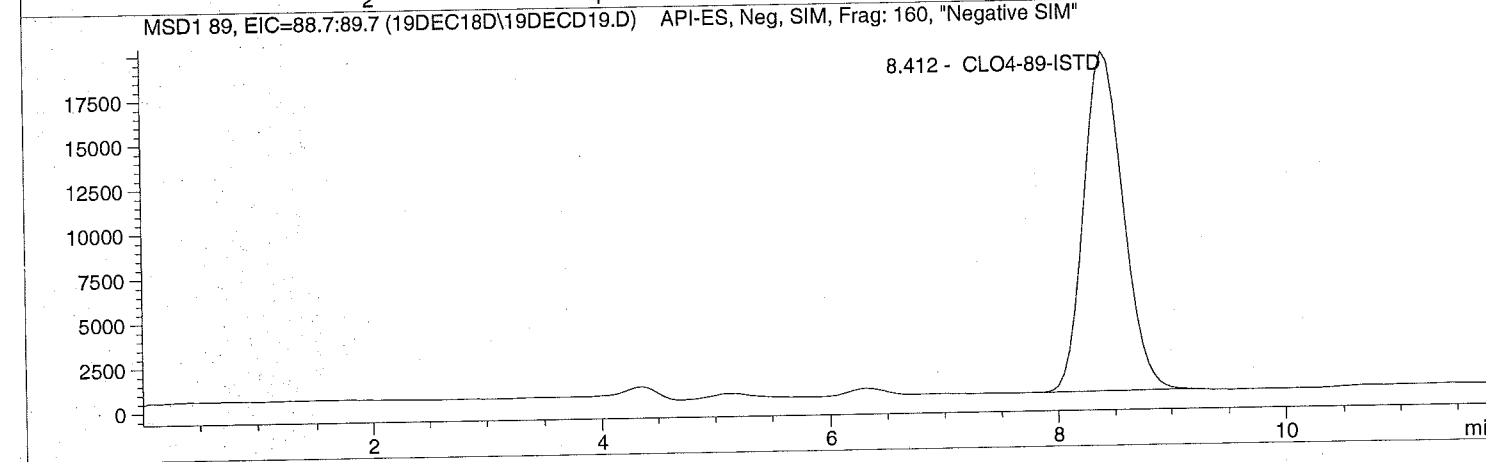
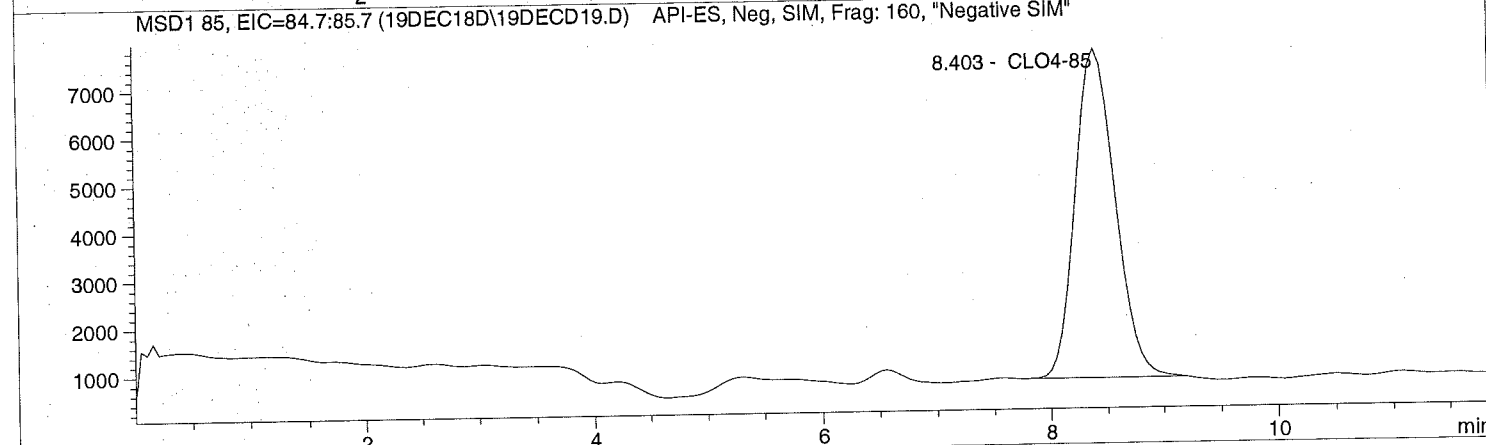
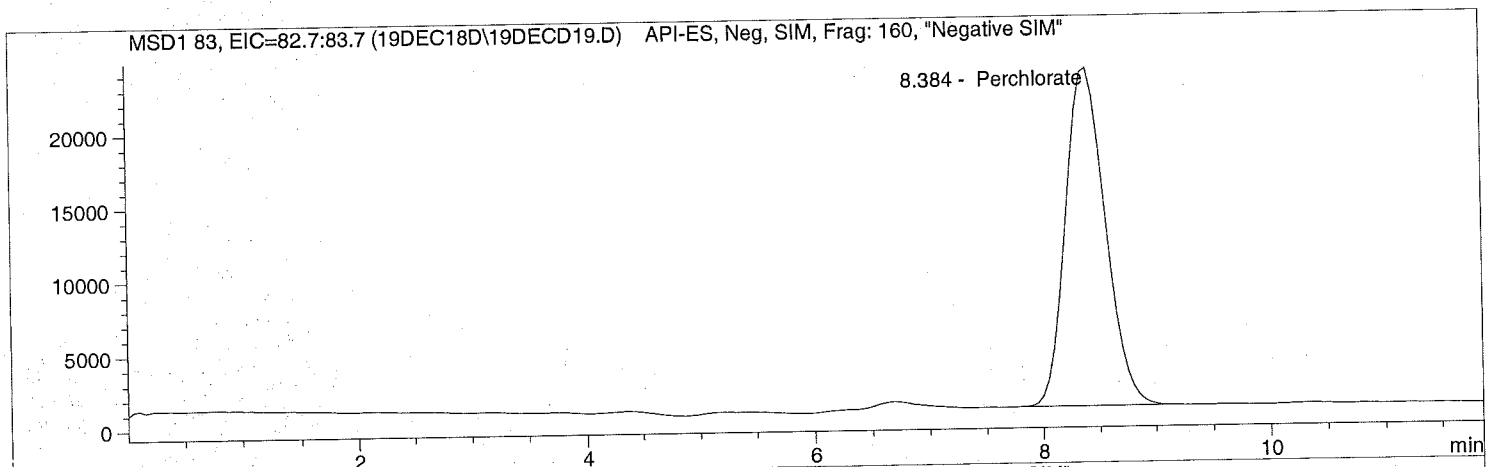
```

Injection Date: 12/19/2018 12:36:05  
Sample Name: 1834591007 100  
Acq Operator: TNB

Seq Line: 19  
Location: Vial 87  
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



Injection Date: 12/19/2018 12:36:05      Seq Line: 19  
Sample Name: 1834591007 100      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: 100.000000  
Sample Amount: 0.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.384	PBA	552737.7	390.1173	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.403	BBA	168774.7	389.2722	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.412	PBA	459757.1	500.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD20.D

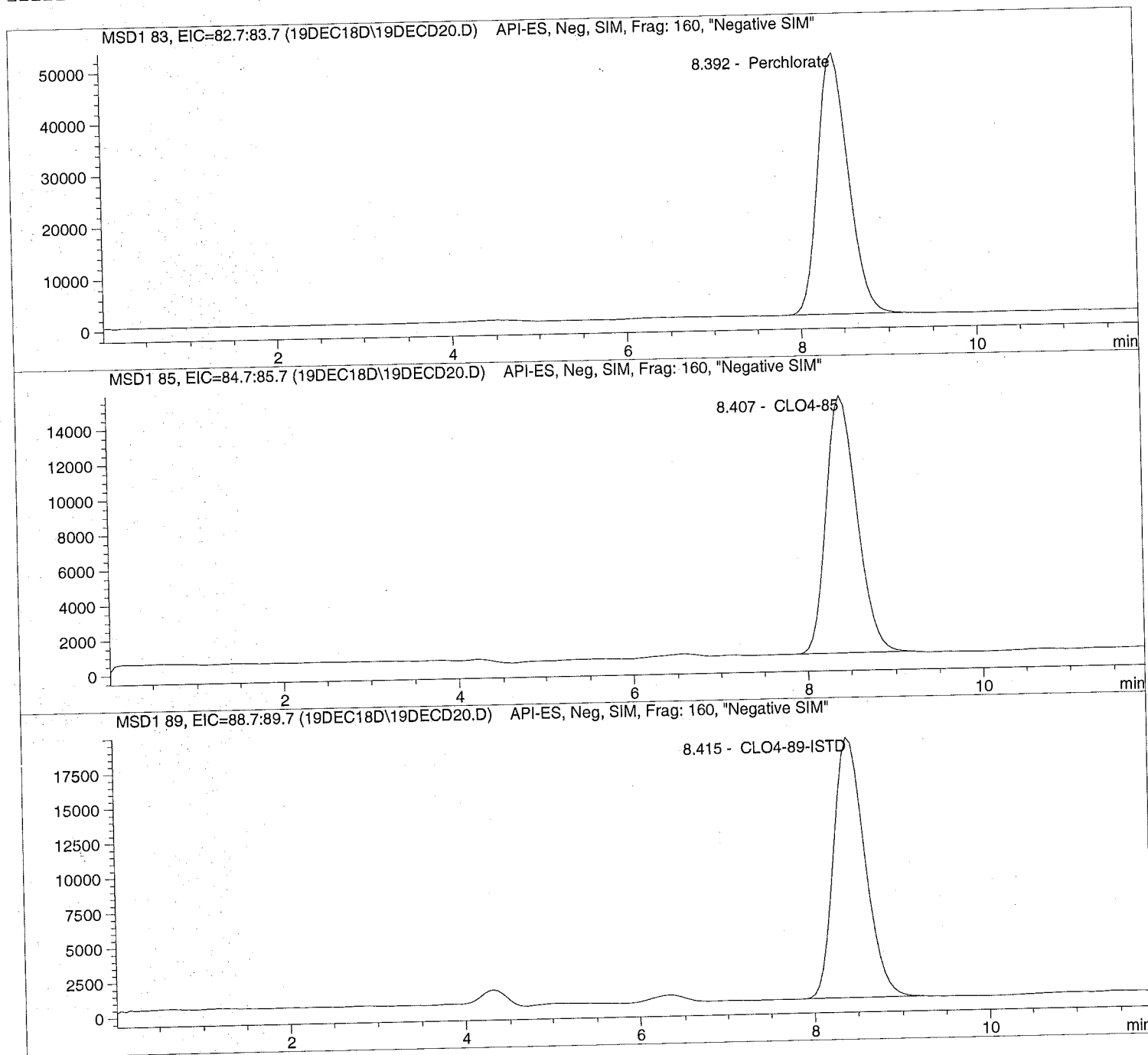
Sample Name: 1834591008 100

Injection Date: 12/19/2018 12:49:52  
Sample Name: 1834591008 100  
Acq Operator: TNB

Seq Line: 20  
Location: Vial 88  
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



Injection Date: 12/19/2018 12:49:52      Seq Line: 20  
Sample Name: 1834591008 100      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: 100.000000  
Sample Amount: 0.000

## LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.392	PBA	1225937.5	833.5335	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.407	PBA	359153.4	810.3836	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.415	PBA	459695.6	500.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

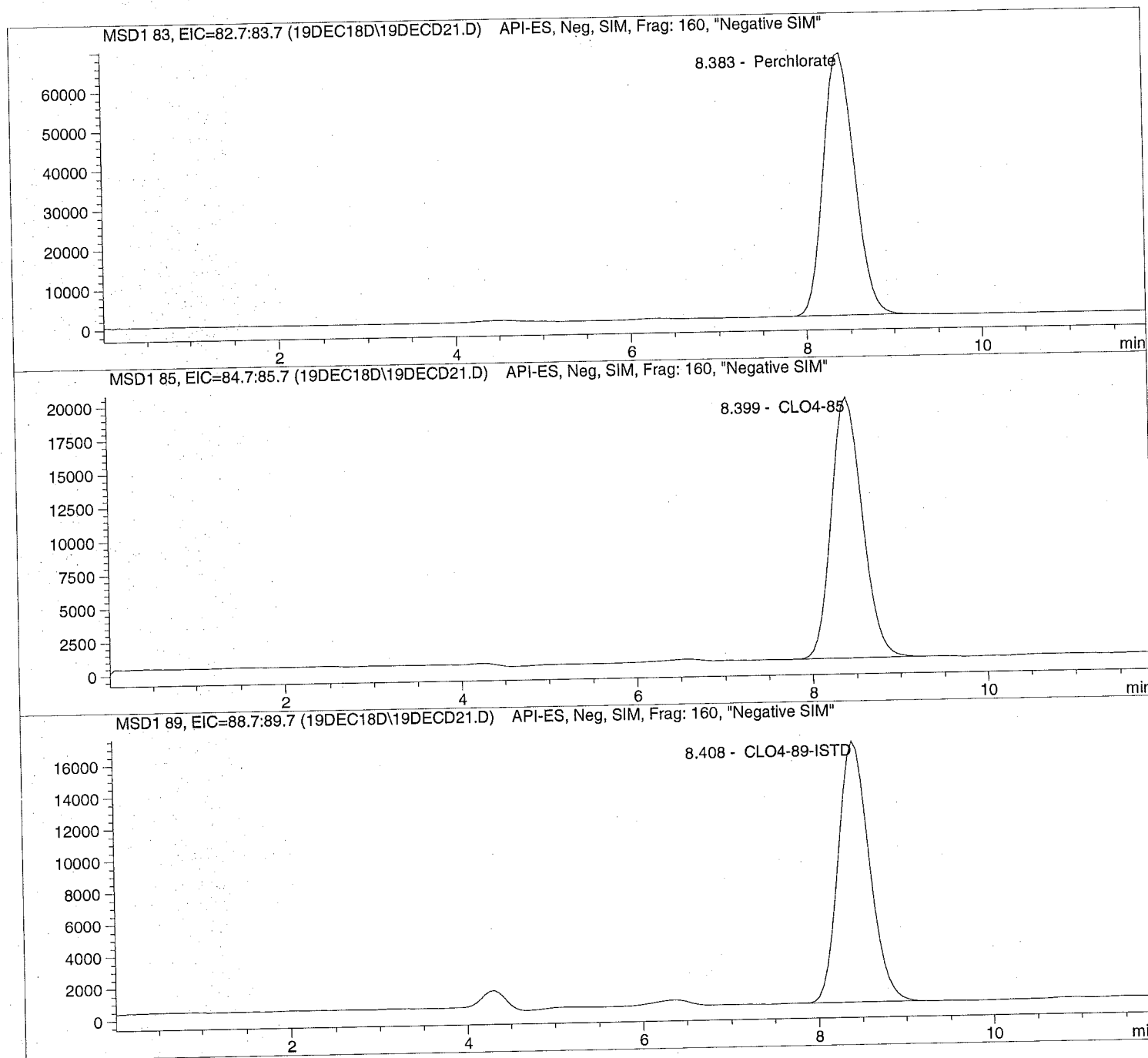


Injection Date: 12/19/2018 13:03:38  
Sample Name: 1834591009 100  
Acq Operator: TNB

Seq Line: 21  
Location: Vial 89  
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



```

=====
Injection Date: 12/19/2018 13:03:38      Seq Line:          21
Sample Name:   1834591009 100            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:       100.000000
Sample Amount:  0.000
=====

```

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.383	PBA	1624602.3	1220.2714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.399	BBA	478619.9	1195.4450	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.408	BBA	409950.0	500.0000	CLO4-89-ISTD

\*\*\* End of Report \*\*\*

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD22.D

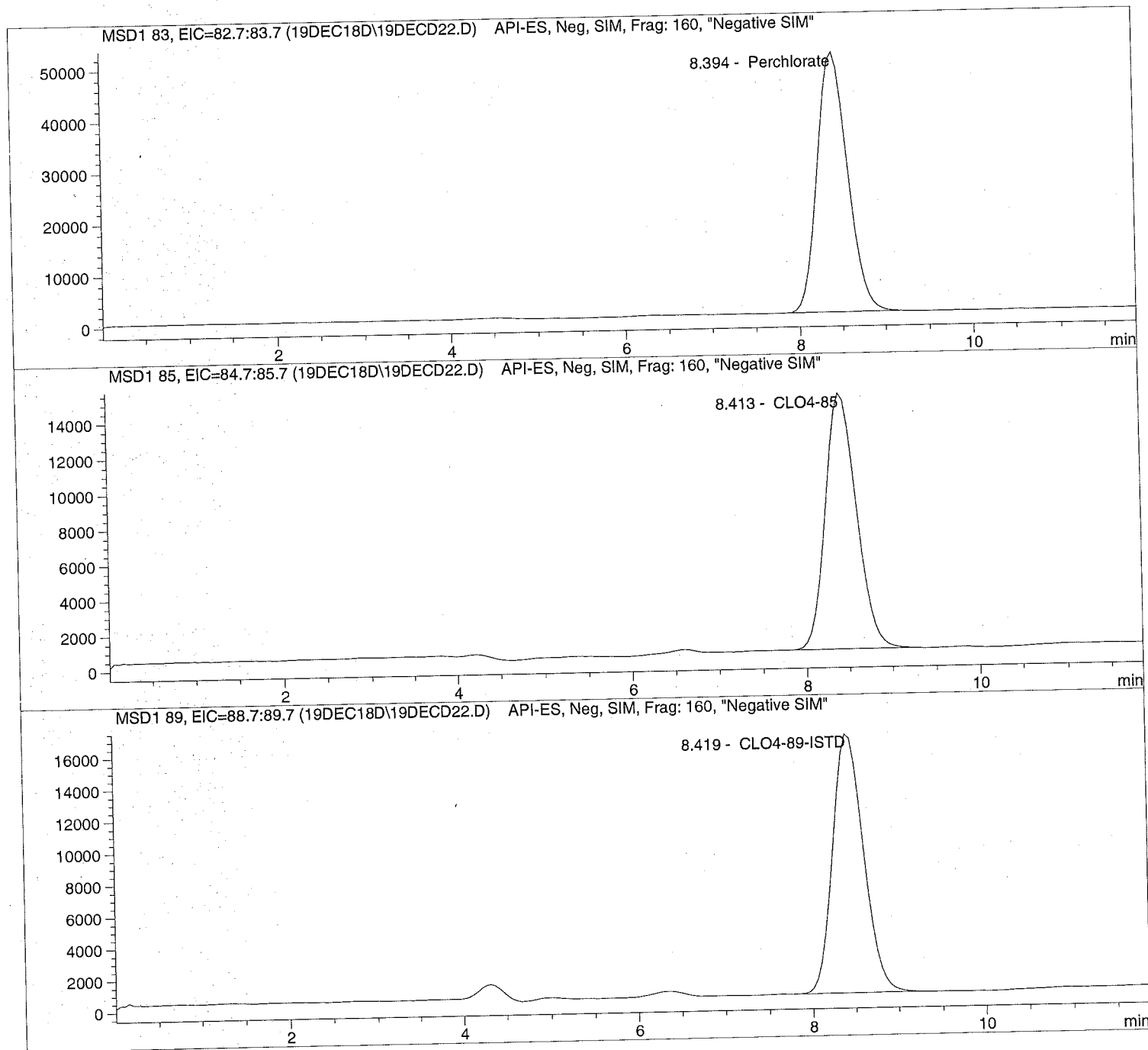
Sample Name: 1834591010 100

Injection Date: 12/19/2018 13:17:30  
Sample Name: 1834591010 100  
Acq Operator: TNB

Seq Line: 22  
Location: Vial 90  
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\19DEC18D\19DECD22.D

Sample Name: 1834591010 100

```

=====
Injection Date: 12/19/2018 13:17:30      Seq Line:          22
Sample Name:   1834591010 100            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:     100.000000
Sample Amount: 0.000
=====

```

```

=====
                          LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.394	PBA	1236587.0	941.3072	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.413	PBA	363480.3	919.0352	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.419	BBA	408616.1	500.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD23.D

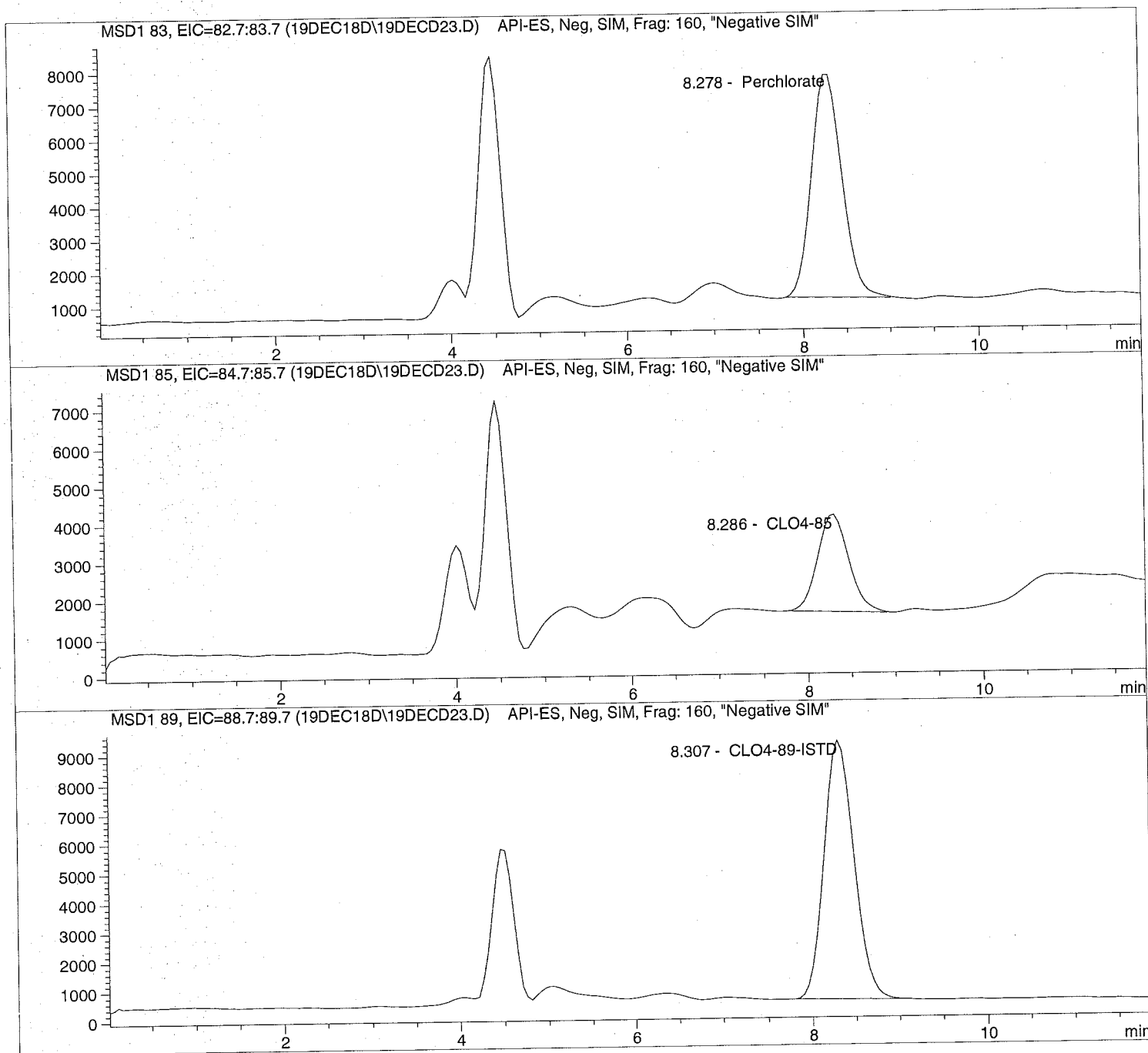
Sample Name: 1834871001

Injection Date: 12/19/2018 13:31:20  
Sample Name: 1834871001  
Acq Operator: TNB

Seq Line: 23  
Location: Vial 91  
Inj. No.: 1  
Inj. Vol.: 30  $\mu$ l

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\19DEC18D\19DECD23.D

Sample Name: 1834871001

```

=====
Injection Date: 12/19/2018 13:31:20      Seq Line:          23
Sample Name:    1834871001                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:       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
8.278	PBA	162192.9	2.6000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.286	PBA	63760.8	3.2576	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.307	PBA	208798.9	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD24.D

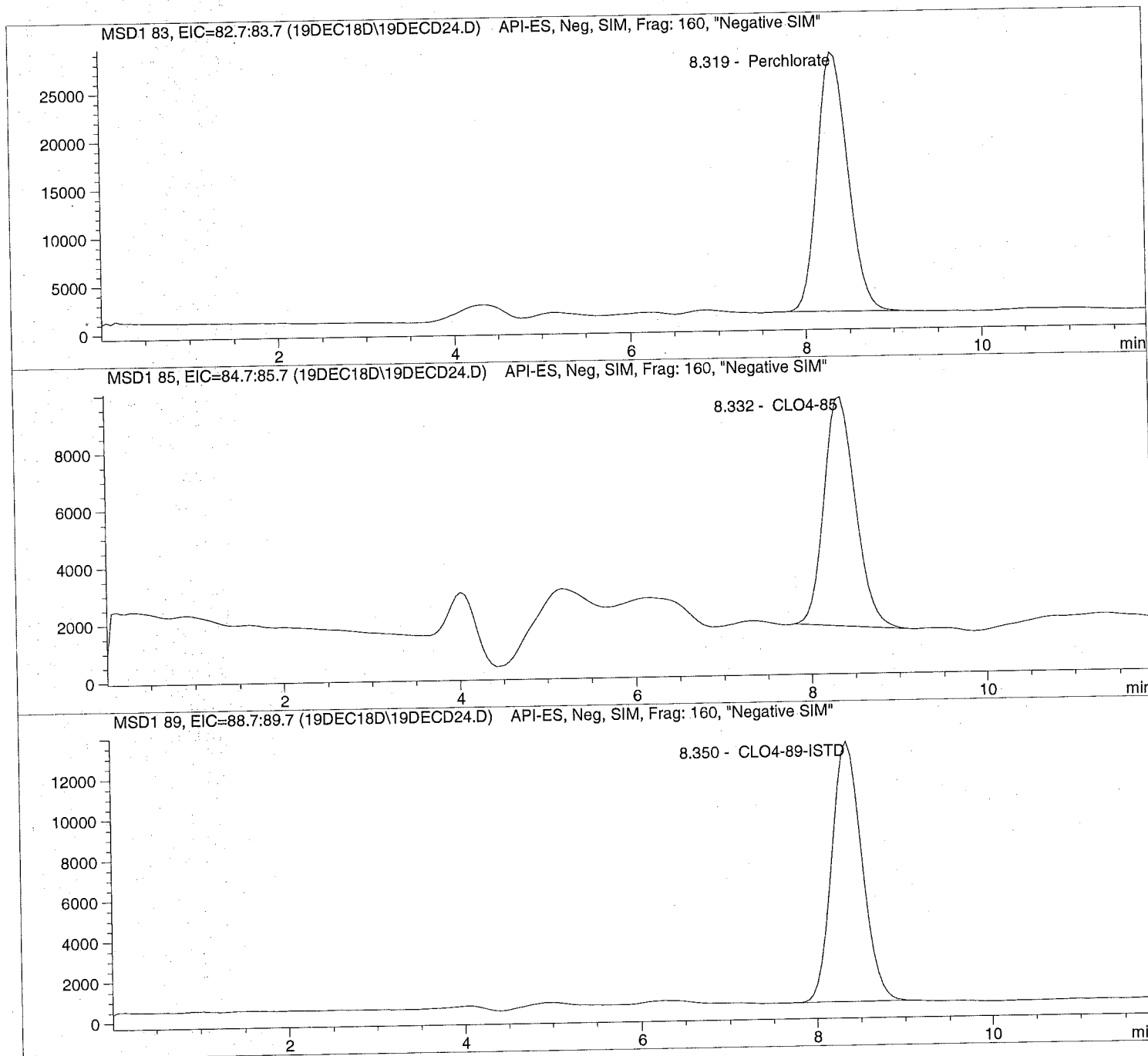
Sample Name: 1834591006 10X

Injection Date: 12/19/2018 13:45:08  
Sample Name: 1834591006 10X  
Acq Operator: TNB

Seq Line: 24  
Location: Vial 92  
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\19DEC18D\19DECD24.D Sample Name: 1834591006 10X

```

=====
Injection Date: 12/19/2018 13:45:08      Seq Line:          24
Sample Name:    1834591006 10X           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-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
8.319	BBA	648996.5	66.5194	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.332	PBA	199622.2	67.6252	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.350	PBA	307854.8	50.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

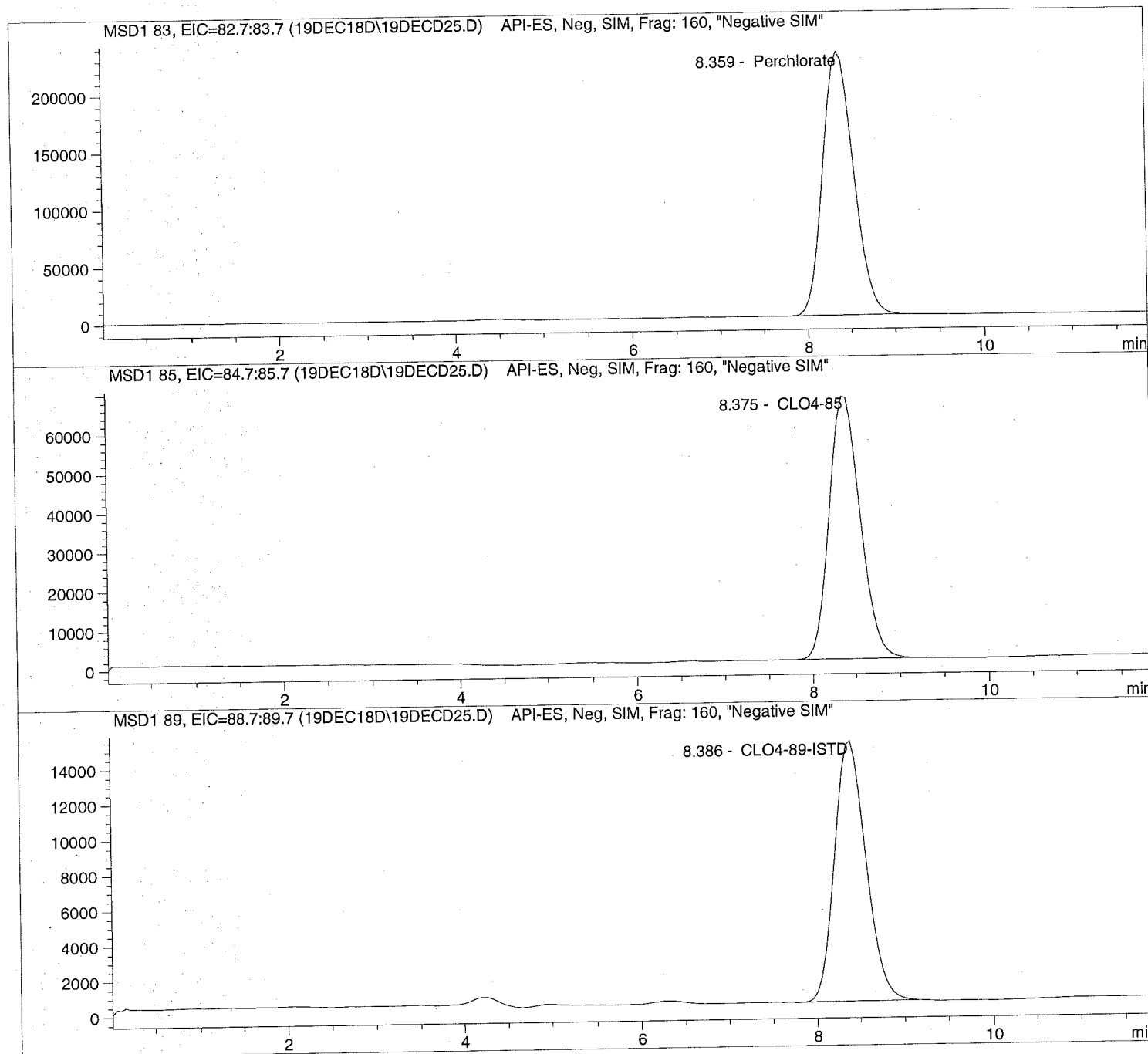


Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD25.D Sample Name: 1834591007 10X

=====  
Injection Date: 12/19/2018 13:58:54 Seq Line: 25  
Sample Name: 1834591007 10X 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-DPR.M  
Last Changed: 12/3/2018 12:46:06

Perchlorate analysis  
=====



Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD25.D Sample Name: 1834591007 10X

```

=====
Injection Date: 12/19/2018 13:58:54      Seq Line:          25
Sample Name:    1834591007 10X          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-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
8.359	PBA	5688991.5	441.4471	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.375	PBA	1662108.8	424.5719	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.386	PBA	371021.2	50.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD26.D

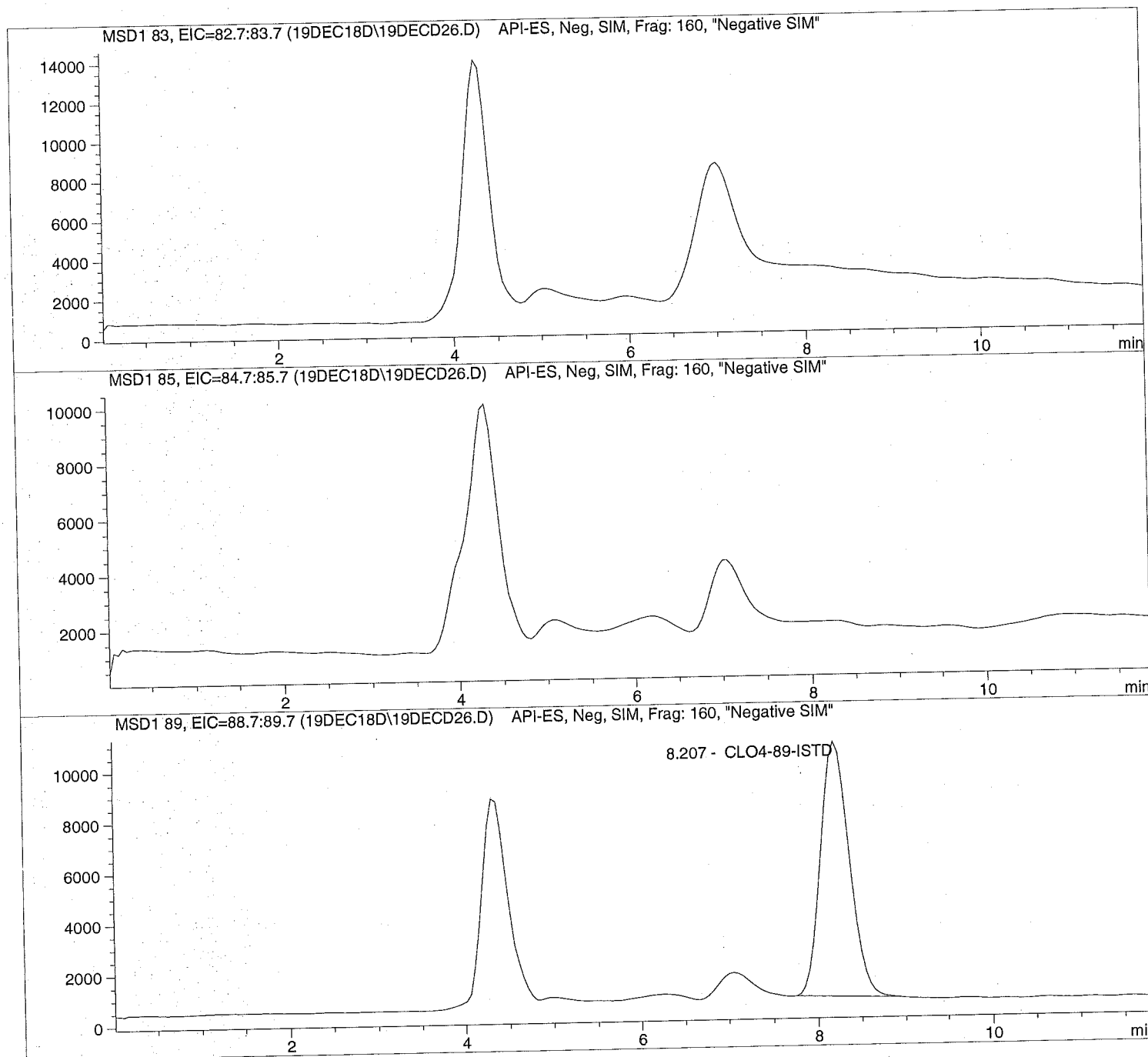
Sample Name: 1834591005 RE

Injection Date: 12/19/2018 14:12:47  
Sample Name: 1834591005 RE  
Acq Operator: TNB

Seq Line: 26  
Location: Vial 94  
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\19DEC18D\19DECD26.D

Sample Name: 1834591005 RE

```

=====
Injection Date: 12/19/2018 14:12:47      Seq Line:          26
Sample Name:   1834591005 RE             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-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
8.207	PBA	229203.5	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD27.D

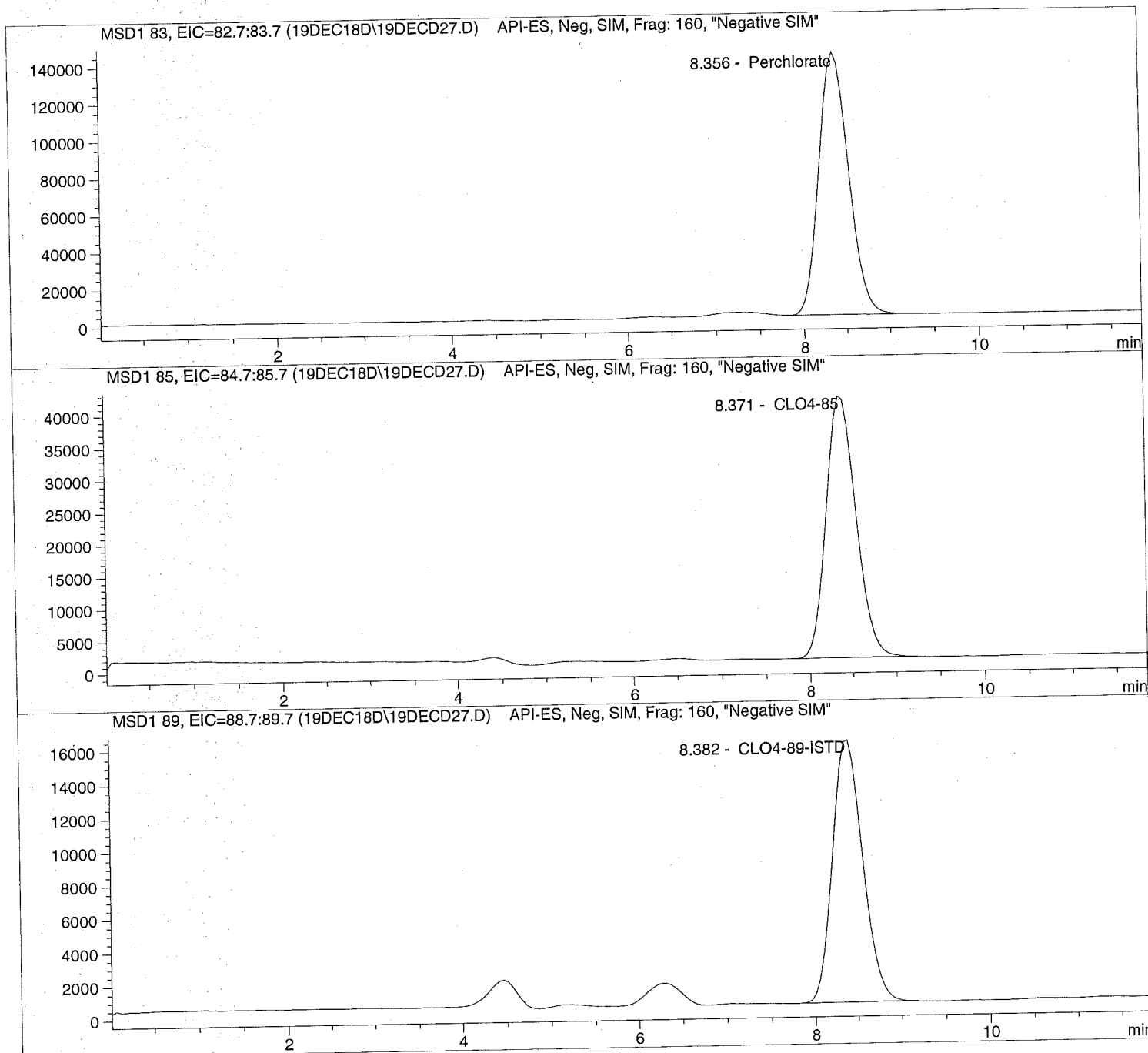
Sample Name: 633247 CCV@25

Injection Date: 12/19/2018 14:26:31  
Sample Name: 633247 CCV@25  
Acq Operator: TNB

Seq Line: 27  
Location: Vial 71  
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\19DEC18D\19DECD27.D

Sample Name: 633247 CCV@25

```

=====
Injection Date: 12/19/2018 14:26:31      Seq Line:          27
Sample Name:    633247    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
8.356	VBA	3387879.3	26.2108	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.371	PBA	985046.6	25.2825	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.382	PBA	384846.7	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

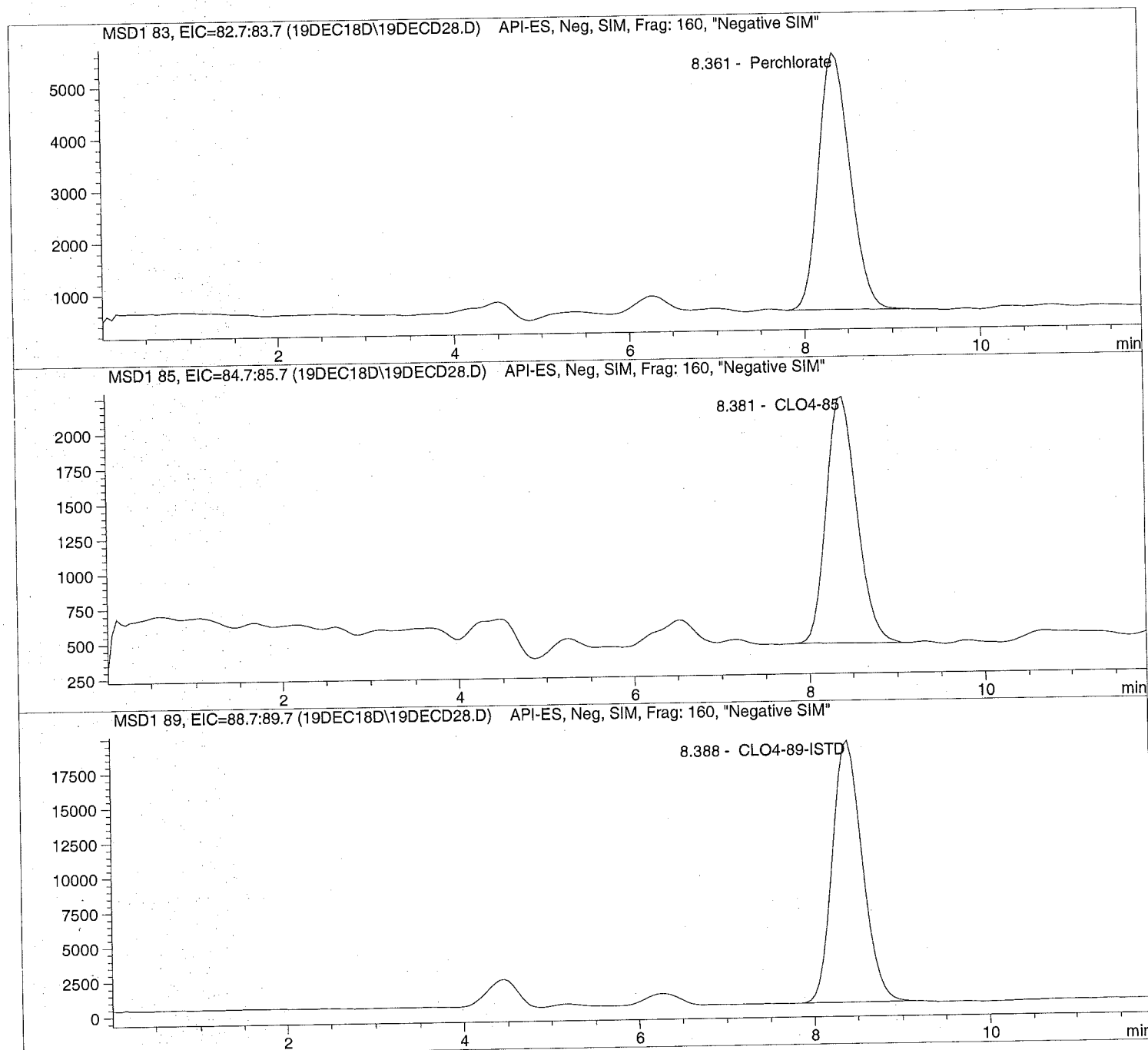
Data file: C:\HPCHEM\1\DATA\19DEC18D\19DECD28.D

Sample Name: 633248 LODV@1.

=====  
Injection Date: 12/19/2018 14:40:17  
Sample Name: 633248 LODV@1.  
Acq Operator: TNB

Seq Line: 28  
Location: Vial 72  
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\19DEC18D\19DECD28.D

Sample Name: 633248 LODV@1.

```

=====
Injection Date: 12/19/2018 14:40:17      Seq Line:          28
Sample Name:   633248  LODV@1.           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:     1.000
=====

```

```

=====
                          LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.361	PBA	123908.4	1.0564	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.381	PBA	43105.4	1.0834	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.388	PBA	451163.4	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```





**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Raw Data**

## **Initial Calibration**

## Batch Review Method:

C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==&gt; Run has not been reprocessed with Batch Review Method

['\*' ==&gt; 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 Verfe	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 Verfe	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 Verfe	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 &amp; 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
9.287	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	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	1.00000	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		

ethod C:\HPCHEM\1\METHODS\CLO4-DPR.M

RetTime [min]	Lvl Sig	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

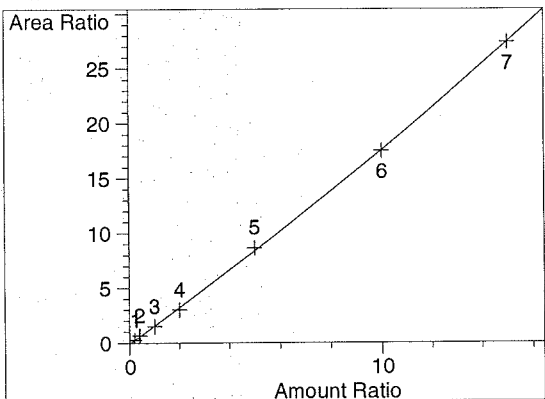
Calibration Level Weights:/

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

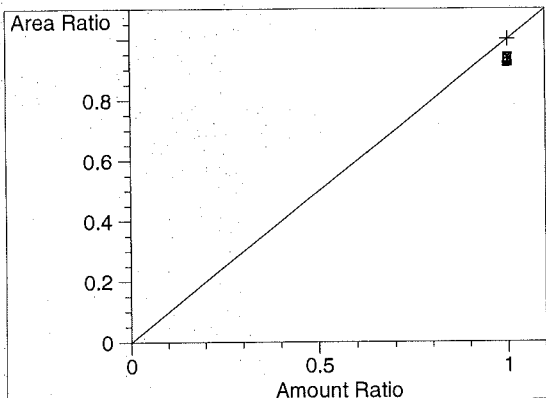
=====  
Peak Sum Table  
=====

\*\*\*No Entries in table\*\*\*  
=====

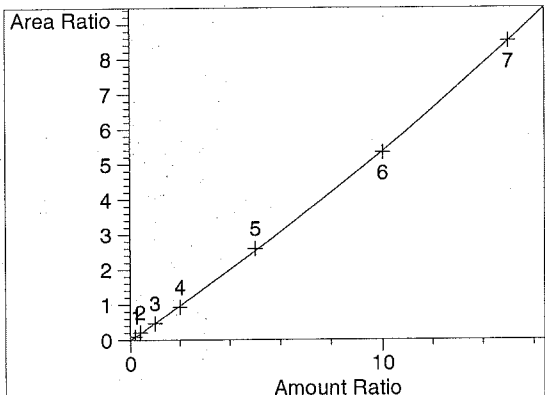
=====  
Calibration Curves  
=====



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

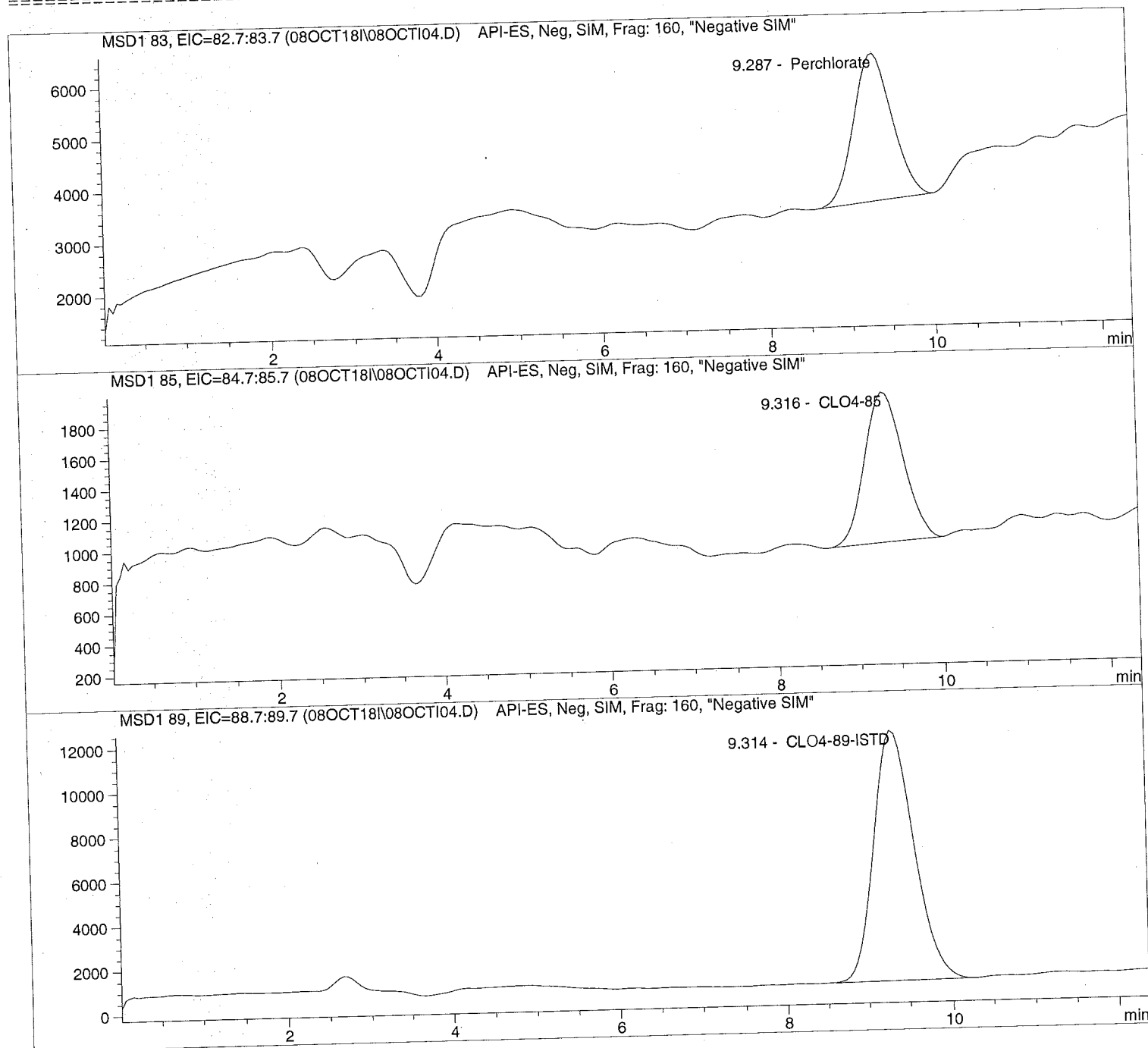
Sample Name: CLO4@ 1.0ug/L

Injection Date: 10/08/2018 11:37:35  
Sample Name: CLO4@ 1.0ug/L  
Acq Operator: TNB

Seq Line: 4  
Location: Vial 74  
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

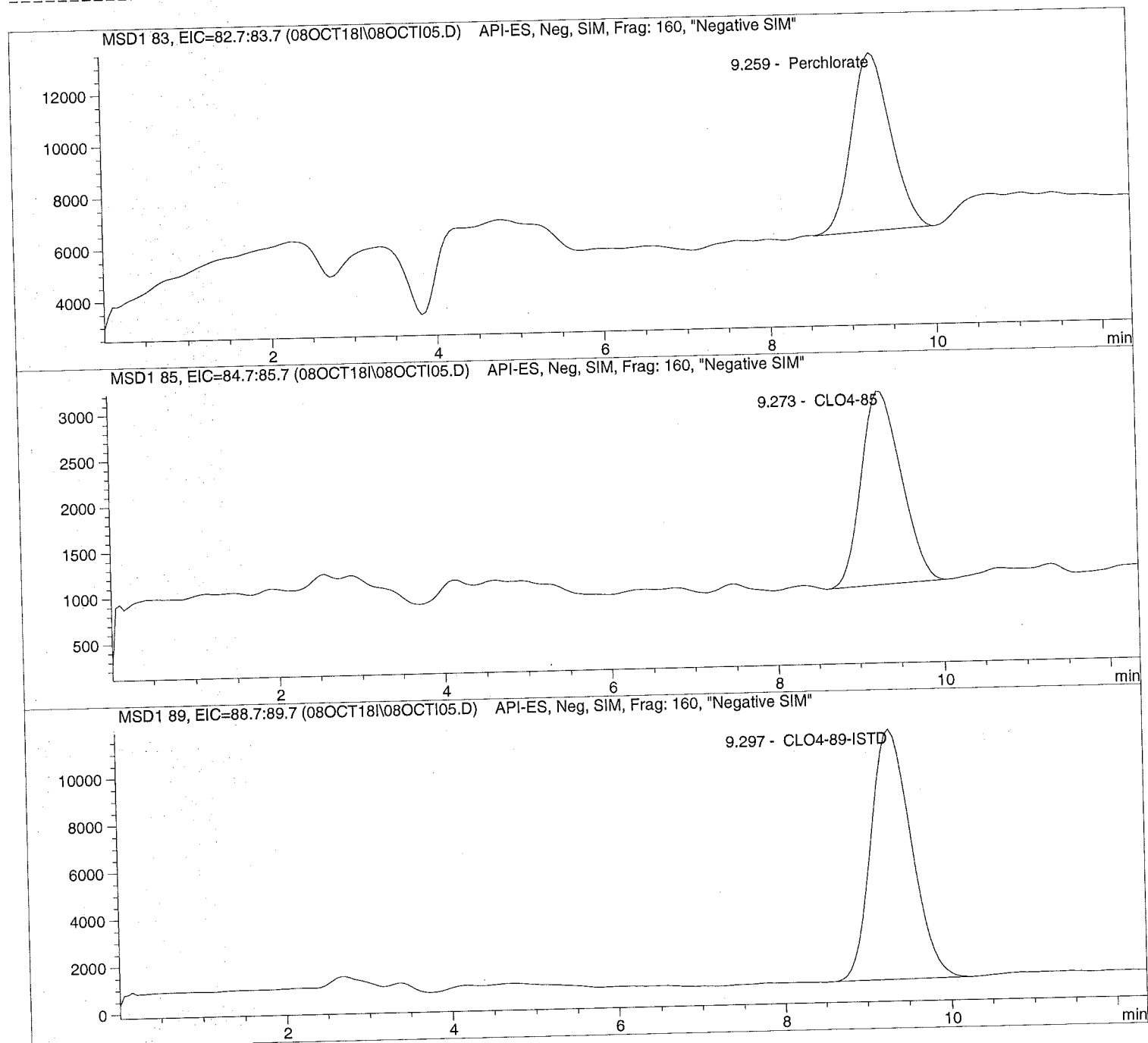
Sample Name: CLO4@ 2.0ug/L

Injection Date: 10/08/2018 11:51:45  
Sample Name: CLO4@ 2.0ug/L  
Acq Operator: TNB

Seq Line: 5  
Location: Vial 75  
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



```
=====
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

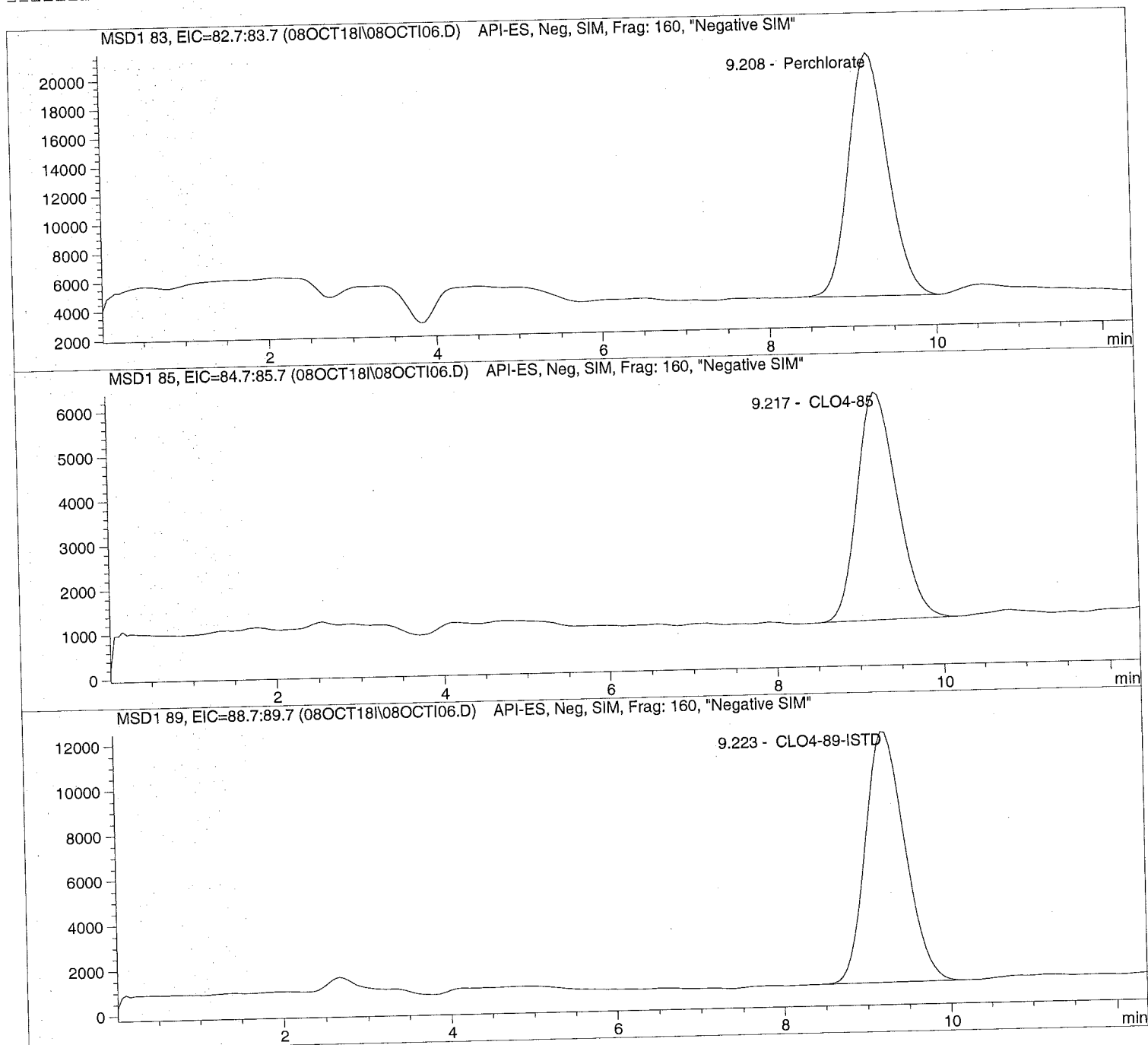
Sample Name: CLO4@ 5.0ug/L

Injection Date: 10/08/2018 12:05:59  
Sample Name: CLO4@ 5.0ug/L  
Acq Operator: TNB

Seq Line: 6  
Location: Vial 76  
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



```
=====
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

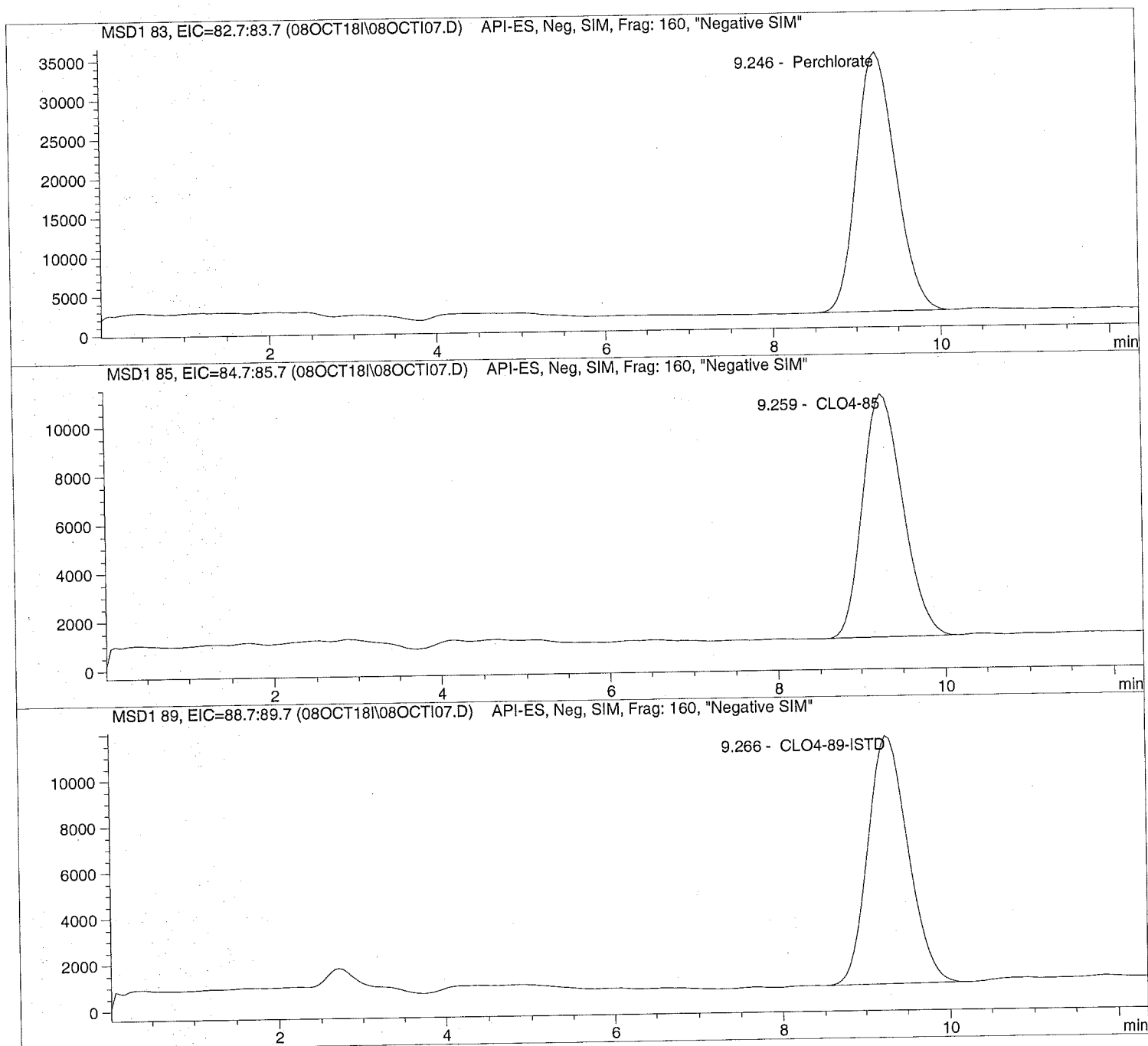
Sample Name: CLO4@ 10.ug/L

Injection Date: 10/08/2018 12:20:10  
Sample Name: CLO4@ 10.ug/L  
Acq Operator: TNB

Seq Line: 7  
Location: Vial 77  
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

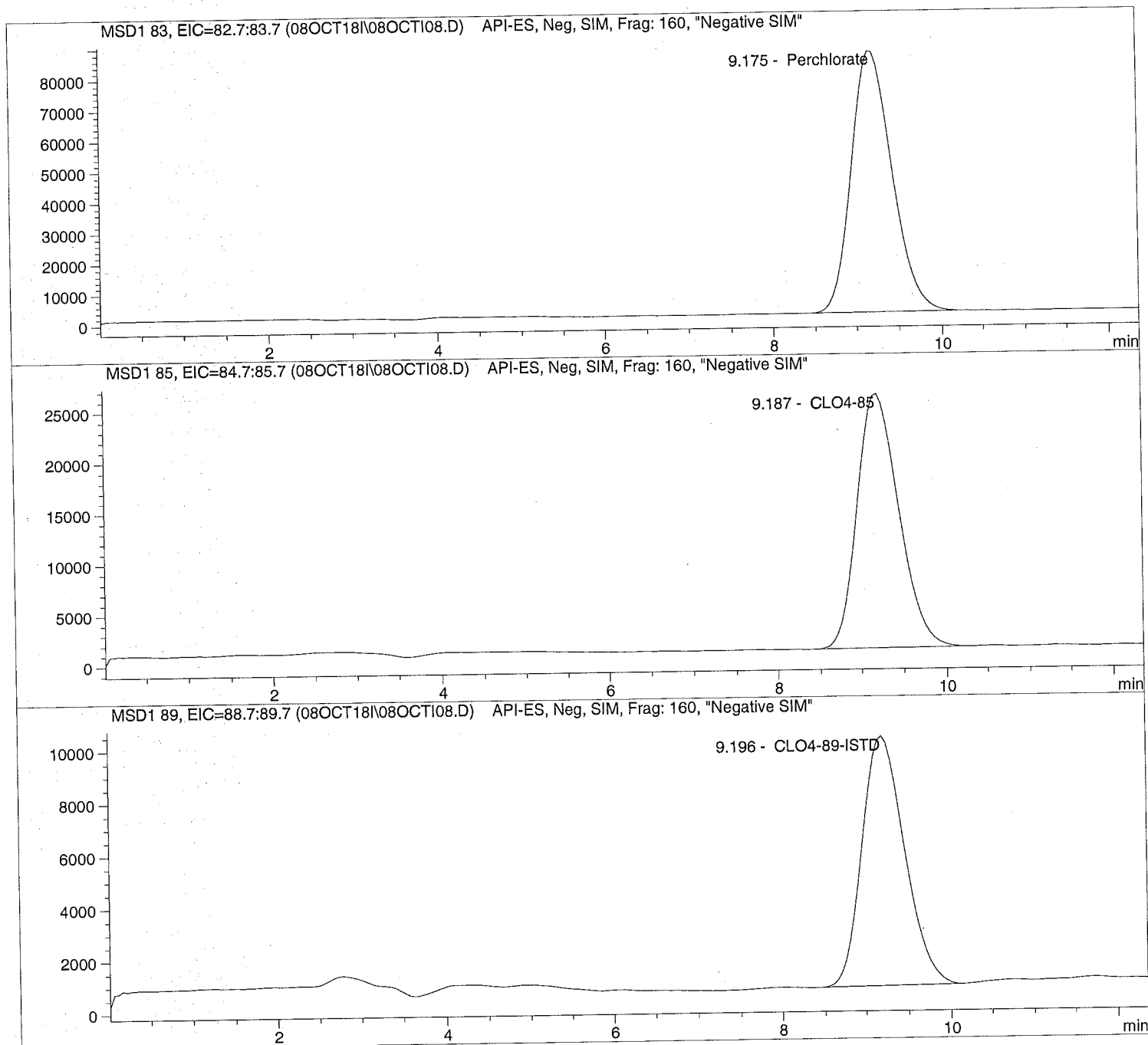
Sample Name: CLO4@ 25.ug/L

Injection Date: 10/08/2018 12:34:24  
Sample Name: CLO4@ 25.ug/L  
Acq Operator: TNB

Seq Line: 8  
Location: Vial 78  
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

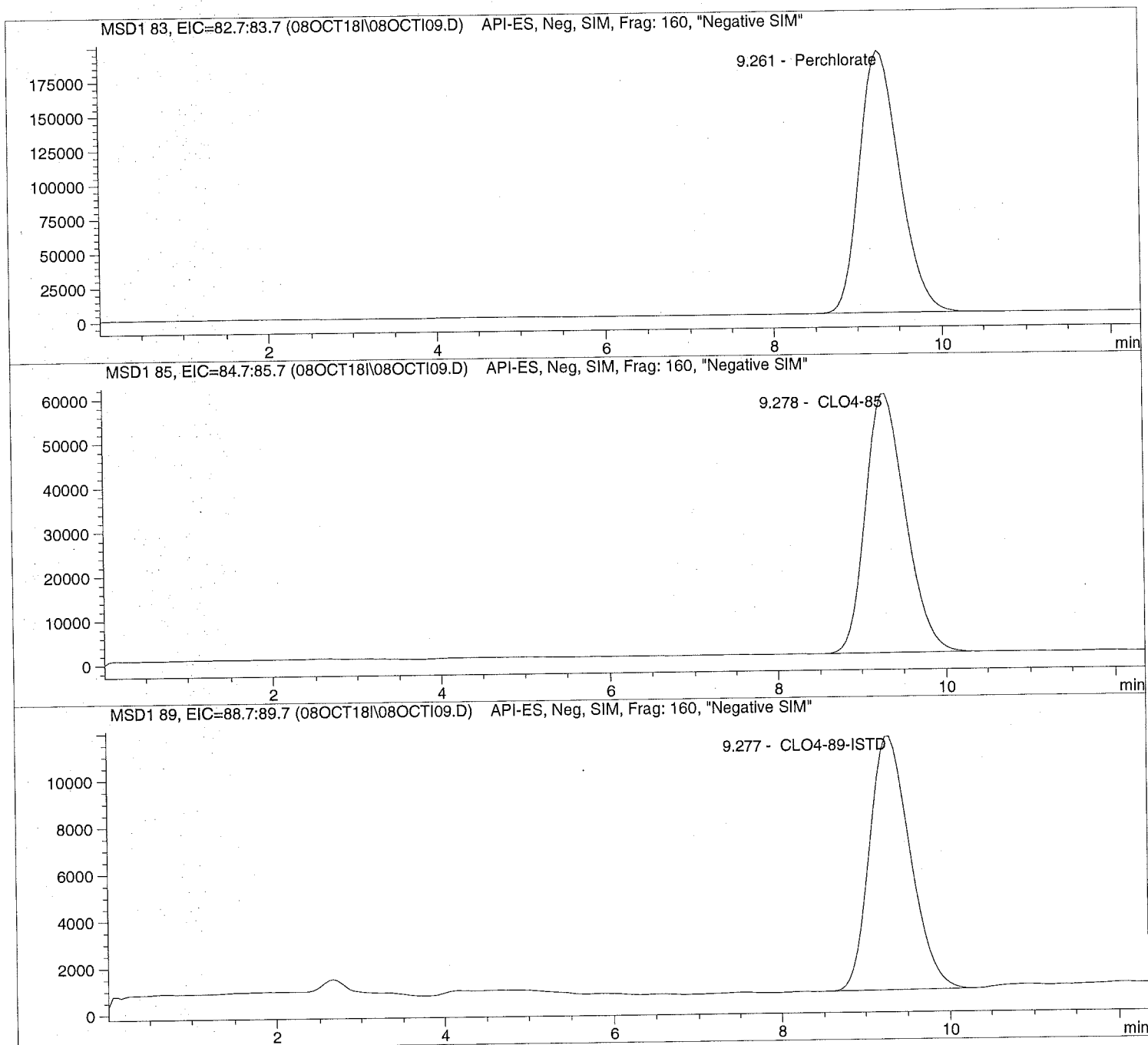
Sample Name: CLO4@ 50.ug/L

Injection Date: 10/08/2018 12:48:34  
Sample Name: CLO4@ 50.ug/L  
Acq Operator: TNB

Seq Line: 9  
Location: Vial 79  
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

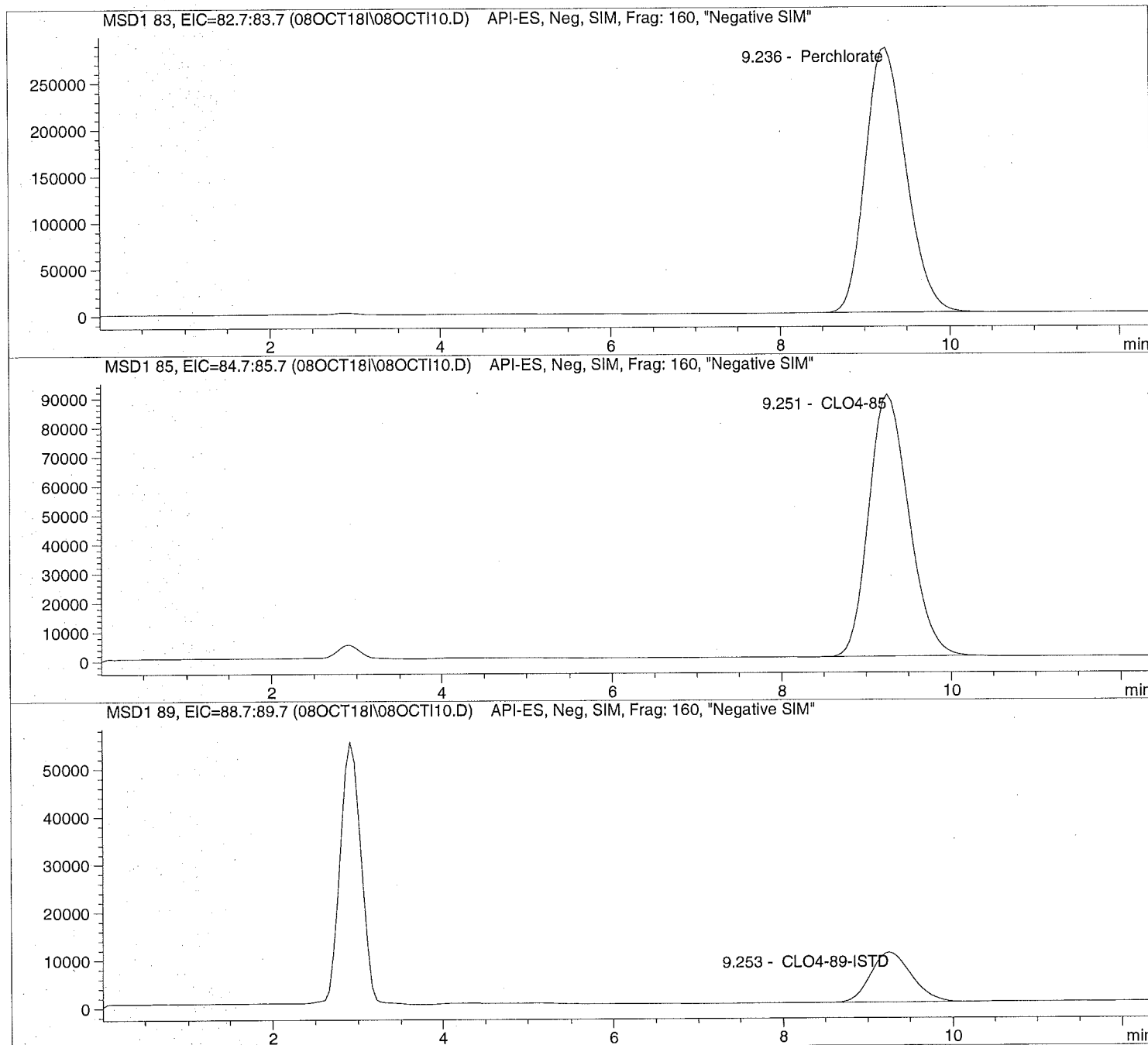
Sample Name: CLO4@ 75.ug/L

Injection Date: 10/08/2018 13:02:48  
Sample Name: CLO4@ 75.ug/L  
Acq Operator: TNB

Seq Line: 10  
Location: Vial 80  
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\08OCT18\08OCTI11.D

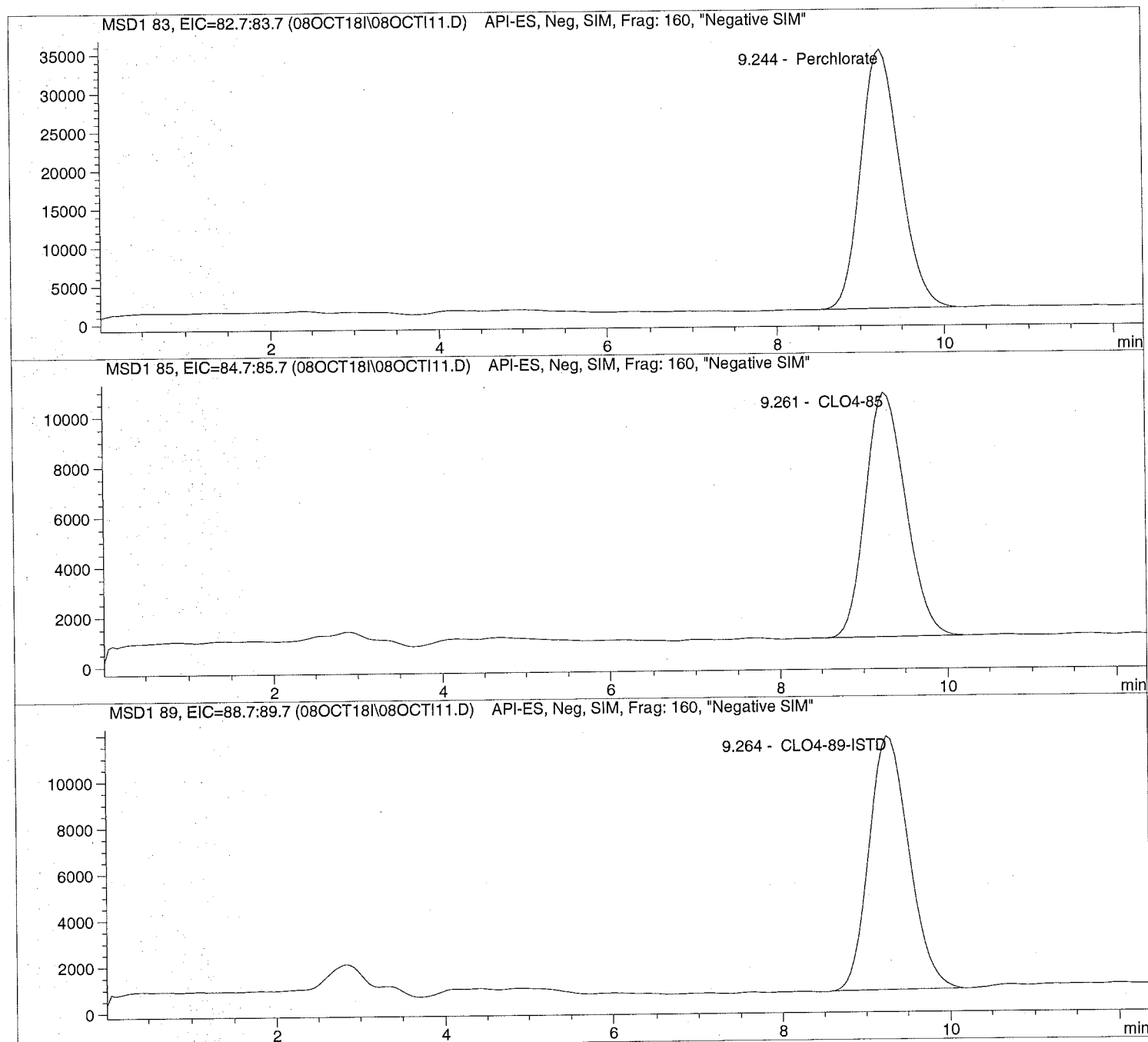
Sample Name: ICAL Verf@10ug/L

Injection Date: 10/08/2018 13:17:00  
Sample Name: ICAL Verf@10ug/L  
Acq Operator: TNB

Seq Line: 11  
Location: Vial 81  
Inj. No.: 1  
Inj. Vol.: 25  $\mu$ l

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

December 28, 2018

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

Work Order: **HS18120734**

Laboratory Results for: **LHAAP / GWTP Bi-Weekly**

Dear Marcia,

ALS Environmental received 2 sample(s) on Dec 13, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

## ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**Work Order:** HS18120734

**SAMPLE SUMMARY**

---

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120734-01	LH18/24_SP650_121218	Groundwater		12-Dec-2018 14:00	13-Dec-2018 09:35	<input type="checkbox"/>
HS18120734-02	Trip Blank	Water	VBLKW 110818-01	13-Dec-2018 00:00	13-Dec-2018 09:35	<input type="checkbox"/>

---



ALS Houston, US

Date: 28-Dec-18

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**Work Order:** HS18120734

---

**CASE NARRATIVE**

---

**GCMS Volatiles by Method SW8260****Batch ID: R329600****Sample ID: CCV\_END**

- Bromomethane outside recovery limits on closing CCV due to foamy sample analyzed before closing CCV.

**Sample ID: LH18/24\_SP650\_121218 (HS18120734-01MS)**

- MS/MSD failed QC limits for select target compounds; RPD within control limits

**Sample ID: VLCSW-1812019**

- Hexachlorobutadiene exceeded QC limits in the LCS. CCV is within QC limits; associated samples in are non-detect.

**Sample ID: VSTD050**

- 4-Methyl-2-Pentanone, cis-1,3-Dichloropropene and 2-Hexanone exceeded %D limits for CCV; associated samples in are non-detect.
- 

**WetChemistry by Method E300****Batch ID: R330134**

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

## ALS Houston, US

Date: 28-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: LHAAP / GWTP Bi-Weekly  
 Sample ID: LH18/24\_SP650\_121218  
 Collection Date: 12-Dec-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18120734  
 Lab ID:HS18120734-01  
 Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
2-Butanone	1.0	U	0.50	1.0	2.0	UG/L	1	19-Dec-2018 15:02	
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
2-Hexanone	1.0	U	1.0	1.0	2.0	UG/L	1	19-Dec-2018 15:02	
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	UG/L	1	19-Dec-2018 15:02	
Acetone	2.0	U	0.40	2.0	2.0	UG/L	1	19-Dec-2018 15:02	
Benzene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Bromobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Bromochloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Bromodichloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Bromoform	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Bromomethane	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Carbon disulfide	1.0	U	0.60	1.0	2.0	UG/L	1	19-Dec-2018 15:02	
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Chlorobenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Chloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Chloroform	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	

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

## ALS Houston, US

Date: 28-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: LHAAP / GWTP Bi-Weekly  
 Sample ID: LH18/24\_SP650\_121218  
 Collection Date: 12-Dec-2018 14:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18120734  
 Lab ID:HS18120734-01  
 Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>							Analyst: PC
Chloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
<b>cis-1,2-Dichloroethene</b>	<b>2.7</b>		<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>UG/L</b>	1	19-Dec-2018 15:02	
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Dibromochloromethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Dibromomethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Ethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	UG/L	1	19-Dec-2018 15:02	
Isopropylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
m,p-Xylene	1.0	U	0.50	1.0	2.0	UG/L	1	19-Dec-2018 15:02	
Methylene chloride	0.50	U	0.40	0.50	2.0	UG/L	1	19-Dec-2018 15:02	
n-Butylbenzene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
n-Propylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Naphthalene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
o-Xylene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Styrene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Tetrachloroethene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Toluene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
<b>Trichloroethene</b>	<b>0.88</b>	J	<b>0.20</b>	<b>0.50</b>	<b>1.0</b>	<b>UG/L</b>	1	19-Dec-2018 15:02	
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
Vinyl chloride	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 15:02	
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>91.7</i>			<b>0</b>	<i>81-118</i>	<b>%REC</b>	1	19-Dec-2018 15:02	
<i>Surr: 4-Bromofluorobenzene</i>	<i>98.1</i>			<b>0</b>	<i>85-114</i>	<b>%REC</b>	1	19-Dec-2018 15:02	
<i>Surr: Dibromofluoromethane</i>	<i>89.9</i>			<b>0</b>	<i>80-119</i>	<b>%REC</b>	1	19-Dec-2018 15:02	
<i>Surr: Toluene-d8</i>	<i>104</i>			<b>0</b>	<i>89-112</i>	<b>%REC</b>	1	19-Dec-2018 15:02	
<b>ANIONS BY E300.0</b>		<b>Method:E300</b>							Analyst: KMU
<b>Chloride</b>	<b>387</b>		<b>2.00</b>	<b>5.00</b>	<b>5.00</b>	<b>mg/L</b>	10	28-Dec-2018 05:45	
<b>Sulfate</b>	<b>18.4</b>		<b>2.00</b>	<b>5.00</b>	<b>5.00</b>	<b>mg/L</b>	10	28-Dec-2018 05:45	

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

## ALS Houston, US

Date: 28-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: LHAAP / GWTP Bi-Weekly  
 Sample ID: Trip Blank  
 Collection Date: 13-Dec-2018 00:00

**ANALYTICAL REPORT**

WorkOrder:HS18120734  
 Lab ID:HS18120734-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>VOLATILES ORGANICS BY METHOD</b>		<b>Method:SW8260</b>						
<b>8260C</b>								Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 14:37
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37
2-Butanone	1.0	U	0.50	1.0	2.0	UG/L	1	19-Dec-2018 14:37
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37
2-Hexanone	1.0	U	1.0	1.0	2.0	UG/L	1	19-Dec-2018 14:37
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 14:37
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	UG/L	1	19-Dec-2018 14:37
Acetone	2.0	U	0.40	2.0	2.0	UG/L	1	19-Dec-2018 14:37
Benzene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37
Bromobenzene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 14:37
Bromochloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37
Bromodichloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37
Bromoform	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 14:37
Bromomethane	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 14:37
Carbon disulfide	1.0	U	0.60	1.0	2.0	UG/L	1	19-Dec-2018 14:37
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	UG/L	1	19-Dec-2018 14:37
Chlorobenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37
Chloroethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37
Chloroform	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37

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

## ALS Houston, US

Date: 28-Dec-18

Client: Bhate Environmental Associates, Inc.  
 Project: LHAAP / GWTP Bi-Weekly  
 Sample ID: Trip Blank  
 Collection Date: 13-Dec-2018 00:00

**ANALYTICAL REPORT**  
 WorkOrder:HS18120734  
 Lab ID:HS18120734-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED	
<b>VOLATILES ORGANICS BY METHOD 8260C</b>		<b>Method:SW8260</b>							Analyst: PC
Chloromethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Dibromochloromethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Dibromomethane	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Ethylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Hexachlorobutadiene	1.0	U	1.0	1.0	1.0	UG/L	1	19-Dec-2018 14:37	
Isopropylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
m,p-Xylene	1.0	U	0.50	1.0	2.0	UG/L	1	19-Dec-2018 14:37	
Methylene chloride	0.50	U	0.40	0.50	2.0	UG/L	1	19-Dec-2018 14:37	
n-Butylbenzene	0.50	U	0.40	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
n-Propylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Naphthalene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
o-Xylene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Styrene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Tetrachloroethene	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Toluene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Trichloroethene	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
Vinyl chloride	0.50	U	0.20	0.50	1.0	UG/L	1	19-Dec-2018 14:37	
<i>Surr: 1,2-Dichloroethane-d4</i>	<i>90.5</i>			<i>0</i>	<i>81-118</i>	<i>%REC</i>	<i>1</i>	<i>19-Dec-2018 14:37</i>	
<i>Surr: 4-Bromofluorobenzene</i>	<i>97.7</i>			<i>0</i>	<i>85-114</i>	<i>%REC</i>	<i>1</i>	<i>19-Dec-2018 14:37</i>	
<i>Surr: Dibromofluoromethane</i>	<i>87.5</i>			<i>0</i>	<i>80-119</i>	<i>%REC</i>	<i>1</i>	<i>19-Dec-2018 14:37</i>	
<i>Surr: Toluene-d8</i>	<i>105</i>			<i>0</i>	<i>89-112</i>	<i>%REC</i>	<i>1</i>	<i>19-Dec-2018 14:37</i>	

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

ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R329600		<b>Test Name :</b> VOLATILES ORGANICS BY METHOD 8260C		<b>Matrix:</b> Water		
HS18120734-02	Trip Blank	13 Dec 2018 00:00			19 Dec 2018 14:37	1
<b>Batch ID</b> R329600		<b>Test Name :</b> VOLATILES ORGANICS BY METHOD 8260C		<b>Matrix:</b> Groundwater		
HS18120734-01	LH18/24_SP650_121218	12 Dec 2018 14:00			19 Dec 2018 15:02	1
<b>Batch ID</b> R330134		<b>Test Name :</b> ANIONS BY E300.0		<b>Matrix:</b> Groundwater		
HS18120734-01	LH18/24_SP650_121218	12 Dec 2018 14:00			28 Dec 2018 05:45	10

ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

**QC BATCH REPORT**

Batch ID: R329600		Instrument: VOA9		Method: SW8260						
MBLK	Sample ID: VBLKW-181219	Units: UG/L			Analysis Date: 19-Dec-2018 14:12					
Client ID:	Run ID: VOA9_329600	SeqNo: 4873544	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	2.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

## ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

## QC BATCH REPORT

Batch ID: R329600		Instrument: VOA9		Method: SW8260						
MBLK	Sample ID: VBLKW-181219	Units: UG/L			Analysis Date: 19-Dec-2018 14:12					
Client ID:	Run ID: VOA9_329600	SeqNo: 4873544	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	1.0	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	0.50	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	45.52	1.0	50	0	91.0	81 - 118				
Surr: 4-Bromofluorobenzene	48.78	1.0	50	0	97.6	85 - 114				
Surr: Dibromofluoromethane	43.82	1.0	50	0	87.6	80 - 119				
Surr: Toluene-d8	52.21	1.0	50	0	104	89 - 112				



ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

**QC BATCH REPORT**

Batch ID: R329600		Instrument: VOA9		Method: SW8260						
LCS	Sample ID: VLCSW-1812019	Units: UG/L			Analysis Date: 19-Dec-2018 13:23					
Client ID:	Run ID: VOA9_329600	SeqNo: 4873543	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	21.45	1.0	20	0	107	78 - 124				
1,1,1-Trichloroethane	19.64	1.0	20	0	98.2	74 - 131				
1,1,2,2-Tetrachloroethane	21.9	1.0	20	0	109	71 - 121				
1,1,2-Trichloroethane	21.95	1.0	20	0	110	80 - 119				
1,1-Dichloroethane	20.76	1.0	20	0	104	77 - 125				
1,1-Dichloroethene	18.1	1.0	20	0	90.5	71 - 131				
1,1-Dichloropropene	22.21	1.0	20	0	111	78 - 125				
1,2,3-Trichlorobenzene	22.77	1.0	20	0	114	69 - 129				
1,2,3-Trichloropropane	21.86	1.0	20	0	109	73 - 122				
1,2,4-Trichlorobenzene	22.37	1.0	20	0	112	69 - 130				
1,2,4-Trimethylbenzene	23.07	1.0	20	0	115	76 - 124				
1,2-Dibromo-3-chloropropane	19.95	1.0	20	0	99.7	62 - 128				
1,2-Dibromoethane	22.07	1.0	20	0	110	77 - 121				
1,2-Dichlorobenzene	21.09	1.0	20	0	105	80 - 119				
1,2-Dichloroethane	20.53	1.0	20	0	103	73 - 128				
1,2-Dichloropropane	22.8	1.0	20	0	114	78 - 122				
1,3,5-Trimethylbenzene	22.87	1.0	20	0	114	75 - 124				
1,3-Dichlorobenzene	21.54	1.0	20	0	108	80 - 119				
1,3-Dichloropropane	21.79	1.0	20	0	109	80 - 119				
1,4-Dichlorobenzene	22.65	1.0	20	0	113	79 - 118				
2,2-Dichloropropane	20.46	1.0	20	0	102	60 - 139				
2-Butanone	43.93	2.0	40	0	110	56 - 143				
2-Chlorotoluene	22.31	1.0	20	0	112	79 - 122				
2-Hexanone	47.86	2.0	40	0	120	57 - 139				
4-Chlorotoluene	22.58	1.0	20	0	113	78 - 122				
4-Isopropyltoluene	23.84	1.0	20	0	119	77 - 127				
4-Methyl-2-pentanone	47.37	2.0	40	0	118	67 - 130				
Acetone	43.94	2.0	40	0	110	39 - 160				
Benzene	22.47	1.0	20	0	112	79 - 120				
Bromobenzene	21.43	1.0	20	0	107	80 - 120				
Bromochloromethane	21.73	1.0	20	0	109	78 - 123				
Bromodichloromethane	20.41	1.0	20	0	102	79 - 125				
Bromoform	19.22	1.0	20	0	96.1	66 - 130				
Bromomethane	17.47	1.0	20	0	87.3	53 - 141				

## ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

## QC BATCH REPORT

Batch ID: R329600		Instrument: VOA9		Method: SW8260						
LCS	Sample ID: VLCSW-1812019	Units: UG/L			Analysis Date: 19-Dec-2018 13:23					
Client ID:	Run ID: VOA9_329600	SeqNo: 4873543	PrepDate:	DF: 1						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	43	2.0	40	0	108	64 - 133				
Carbon tetrachloride	20.87	1.0	20	0	104	72 - 136				
Chlorobenzene	21.48	1.0	20	0	107	82 - 118				
Chloroethane	18.03	1.0	20	0	90.2	60 - 138				
Chloroform	19.61	1.0	20	0	98.0	79 - 124				
Chloromethane	18.29	1.0	20	0	91.4	50 - 139				
cis-1,2-Dichloroethene	20.47	1.0	20	0	102	78 - 123				
cis-1,3-Dichloropropene	22.46	1.0	20	0	112	75 - 124				
Dibromochloromethane	21.34	1.0	20	0	107	74 - 126				
Dibromomethane	20.94	1.0	20	0	105	79 - 123				
Dichlorodifluoromethane	19.71	1.0	20	0	98.5	32 - 152				
Ethylbenzene	22.22	1.0	20	0	111	79 - 121				
Hexachlorobutadiene	27.23	1.0	20	0	136	66 - 134				S
Isopropylbenzene	22.91	1.0	20	0	115	72 - 131				
m,p-Xylene	45.06	2.0	40	0	113	80 - 121				
Methylene chloride	21.6	2.0	20	0	108	74 - 124				
Naphthalene	23.36	1.0	20	0	117	61 - 128				
n-Butylbenzene	24.55	1.0	20	0	123	75 - 128				
n-Propylbenzene	23.46	1.0	20	0	117	76 - 126				
o-Xylene	22.37	1.0	20	0	112	78 - 122				
sec-Butylbenzene	23.63	1.0	20	0	118	77 - 126				
Styrene	23	1.0	20	0	115	78 - 123				
tert-Butylbenzene	23.12	1.0	20	0	116	78 - 124				
Tetrachloroethene	22.72	1.0	20	0	114	74 - 129				
Toluene	22.34	1.0	20	0	112	80 - 121				
trans-1,2-Dichloroethene	20.96	1.0	20	0	105	75 - 124				
trans-1,3-Dichloropropene	19.75	1.0	20	0	98.8	73 - 127				
Trichloroethene	21.24	1.0	20	0	106	79 - 123				
Trichlorofluoromethane	17.94	1.0	20	0	89.7	65 - 141				
Vinyl chloride	19.66	1.0	20	0	98.3	58 - 137				
Surr: 1,2-Dichloroethane-d4	43.64	1.0	50	0	87.3	81 - 118				
Surr: 4-Bromofluorobenzene	51.2	1.0	50	0	102	85 - 114				
Surr: Dibromofluoromethane	44.46	1.0	50	0	88.9	80 - 119				
Surr: Toluene-d8	52.77	1.0	50	0	106	89 - 112				

ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

**QC BATCH REPORT**

Batch ID: R329600		Instrument: VOA9		Method: SW8260						
MS		Sample ID: HS18120734-01MS		Units: UG/L		Analysis Date: 19-Dec-2018 15:26				
Client ID: LH18/24_SP650_121218		Run ID: VOA9_329600		SeqNo: 4873547		PrepDate:		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
1,1,1,2-Tetrachloroethane	23.32	1.0	20	0	117	78 - 124				
1,1,1-Trichloroethane	21.6	1.0	20	0	108	74 - 131				
1,1,2,2-Tetrachloroethane	22.82	1.0	20	0	114	71 - 121				
1,1,2-Trichloroethane	23.2	1.0	20	0	116	80 - 119				
1,1-Dichloroethane	22.17	1.0	20	0	111	77 - 125				
1,1-Dichloroethene	18.5	1.0	20	0	92.5	71 - 131				
1,1-Dichloropropene	24.88	1.0	20	0	124	78 - 125				
1,2,3-Trichlorobenzene	22.86	1.0	20	0	114	69 - 129				
1,2,3-Trichloropropane	21.74	1.0	20	0	109	73 - 122				
1,2,4-Trichlorobenzene	22.74	1.0	20	0	114	69 - 130				
1,2,4-Trimethylbenzene	24.72	1.0	20	0	124	76 - 124				
1,2-Dibromo-3-chloropropane	20.38	1.0	20	0	102	62 - 128				
1,2-Dibromoethane	23.33	1.0	20	0	117	77 - 121				
1,2-Dichlorobenzene	22.08	1.0	20	0	110	80 - 119				
1,2-Dichloroethane	22.31	1.0	20	0	112	73 - 128				
1,2-Dichloropropane	24.66	1.0	20	0	123	78 - 122			S	
1,3,5-Trimethylbenzene	24.62	1.0	20	0	123	75 - 124				
1,3-Dichlorobenzene	22.54	1.0	20	0	113	80 - 119				
1,3-Dichloropropane	23.31	1.0	20	0	117	80 - 119				
1,4-Dichlorobenzene	23.73	1.0	20	0	119	79 - 118			S	
2,2-Dichloropropane	22.39	1.0	20	0	112	60 - 139				
2-Butanone	44.1	2.0	40	0	110	56 - 143				
2-Chlorotoluene	23.89	1.0	20	0	119	79 - 122				
2-Hexanone	48.46	2.0	40	0	121	57 - 139				
4-Chlorotoluene	24.02	1.0	20	0	120	78 - 122				
4-Isopropyltoluene	25.44	1.0	20	0	127	77 - 127			S	
4-Methyl-2-pentanone	47.94	2.0	40	0	120	67 - 130				
Acetone	38.91	2.0	40	0	97.3	39 - 160				
Benzene	24.5	1.0	20	0	123	79 - 120			S	
Bromobenzene	22.78	1.0	20	0	114	80 - 120				
Bromochloromethane	22.81	1.0	20	0	114	78 - 123				
Bromodichloromethane	22.36	1.0	20	0	112	79 - 125				
Bromoform	20.12	1.0	20	0	101	66 - 130				
Bromomethane	10.78	1.0	20	0	53.9	53 - 141				

## ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

## QC BATCH REPORT

Batch ID: R329600		Instrument: VOA9		Method: SW8260						
MS		Sample ID: HS18120734-01MS		Units: UG/L		Analysis Date: 19-Dec-2018 15:26				
Client ID: LH18/24_SP650_121218		Run ID: VOA9_329600		SeqNo: 4873547		PrepDate:		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Carbon disulfide	45.07	2.0	40	0	113	64 - 133				
Carbon tetrachloride	24.07	1.0	20	0	120	72 - 136				
Chlorobenzene	23.31	1.0	20	0	117	82 - 118				
Chloroethane	18.58	1.0	20	0	92.9	60 - 138				
Chloroform	21.38	1.0	20	0	107	79 - 124				
Chloromethane	18.23	1.0	20	0	91.1	50 - 139				
cis-1,2-Dichloroethene	24.21	1.0	20	2.687	108	78 - 123				
cis-1,3-Dichloropropene	23.58	1.0	20	0	118	75 - 124				
Dibromochloromethane	23.08	1.0	20	0	115	74 - 126				
Dibromomethane	22.57	1.0	20	0	113	79 - 123				
Dichlorodifluoromethane	10.41	1.0	20	0	52.0	32 - 152				
Ethylbenzene	24.03	1.0	20	0	120	79 - 121				
Hexachlorobutadiene	26.9	1.0	20	0	135	66 - 134			S	
Isopropylbenzene	25.07	1.0	20	0	125	72 - 131				
m,p-Xylene	48.89	2.0	40	0	122	80 - 121			S	
Methylene chloride	23.42	2.0	20	0	117	74 - 124				
Naphthalene	23.64	1.0	20	0	118	61 - 128				
n-Butylbenzene	25.98	1.0	20	0	130	75 - 128			S	
n-Propylbenzene	25.06	1.0	20	0	125	76 - 126				
o-Xylene	24.52	1.0	20	0	123	78 - 122			S	
sec-Butylbenzene	25.5	1.0	20	0	127	77 - 126			S	
Styrene	24.6	1.0	20	0	123	78 - 123			S	
tert-Butylbenzene	24.94	1.0	20	0	125	78 - 124			S	
Tetrachloroethene	24.23	1.0	20	0	121	74 - 129				
Toluene	24.29	1.0	20	0	121	80 - 121			S	
trans-1,2-Dichloroethene	22.56	1.0	20	0	113	75 - 124				
trans-1,3-Dichloropropene	21.18	1.0	20	0	106	73 - 127				
Trichloroethene	24.47	1.0	20	0.8775	118	79 - 123				
Trichlorofluoromethane	17.99	1.0	20	0	90.0	65 - 141				
Vinyl chloride	16.71	1.0	20	0	83.6	58 - 137				
Surr: 1,2-Dichloroethane-d4	43.67	1.0	50	0	87.3	81 - 118				
Surr: 4-Bromofluorobenzene	51.51	1.0	50	0	103	85 - 114				
Surr: Dibromofluoromethane	44.82	1.0	50	0	89.6	80 - 119				
Surr: Toluene-d8	52.8	1.0	50	0	106	89 - 112				

ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

**QC BATCH REPORT**

Batch ID: R329600		Instrument: VOA9		Method: SW8260						
MSD		Sample ID: HS18120734-01MSD		Units: UG/L		Analysis Date: 19-Dec-2018 15:51				
Client ID: LH18/24_SP650_121218		Run ID: VOA9_329600		SeqNo: 4873548		PrepDate:		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	22.22	1.0	20	0	111	78 - 124	23.32	4.81	20	
1,1,1-Trichloroethane	20.38	1.0	20	0	102	74 - 131	21.6	5.84	20	
1,1,2,2-Tetrachloroethane	22.36	1.0	20	0	112	71 - 121	22.82	2.04	20	
1,1,2-Trichloroethane	22.38	1.0	20	0	112	80 - 119	23.2	3.64	20	
1,1-Dichloroethane	21.22	1.0	20	0	106	77 - 125	22.17	4.42	20	
1,1-Dichloroethene	18.27	1.0	20	0	91.4	71 - 131	18.5	1.22	20	
1,1-Dichloropropene	23.42	1.0	20	0	117	78 - 125	24.88	6.07	20	
1,2,3-Trichlorobenzene	22.48	1.0	20	0	112	69 - 129	22.86	1.65	20	
1,2,3-Trichloropropane	21.67	1.0	20	0	108	73 - 122	21.74	0.315	20	
1,2,4-Trichlorobenzene	22.05	1.0	20	0	110	69 - 130	22.74	3.07	20	
1,2,4-Trimethylbenzene	23.62	1.0	20	0	118	76 - 124	24.72	4.54	20	
1,2-Dibromo-3-chloropropane	19.66	1.0	20	0	98.3	62 - 128	20.38	3.59	20	
1,2-Dibromoethane	22.49	1.0	20	0	112	77 - 121	23.33	3.68	20	
1,2-Dichlorobenzene	21.13	1.0	20	0	106	80 - 119	22.08	4.4	20	
1,2-Dichloroethane	21.39	1.0	20	0	107	73 - 128	22.31	4.18	20	
1,2-Dichloropropane	23.86	1.0	20	0	119	78 - 122	24.66	3.3	20	
1,3,5-Trimethylbenzene	23.29	1.0	20	0	116	75 - 124	24.62	5.55	20	
1,3-Dichlorobenzene	21.54	1.0	20	0	108	80 - 119	22.54	4.53	20	
1,3-Dichloropropane	22.62	1.0	20	0	113	80 - 119	23.31	3	20	
1,4-Dichlorobenzene	22.88	1.0	20	0	114	79 - 118	23.73	3.64	20	
2,2-Dichloropropane	20.98	1.0	20	0	105	60 - 139	22.39	6.5	20	
2-Butanone	43.88	2.0	40	0	110	56 - 143	44.1	0.488	20	
2-Chlorotoluene	22.65	1.0	20	0	113	79 - 122	23.89	5.34	20	
2-Hexanone	48.28	2.0	40	0	121	57 - 139	48.46	0.379	20	
4-Chlorotoluene	23.02	1.0	20	0	115	78 - 122	24.02	4.27	20	
4-Isopropyltoluene	24.51	1.0	20	0	123	77 - 127	25.44	3.7	20	
4-Methyl-2-pentanone	47.49	2.0	40	0	119	67 - 130	47.94	0.944	20	
Acetone	43.99	2.0	40	0	110	39 - 160	38.91	12.3	20	
Benzene	23.02	1.0	20	0	115	79 - 120	24.5	6.22	20	
Bromobenzene	21.66	1.0	20	0	108	80 - 120	22.78	5.05	20	
Bromochloromethane	22.48	1.0	20	0	112	78 - 123	22.81	1.46	20	
Bromodichloromethane	21.71	1.0	20	0	109	79 - 125	22.36	2.97	20	
Bromoform	19.3	1.0	20	0	96.5	66 - 130	20.12	4.19	20	
Bromomethane	9.701	1.0	20	0	48.5	53 - 141	10.78	10.5	20	S

## ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

## QC BATCH REPORT

Batch ID: R329600		Instrument: VOA9		Method: SW8260					
MSD		Sample ID: HS18120734-01MSD		Units: UG/L		Analysis Date: 19-Dec-2018 15:51			
Client ID: LH18/24_SP650_121218		Run ID: VOA9_329600		SeqNo: 4873548		PrepDate:		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual
Carbon disulfide	43.1	2.0	40	0	108	64 - 133	45.07	4.46	20
Carbon tetrachloride	22.67	1.0	20	0	113	72 - 136	24.07	5.99	20
Chlorobenzene	22.05	1.0	20	0	110	82 - 118	23.31	5.52	20
Chloroethane	16.63	1.0	20	0	83.1	60 - 138	18.58	11.1	20
Chloroform	20.2	1.0	20	0	101	79 - 124	21.38	5.67	20
Chloromethane	18.04	1.0	20	0	90.2	50 - 139	18.23	1.03	20
cis-1,2-Dichloroethene	23.17	1.0	20	2.687	102	78 - 123	24.21	4.4	20
cis-1,3-Dichloropropene	22.96	1.0	20	0	115	75 - 124	23.58	2.65	20
Dibromochloromethane	22.14	1.0	20	0	111	74 - 126	23.08	4.18	20
Dibromomethane	22.09	1.0	20	0	110	79 - 123	22.57	2.17	20
Dichlorodifluoromethane	9.713	1.0	20	0	48.6	32 - 152	10.41	6.91	20
Ethylbenzene	22.94	1.0	20	0	115	79 - 121	24.03	4.62	20
Hexachlorobutadiene	25.6	1.0	20	0	128	66 - 134	26.9	4.97	20
Isopropylbenzene	23.75	1.0	20	0	119	72 - 131	25.07	5.41	20
m,p-Xylene	46.6	2.0	40	0	116	80 - 121	48.89	4.8	20
Methylene chloride	22.17	2.0	20	0	111	74 - 124	23.42	5.49	20
Naphthalene	23.33	1.0	20	0	117	61 - 128	23.64	1.32	20
n-Butylbenzene	24.91	1.0	20	0	125	75 - 128	25.98	4.2	20
n-Propylbenzene	23.78	1.0	20	0	119	76 - 126	25.06	5.24	20
o-Xylene	23.15	1.0	20	0	116	78 - 122	24.52	5.76	20
sec-Butylbenzene	24.17	1.0	20	0	121	77 - 126	25.5	5.32	20
Styrene	23.59	1.0	20	0	118	78 - 123	24.6	4.18	20
tert-Butylbenzene	23.79	1.0	20	0	119	78 - 124	24.94	4.7	20
Tetrachloroethene	23.5	1.0	20	0	118	74 - 129	24.23	3.05	20
Toluene	23.06	1.0	20	0	115	80 - 121	24.29	5.16	20
trans-1,2-Dichloroethene	20.91	1.0	20	0	105	75 - 124	22.56	7.59	20
trans-1,3-Dichloropropene	20.37	1.0	20	0	102	73 - 127	21.18	3.89	20
Trichloroethene	23.12	1.0	20	0.8775	111	79 - 123	24.47	5.68	20
Trichlorofluoromethane	17.26	1.0	20	0	86.3	65 - 141	17.99	4.19	20
Vinyl chloride	16.07	1.0	20	0	80.3	58 - 137	16.71	3.91	20
Surr: 1,2-Dichloroethane-d4	43.51	1.0	50	0	87.0	81 - 118	43.67	0.368	20
Surr: 4-Bromofluorobenzene	51.46	1.0	50	0	103	85 - 114	51.51	0.0905	20
Surr: Dibromofluoromethane	44.68	1.0	50	0	89.4	80 - 119	44.82	0.318	20
Surr: Toluene-d8	52.72	1.0	50	0	105	89 - 112	52.8	0.158	20

ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

**QC BATCH REPORT**

**Batch ID:** R329600      **Instrument:** VOA9      **Method:** SW8260

The following samples were analyzed in this batch: HS18120734-01      HS18120734-02

ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

**QC BATCH REPORT**

Batch ID: R330134		Instrument: ICS3K2		Method: E300						
<b>MBLK</b>	Sample ID: <b>WBLKW2-122718</b>	Units: <b>mg/L</b>		Analysis Date: <b>28-Dec-2018 00:43</b>						
Client ID:	Run ID: <b>ICS3K2_330134</b>	SeqNo: <b>4886067</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	0.500	0.500								U
Sulfate	0.500	0.500								U
<b>LCS</b>	Sample ID: <b>WLCSW2-122718</b>	Units: <b>mg/L</b>		Analysis Date: <b>28-Dec-2018 01:04</b>						
Client ID:	Run ID: <b>ICS3K2_330134</b>	SeqNo: <b>4886068</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.7	0.500	20	0	98.5	90 - 110				
Sulfate	19.12	0.500	20	0	95.6	90 - 110				
<b>LCSD</b>	Sample ID: <b>WLCSDW2-122718</b>	Units: <b>mg/L</b>		Analysis Date: <b>28-Dec-2018 01:26</b>						
Client ID:	Run ID: <b>ICS3K2_330134</b>	SeqNo: <b>4886069</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.81	0.500	20	0	99.1	90 - 110	19.7	0.557	20	
Sulfate	19.14	0.500	20	0	95.7	90 - 110	19.12	0.105	20	
<b>MS</b>	Sample ID: <b>HS18121463-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>28-Dec-2018 02:09</b>						
Client ID:	Run ID: <b>ICS3K2_330134</b>	SeqNo: <b>4886071</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.28	0.500	10	9.582	96.9	80 - 120				
Sulfate	50.14	0.500	10	40.54	96.0	80 - 120				O
<b>MS</b>	Sample ID: <b>HS18121431-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>28-Dec-2018 06:28</b>						
Client ID:	Run ID: <b>ICS3K2_330134</b>	SeqNo: <b>4886088</b>	PrepDate:	DF: <b>1</b>						
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	14.23	0.500	10	4.397	98.3	80 - 120				
Sulfate	15.23	0.500	10	5.341	98.9	80 - 120				



ALS Houston, US

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

**QC BATCH REPORT**

Batch ID: R330134		Instrument: ICS3K2			Method: E300					
<b>MSD</b>	Sample ID: <b>HS18121463-01MSD</b>	Units: <b>mg/L</b>			Analysis Date: <b>28-Dec-2018 02:31</b>					
Client ID:	Run ID: <b>ICS3K2_330134</b>	SeqNo: <b>4886072</b>			PrepDate:			DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.58	0.500	10	9.582	99.9	80 - 120	19.28	1.54	20	
Sulfate	51.1	0.500	10	40.54	106	80 - 120	50.14	1.89	20	O
<b>MSD</b>	Sample ID: <b>HS18121431-01MSD</b>	Units: <b>mg/L</b>			Analysis Date: <b>28-Dec-2018 06:49</b>					
Client ID:	Run ID: <b>ICS3K2_330134</b>	SeqNo: <b>4886089</b>			PrepDate:			DF: <b>1</b>		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	14.41	0.500	10	4.397	100	80 - 120	14.23	1.24	20	
Sulfate	15.34	0.500	10	5.341	100.0	80 - 120	15.23	0.707	20	

The following samples were analyzed in this batch: HS18120734-01

**ALS Houston, US**

Date: 28-Dec-18

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP / GWTP Bi-Weekly  
**WorkOrder:** HS18120734

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

<b>Unit Reported</b>	<b>Description</b>
mg/L	Milligrams per Liter

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

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

**Sample Receipt Checklist**

Client Name: Bhate Environmental  
 Work Order: HS18120734

Date/Time Received: **13-Dec-2018 09:35**  
 Received by: **NDR**

Checklist completed by: Jared R. Makan 13-Dec-2018  
 eSignature Date  
 Reviewed by: RJ Modashia 13-Dec-2018  
 eSignature Date

Matrices: **Water** Carrier name: **FedEx Priority Overnight**

- Shipping container/cooler in good condition? Yes  No  Not Present
- Custody seals intact on shipping container/cooler? Yes  No  Not Present
- Custody seals intact on sample bottles? Yes  No  Not Present
- Chain of custody present? Yes  No
- Chain of custody signed when relinquished and received? Yes  No
- Chain of custody agrees with sample labels? Yes  No
- Samples in proper container/bottle? Yes  No
- Sample containers intact? Yes  No
- TX1005 solids received in hermetically sealed vials? Yes  No  N/A
- Sufficient sample volume for indicated test? Yes  No
- All samples received within holding time? Yes  No
- Container/Temp Blank temperature in compliance? Yes  No

Temperature(s)/Thermometer(s): 0.9c/1.2c UC/C IR25  
 Cooler(s)/Kit(s): 24895  
 Date/Time sample(s) sent to storage: 12/13/2018 11:15

- 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:



 <b>ALS</b> 10450 Standliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax +1 281 530 5887	<b>CUSTODY SEAL</b>		Seal Broken By: SM
	Date: 12/12/18	Time: 14:30	Date:
	Name: Scott Beesinger	Company: SGRA	12/13/18

24895  
DEC 13 2018



Must Deliver Next Business Day  
Time and Temperature Sensitive!

24895

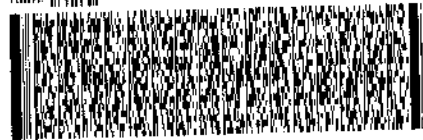
ORIGIN ID:SGRA (803) 930-6189  
 SCOTT BEESINGER  
 AP7 IN ENVIRONMENTAL & INFRASTRUCTURE  
 1203-B EAST GRAND AVE  
 PMB 202  
 MARSHALL, TX 75670  
 UNITED STATES US

SHIP DATE: 25APR19  
 ACTWGT: 1.00 LB MAX  
 CAD: 300130/CAFE3111  
 DIMS: 26x14x14 IN

TO CLIENT SERVICES  
 ALS LABORATORY GROUP  
 10450 STANCLIFF ROAD  
 SUITE 210  
 HOUSTON TX 77099

(281) 630-5656  
 REF: LHAAP - 50 - RJ

RMA: 011111



FedEx  
Express

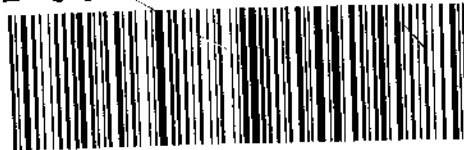


FedEx  
TRACKING  
0221 4380 9528 5124

THU - 13 DEC 10:30A  
 PRIORITY OVERNIGHT

AB SGRA

77099  
TX-US  
IAH



66 FIG 162785 120FC18 006A 553E1/F1FT/DC0A



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

January 14, 2019

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

Work Order: **HS18121078**

Laboratory Results for: **LHAAP 18/24 GWTP Weekly Samples**

Dear Marcia,

ALS Environmental received 2 sample(s) on Dec 19, 2018 for the analysis presented in the following report.

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

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

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

Sincerely,

Generated By: JUMOKE.LAWAL  
RJ Modashia  
Project Manager

ALS Houston, US

Date: 14-Jan-19

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP 18/24 GWTP Weekly Samples  
**Work Order:** HS18121078

**SAMPLE SUMMARY**

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Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18121078-01	LH18/24-SP650_121818	Water		18-Dec-2018 14:00	19-Dec-2018 11:00	<input type="checkbox"/>
HS18121078-02	LH18/24-SP650_121818_BIX	Water		18-Dec-2018 14:00	19-Dec-2018 11:00	<input type="checkbox"/>

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**ALS Houston, US**

Date: 14-Jan-19

---

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP 18/24 GWTP Weekly Samples  
**Work Order:**

**CASE NARRATIVE**

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**Work Order Comments**

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

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**Work Order Comments**

- The analysis for TOC subcontracted to ALS Kelso WA Final report attached.

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**WetChemistry by Method E350.3**

**Batch ID: R329976**

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

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**WetChemistry by Method E365.3**

**Batch ID: R329873**

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

## ALS Houston, US

Date: 14-Jan-19

Client: Bhate Environmental Associates, Inc.  
 Project: LHAAP 18/24 GWTP Weekly Samples  
 Sample ID: LH18/24-SP650\_121818  
 Collection Date: 18-Dec-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18121078  
 Lab ID:HS18121078-01  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>AMMONIA AS N BY E350.3(ISE)</b>								Analyst: MZD
Nitrogen, Ammonia (As N)	7.9		0.20	0.50	0.20	mg/L	1	26-Dec-2018 17:00
<b>ORTHO PHOSPHATE (PO4) AS P BY E365.3</b>								Analyst: JHD
Phosphorus, Total Orthophosphate (As P)	1.53		0.100	0.400	0.250	mg/L	10	19-Dec-2018 18:49
<b>SUBCONTRACT ANALYSIS - TOC ANALYSIS</b>								Analyst: SUBK
Subcontract Analysis	See Attached		0	0		NA	1	10-Jan-2019 09:31

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

## ALS Houston, US

Date: 14-Jan-19

Client: Bhate Environmental Associates, Inc.  
 Project: LHAAP 18/24 GWTP Weekly Samples  
 Sample ID: LH18/24-SP650\_121818\_BIX  
 Collection Date: 18-Dec-2018 14:00

**ANALYTICAL REPORT**

WorkOrder:HS18121078  
 Lab ID:HS18121078-02  
 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
<b>SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)</b>		<b>Method:NA</b>		Analyst: SUB				
Subcontract Analysis	See Attached		0	0		NA	1	04-Jan-2019 09:11

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

ALS Houston, US

Date: 14-Jan-19

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP 18/24 GWTP Weekly Samples  
**WorkOrder:** HS18121078

**DATES REPORT**

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
<b>Batch ID</b> R329873	<b>Test Name</b> : ORTHO PHOSPHATE (PO4) AS P BY E365.3		<b>Matrix:</b> Water			
HS18121078-01	LH18/24-SP650_121818	18 Dec 2018 14:00			19 Dec 2018 18:49	10
<b>Batch ID</b> R329976	<b>Test Name</b> : AMMONIA AS N BY E350.3(ISE)		<b>Matrix:</b> Water			
HS18121078-01	LH18/24-SP650_121818	18 Dec 2018 14:00			26 Dec 2018 17:00	1
<b>Batch ID</b> R330449	<b>Test Name</b> : SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		<b>Matrix:</b> Water			
HS18121078-02	LH18/24-SP650_121818_BIX	18 Dec 2018 14:00			04 Jan 2019 09:11	1
<b>Batch ID</b> R330762	<b>Test Name</b> : SUBCONTRACT ANALYSIS - TOC ANALYSIS		<b>Matrix:</b> Water			
HS18121078-01	LH18/24-SP650_121818	18 Dec 2018 14:00			10 Jan 2019 09:31	1

ALS Houston, US

Date: 14-Jan-19

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP 18/24 GWTP Weekly Samples  
**WorkOrder:** HS18121078

**QC BATCH REPORT**

Batch ID: R329873		Instrument: UV-2450		Method: E365.3						
<b>MBLK</b>	Sample ID: <b>MBLK-329873</b>	Units: <b>mg/L</b>		Analysis Date: <b>19-Dec-2018 18:49</b>						
Client ID:	Run ID: <b>UV-2450_329873</b>	SeqNo: <b>4880712</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.0400	0.0250							U	
<b>LCS</b>	Sample ID: <b>LCS-329873</b>	Units: <b>mg/L</b>		Analysis Date: <b>19-Dec-2018 18:49</b>						
Client ID:	Run ID: <b>UV-2450_329873</b>	SeqNo: <b>4880713</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.241	0.0250	0.25	0	96.4	85 - 115				
<b>LCSD</b>	Sample ID: <b>LCSD-329873</b>	Units: <b>mg/L</b>		Analysis Date: <b>19-Dec-2018 18:49</b>						
Client ID:	Run ID: <b>UV-2450_329873</b>	SeqNo: <b>4880714</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.243	0.0250	0.25	0	97.2	85 - 115	0.241	0.826	20	
<b>MS</b>	Sample ID: <b>HS18121055-01MS</b>	Units: <b>mg/L</b>		Analysis Date: <b>19-Dec-2018 18:49</b>						
Client ID:	Run ID: <b>UV-2450_329873</b>	SeqNo: <b>4880715</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.264	0.0250	0.25	0.003	104	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18121055-01MSD</b>	Units: <b>mg/L</b>		Analysis Date: <b>19-Dec-2018 18:49</b>						
Client ID:	Run ID: <b>UV-2450_329873</b>	SeqNo: <b>4880716</b>		PrepDate:			DF: <b>1</b>			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit Qual	
Phosphorus, Total Orthophosphate (As P)	0.266	0.0250	0.25	0.003	105	80 - 120	0.264	0.755	20	

The following samples were analyzed in this batch: HS18121078-01

ALS Houston, US

Date: 14-Jan-19

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP 18/24 GWTP Weekly Samples  
**WorkOrder:** HS18121078

**QC BATCH REPORT**

Batch ID:	R329976	Instrument:	WetChem_HS	Method:	E350.3					
<b>MBLK</b>	Sample ID: <b>MBLK-329976</b>	Units:	mg/L	Analysis Date:	<b>26-Dec-2018 17:00</b>					
Client ID:	Run ID: <b>WetChem_HS_329976</b>	SeqNo:	<b>4882782</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.50	0.20								U
<b>LCS</b>	Sample ID: <b>LCS-329976</b>	Units:	mg/L	Analysis Date:	<b>26-Dec-2018 17:00</b>					
Client ID:	Run ID: <b>WetChem_HS_329976</b>	SeqNo:	<b>4882783</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.989	0.20	10	0	99.9	80 - 120				
<b>MS</b>	Sample ID: <b>HS18120977-01MS</b>	Units:	mg/L	Analysis Date:	<b>26-Dec-2018 17:00</b>					
Client ID:	Run ID: <b>WetChem_HS_329976</b>	SeqNo:	<b>4882786</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	12.59	0.20	10	2.957	96.3	80 - 120				
<b>MSD</b>	Sample ID: <b>HS18120977-01MSD</b>	Units:	mg/L	Analysis Date:	<b>26-Dec-2018 17:00</b>					
Client ID:	Run ID: <b>WetChem_HS_329976</b>	SeqNo:	<b>4882787</b>	PrepDate:	DF: <b>1</b>					
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	12.6	0.20	10	2.957	96.4	80 - 120	12.59	0.0794	20	

The following samples were analyzed in this batch: HS18121078-01

**ALS Houston, US**

Date: 14-Jan-19

**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP 18/24 GWTP Weekly Samples  
**WorkOrder:** HS18121078

**QUALIFIERS,  
ACRONYMS, UNITS**

<b>Qualifier</b>	<b>Description</b>
*	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

<b>Acronym</b>	<b>Description</b>
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 Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

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**CERTIFICATIONS,ACCREDITATIONS & LICENSES**

<b>Agency</b>	<b>Number</b>	<b>Expire Date</b>
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
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019



ALS Houston, US

Date: 14-Jan-19

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**Client:** Bhate Environmental Associates, Inc.  
**Project:** LHAAP 18/24 GWTP Weekly Samples  
**Work Order:** HS18121078

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**SAMPLE TRACKING**

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Lab Samp ID	Client Sample ID	Action	Date	Person	New Location
HS18121078-01	LH18/24-SP650_121818	Login	12/19/2018 1:23:06 PM	JRM	WET331
HS18121078-01	LH18/24-SP650_121818	Login	12/19/2018 1:23:06 PM	JRM	WET331
HS18121078-01	LH18/24-SP650_121818	Login	12/19/2018 1:23:06 PM	JRM	Sub
HS18121078-02	LH18/24-SP650_121818_BIX	Login	12/19/2018 1:23:06 PM	JRM	Sub

---

**Sample Receipt Checklist**

Client Name: Bhate Environmental  
 Work Order: HS18121078

Date/Time Received: **19-Dec-2018 11:00**  
 Received by: **JRM**

Checklist completed by:	<u>Jared R. Makan</u>	<u>19-Dec-2018</u>	Reviewed by:	<u>RJ Modashia</u>	<u>19-Dec-2018</u>
	eSignature	Date		eSignature	Date

Matrices: **Water** Carrier name: **FedEx Priority Overnight**

- |   |   |                             |   |
|---|---|-----------------------------|---|
| Shipping container/cooler in good condition?            | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | Not Present <input type="checkbox"/>            |
| Custody seals intact on shipping container/cooler?      | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | Not Present <input type="checkbox"/>            |
| Custody seals intact on sample bottles?                 | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | Not Present <input checked="" type="checkbox"/> |
| Chain of custody present?                               | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |   |
| Chain of custody signed when relinquished and received? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |   |
| Chain of custody agrees with sample labels?             | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |   |
| Samples in proper container/bottle?                     | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |   |
| Sample containers intact?                               | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |   |
| TX1005 solids received in hermetically sealed vials?    | Yes <input type="checkbox"/>            | No <input type="checkbox"/> | N/A <input checked="" type="checkbox"/>         |
| Sufficient sample volume for indicated test?            | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |   |
| All samples received within holding time?               | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |   |
| Container/Temp Blank temperature in compliance?         | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |   |

Temperature(s)/Thermometer(s):	2.2c/2.6c UC/C	IR11
Cooler(s)/Kit(s):	Red	
Date/Time sample(s) sent to storage:	12/19/2018 13:30	
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/> No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/> N/A <input type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/> N/A <input type="checkbox"/>
pH adjusted by:		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:



FedEx  
TRK#  
0221 4380 9528 5157


WED - 19 DEC 10:30A  
PRIORITY OVERNIGHT

AB SGRA

77099  
TX-US  
IAH



FID 162785 180TC18 GGGG 953CL/F1FE/0C9A

 <b>ALS</b> 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 Fax. +1 281 530 5887	<b>CUSTODY</b>	
	Date: 12/18/18	Time:
Name: Scott P... Company: F&T		

<b>SEAL</b>	Seal Broken By:
1030	SM
12/18/18	Date:
	12/19/18



## Case Narrative

**Method:** 6850

**Analysis:** Perchlorate

**Analysis SOP:** LC-MS-CLO4

**ALS WO ID(s):** 1835578; 1835582; 1835584;  
1835586; 1835589

**Client:** ALS Laboratories (Houston, TX)

**Matrix:** Water

**ELMS Batch (HBN):** 2189 (230318)

**General Set Information:** There were sixteen 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  $^{18}\text{O}$  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. 50 $\mu\text{L}$  of an  $^{18}\text{O}$  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 0.45 $\mu\text{m}$  Syringe filters.

**Holding Times:** Holding times were met for all analyses.

**Dilutions:** Field samples 1835578001 and 1835586003/04/06 were analyzed and reported from 1:1,000 dilutions. Field samples 1835586005/07 were analyzed and reported from 1:100 dilutions. Field sample 1835589004 was analyzed and reported from a 1:10 dilution. The reporting limits have been adjusted accordingly.

**Method QC data:** The method blank (LMB 634659) was less than 1/2 the CRDL. The recovery for the LCS (634660) was within acceptable parameters.



**MS/MSD Analysis:** MS/MSD was performed on sample 1835582001 (Client ID: LH18/24-SP650\_121818\_BIX). 5.0 $\mu$ l of Working Standard Solution Horizon ID 43701 was added to 10.0mL of sample preparation. The spike target was 5. $\mu$ g/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  $\mu$ g/L. Results were calculated in  $\mu$ g/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve ( $\mu$ g/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.

Thomas Bosch                      January 02, 2019  
Analyst    Date



# ANALYTICAL REPORT

Report Date: January 03, 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: **34-1835584**

Project ID: HS18121078

Purchase Order: HS18121078

Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_121818_BIX	1835584001	12/18/18	12/21/18	



## ANALYTICAL REPORT

Workorder: 34-1835584

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

## Analytical Results

Sample ID: <b>LH18/24-SP650_121818_BIX</b>	Sampling Site: NA	Collected: 12/18/2018				
Lab ID: 1835584001	Media: 125 mL Nalgene	Received: 12/21/2018				
Matrix: Water	Sampling Parameter: NA					
<b>Analysis Method - EPA 6850, DoD QSM</b>						
Preparation: Not Applicable	Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2189 (HBN: 230318) Analyzed: 12/31/2018 10:27	Instrument ID: LCMS04 Percent Solid: NA Report Basis: Wet				
<b>Analyte</b>	<b>Result (ug/L)</b>	<b>DL (ug/L)</b>	<b>LOD (ug/L)</b>	<b>LOQ (ug/L)</b>	<b>Dilution</b>	<b>Qual</b>
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 01/02/2019 10:42	/S/ Stephen Brose 01/03/2019 07:49

## Laboratory Contact Information

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

Phone: (801) 266-7700  
Email: als@alst.com  
Web: www.alst.com





## ANALYTICAL REPORT

Workorder: 34-1835584

Client: ALS Environmental  
(Houston)

Project Manager: Kevin W. Griffiths

**General Lab Comments**

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

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

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

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

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

**Result Symbol Definitions**

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

**Qualifier Symbol Definitions**

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



# Quality Control Sample Batch Report

00922775

## Analysis Information

**Workorder:** 1835584

**Limits:** Client SOW/Contract Specified  
**Basis:** DoD QSM

**Preparation:** NA  
**Batch:** NA  
**Prepared By:** NA

**Analysis:** EPA 6850, DoD QSM  
**Batch:** ELMS/2189 (HBN: 230318)  
**Analyzed By:** Thomas Bosch

## Blank

<b>LMB:</b> 634659 <b>Analyzed:</b> 12/31/2018 09:04 <b>Units:</b> ug/L			
Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

## Laboratory Control Sample

<b>LCS:</b> 634660 <b>Analyzed:</b> 12/31/2018 09:17 <b>Dilution:</b> 1 <b>Units:</b> ug/L				
Analyte	Result	Target	% Rec	QC Limits
Perchlorate	4.78	5.00	95.7	78.8   123.8

## Matrix Spike - Matrix Spike Duplicate

<b>Sample:</b> 1835582001 <b>Analyzed:</b> 12/31/2018 09:45 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MS:</b> 634661 <b>Analyzed:</b> 12/31/2018 09:59 <b>Dilution:</b> 1 <b>Units:</b> ug/L			<b>MSD:</b> 634662 <b>Analyzed:</b> 12/31/2018 10:13 <b>Dilution:</b> 1 <b>Units:</b> ug/L			
Analyte	Result	Result	Target	% Rec	QC Limits	Result	% Rec	RPD	QC Limits
Perchlorate	ND	4.67	5	93.4	78.8   123.8	4.82	96.3	3.06	0.0   20.0

## Continuing Calibration Verification

<b>CCV:</b> 634656 <b>Analyzed:</b> 12/31/2018 08:20 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 634663 <b>Analyzed:</b> 12/31/2018 12:30 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			<b>CCV:</b> 634665 <b>Analyzed:</b> 12/31/2018 14:20 <b>Units:</b> ug/L <b>Criteria:</b> ± 15%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	25.8	25.0	103	25.7	25.0	103	26.2	25.0	105

## Interference Check Sample

<b>ICSA:</b> 634658 <b>Analyzed:</b> 12/31/2018 08:50 <b>Units:</b> ug/L <b>Criteria:</b> ± 30%			
Analyte	Result	Target	% Rec.
Perchlorate	1.07	1.00	107

## Limit of Detection Verification

<b>LODV:</b> 634657 <b>Analyzed:</b> 12/31/2018 08:36 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 634664 <b>Analyzed:</b> 12/31/2018 12:44 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			<b>LODV:</b> 634666 <b>Analyzed:</b> 12/31/2018 14:34 <b>Units:</b> ug/L <b>Criteria:</b> ± 50%			
Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.08	1.00	108	1.09	1.00	109	1.08	1.00	108



# Quality Control Sample Batch Report

00922776

## Analysis Information

**Workorder:** 1835584

**Limits:** Client SOW/Contract Specified

**Preparation:** NA

**Analysis:** EPA 6850, DoD QSM

**Basis:** DoD QSM

**Batch:** NA

**Batch:** ELMS/2189 (HBN: 230318)

**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 01/02/2019 10:42	/S/ Stephen Brose 01/03/2019 07:49

## Symbols and Definitions

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

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



18698/#2

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

### Subcontract Chain of Custody

COC ID: 10472

1835584

**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:** HS18121078  
**TSR:** Danielle Winnings

LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
ANALYSIS REQUESTED			DUE DATE
1. HS18121078-02 ✓	LH18/24-SP650_121818_BIX	Water	18 Dec 2018 14:00
SUB_Perch-6850			04 Jan 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: Pats Moran

Date/Time: 12/20/18 18:40

Received By: M Schmidt

Date/Time: 12/21/2018 10:50

Cooler ID(s): \_\_\_\_\_

Temperature(s): \_\_\_\_\_

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

**COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)**

1835584

Client Name: ALS Houston Project/Task/Site: \_\_\_\_\_  
 Date/Time of Receipt: 12/21/2018 10:50 Number of Coolers Received: 1

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

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

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 9051	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: M. Schmitt Signature M. Schmitt Printed Name 12/21/2018 Date

**CLIENT-RELATED INFORMATION**

- |  |   |  |   |
|--|---|--|---|
| <input type="checkbox"/> Missing Cooler                  | <input type="checkbox"/> Missing Samples/Bottles          | <input type="checkbox"/> Incorrect Preservation    | <input type="checkbox"/> Insufficient Sample Volume |
| <input type="checkbox"/> Cooler Conditions               | <input type="checkbox"/> Broken/Leaking Samples           | <input type="checkbox"/> pH Criteria Not Met       | <input type="checkbox"/> Chain of Custody Problems  |
| <input type="checkbox"/> Missing Paperwork               | <input type="checkbox"/> Incorrect Bottle Type            | <input type="checkbox"/> Residual Chlorine Present | <input type="checkbox"/> Other:                     |
| <input type="checkbox"/> Missing/Incorrect Bottle Labels | <input type="checkbox"/> Cooler Temperatures Out of Range | <input type="checkbox"/> Head Space in Bottles     |   |

**BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:**

Client Notified? YES  NO

**Response Required Within 24 Hours**

**PROJECT MANAGEMENT**

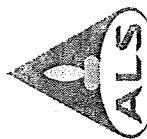
**PROJECT MANAGER COMMENTS:**

ALS Project Manager: \_\_\_\_\_ Returned to Sample Receipt by: \_\_\_\_\_ Date: \_\_\_\_\_  
Printed Name Signature







# Batch Worklist

HBN: 230318



Instrument: WP

Status: WP

Created: 12/31/2018 08:14

Analyst: T. Bosch

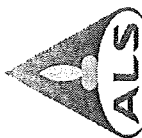
Batch: ELMS/2189

Rule: EPA 6850, DoD QSM Water

- Workorder: 1835578 [ENV\_LVL4]
- Workorder: 1835582 [ENV\_LVL4]
- Workorder: 1835584 [ENV\_LVL4]
- Workorder: 1835586 [ENV\_LVL4]
- Workorder: 1835589 [ENV\_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dist Wt	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	634656	CCV for HBN 230318 [ELMS/2189]				CCV	3		E685041C3Q	5311		17/2019	17/2019
2	634657	LODV for HBN 230318 [ELMS/2189]				LODV	3		E6850..D3Q	5311		17/2019	17/2019
3	634658	ICS for HBN 230318 [ELMS/2189]				ICS	3		E6850..D3Q	5311		17/2019	17/2019
4	634659	LMB for HBN 230318 [ELMS/2189]				LMB	3		E6850Q413Q	5311		17/2019	17/2019
5	634660	LCS for HBN 230318 [ELMS/2189]				LCS	3		E6850Q413Q	5311		17/2019	17/2019
6	1835578001	LH18/24-SP140_121818				SAMPLE	3	1835578001-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
7	1835582001	LH18/24-SP650_121818_BIX				SAMPLE	3	1835582001-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
8	634661	LH18/24-SP650..(1835582001MS)				MS	3		E6850Q413Q	5311		17/2019	17/2019
9	634662	LH18/24-SP65..(1835582001MSD)				MSD	3		E6850Q413Q	5311		17/2019	17/2019
10	1835584001	LH18/24-SP650_121818_BIX				SAMPLE	3	1835584001-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
11	1835586001	18CPTMW12SW_121718				SAMPLE	3	1835586001-A	E6850Q41.3	5480	1/14/2019	17/2019	17/2019
12	1835586002	18CPTMW12DW_121718				SAMPLE	3	1835586002-A	E6850Q41.3	5480	1/14/2019	17/2019	17/2019
13	1835586003	MW7_121718				SAMPLE	3	1835586003-A	E6850Q41.3	5480	1/14/2019	17/2019	17/2019
14	1835586004	18CPTMW08SW_121818				SAMPLE	3	1835586004-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
15	1835586005	18CPTMW08DW_121818				SAMPLE	3	1835586005-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
16	1835586006	MW5_121818				SAMPLE	3	1835586006-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
17	1835586007	MW9_121818				SAMPLE	3	1835586007-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
18	634663	CCV for HBN 230318 [ELMS/2189]				CCV	3		E685041C3Q	5311		17/2019	17/2019
19	634664	LODV for HBN 230318 [ELMS/2189]				LODV	3		E6850..D3Q	5311		17/2019	17/2019
20	1835586008	18CPTMW10SW_121818				SAMPLE	3	1835586008-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
21	1835586009	18CPTMW10DW_121818				SAMPLE	3	1835586009-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
22	1835589001	AWD3_121718				SAMPLE	3	1835589001-A	E6850Q41.3	5480	1/14/2019	17/2019	17/2019
23	1835589002	AWD1_121818				SAMPLE	3	1835589002-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
24	1835589003	18CPTMW04SW_121818				SAMPLE	3	1835589003-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019
25	1835589004	18CPTMW04_121818				SAMPLE	3	1835589004-A	E6850Q41.3	5480	1/15/2019	17/2019	17/2019





# Batch Worklist

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
26	634665	CCV for HBN 230318 [ELMS/2189]				CCV	3		E685041C3Q	5311		17/2019	
27	634666	LODY for HBN 230318 [ELMS/2189]				LODY	3		E6850.D3Q	5311		17/2019	



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# **Analytical Documentation**

ALS Work Order #'s & Sample #( )'s: 1835578 (001); 1835582 (001); 1835584 (001); 1835586 (001-09);  
 1835589 (001-04) ELMS Batch/HBN ID: 2189 (230318)  
 Prep Date: 12/28/2018 Analysis Date: 12/31/2018 Analyst: T. Bosch  
 Analyte: **Perchlorate** Matrix: **Water** Method: **6850**  
 Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\DEC\31DEC18D.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 634660; Target = 5.0µg/L. ASTM type II water was used for LMB 634659.

**MS/MSD:** MS/MSD was performed on sample 1835582001 (Client ID: LH18/24-SP650\_121818\_BIX). 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 1835578001 and 1835586003/04/06 were analyzed and reported from 1:1,000 dilutions. Field samples 1835586005/07 were analyzed and reported from 1:100 dilutions. Field sample 1835589004 was analyzed and reported from a 1:10 dilution. The reporting limits have been adjusted accordingly.
- 2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
- 3) Sample data can be viewed at two directories within the ALS system: \\ALS\TWS013\LCMS\LCMS04\2018\DEC\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
- 4) Notebook: \\als\TWS013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\230318-DoD-ALS-Hstn LCMS4 or through \\ALS\TWS013\DATAREVIEW\HBN#

### 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.**

<u>Chromatography (GC, HPLC, LC/MS) Technical Review Criteria</u>	<u>Analyst Initials</u>	<u>Reviewer Initials</u>
Batch(es)/SDG: E LMS: 2189 HBN: 230318 1835586/1835589		
Sample Set IDs if Applicable: 1835576/1835582/1835584		
Calibration standards analyzed and meets criteria	TB	SB
Standards traceability checked and meets criteria	TB	SB
Standard curve coefficients evaluated and meet criteria	TB	SB
ICVs analyzed and meet acceptance criteria	TB	SB
CCVs analyzed and meet acceptance criteria	TB	SB
Method Blanks analyzed and meet acceptance criteria	TB	SB
Retention Time Windows checked	TB	SB
<b>For method 8081A, Endrin/DDT Breakdown is checked for compliance</b>	—	—
Surrogate recoveries checked and appropriately addressed	—	—
Method Preparation Blanks analyzed and meet acceptance criteria	TB	SB
MSs, MSDs, and/or MDs analyzed and calculations checked; applicable flags applied on QC reports; LCSs analyzed and meet acceptance criteria when performed	TB	SB
RLVS analyzed	TB	SB
Preparation and analysis hold times met	TB	SB
Preparation deviations and re-preparations noted when performed	TB	SB
Analysis deviations and re-analyses noted when performed	TB	SB
Sample dilution factors noted on reports	TB	SB
Electronic records in HBN transcription accuracy and completeness checked	TB	SB
Preparation and analysis calculations checked	TB	SB
NCRs are completed as necessary NC/CAR# _____	—	—
Report forms are complete and accurate	TB	SB
Manual integrations checked	TB	SB



## STANDARD REPORT

## Working Standard - CLO4 WRK

<b>CLO4 WRK</b>		<b>Description - 6850 WKG Std 100.ug/L</b>			
Standard: 43702		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 WRK	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	0.1 ug/mL		
<b>Composition</b>					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43701	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	09/18/2019



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4 STOCK

CLO4 STOCK		Description - 6850 Stock AccStd 1,000ug/mL	
Standard: 43659	Created By: Thomas Bosch	Amount: 100 mL	
MFG: AccuStandard	Create Date: 09/17/2018 09:09AM	Expires: 07/25/2020	
MFG Lot: 218065075		Usable: No	
Part ID: IC-PER-10X-1		Lab Lot: CLO4 STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

### Constituent

#### Working Standard - CLO4 INT

CLO4 INT		Description - 6850 Intermdt AccStd 10.ug/mL			
Standard: 43701		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 09/18/2018 02:09PM		Expires: 09/18/2019	
MFG Lot: TNB: 09/18/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 INT	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
43659	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	07/25/2020





## STANDARD REPORT

## Working Standard - CLO4 QC WRK

CLO4 QC WRK		Description - 6850 QC WKG STD 100ug/L			
Standard: 41831		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				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 Intrmdf Std-QC 10ug/mL			
Standard: 41830		Created By: Thomas Bosch		Amount: 10 mL	
MFG: ALS/SLC		Create Date: 05/09/2018 10:05AM		Expires: 05/09/2019	
MFG Lot: TNB: 05/09/2018				Usable: Yes	
Pipette ID: Not Provided				Lab Lot: CLO4 QC INT 10.ug/mL	
Pos.	Analyte	Name	Concentration		
1	14797-73-0	Perchlorate	10 ug/mL		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020



## STANDARD REPORT

### Constituent

#### Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water	
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L	
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025	
MFG Lot: Not Provided		Usable: Yes	
Part ID: Not Provided		Lab Lot: LAB 109	
Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			



## STANDARD REPORT

### Constituent

#### Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK		Description - 6850 QC Stock STD 1,000ug/mL	
Standard: 36748	Created By: Thomas Bosch	Amount: 100 mL	
MFG: Ultra Scientific	Create Date: 05/11/2017 01:05PM	Expires: 03/31/2020	
MFG Lot: CP-0860		Usable: Yes	
Part ID: ICC-013		Lab Lot: CLO4 QC STOCK	
Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL



## STANDARD REPORT

## Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L			
Standard: 43730	Created By: Thomas Bosch	Amount: 25 mL			
MFG: ALS/SLC	Create Date: 09/20/2018 09:09AM	Expires: 09/20/2019			
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes			
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK			
Pos.	Analyte	Name	Concentration		
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L		
2	14797-73-0-89	Perchlorate 89	1000 ug/L		
Composition					
Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
43729	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.25 mL	04/28/2026



## STANDARD REPORT

## Constituent

## Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock	
Standard: 43729	Created By: Thomas Bosch	Amount: 1 mL	
MFG: Cambridge Isotope	Create Date: 09/20/2018 09:09AM	Expires: 04/28/2026	
MFG Lot: SDFF-012A	Verified By: Thomas Bosch	Usable: Yes	
Part ID: OLM-7310-S	Verify Date:	Lab Lot: CLO4ISTDSTK	
Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL



# Certificate of Analysis



## ISO Guide 34 Reference Material

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

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

Product Name: Perchlorate IC Standard

### Description:

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

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

Solvent: water (low TOC, < 50 ppb)

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

### Traceability:

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

### Estimation of Uncertainties:

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

### Homogeneity:

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

### Intended Use:

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

### Instructions for Use:

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

### Hazards:

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

### Expiration of Certification:

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





# Certificate of Analysis



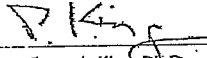
## ISO Guide 34 Reference Material

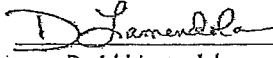
Product Number: ICC-013  
 Lot Number: CP-0860

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

### Maintenance of Certification:

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

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

  
 Daniel J. Lamendola  
 Director of QA/RA



125 Market Street  
New Haven, CT 06513  
USA



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

# CERTIFICATE OF ANALYSIS



43659

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1  
Description: Perchlorate Standard  
Element: Perchlorate (ClO<sub>4</sub>)  
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 <sub>4</sub> 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, Inorganic QC Manager



Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

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



23118

Product Name: PERCHLORIC ACID, SODIUM SALT  
(Isotopic Label & Enrichment Specification) (18O4, 90%+) 100 UG/ML IN WATER

Lot Number: SDDG-013

Catalog Number: OLM-7310-S

Product Information

Chemical Purity Specification:  $\geq 98\%$

Labeled CAS Number: NA

Unlabeled CAS Number: 7601-89-0

MW\*: 130.4

Chemical Formula: NaCl\*O4

Storage: Store at room temperature away from light and moisture.

Stability: See storage and expiration date.

Certification

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

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

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

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

Approved by: T. J. Eckersley

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

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 $\mu\text{g/mL}$
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 $\pm$ 2.8 $\mu\text{g/mL}$ (k=2)



**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES

**Environmental Division**

# Raw Data

Batch Report: C:\HPCHEM\1\DATA\31DEC18D\31DEC18S.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	
#*	634656	C	Vial 71	1	Control	1	3.38486e6	8.717	25.82627
#*	634657	L	Vial 72	1	Control	2	1.09751e5	8.784	1.07661
#*	634658	I	Vial 73	1	Control	3	8.96540e4	8.767	1.06520
#*	634659	L	Vial 74	1	Control	4	0.00000	0.000	0.00000
#*	634660	Q	Vial 75	1	Control	5	5.99223e5	8.831	4.78394
#*	1835578001		Vial 76	1	Sample	6	7.14567e5	8.842	5739.33673
#*	1835582001		Vial 77	1	Sample	7	0.00000	0.000	0.00000
#*	634661	3	Vial 78	1	Sample	8	3.56092e5	8.670	4.67205
#*	634662	3	Vial 79	1	Sample	9	4.10282e5	8.663	4.81700
#*	1835584001		Vial 80	1	Sample	10	0.00000	0.000	0.00000
#*	1835586001		Vial 81	1	Sample	11	6.39972e4	8.610	1.07753
#*	1835586002		Vial 82	1	Sample	12	4.44404e4	8.730	5.58335e-1
#*	1835586003		Vial 83	1	Sample	13	1.93254e6	8.819	1.35147e4
#*	1835586004		Vial 84	1	Sample	14	2.75640e6	8.814	2.19010e4
#*	1835586005		Vial 85	1	Sample	15	3.72005e6	8.819	3303.36411
#*	1835586007		Vial 87	1	Sample	17	7.32888e5	8.821	569.32373
#*	1835586006		Vial 86	1	Sample	18	3.14221e6	8.818	2.73281e4
#*	634663	C	Vial 71	1	Control	19	2.70207e6	8.778	25.72516
#*	634664	L	Vial 72	1	Control	20	1.02100e5	8.801	1.08980
#*	1835586008		Vial 88	1	Sample	21	0.00000	0.000	0.00000
#*	1835586009		Vial 89	1	Sample	22	4.33757e5	8.714	3.38575
#*	1835589001		Vial 90	1	Sample	23	8.62875e5	8.797	6.91698
#*	1835589002		Vial 91	1	Sample	24	1.46153e5	8.783	1.23214
#*	1835589003		Vial 92	1	Sample	25	0.00000	0.000	0.00000
#*	1835589004		Vial 93	1	Sample	26	3.25431e6	8.794	221.52674
#*	634665	C	Vial 71	1	Control	27	3.22313e6	8.805	26.21087
*	634666	L	Vial 72	1	Control	28	1.07063e5	8.812	1.07853

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount	
#*	634656	C	Vial 71	1	Control	1	9.90849e5	8.735	25.07424
#*	634657	L	Vial 72	1	Control	2	4.07296e4	8.805	1.17529
#*	634658	I	Vial 73	1	Control	3	3.99010e4	8.779	1.37458
#*	634659	L	Vial 74	1	Control	4	0.00000	0.000	0.00000
#*	634660	Q	Vial 75	1	Control	5	1.88568e5	8.848	4.94214
#*	1835578001		Vial 76	1	Sample	6	2.19904e5	8.859	5823.86471
#*	1835582001		Vial 77	1	Sample	7	0.00000	0.000	0.00000
#*	634661	3	Vial 78	1	Sample	8	1.26371e5	8.688	5.42112
#*	634662	3	Vial 79	1	Sample	9	1.38404e5	8.679	5.32464
#*	1835584001		Vial 80	1	Sample	10	0.00000	0.000	0.00000
#*	1835586001		Vial 81	1	Sample	11	2.78012e4	8.630	1.36193
#*	1835586002		Vial 82	1	Sample	12	1.56699e4	8.746	5.03128e-1
#*	1835586003		Vial 83	1	Sample	13	5.60856e5	8.836	1.30516e4
#*	1835586004		Vial 84	1	Sample	14	8.06830e5	8.828	2.12919e4
#*	1835586005		Vial 85	1	Sample	15	1.07822e6	8.833	3168.51355
#*	1835586007		Vial 87	1	Sample	17	2.20861e5	8.835	565.97425
#*	1835586006		Vial 86	1	Sample	18	9.00319e5	8.835	2.59890e4
#*	634663	C	Vial 71	1	Control	19	7.81696e5	8.795	24.70120
#*	634664	L	Vial 72	1	Control	20	3.57379e4	8.816	1.12914
#*	1835586008		Vial 88	1	Sample	21	0.00000	0.000	0.00000
#*	1835586009		Vial 89	1	Sample	22	1.41589e5	8.729	3.58693
#*	1835589001		Vial 90	1	Sample	23	2.57706e5	8.812	6.83735
#*	1835589002		Vial 91	1	Sample	24	5.03445e4	8.794	1.27829
#*	1835589003		Vial 92	1	Sample	25	0.00000	0.000	0.00000
#*	1835589004		Vial 93	1	Sample	26	9.35943e5	8.810	211.78317
#*	634665	C	Vial 71	1	Control	27	9.26681e5	8.823	25.01704

Batch Report: C:\HPCHEM\1\DATA\31DEC18D\31DEC18S.B

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount	
*	634666	L	Vial 72	1	Control	28	3.60965e4	8.828	1.07802

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount	
#*	634656	C	Vial 71	1	Control	1	3.90534e5	8.742	5.00000
#*	634657	L	Vial 72	1	Control	2	3.90274e5	8.810	5.00000
#*	634658	I	Vial 73	1	Control	3	3.23063e5	8.795	5.00000
#*	634659	L	Vial 74	1	Control	4	3.95061e5	8.849	5.00000
#*	634660	Q	Vial 75	1	Control	5	4.01626e5	8.856	5.00000
#*	1835578001		Vial 76	1	Sample	6	3.95530e5	8.870	5000.00000
#*	1835582001		Vial 77	1	Sample	7	2.58532e5	8.707	5.00000
#*	634661	3	Vial 78	1	Sample	8	2.44700e5	8.696	5.00000
#*	634662	3	Vial 79	1	Sample	9	2.73000e5	8.693	5.00000
#*	1835584001		Vial 80	1	Sample	10	2.42637e5	8.698	5.00000
#*	1835586001		Vial 81	1	Sample	11	2.27333e5	8.645	5.00000
#*	1835586002		Vial 82	1	Sample	12	3.92498e5	8.760	5.00000
#*	1835586003		Vial 83	1	Sample	13	4.38558e5	8.843	5000.00000
#*	1835586004		Vial 84	1	Sample	14	3.78123e5	8.839	5000.00000
#*	1835586005		Vial 85	1	Sample	15	3.30865e5	8.841	500.00000
#*	1835586007		Vial 87	1	Sample	17	4.09114e5	8.845	500.00000
#*	1835586006		Vial 86	1	Sample	18	3.41579e5	8.843	5000.00000
#*	634663	C	Vial 71	1	Control	19	3.13045e5	8.804	5.00000
#*	634664	L	Vial 72	1	Control	20	3.57627e5	8.826	5.00000
#*	1835586008		Vial 88	1	Sample	21	2.49985e5	8.685	5.00000
#*	1835586009		Vial 89	1	Sample	22	4.19706e5	8.740	5.00000
#*	1835589001		Vial 90	1	Sample	23	3.92953e5	8.820	5.00000
#*	1835589002		Vial 91	1	Sample	24	4.40634e5	8.806	5.00000
#*	1835589003		Vial 92	1	Sample	25	2.63354e5	8.709	5.00000
#*	1835589004		Vial 93	1	Sample	26	4.41113e5	8.820	50.00000
#*	634665	C	Vial 71	1	Control	27	3.66130e5	8.833	5.00000
*	634666	L	Vial 72	1	Control	28	3.79873e5	8.839	5.00000

\*\*\* End of Report \*\*\*

## Sequence Table:

## Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
====	=====	=====	=====	===	=====	=====	=====
1	Vial 71	634656	CCV@25	CLO4-AQN	1	Ctrl Samp	
2	Vial 72	634657	LODV@1.	CLO4-AQN	1	Ctrl Samp	
3	Vial 73	634658	ICS@1.0	CLO4-AQN	1	Ctrl Samp	
4	Vial 74	634659	LMB	CLO4-AQN	1	Ctrl Samp	
5	Vial 75	634660	QC@5.0	CLO4-AQN	1	Ctrl Samp	
6	Vial 76	1835578001	1K	CLO4-AQN	1	Sample	
7	Vial 77	1835582001		CLO4-AQN	1	Sample	
8	Vial 78	634661	355821S	CLO4-AQN	1	Sample	
9	Vial 79	634662	355821D	CLO4-AQN	1	Sample	
10	Vial 80	1835584001		CLO4-AQN	1	Sample	
11	Vial 81	1835586001		CLO4-AQN	1	Sample	
12	Vial 82	1835586002		CLO4-AQN	1	Sample	
13	Vial 83	1835586003	1K	CLO4-AQN	1	Sample	
14	Vial 84	1835586004	1K	CLO4-AQN	1	Sample	
15	Vial 85	1835586005	100	CLO4-AQN	1	Sample	
16	Vial 86	1835586006	1K	CLO4-AQN	1	Sample	
17	Vial 87	1835586007	100	CLO4-AQN	1	Sample	
18	Vial 86	1835586006	1K	CLO4-AQN	1	Sample	
19	Vial 71	634663	CCV@25	CLO4-AQN	1	Ctrl Samp	
20	Vial 72	634664	LODV@1.	CLO4-AQN	1	Ctrl Samp	
21	Vial 88	1835586008		CLO4-AQN	1	Sample	
22	Vial 89	1835586009		CLO4-AQN	1	Sample	
23	Vial 90	1835589001		CLO4-AQN	1	Sample	
24	Vial 91	1835589002		CLO4-AQN	1	Sample	
25	Vial 92	1835589003		CLO4-AQN	1	Sample	
26	Vial 93	1835589004	10X	CLO4-AQN	1	Sample	
27	Vial 71	634665	CCV@25	CLO4-AQN	1	Ctrl Samp	
28	Vial 72	634666	LODV@1.	CLO4-AQN	1	Ctrl Samp	

Data file: C:\HPCHEM\1\DATA\31DEC18D\31DECD01.D

Sample Name: 634656

CCV@25

Injection Date: 12/31/2018 08:20:48

Seq Line: 1

Sample Name: 634656 CCV@25

Location: Vial 71

Acq Operator: TNB

Inj. No.: 1

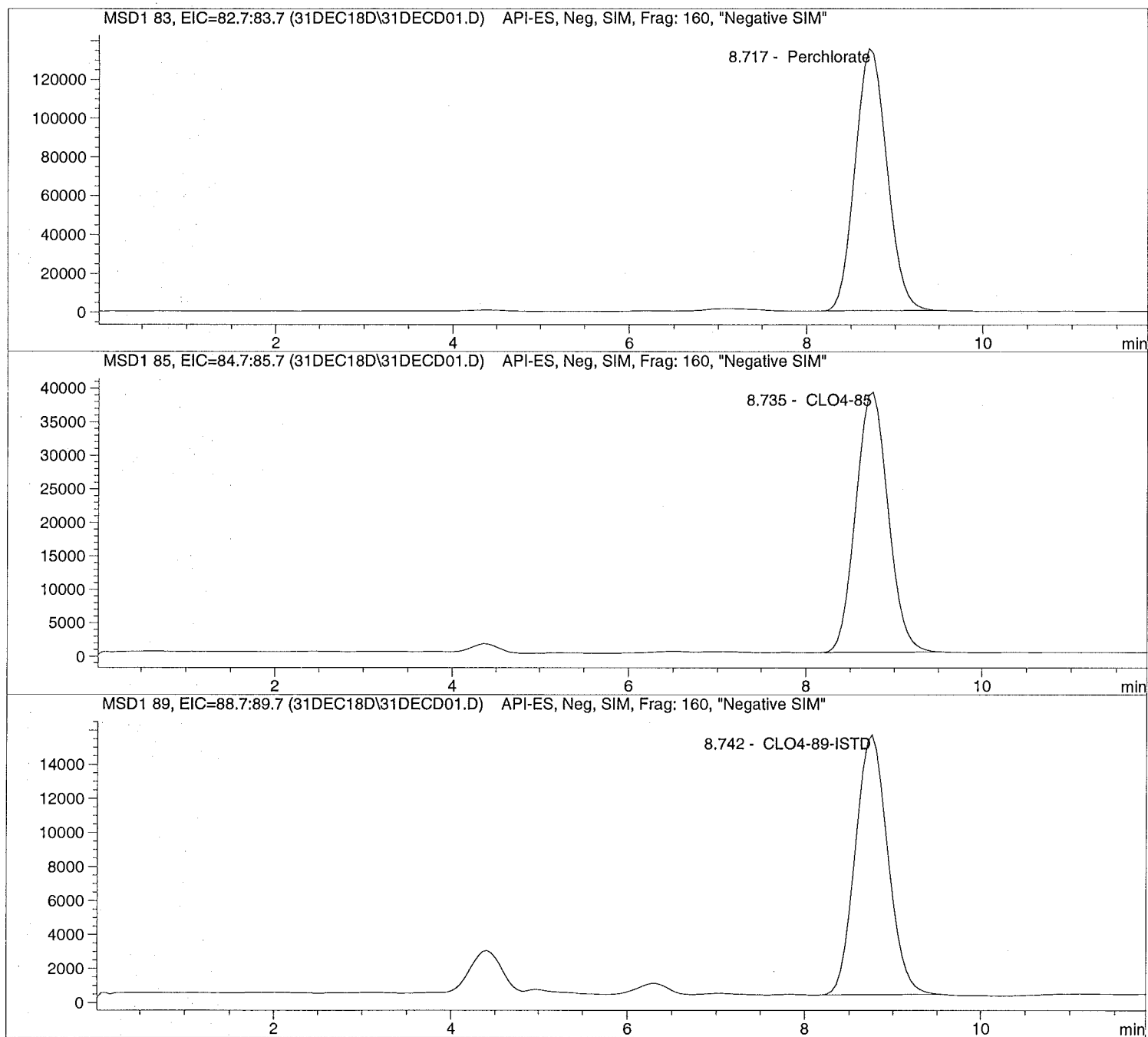
Inj. Vol.: 30 µl

Acq. Method: CLO4-AQN.M

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

Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



```

=====
Injection Date: 12/31/2018 08:20:48      Seq Line:          1
Sample Name:   634656   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
8.717	PBA	3384864.3	25.8263	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.735	PBA	990848.8	25.0742	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.742	PBA	390533.6	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```



Data file: C:\HPCHEM\1\DATA\31DEC18D\31DECD02.D

Sample Name: 634657 LODV@1.

Injection Date: 12/31/2018 08:36:24

Seq Line: 2

Sample Name: 634657 LODV@1.

Location: Vial 72

Acq Operator: TNB

Inj. No.: 1

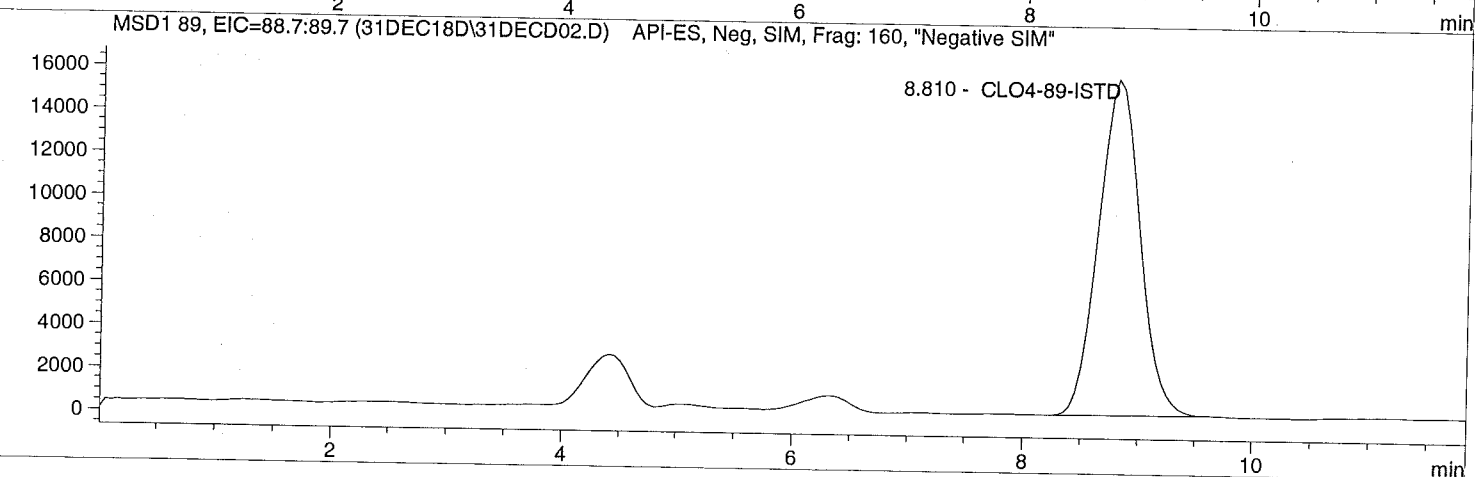
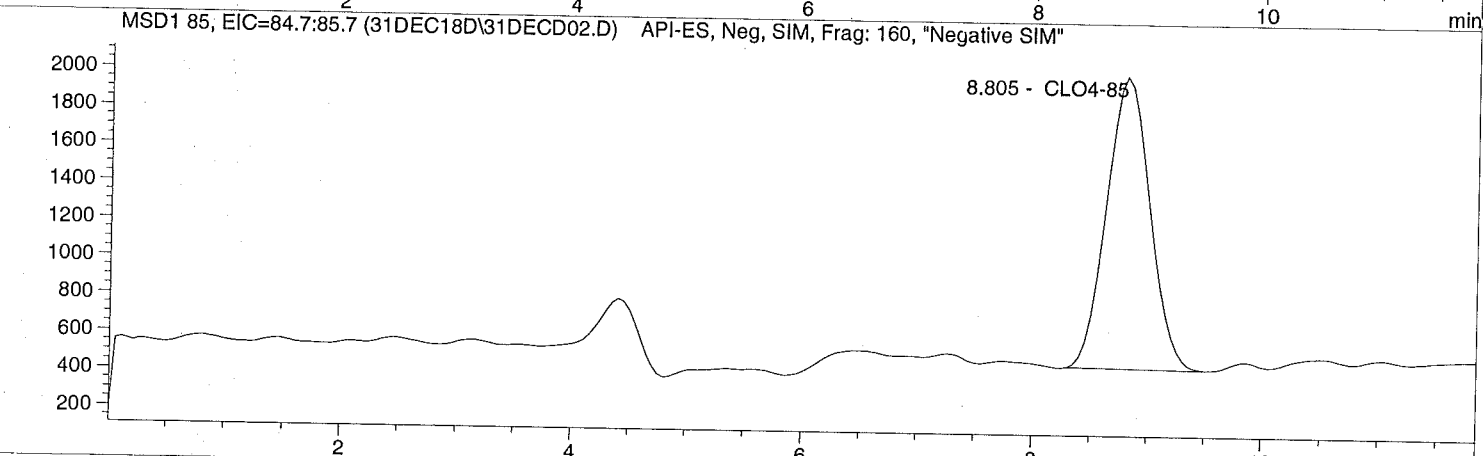
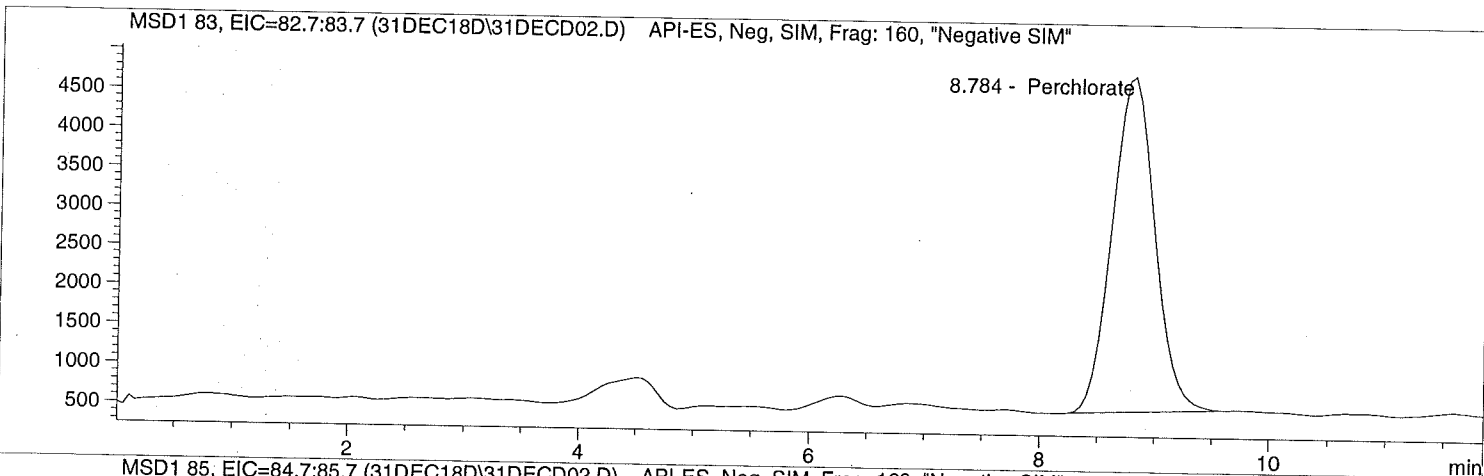
Inj. Vol.: 30 µl

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\31DEC18D\31DECD02.D Sample Name: 634657 LODV@1.

```

=====
Injection Date: 12/31/2018 08:36:24      Seq Line:          2
Sample Name:    634657  LODV@1.          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:  1.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.784	PBA	109750.7	1.0766	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.805	PBA	40729.6	1.1753	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.810	PBA	390274.2	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

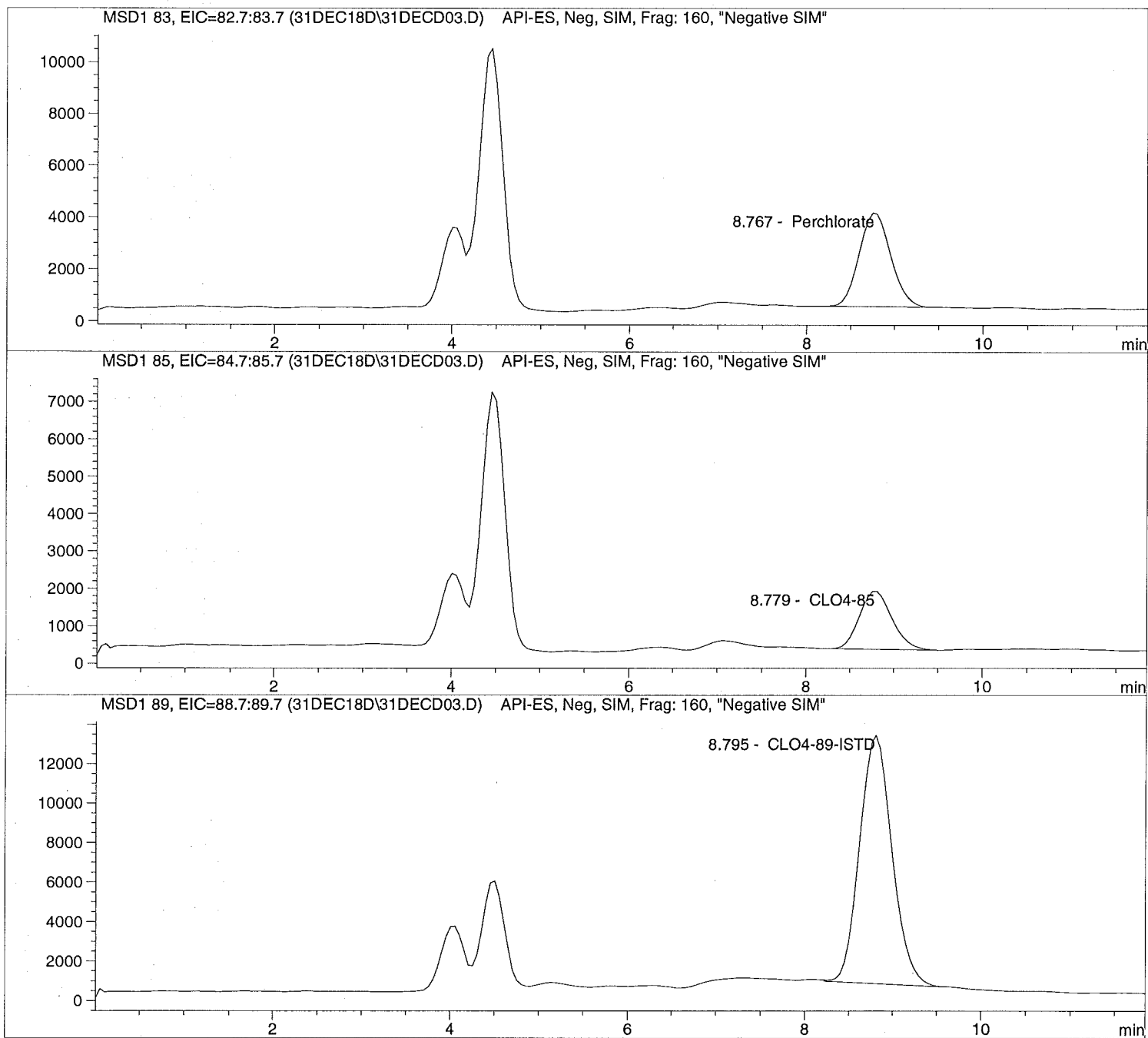
```

Injection Date: 12/31/2018 08:50:13  
Sample Name: 634658 ICS@1.0  
Acq Operator: TNB

Seq Line: 3  
Location: Vial 73  
Inj. No.: 1  
Inj. Vol.: 30  $\mu$ l

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\31DEC18D\31DECD03.D Sample Name: 634658 ICS@1.0

```

=====
Injection Date: 12/31/2018 08:50:13      Seq Line:      3
Sample Name:   634658 ICS@1.0           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: 1.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.767	PBA	89654.0	1.0652	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.779	PBA	39901.0	1.3746	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.795	BBA	323062.8	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

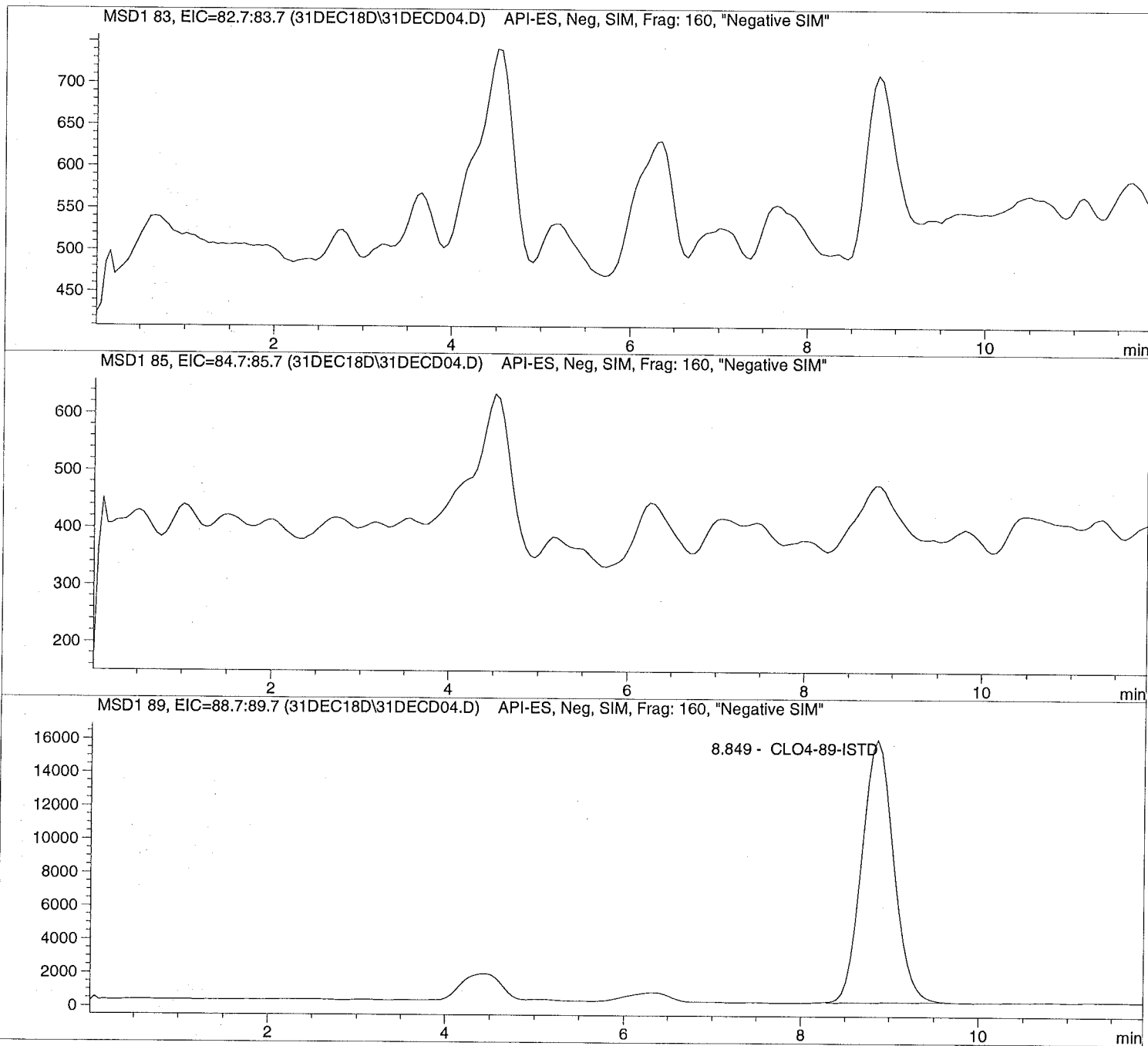
```

Injection Date: 12/31/2018 09:04:02  
Sample Name: 634659 LMB  
Acq Operator: TNB

Seq Line: 4  
Location: Vial 74  
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\31DEC18D\31DECD04.D Sample Name: 634659 LMB

```

=====
Injection Date: 12/31/2018 09:04:02      Seq Line:          4
Sample Name:    634659 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
8.849	BBA	395060.9	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\31DEC18D\31DECD05.D

Sample Name: 634660

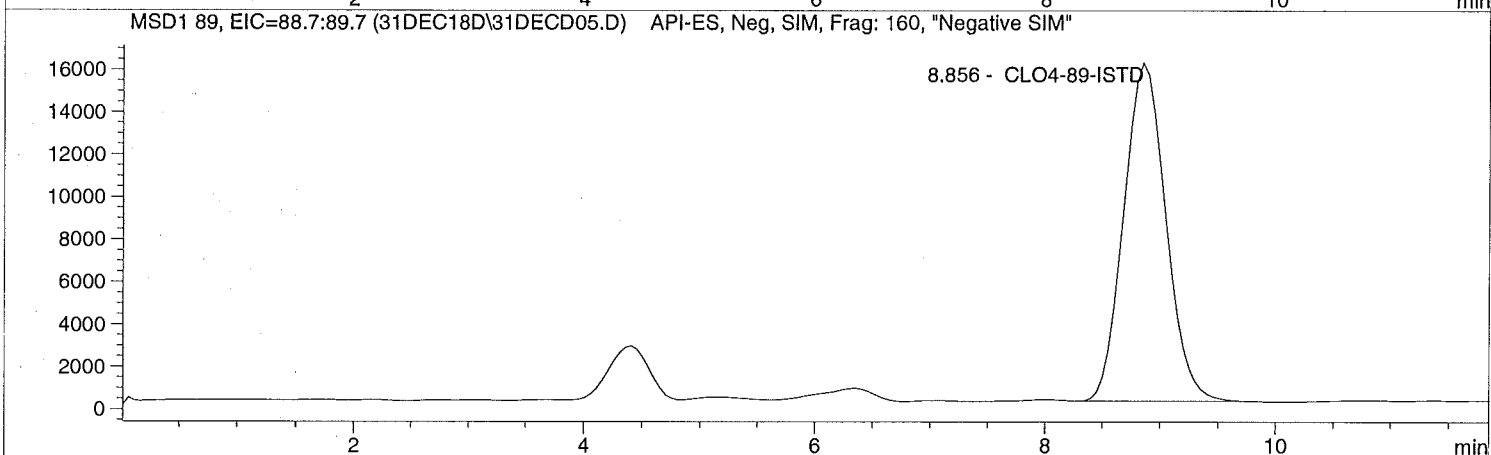
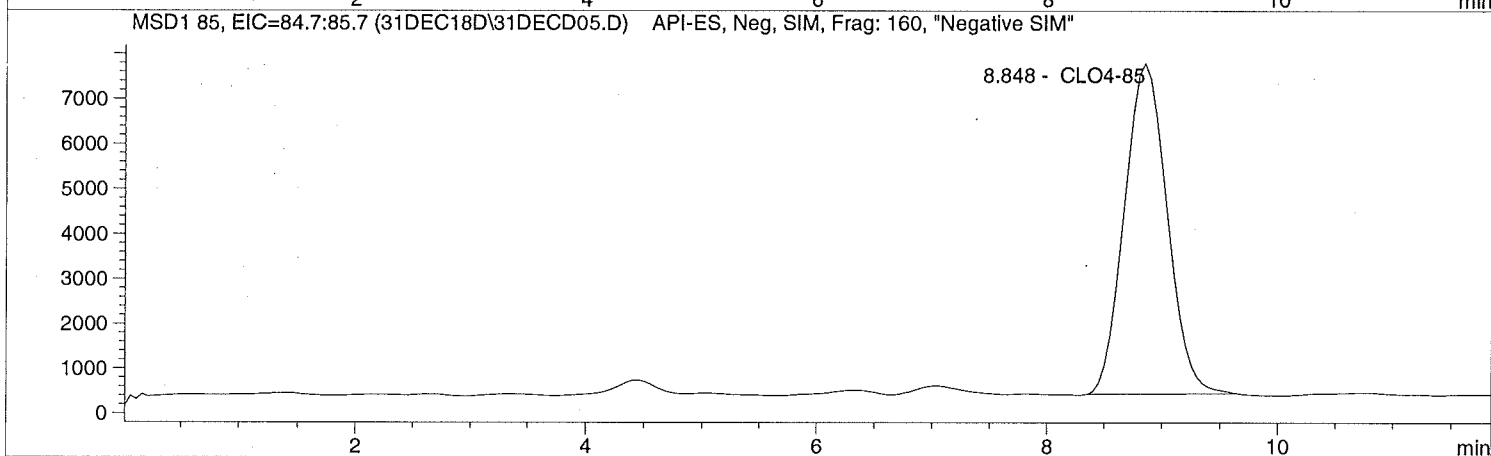
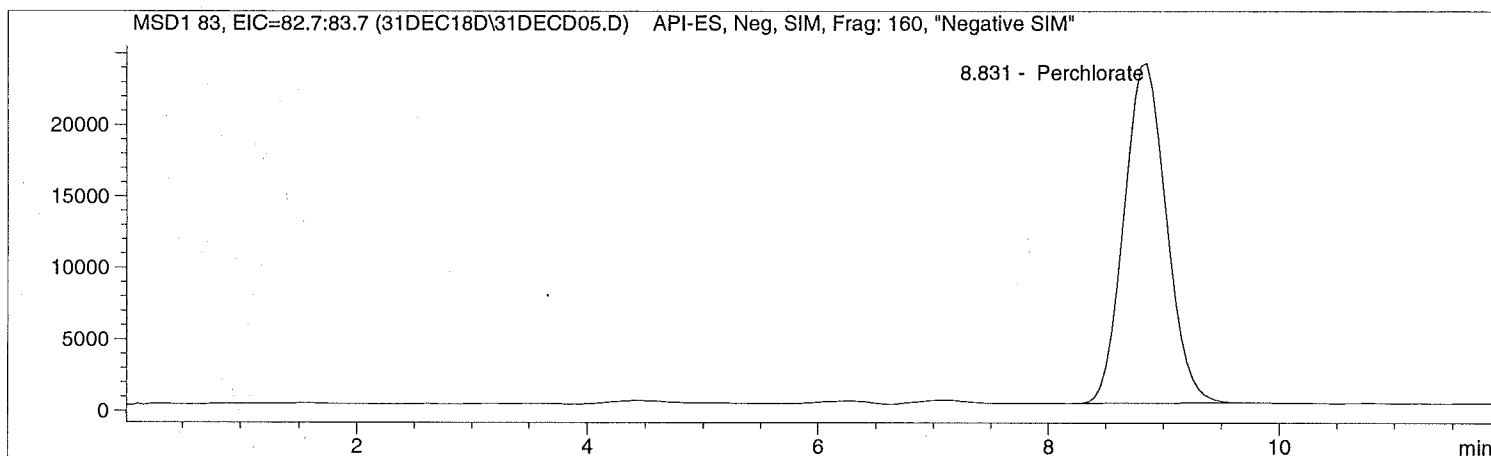
QC@5.0

Injection Date: 12/31/2018 09:17:46  
Sample Name: 634660 QC@5.0  
Acq Operator: TNB

Seq Line: 5  
Location: Vial 75  
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\31DEC18D\31DECD05.D Sample Name: 634660 QC@5.0

```

=====
Injection Date: 12/31/2018 09:17:46      Seq Line: 5
Sample Name: 634660 QC@5.0              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: 5.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.831	PBA	599222.9	4.7839	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.848	PBA	188568.1	4.9421	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.856	PBA	401626.1	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```



Data file: C:\HPCHEM\1\DATA\31DEC18D\31DECD06.D

Sample Name: 1835578001 1K

Injection Date: 12/31/2018 09:31:52

Seq Line: 6

Sample Name: 1835578001 1K

Location: Vial 76

Acq Operator: TNB

Inj. No.: 1

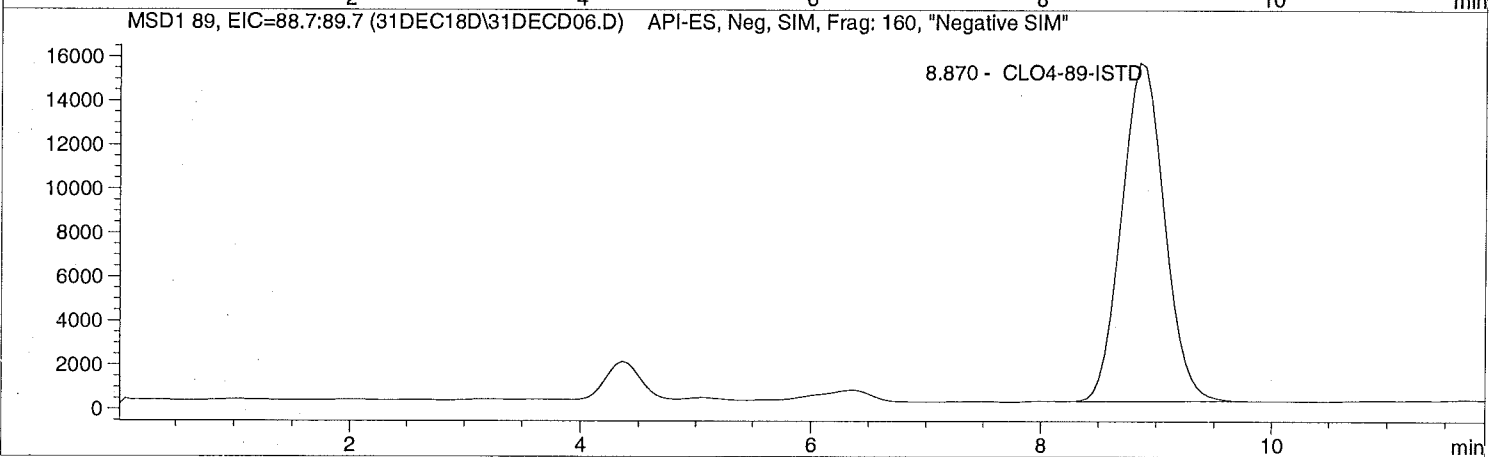
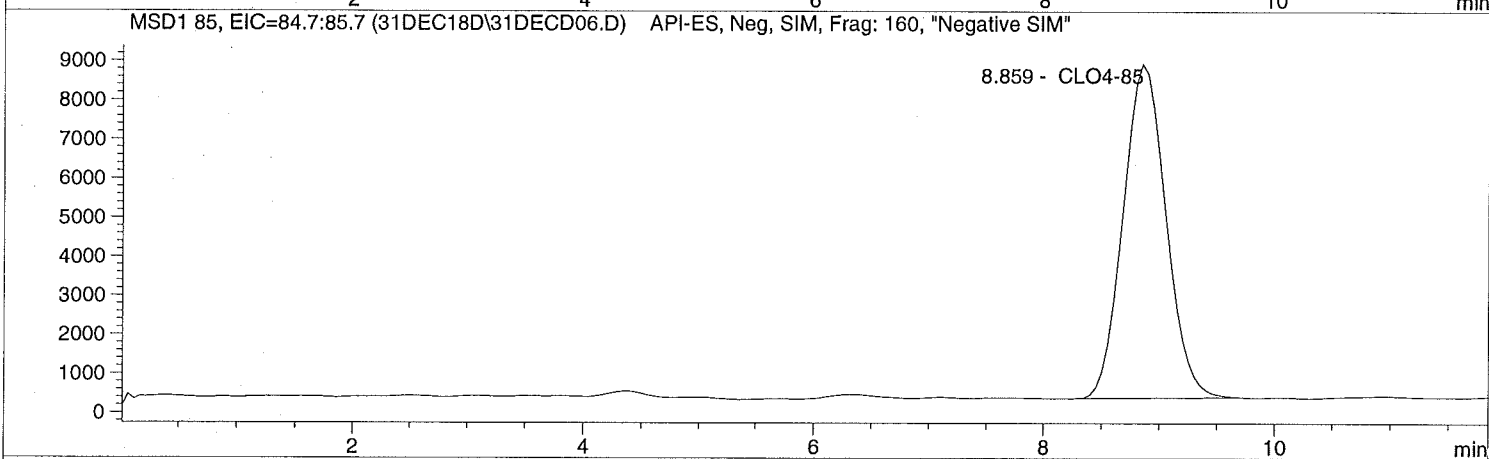
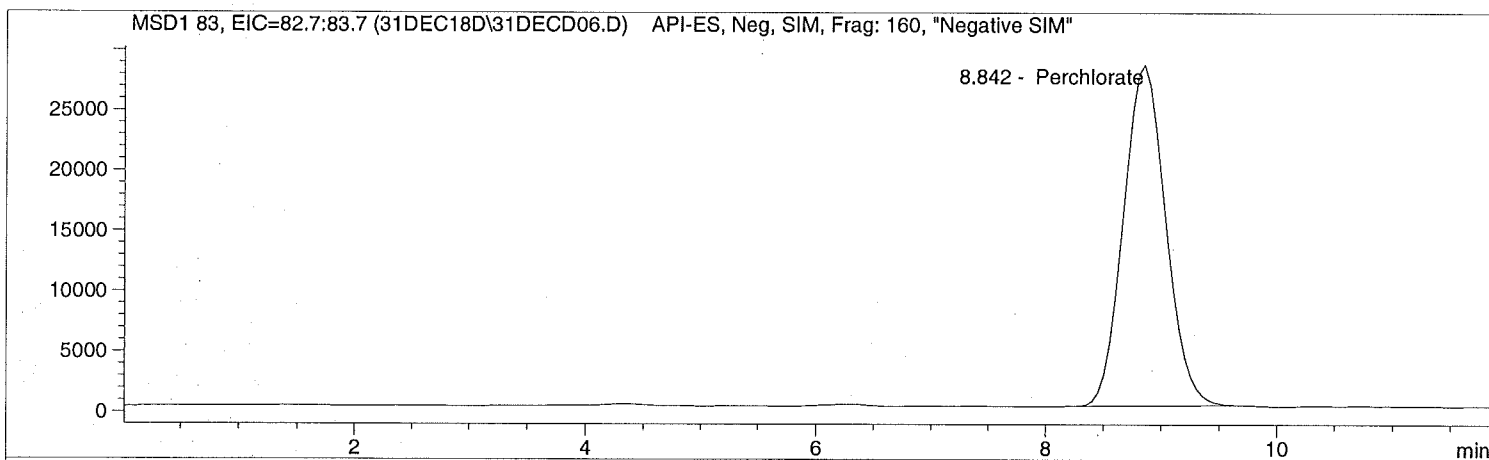
Inj. Vol.: 30 µl

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\31DEC18D\31DECD06.D Sample Name: 1835578001 1K

```

=====
Injection Date: 12/31/2018 09:31:52      Seq Line: 6
Sample Name: 1835578001 1K              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: 1000.000000
Sample Amount: 0.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.842	BBA	714567.3	5739.3367	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.859	PBA	219903.9	5823.8647	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.870	BBA	395529.7	5000.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

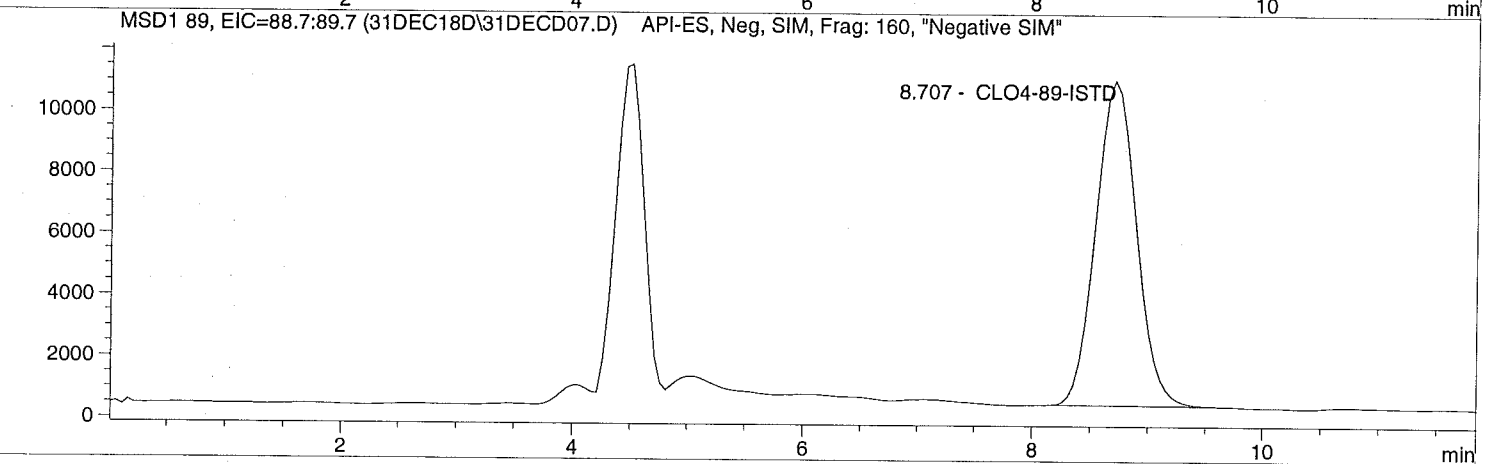
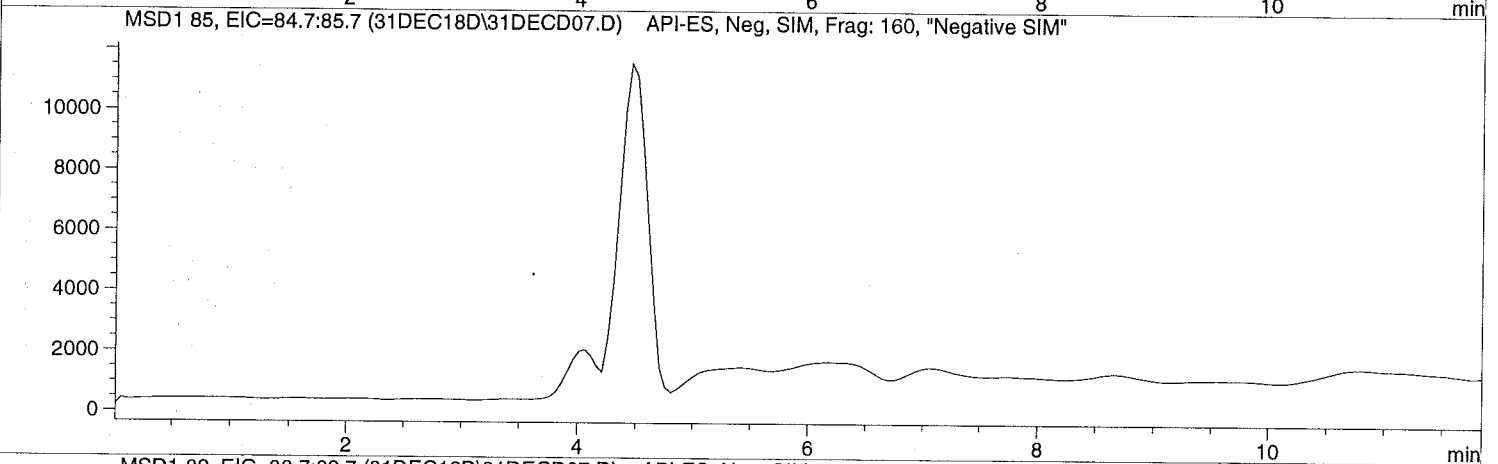
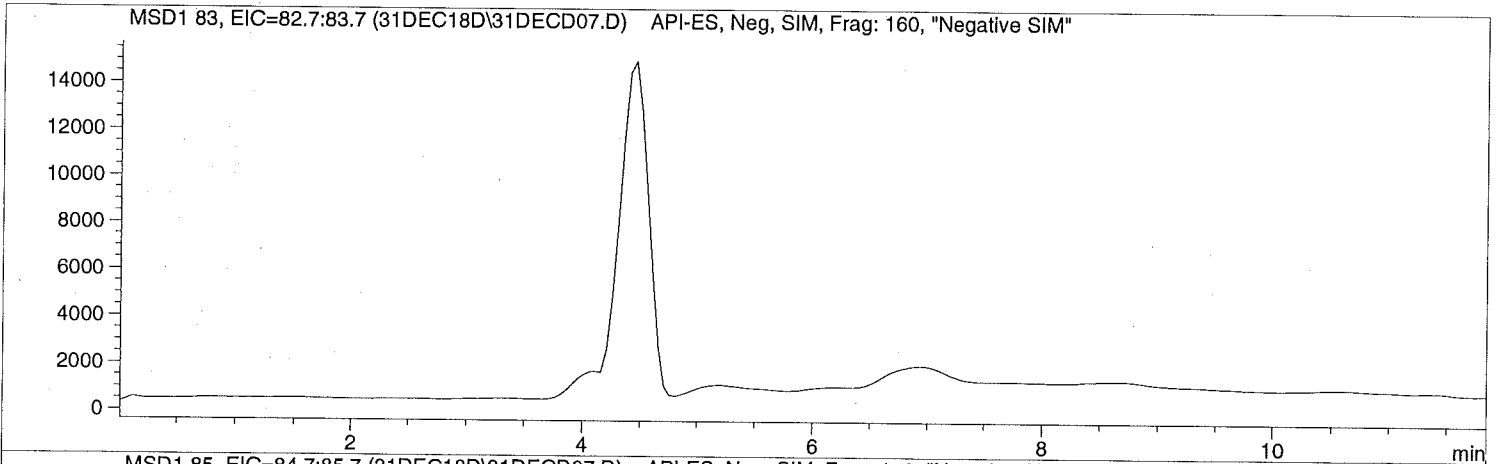
```

=====  
Injection Date: 12/31/2018 09:45:43  
Sample Name: 1835582001  
Acq Operator: TNB

Seq Line: 7  
Location: Vial 77  
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\31DEC18D\31DECD07.D

Sample Name: 1835582001

```

=====
Injection Date: 12/31/2018 09:45:43      Seq Line: 7
Sample Name:    1835582001                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
8.707	PBA	258531.5	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Injection Date: 12/31/2018 09:59:29

Seq Line: 8

Sample Name: 634661 355821S

Location: Vial 78

Acq Operator: TNB

Inj. No.: 1

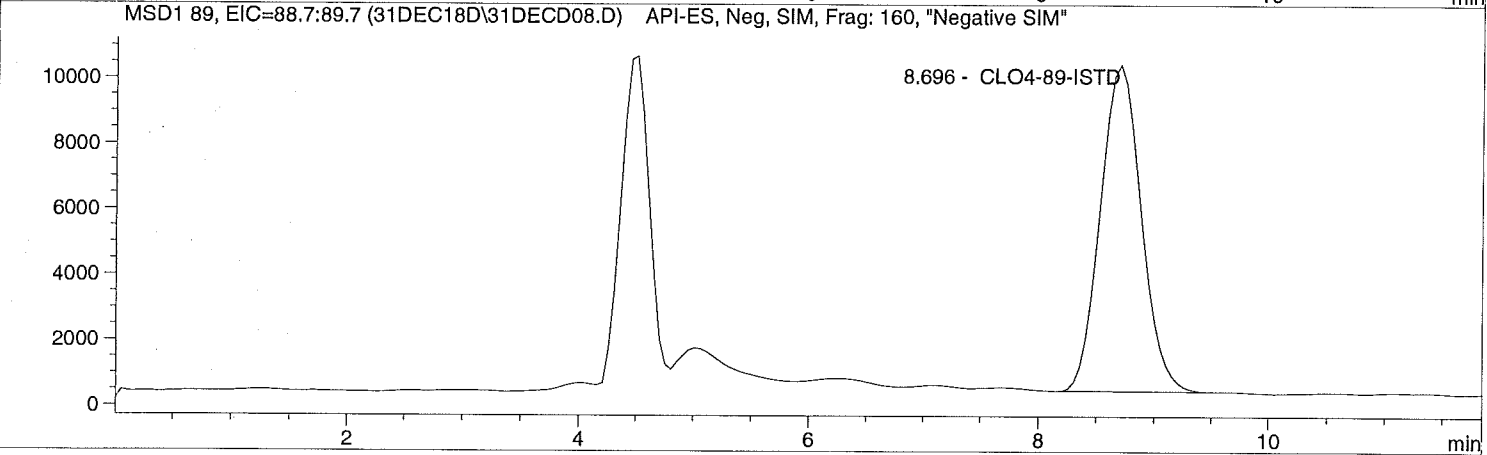
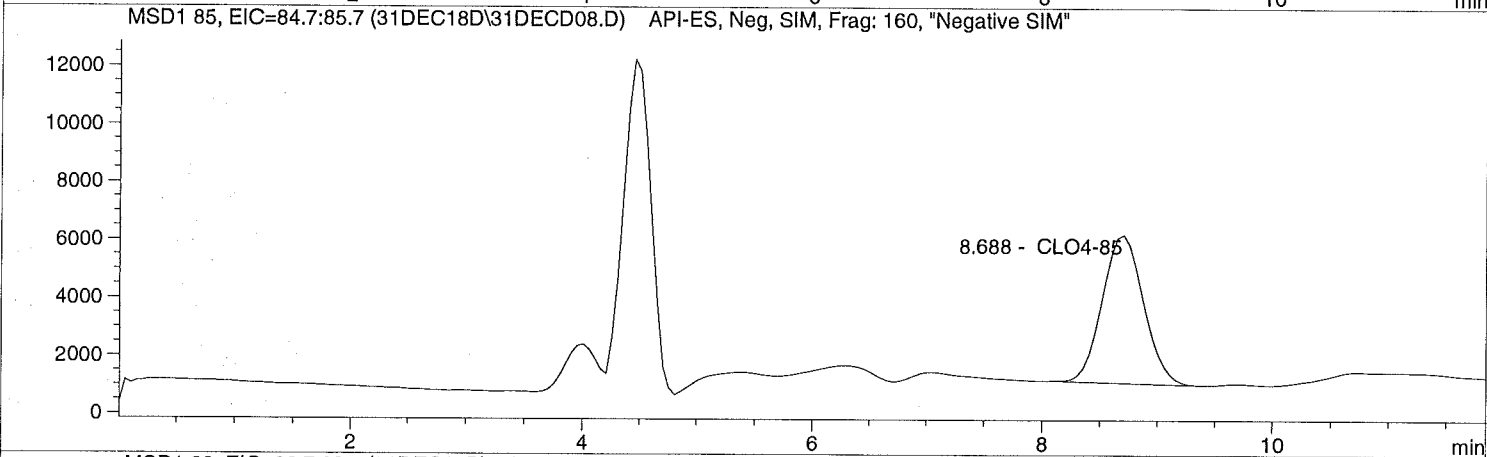
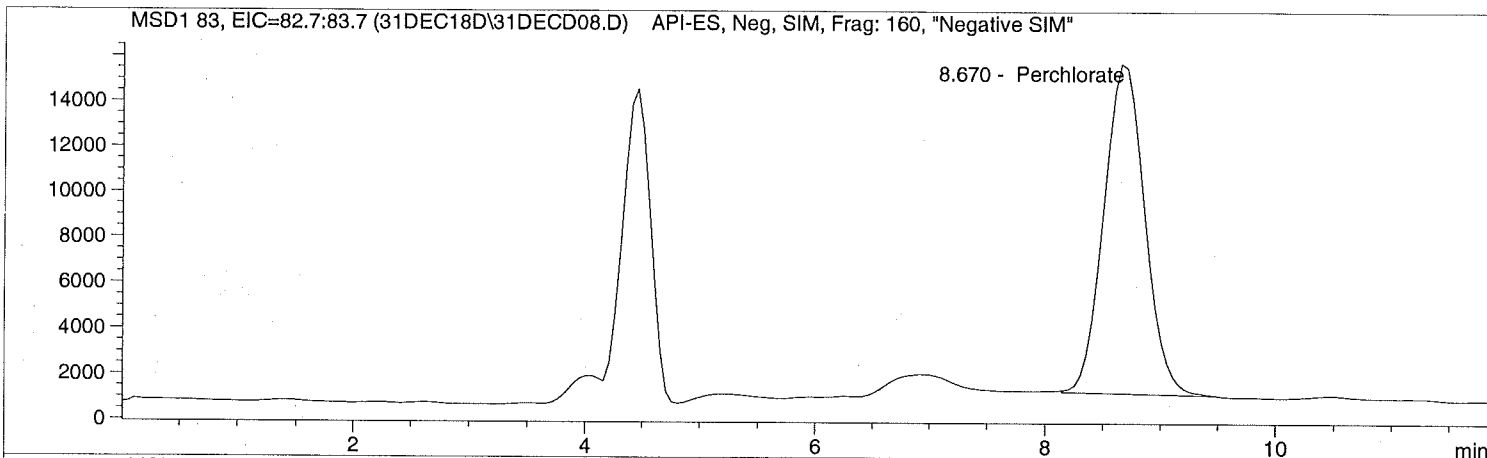
Inj. Vol.: 30 µl

Acq. Method: CLO4-AQN.M

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

Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



```
=====
Injection Date: 12/31/2018 09:59:29      Seq Line:      8
Sample Name:    634661 355821S          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
8.670	BBA	356092.0	4.6720	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.688	BBA	126371.5	5.4211	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.696	PBA	244700.5	5.0000	CLO4-89-ISTD

```
=====
*** End of Report ***
=====
```

Data file: C:\HPCHEM\1\DATA\31DEC18D\31DECD09.D

Sample Name: 634662 355821D

Injection Date: 12/31/2018 10:13:16

Seq Line: 9

Sample Name: 634662 355821D

Location: Vial 79

Acq Operator: TNB

Inj. No.: 1

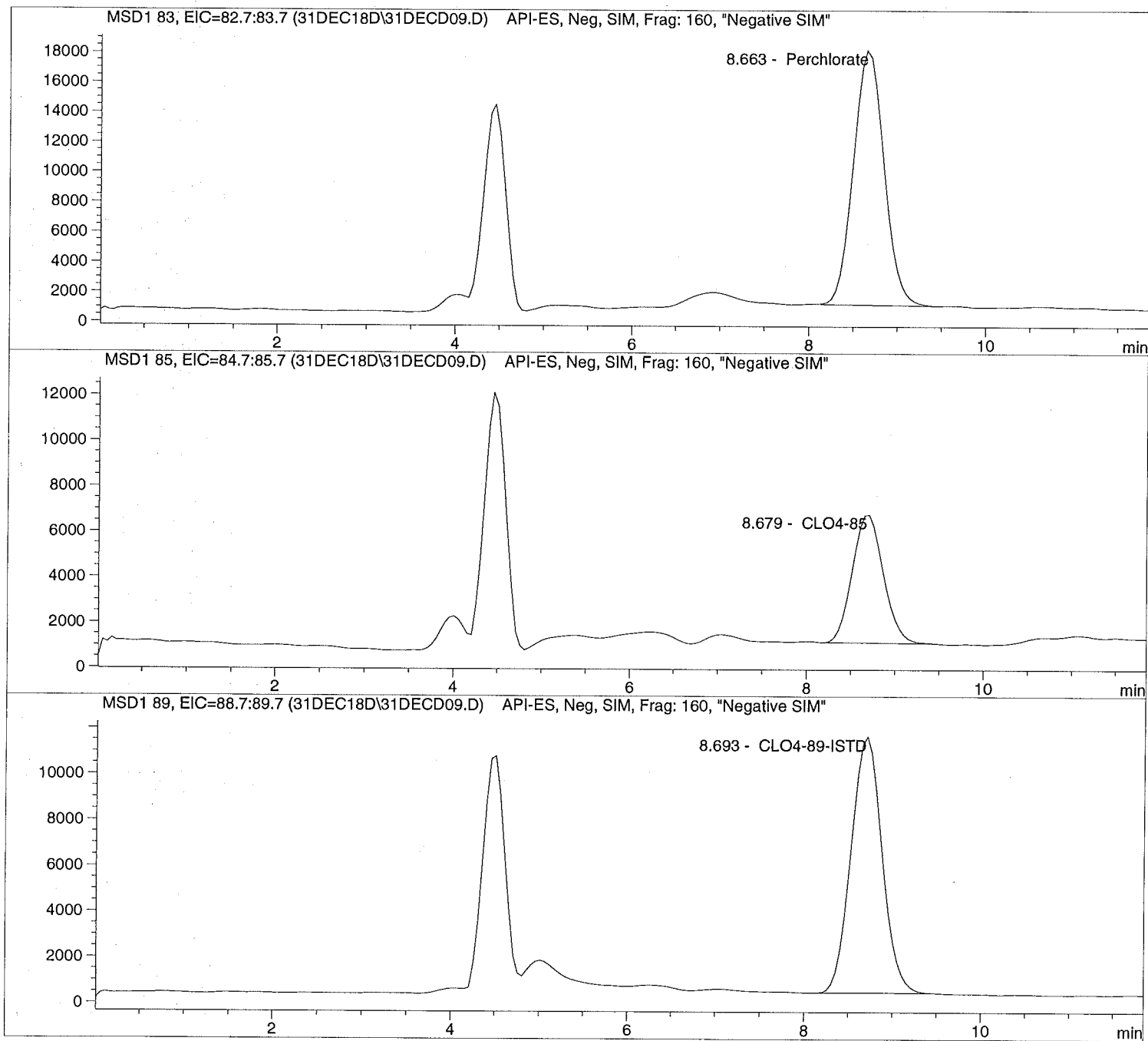
Inj. Vol.: 30  $\mu$ l

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\31DEC18D\31DECD09.D

Sample Name: 634662 355821D

```

=====
Injection Date: 12/31/2018 10:13:16      Seq Line:          9
Sample Name:   634662 355821D           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
8.663	BBA	410281.9	4.8170	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.679	PBA	138404.0	5.3246	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.693	PBA	273000.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

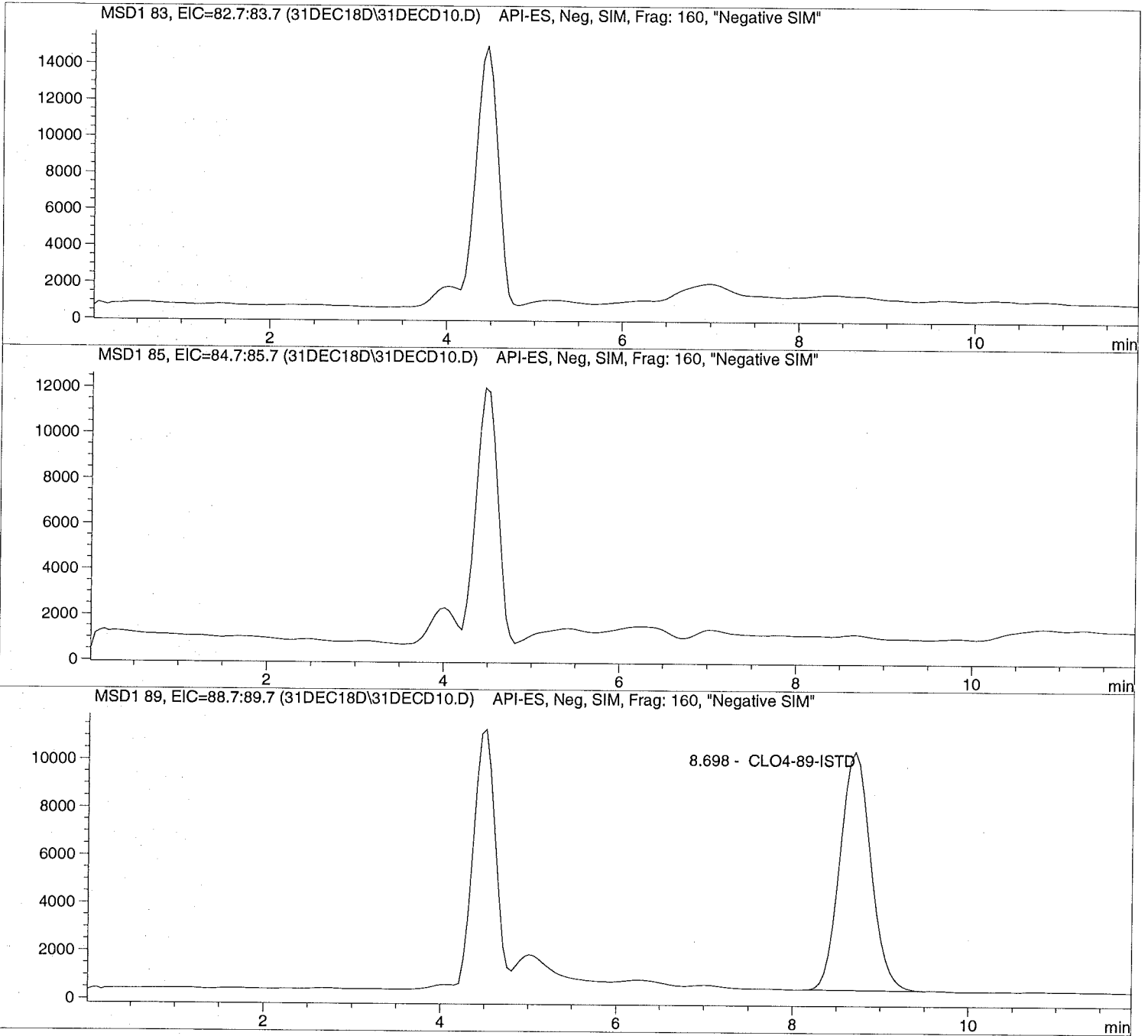


Injection Date: 12/31/2018 10:27:06  
Sample Name: 1835584001  
Acq Operator: TNB

Seq Line: 10  
Location: Vial 80  
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\31DEC18D\31DECD10.D

Sample Name: 1835584001

```

=====
Injection Date: 12/31/2018 10:27:06      Seq Line:          10
Sample Name:    1835584001                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
8.698	PBA	242636.8	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

Data file: C:\HPCHEM\1\DATA\31DEC18D\31DECD11.D

Sample Name: 1835586001

Injection Date: 12/31/2018 10:40:55

Seq Line: 11

Sample Name: 1835586001

Location: Vial 81

Acq Operator: TNB

Inj. No.: 1

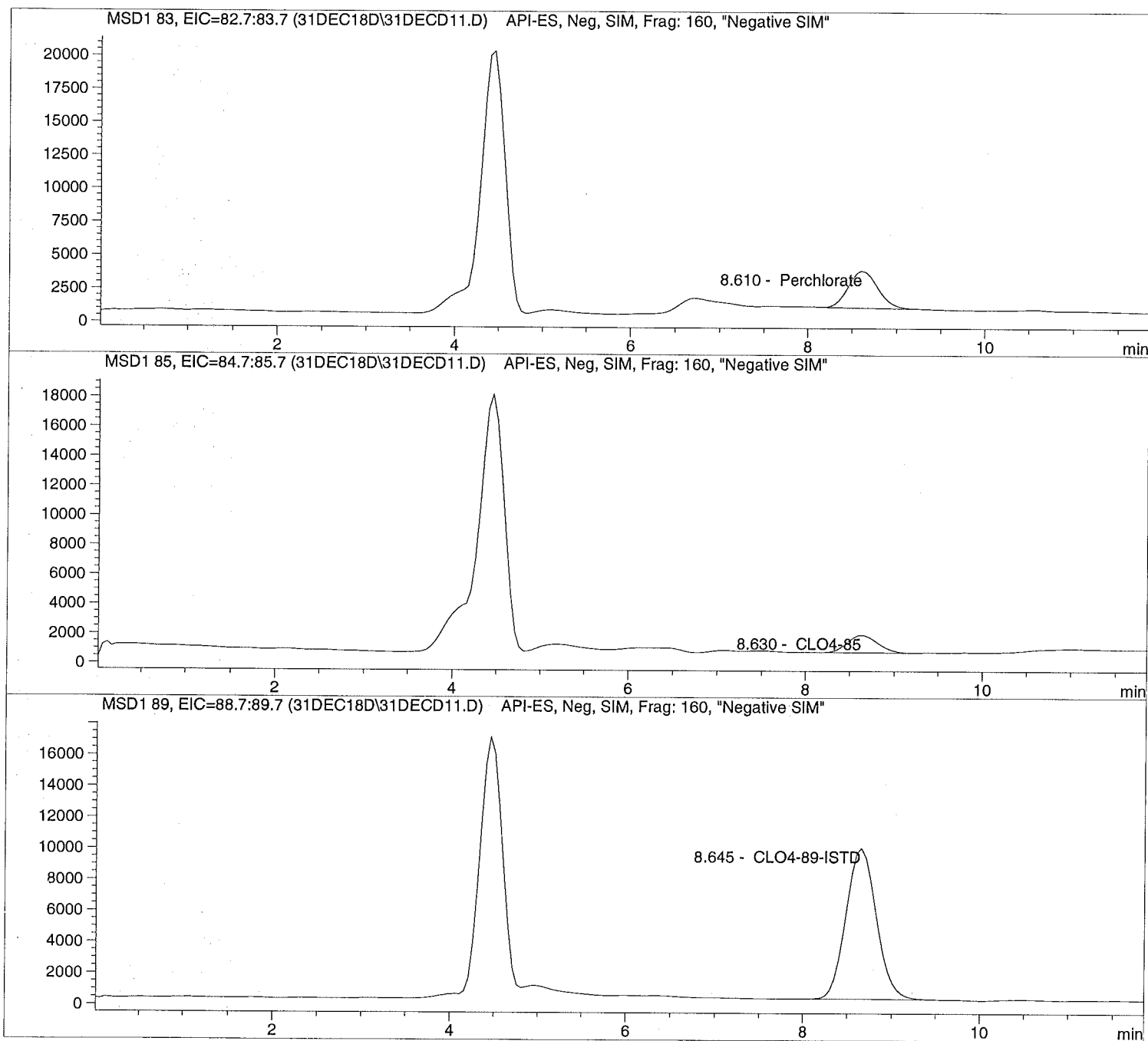
Inj. Vol.: 30  $\mu$ l

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\31DEC18D\31DECD11.D

Sample Name: 1835586001

```

=====
Injection Date: 12/31/2018 10:40:55      Seq Line:          11
Sample Name:    1835586001                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:       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
8.610	BBA	63997.2	1.0775	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.630	PBA	27801.2	1.3619	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.645	BBA	227333.3	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

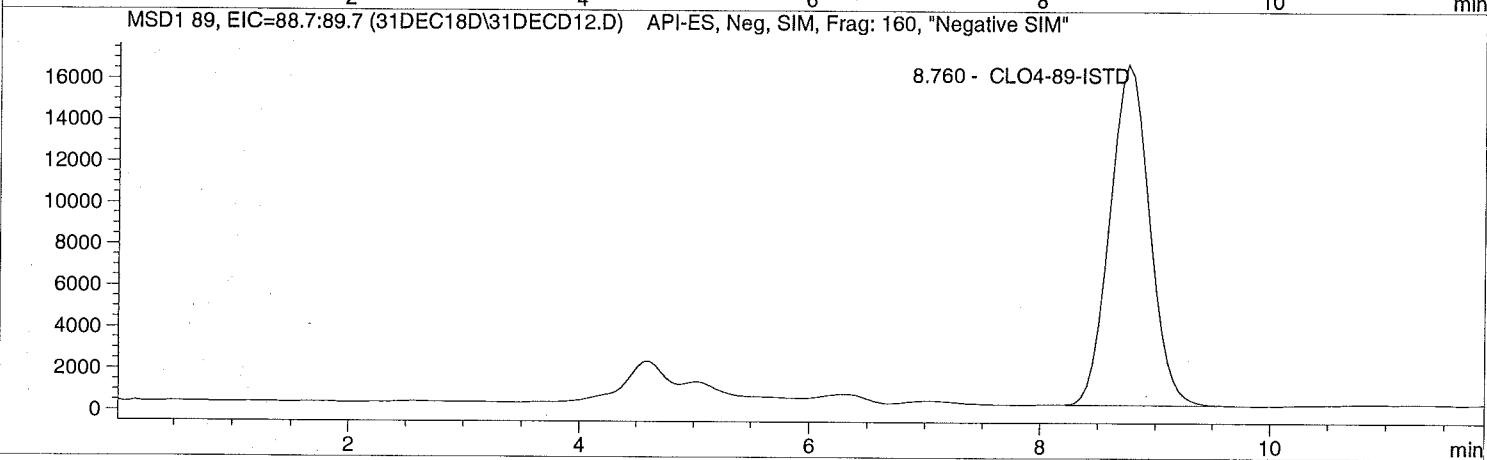
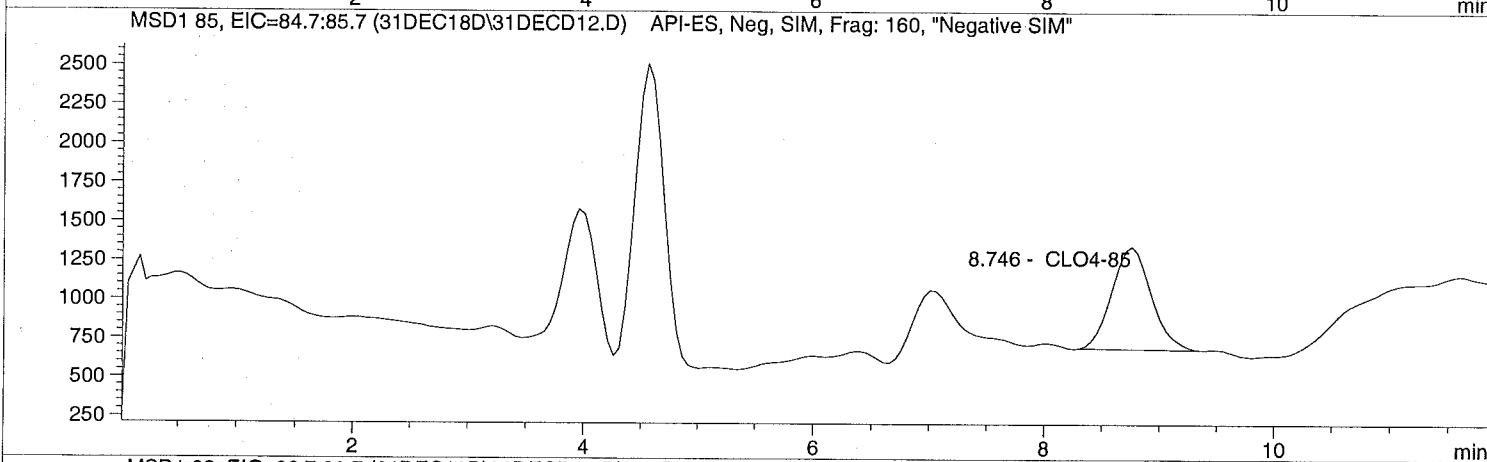
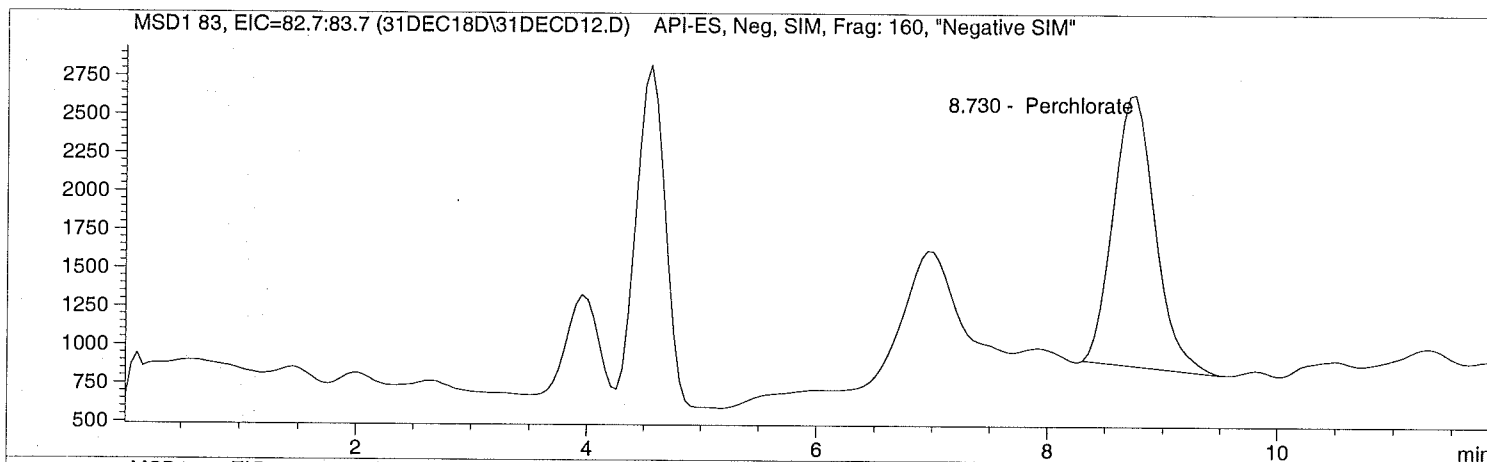
```

Injection Date: 12/31/2018 10:54:40  
Sample Name: 1835586002  
Acq Operator: TNB

Seq Line: 12  
Location: Vial 82  
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\31DEC18D\31DECD12.D

Sample Name: 1835586002

```

=====
Injection Date: 12/31/2018 10:54:40      Seq Line:      12
Sample Name:    1835586002                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
8.730	PBA	44440.4	0.5583	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.746	PBA	15669.9	0.5031	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.760	BBA	392498.0	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

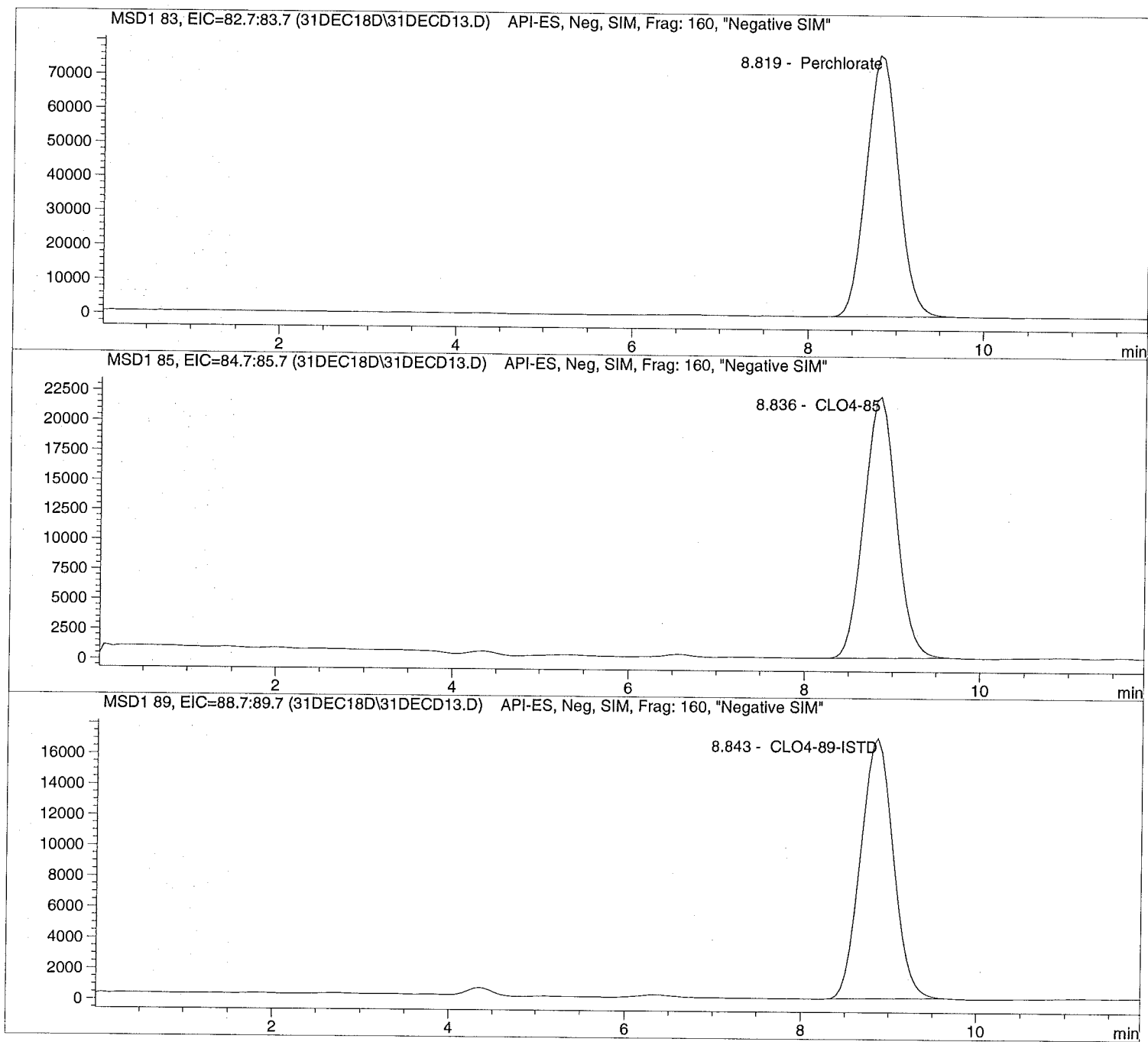
```

Data file: C:\HPCHEM\1\DATA\31DEC18D\31DECD13.D Sample Name: 1835586003 1K

```
=====
Injection Date: 12/31/2018 11:08:25      Seq Line:          13
Sample Name:    1835586003 1K           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\31DEC18D\31DECD13.D Sample Name: 1835586003 1K

```

=====
Injection Date: 12/31/2018 11:08:25      Seq Line:          13
Sample Name:   1835586003 1K             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:      1000.000000
Sample Amount: 0.000
=====

```

```

=====
                          LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.819	PBA	1932537.0	13514.6911	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.836	PBA	560856.3	13051.5983	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.843	PBA	438558.3	5000.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

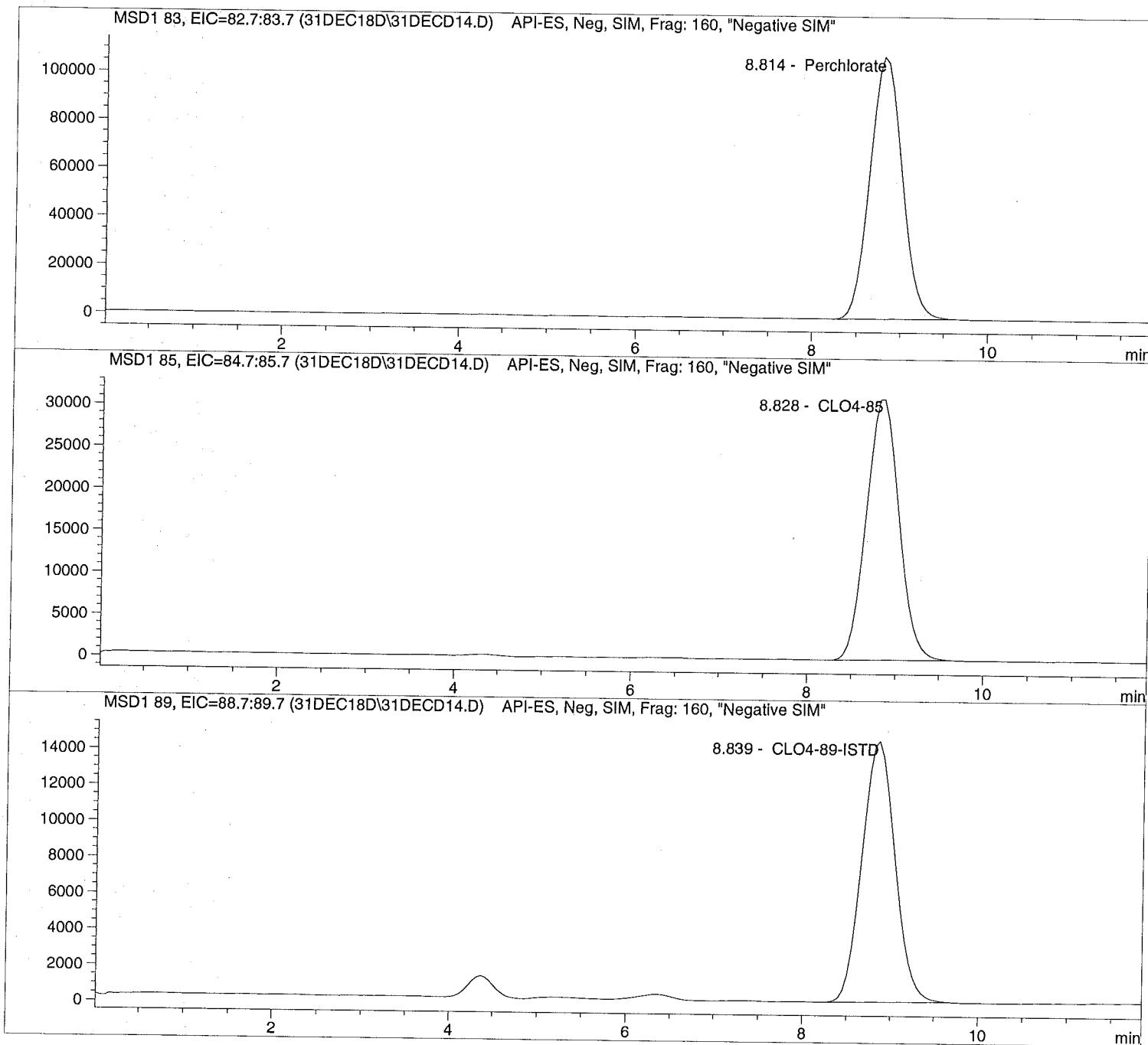


Injection Date: 12/31/2018 11:22:09  
Sample Name: 1835586004 1K  
Acq Operator: TNB

Seq Line: 14  
Location: Vial 84  
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\31DEC18D\31DECD14.D Sample Name: 1835586004 1K

```

=====
Injection Date: 12/31/2018 11:22:09      Seq Line:          14
Sample Name:   1835586004 1K             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:       1000.000000
Sample Amount:  0.000
=====

```

```

=====
LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.814	PBA	2756395.0	21900.9544	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.828	PBA	806830.3	21291.8515	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.839	PBA	378123.1	5000.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

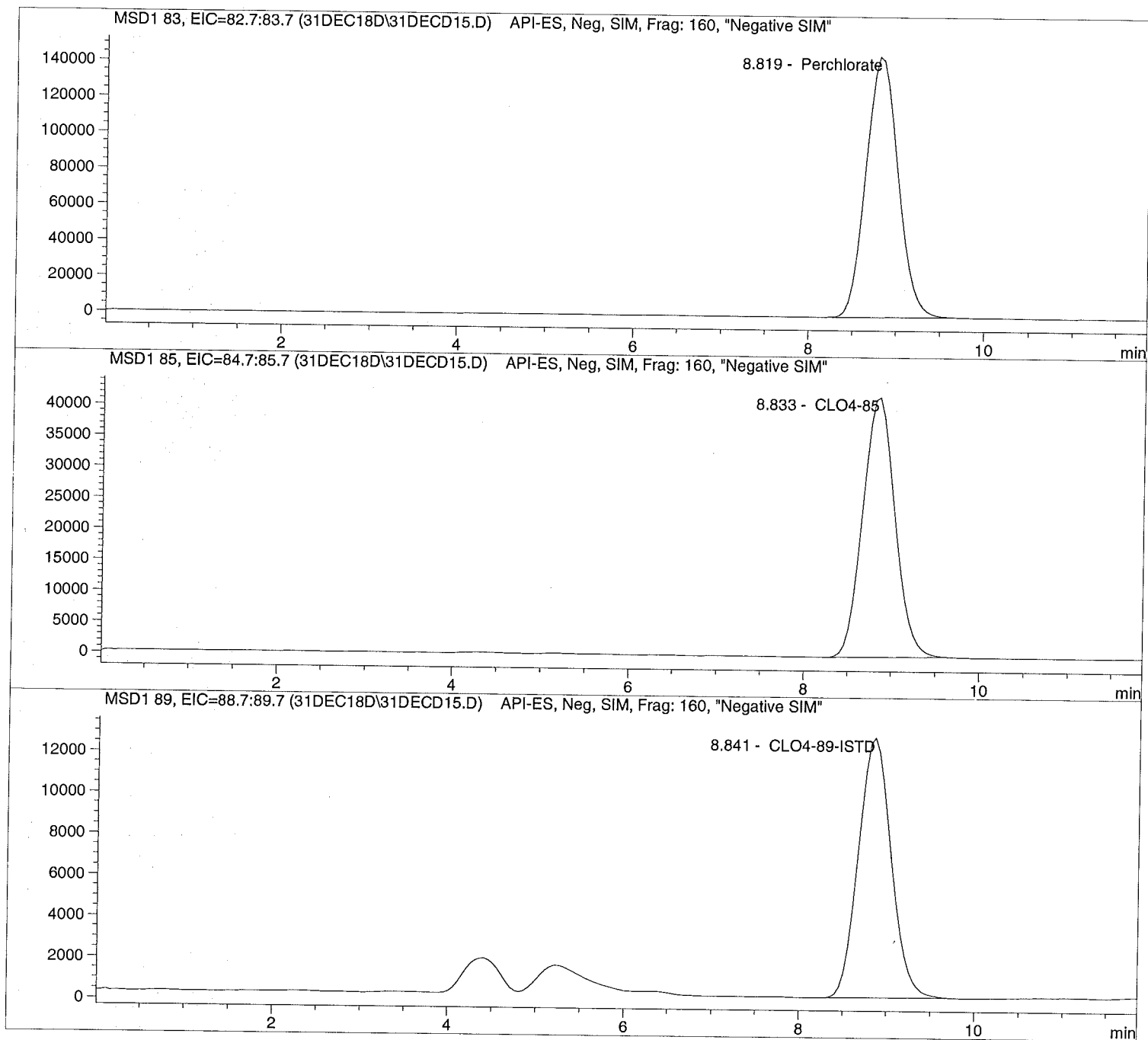
```

Data file: C:\HPCHEM\1\DATA\31DEC18D\31DECD15.D Sample Name: 1835586005 100

=====  
Injection Date: 12/31/2018 11:35:53 Seq Line: 15  
Sample Name: 1835586005 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\31DEC18D\31DECD15.D Sample Name: 1835586005 100

```

=====
Injection Date: 12/31/2018 11:35:53      Seq Line:          15
Sample Name:   1835586005 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
8.819	PBA	3720053.2	3303.3641	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.833	PBA	1078219.3	3168.5135	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.841	PBA	330864.6	500.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

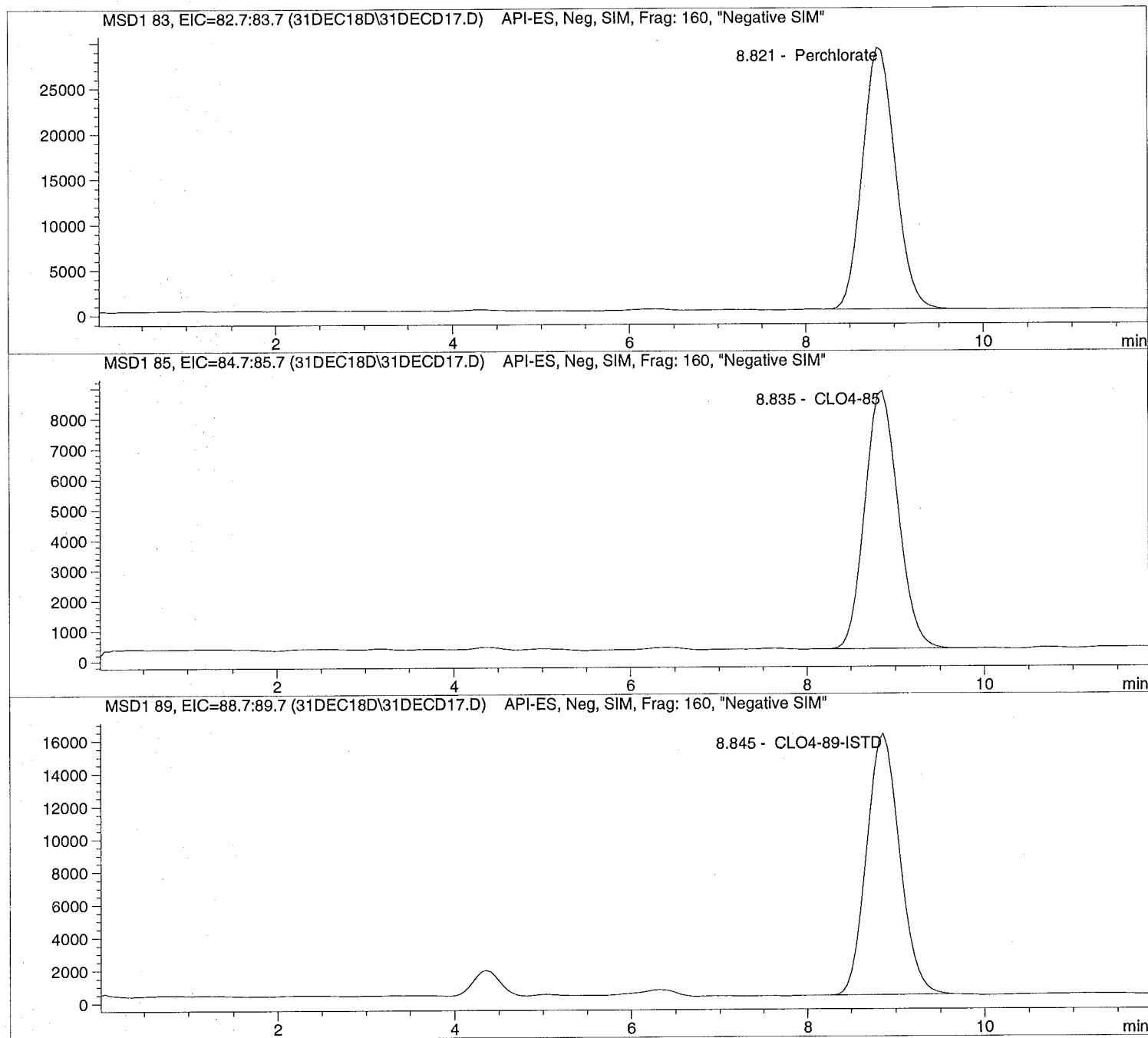
```

Injection Date: 12/31/2018 12:03:10  
Sample Name: 1835586007 100  
Acq Operator: TNB

Seq Line: 17  
Location: Vial 87  
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



```
=====
Injection Date: 12/31/2018 12:03:10      Seq Line:          17
Sample Name:    1835586007 100           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:       100.000000
Sample Amount:  0.000
=====
```

## ===== LCMS Results =====

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.821	BBA	732888.5	569.3237	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.835	PBA	220860.7	565.9742	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.845	PBA	409114.1	500.0000	CLO4-89-ISTD

=====
\*\*\* End of Report \*\*\*
=====



Data file: C:\HPCHEM\1\DATA\31DEC18D\31DECD18.D Sample Name: 1835586006 1K

```

=====
Injection Date: 12/31/2018 12:16:57      Seq Line:          18
Sample Name:   1835586006 1K             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:      1000.000000
Sample Amount: 0.000
=====

```

```

=====
                          LCMS Results
=====

```

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.818	PBA	3142211.0	27328.0709	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.835	PBA	900319.0	25988.9835	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.843	PBA	341578.5	5000.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

```

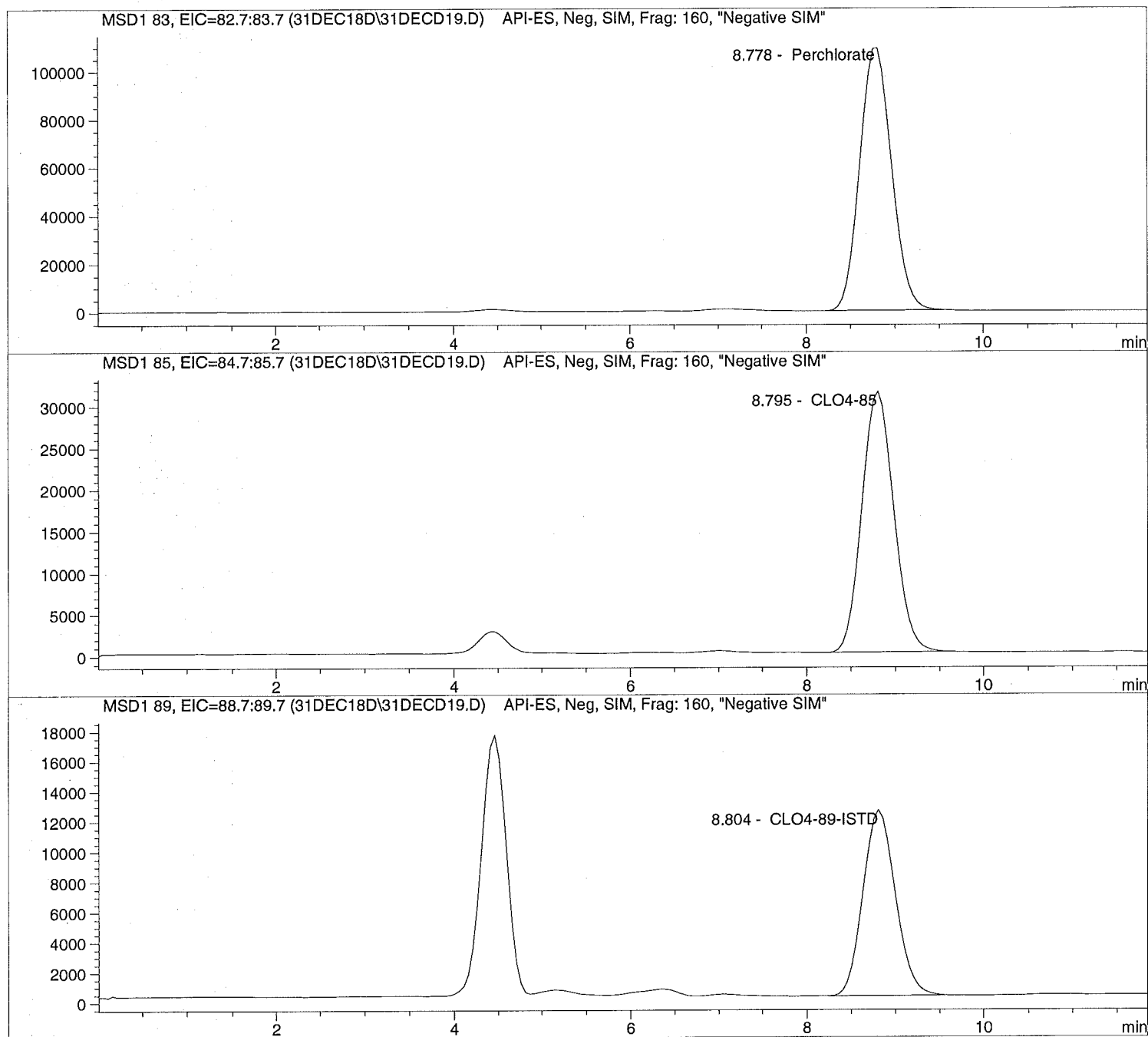


Injection Date: 12/31/2018 12:30:43  
Sample Name: 634663 CCV@25  
Acq Operator: TNB

Seq Line: 19  
Location: Vial 71  
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



```
=====
Injection Date: 12/31/2018 12:30:43      Seq Line:          19
Sample Name:    634663   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
8.778	PBA	2702067.8	25.7252	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.795	PBA	781696.0	24.7012	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.804	BBA	313044.7	5.0000	CLO4-89-ISTD

=====
\*\*\* End of Report \*\*\*
=====

Data file: C:\HPCHEM\1\DATA\31DEC18D\31DECD20.D

Sample Name: 634664 LODV@1.

Injection Date: 12/31/2018 12:44:27

Seq Line: 20

Sample Name: 634664 LODV@1.

Location: Vial 72

Acq Operator: TNB

Inj. No.: 1

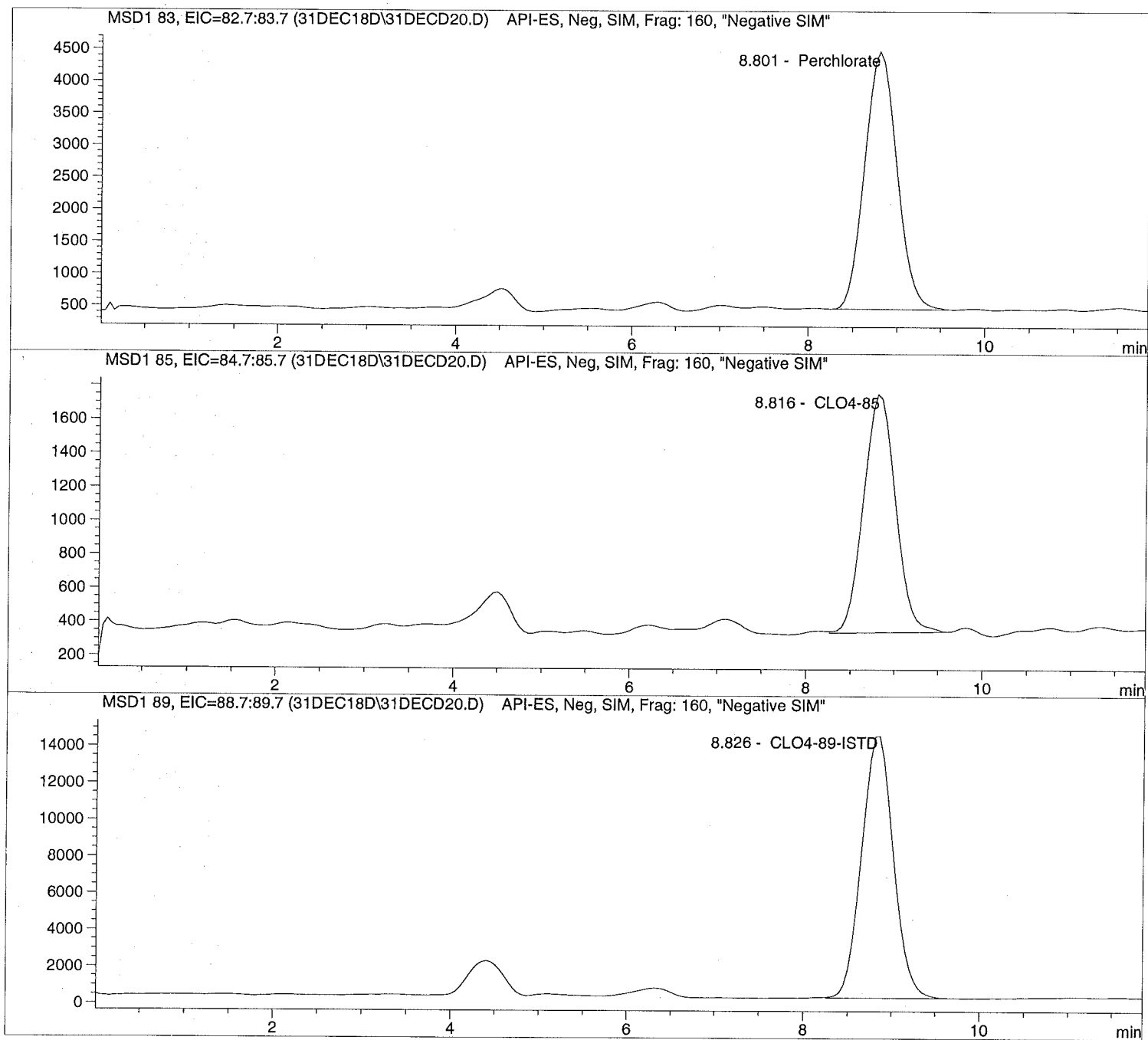
Inj. Vol.: 30  $\mu$ l

Acq. Method: CLO4-AQN.M

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

Last Changed: 12/3/2018 12:46:06

Perchlorate analysis



```
=====
Injection Date: 12/31/2018 12:44:27      Seq Line:          20
Sample Name:    634664  LODV@1.          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:  1.000
=====
```

## ===== LCMS Results =====

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.801	PBA	102099.9	1.0898	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.816	BBA	35737.9	1.1291	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.826	BBA	357627.3	5.0000	CLO4-89-ISTD

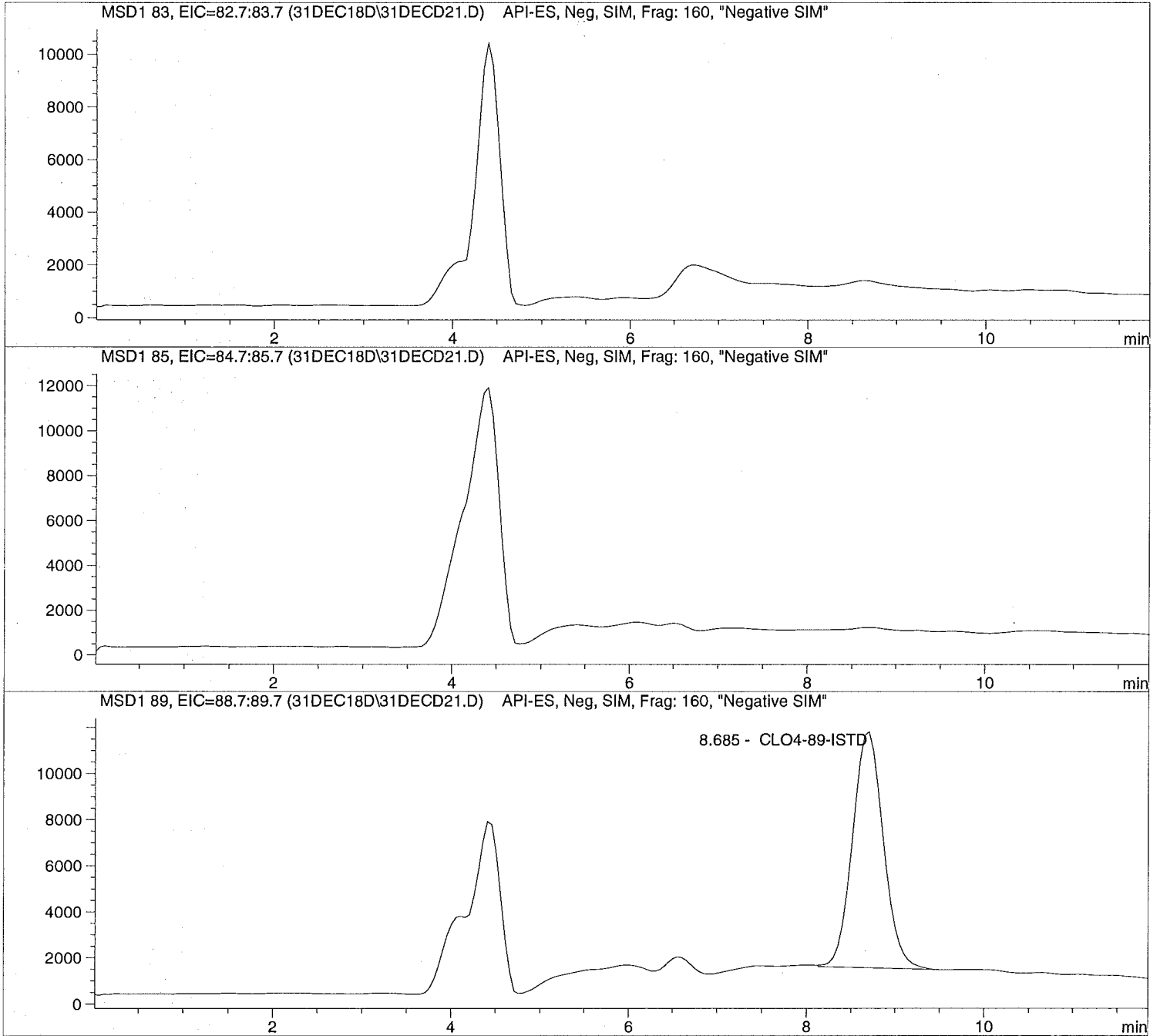
=====
\*\*\* End of Report \*\*\*

Injection Date: 12/31/2018 12:58:12  
Sample Name: 1835586008  
Acq Operator: TNB

Seq Line: 21  
Location: Vial 88  
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



```
=====  
Injection Date: 12/31/2018 12:58:12      Seq Line:          21  
Sample Name:   1835586008                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
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
8.685	BBA	249985.3	5.0000	CLO4-89-ISTD

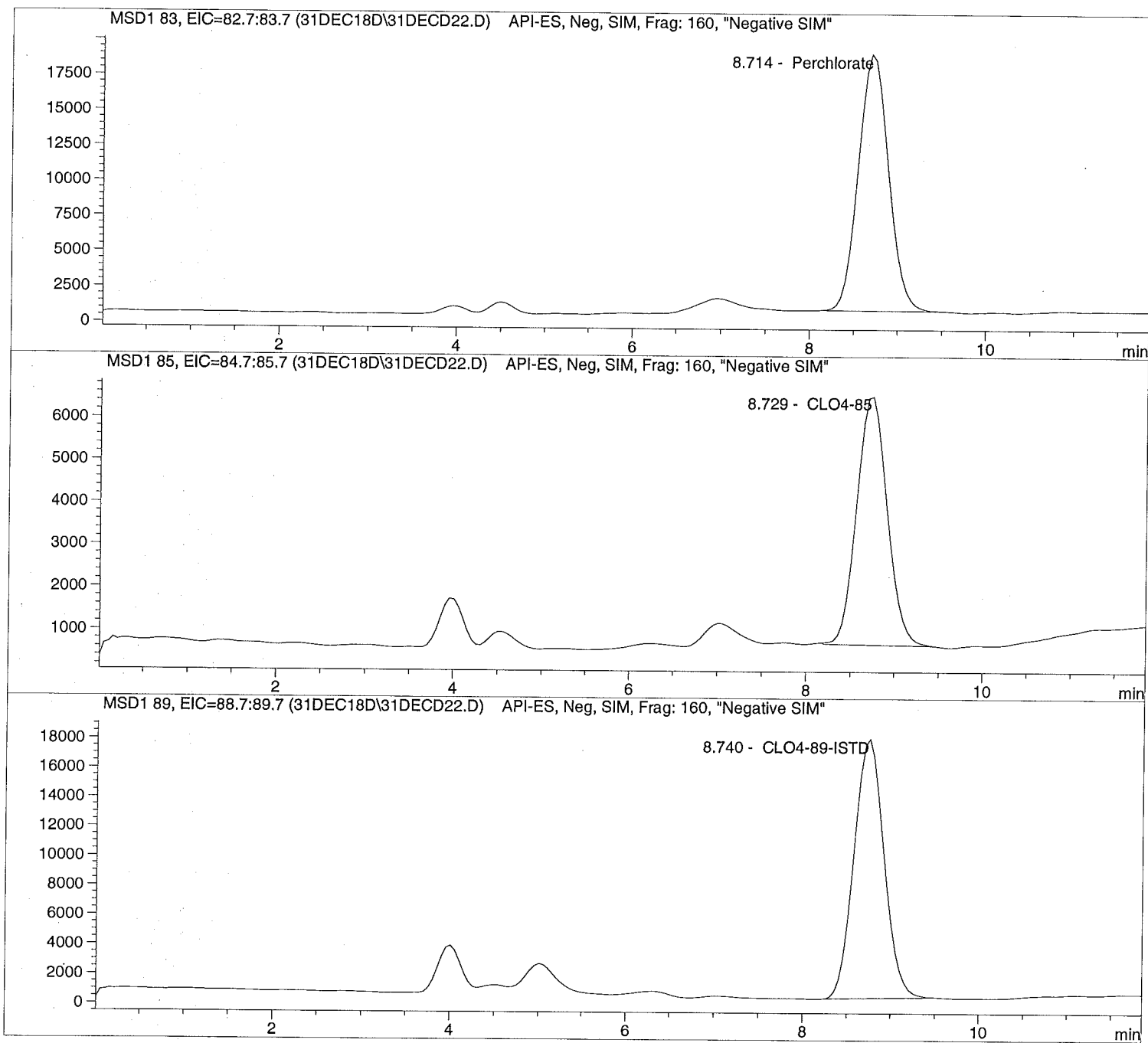
=====  
\*\*\* End of Report \*\*\*  
=====

Injection Date: 12/31/2018 13:12:01  
Sample Name: 1835586009  
Acq Operator: TNB

Seq Line: 22  
Location: Vial 89  
Inj. No.: 1  
Inj. Vol.: 30  $\mu$ l

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

Perchlorate analysis



```
=====
Injection Date: 12/31/2018 13:12:01      Seq Line:           22
Sample Name:    1835586009                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:       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
8.714	BBA	433756.5	3.3857	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.729	BBA	141588.7	3.5869	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.740	PBA	419706.2	5.0000	CLO4-89-ISTD

```
=====
*** End of Report ***
=====
```

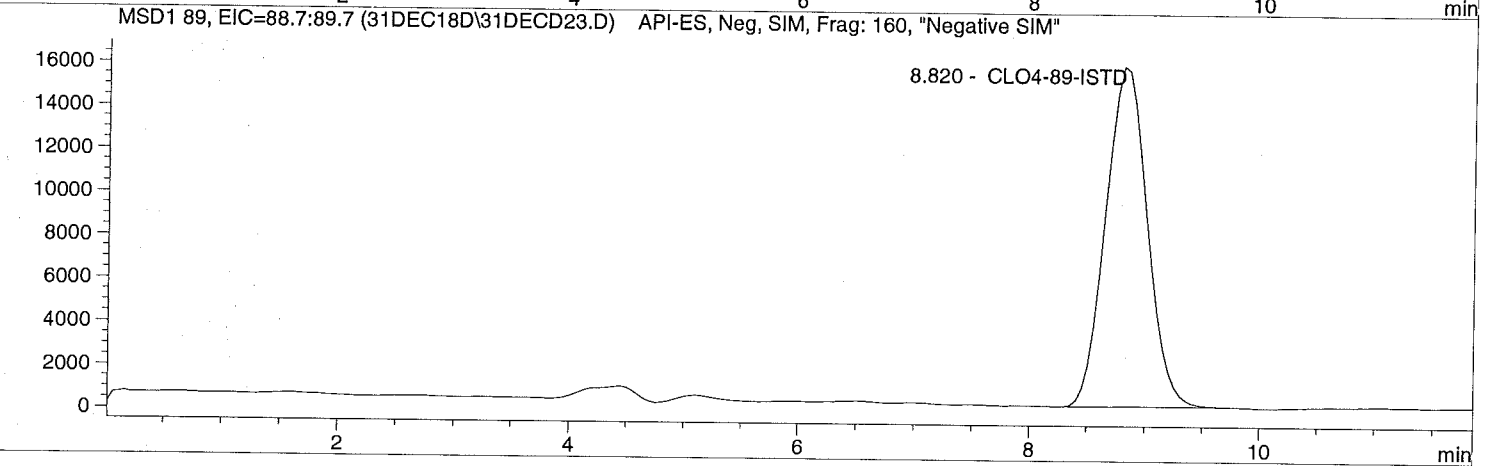
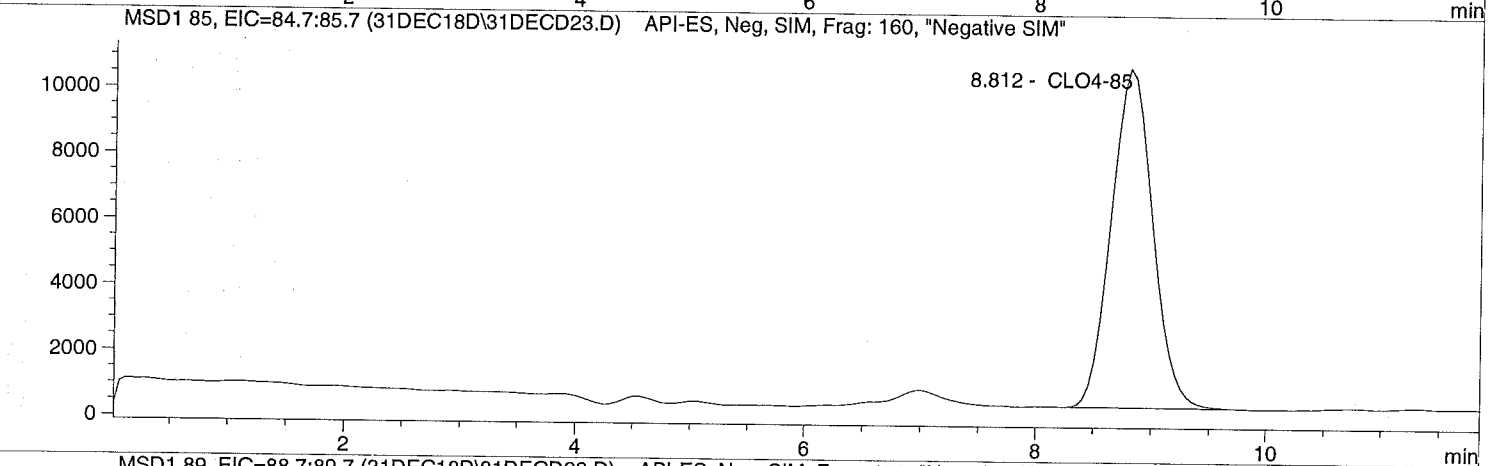
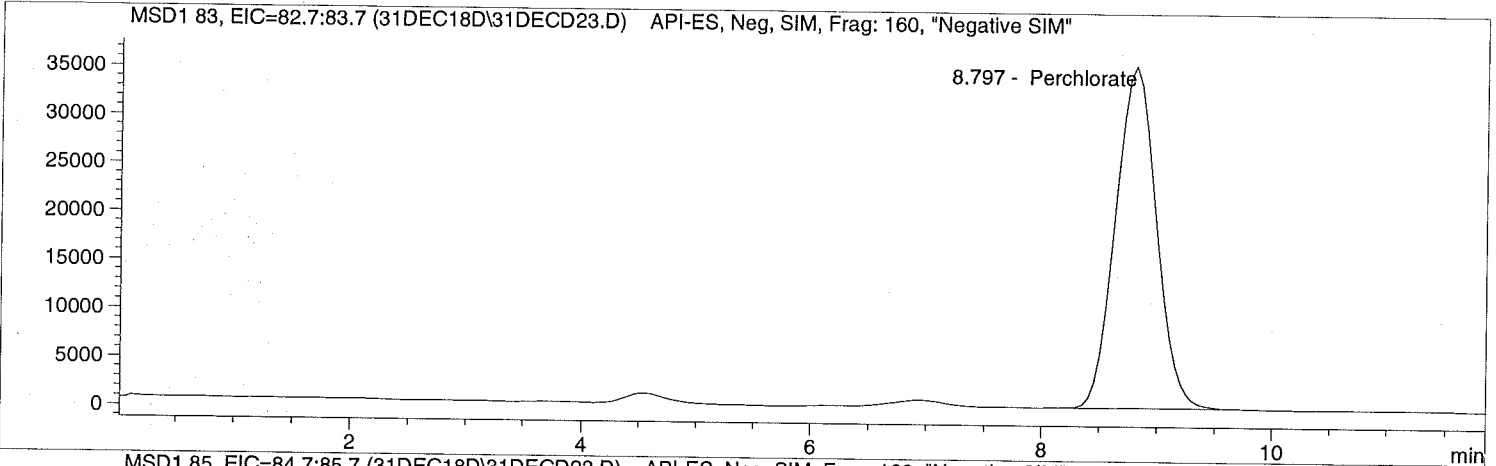


Injection Date: 12/31/2018 13:25:49  
Sample Name: 1835589001  
Acq Operator: TNB

Seq Line: 23  
Location: Vial 90  
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



```

=====
Injection Date: 12/31/2018 13:25:49      Seq Line:          23
Sample Name:   1835589001                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
8.797	BBA	862874.8	6.9170	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.812	PBA	257705.9	6.8373	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.820	PBA	392953.1	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

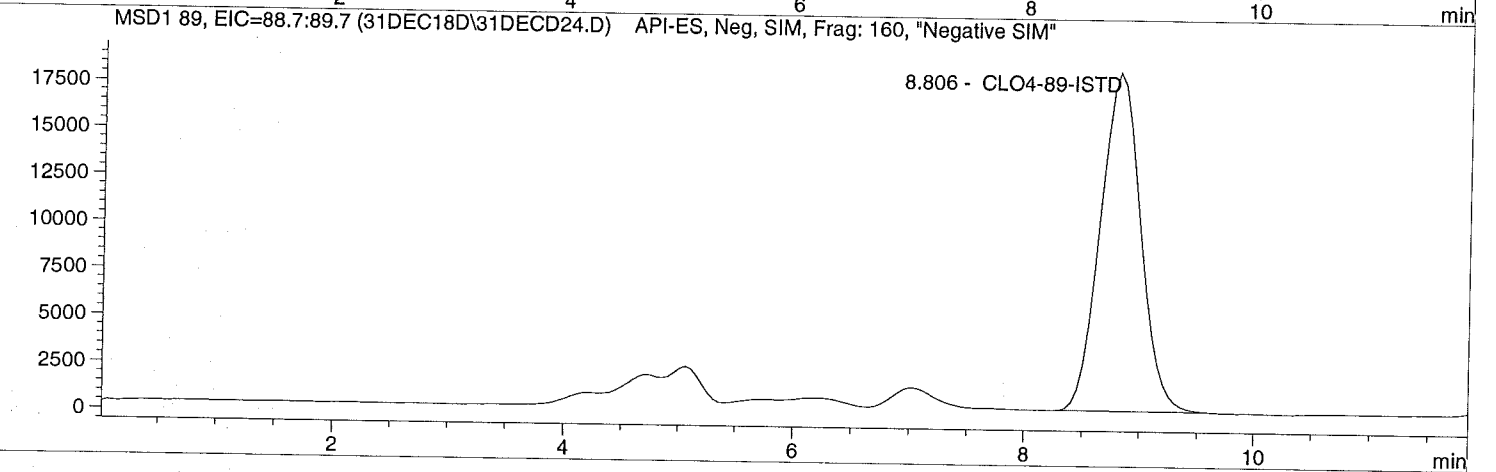
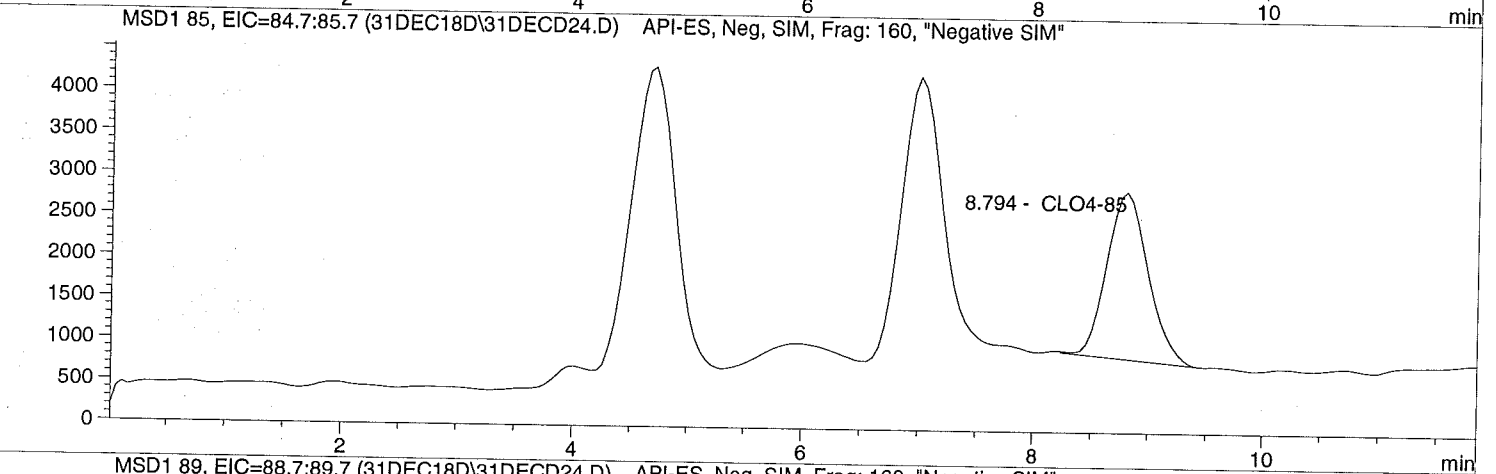
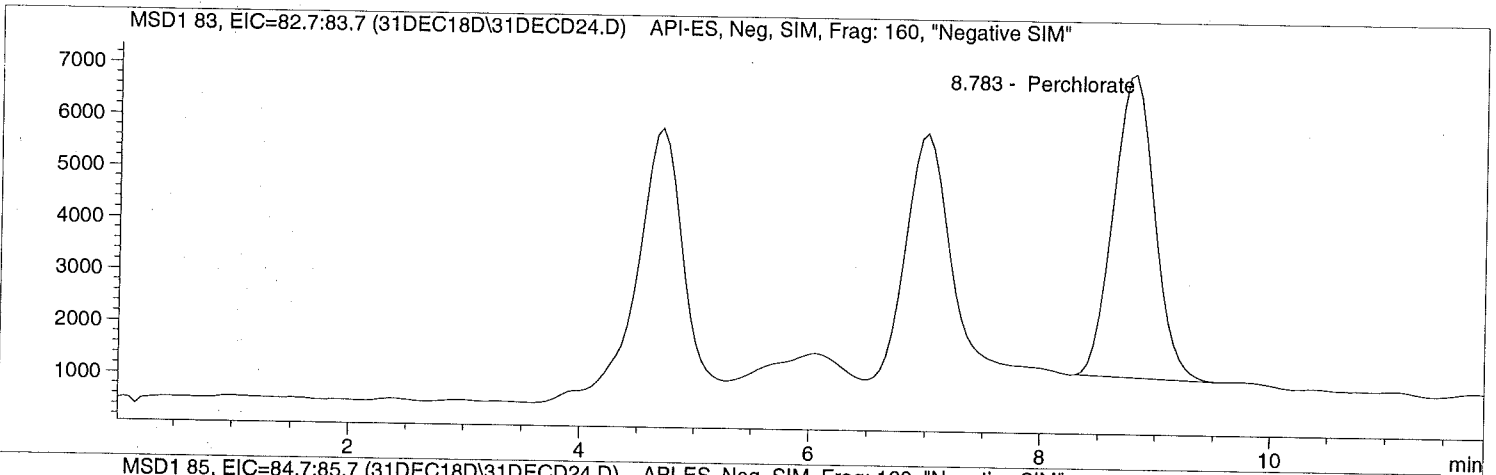
```

Injection Date: 12/31/2018 13:39:38  
Sample Name: 1835589002  
Acq Operator: TNB

Seq Line: 24  
Location: Vial 91  
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



```
=====
Injection Date: 12/31/2018 13:39:38      Seq Line:          24
Sample Name:    1835589002              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:       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
8.783	PBA	146153.0	1.2321	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.794	BBA	50344.5	1.2783	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.806	PBA	440634.0	5.0000	CLO4-89-ISTD

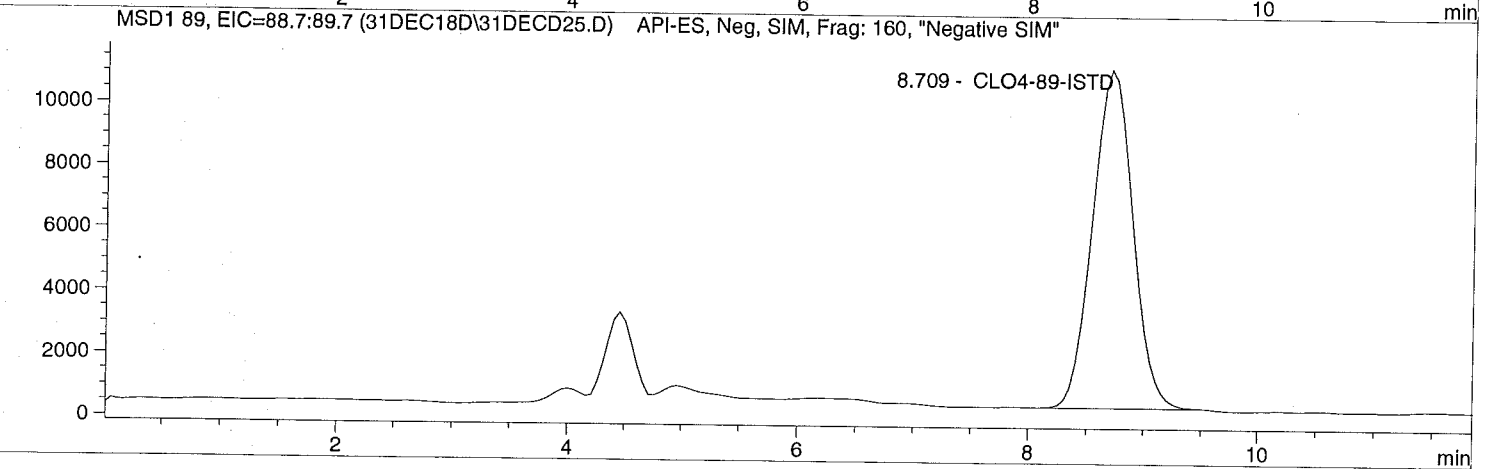
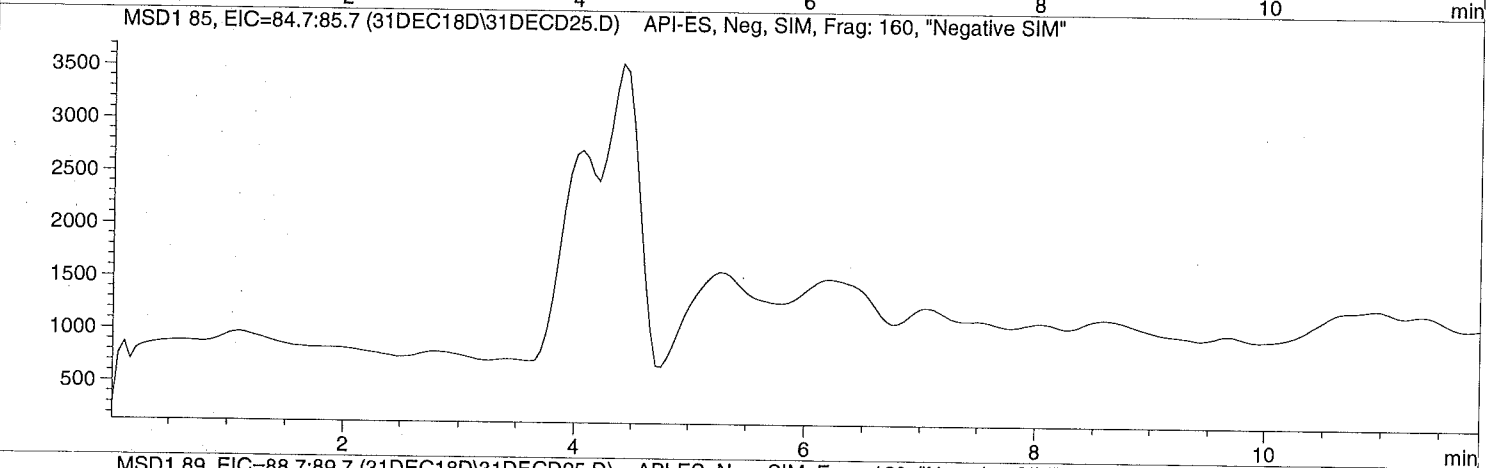
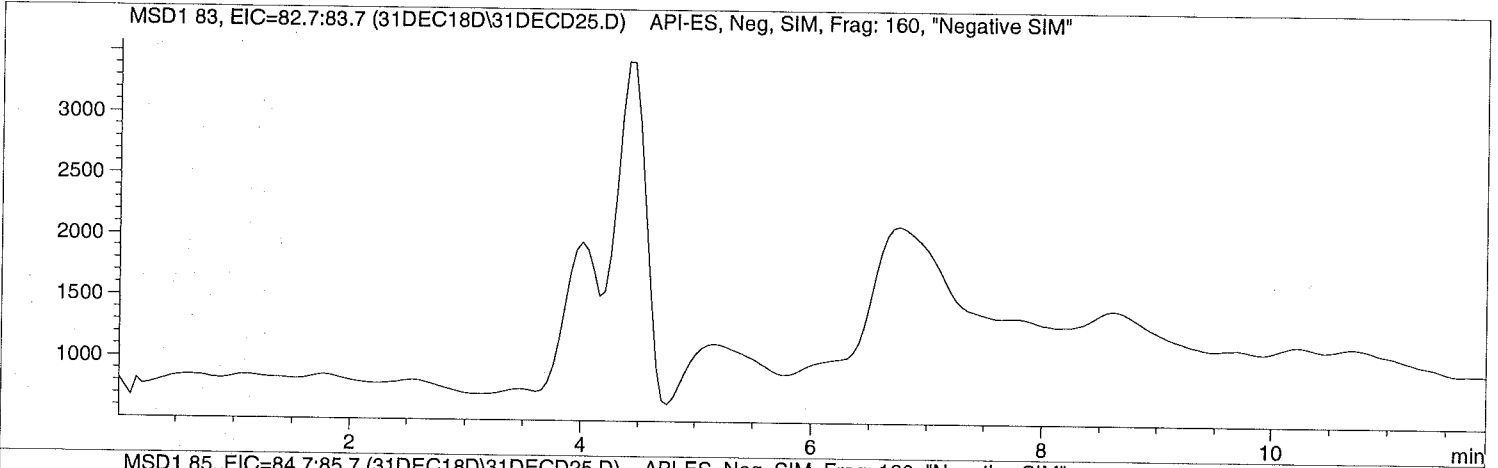
=====
\*\*\* End of Report \*\*\*
=====

=====  
Injection Date: 12/31/2018 13:53:22  
Sample Name: 1835589003  
Acq Operator: TNB

Seq Line: 25  
Location: Vial 92  
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  
=====



```
=====
Injection Date: 12/31/2018 13:53:22      Seq Line:          25
Sample Name:    1835589003                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-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
8.709	BBA	263354.0	5.0000	CLO4-89-ISTD

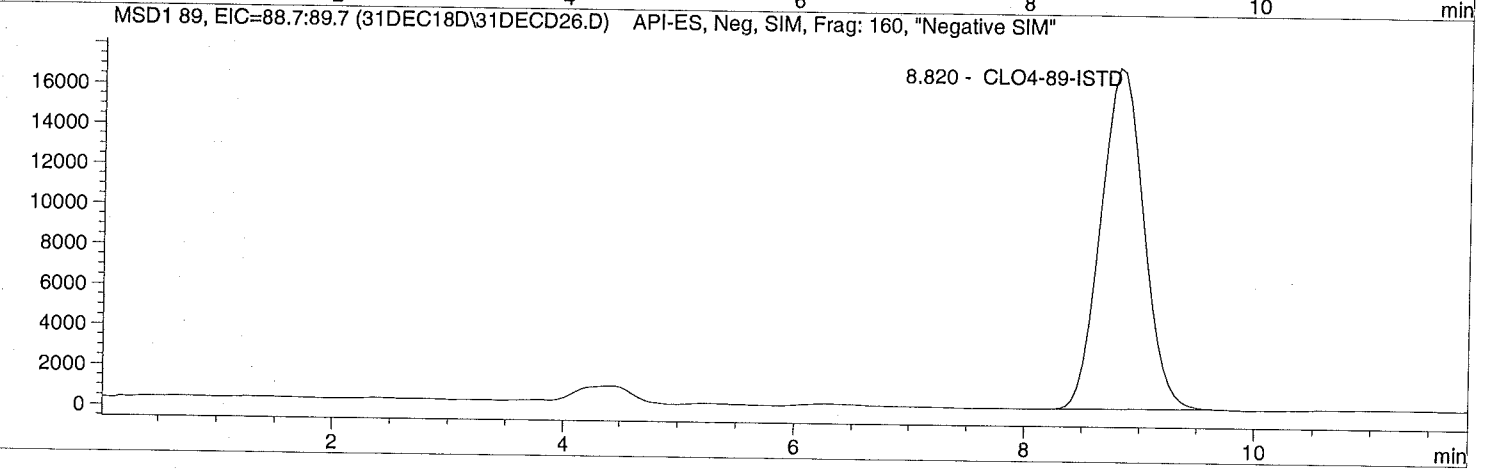
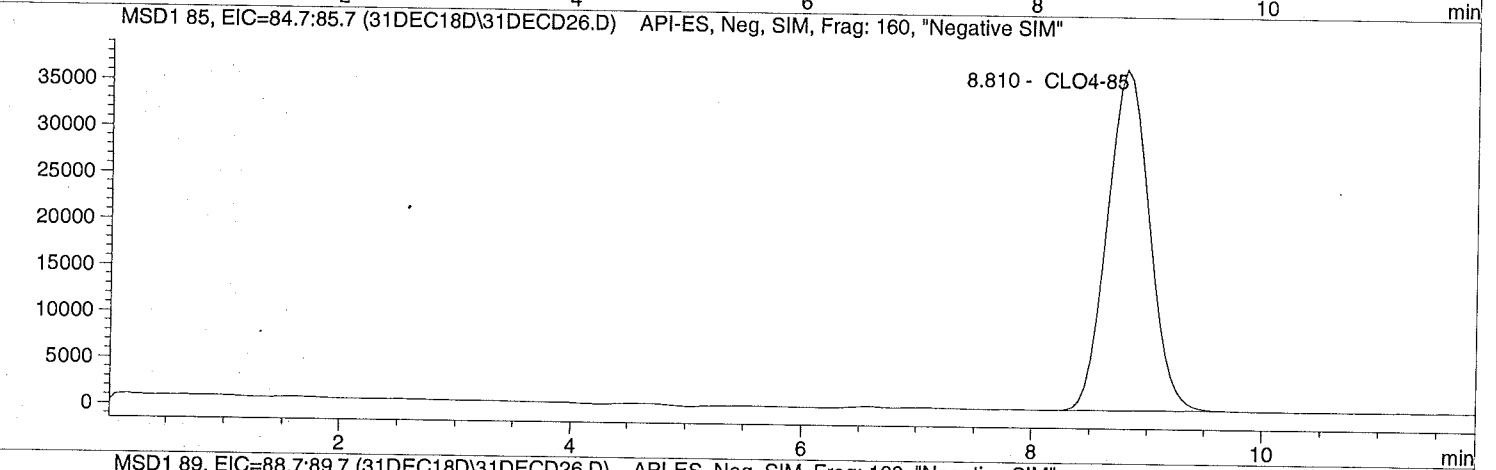
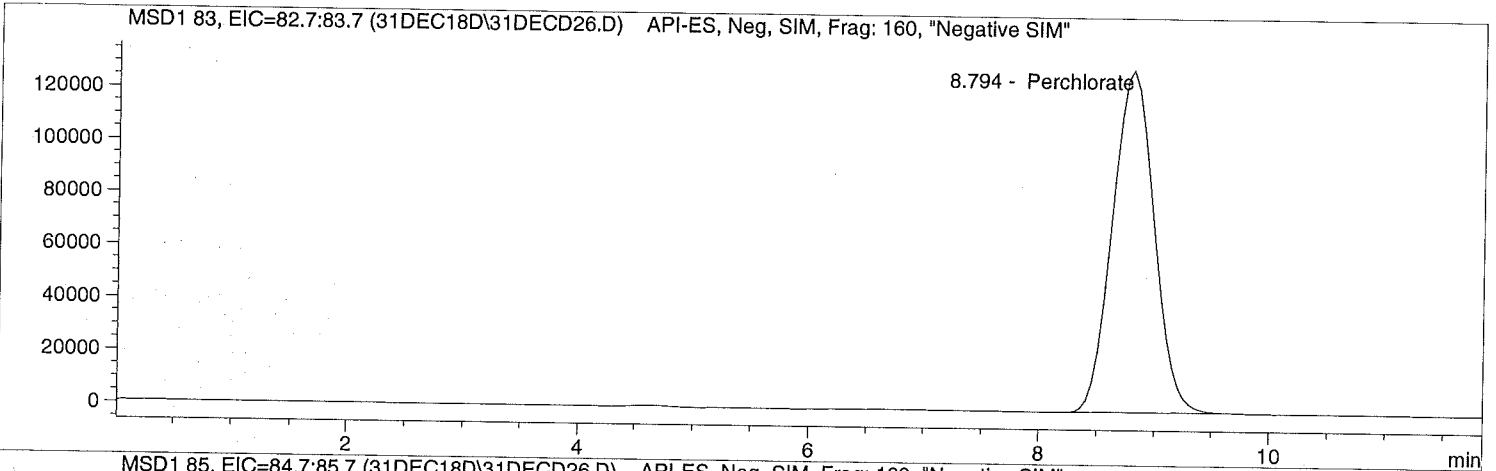
=====
\*\*\* End of Report \*\*\*
=====

Injection Date: 12/31/2018 14:07:05  
Sample Name: 1835589004 10X  
Acq Operator: TNB

Seq Line: 26  
Location: Vial 93  
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



```
=====  
Injection Date: 12/31/2018 14:07:05      Seq Line:          26  
Sample Name:    1835589004 10X          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-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
8.794	PBA	3254305.3	221.5267	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.810	PBA	935943.4	211.7832	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.820	BBA	441113.3	50.0000	CLO4-89-ISTD

=====  
\*\*\* End of Report \*\*\*  
=====

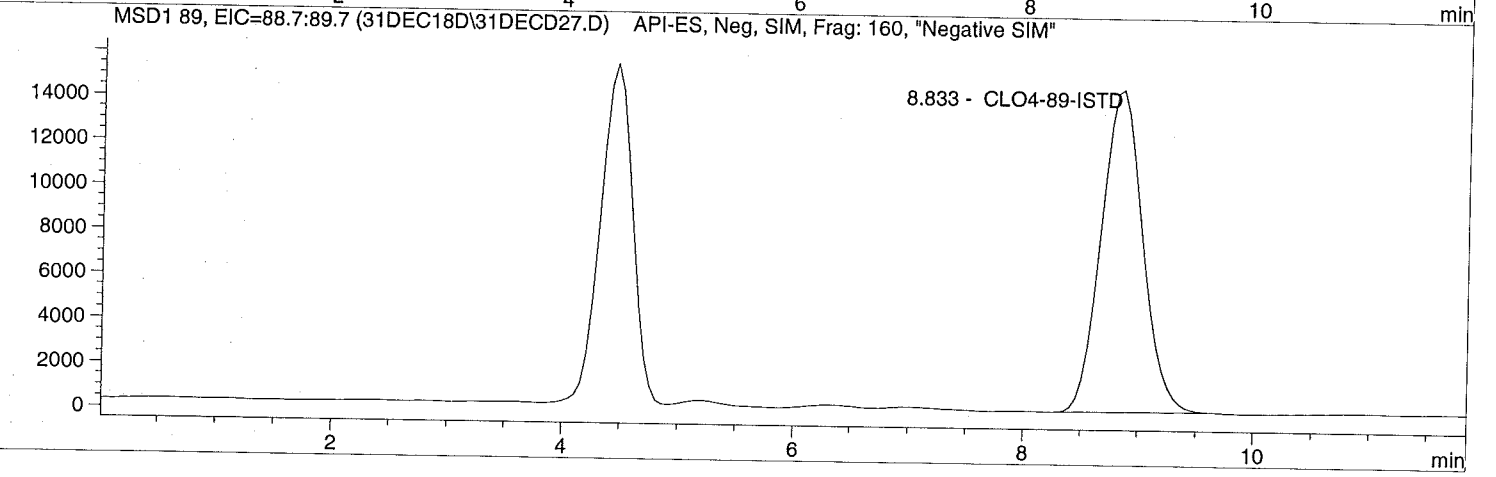
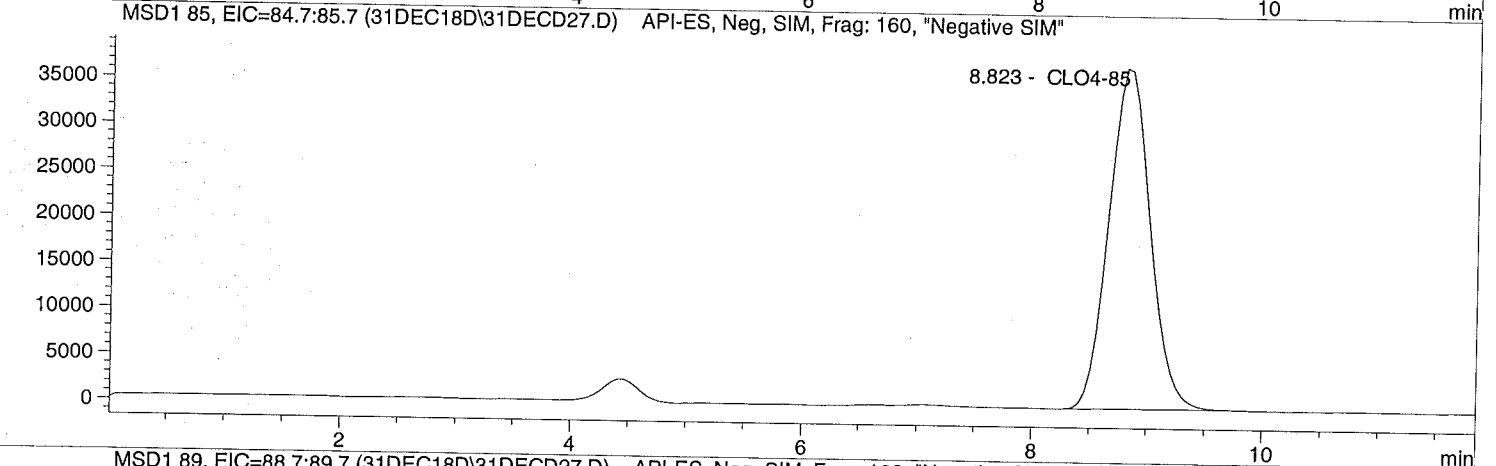
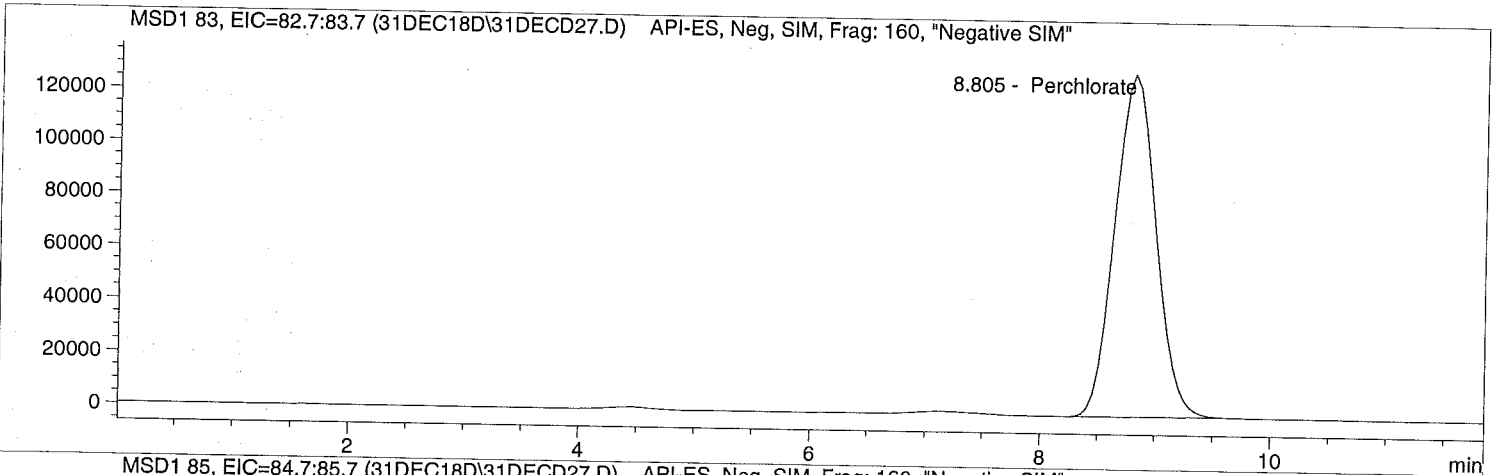


Injection Date: 12/31/2018 14:20:49  
Sample Name: 634665 CCV@25  
Acq Operator: TNB

Seq Line: 27  
Location: Vial 71  
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



```

=====
Injection Date: 12/31/2018 14:20:49      Seq Line:          27
Sample Name:    634665   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
8.805	VBA	3223125.5	26.2109	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.823	PBA	926680.6	25.0170	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.833	PBA	366130.1	5.0000	CLO4-89-ISTD

```

=====
*** End of Report ***
=====

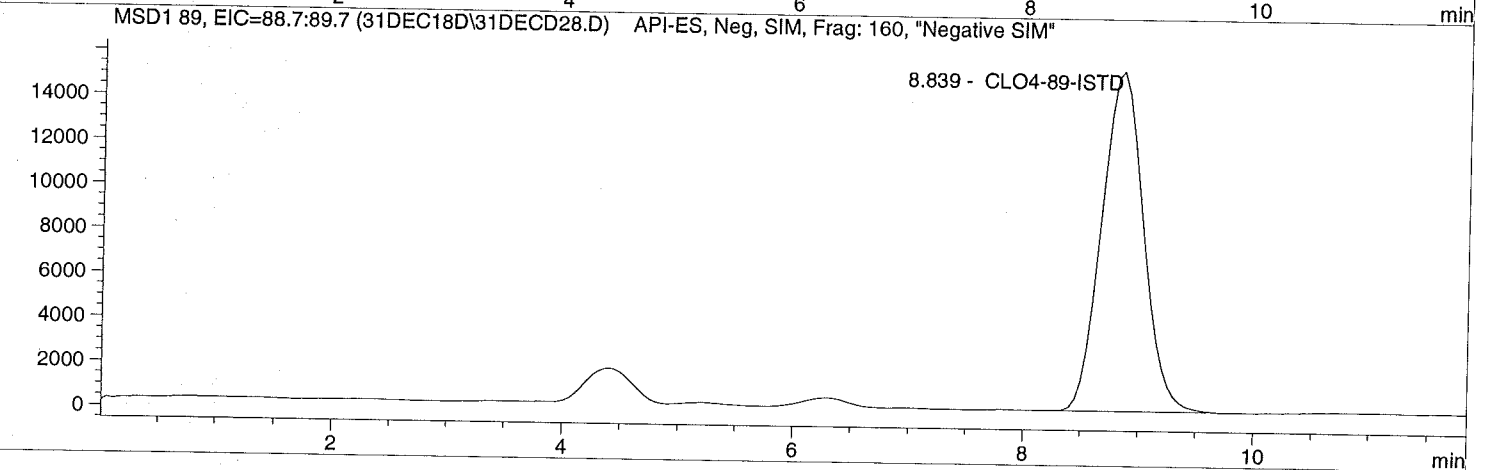
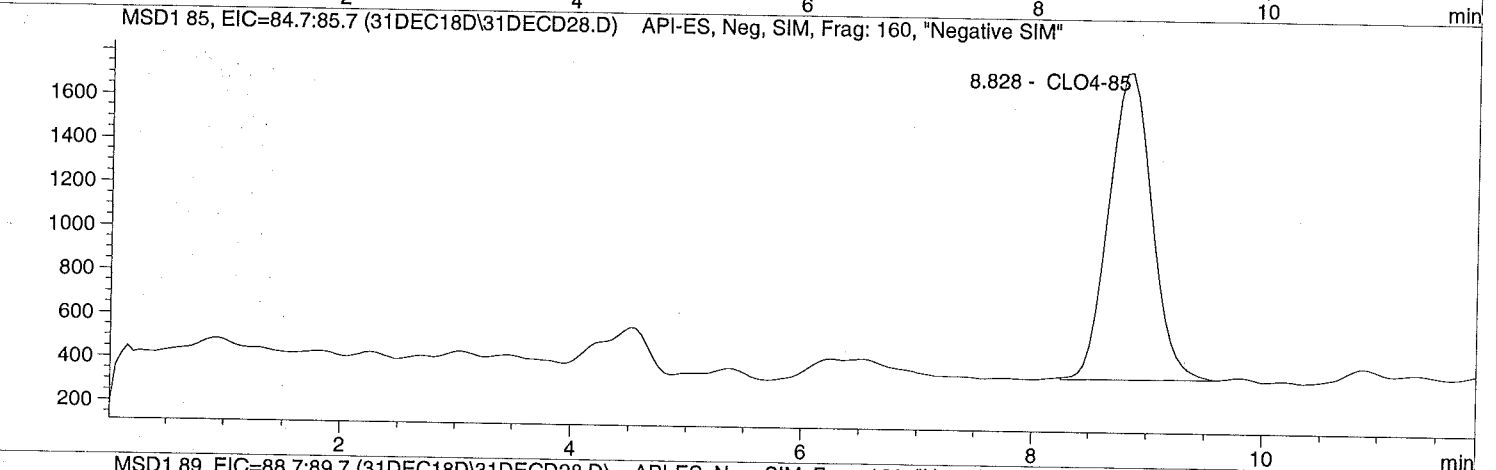
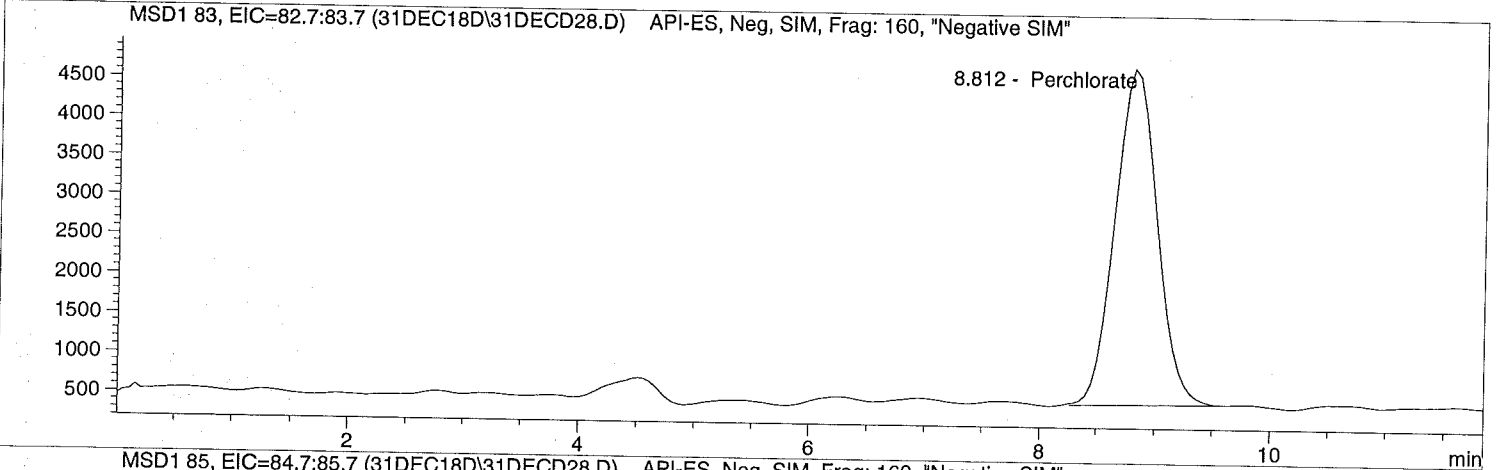
```

Injection Date: 12/31/2018 14:34:33  
Sample Name: 634666 LODV@1.  
Acq Operator: TNB

Seq Line: 28  
Location: Vial 72  
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



Injection Date: 12/31/2018 14:34:33      Seq Line: 28  
Sample Name: 634666 LODV@1.      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: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.812	PBA	107062.6	1.0785	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.828	BBA	36096.5	1.0780	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.839	BBA	379872.9	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 (Amt) (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	Lvl	Amount	Area	Amt/Area	Ref	Grp	Name
[min]	Sig						
9.287	1	1.00000	9.40790e4	1.06294e-5	1		Perchlorate
		2.00000	2.26957e5	8.81224e-6			
		5.00000	5.50307e5	9.08584e-6			
		10.00000	1.07623e6	9.29172e-6			
		25.00000	2.88097e6	8.67764e-6			
		50.00000	6.29507e6	7.94272e-6			
		75.00000	9.45737e6	7.93033e-6			
9.314	3	5.00000	3.79545e5	1.31737e-5	+I1		CLO4-89-ISTD
		5.00000	3.52582e5	1.41811e-5			
		5.00000	3.66805e5	1.36312e-5			
		5.00000	3.56815e5	1.40129e-5			
		5.00000	3.32340e5	1.50448e-5			
		5.00000	3.59393e5	1.39124e-5			
		5.00000	3.45193e5	1.44847e-5			
9.316	2	1.00000	3.17987e4	3.14479e-5	1		CLO4-85
		2.00000	7.05436e4	2.83513e-5			
		5.00000	1.69833e5	2.94406e-5			
		10.00000	3.31565e5	3.01600e-5			
		25.00000	8.62978e5	2.89695e-5			
		50.00000	1.91847e6	2.60625e-5			

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

RetTime [min]	Lvl Sig	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

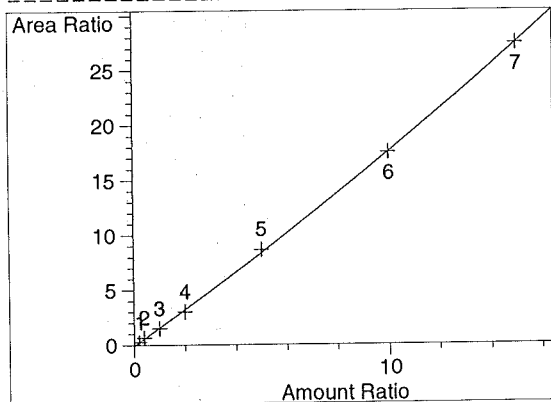
Calibration Level Weights:/

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  
 =====

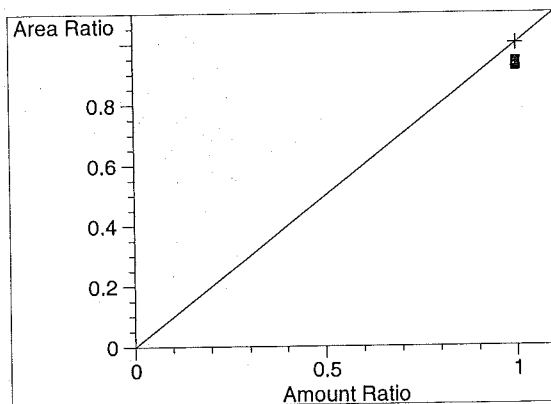
=====  
 \*\*\*No Entries in table\*\*\*  
 =====



=====  
 Calibration Curves  
 =====


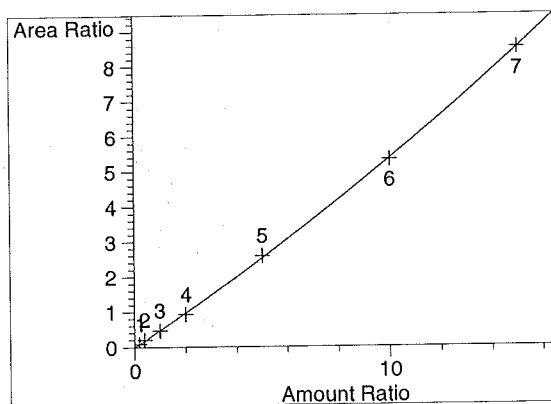
Perchlorate at exp. RT: 9.287  
 MSD1 83, EIC=82.7:83.7  
 Correlation: 0.99971  
 Residual Std. Dev.: 0.16701  
 Formula:  $y = ax^2 + bx + c$   
 a: 1.45482e-2  
 b: 1.61590  
 c: -6.73998e-2  
 x: Amount Ratio  
 y: Area Ratio

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

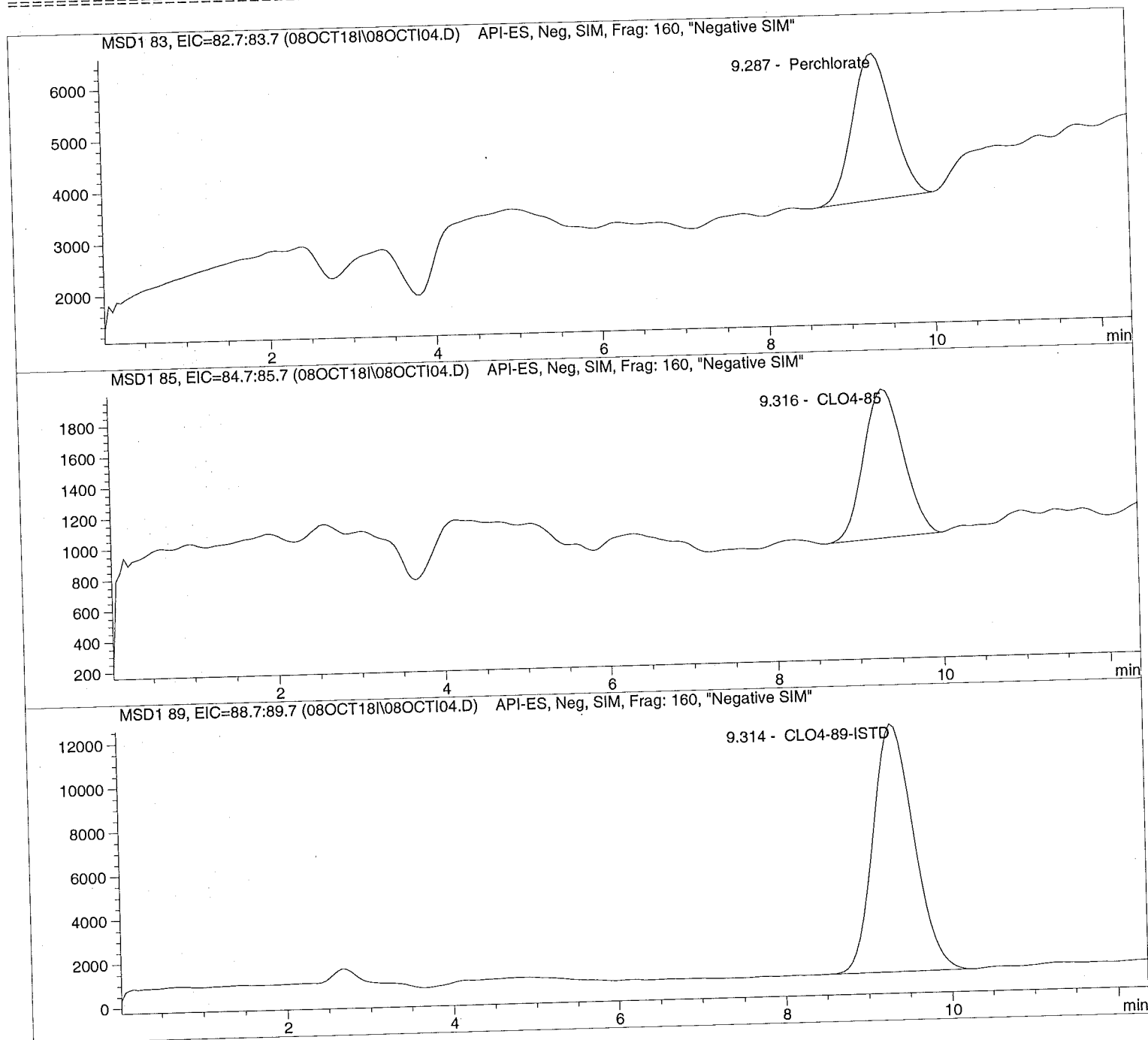
Sample Name: CLO4@ 1.0ug/L

Injection Date: 10/08/2018 11:37:35  
Sample Name: CLO4@ 1.0ug/L  
Acq Operator: TNB

Seq Line: 4  
Location: Vial 74  
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 ***
=====

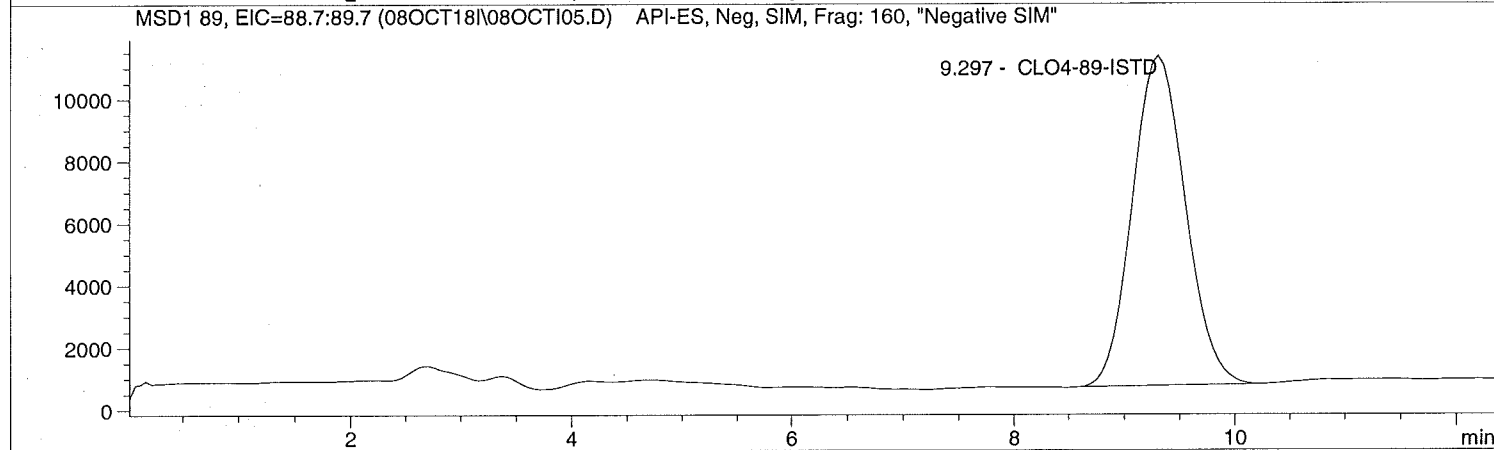
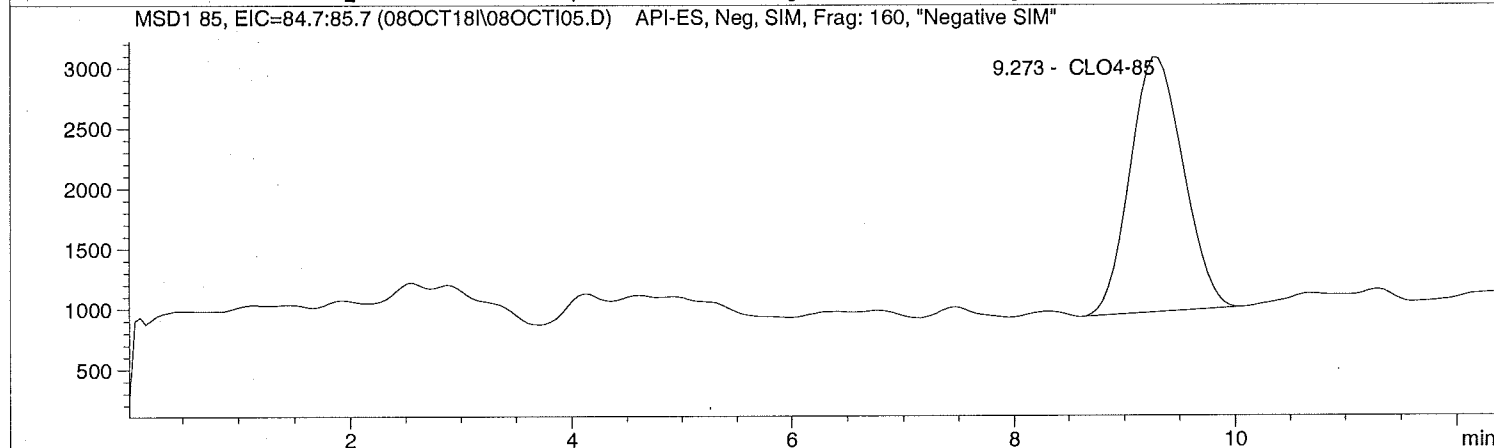
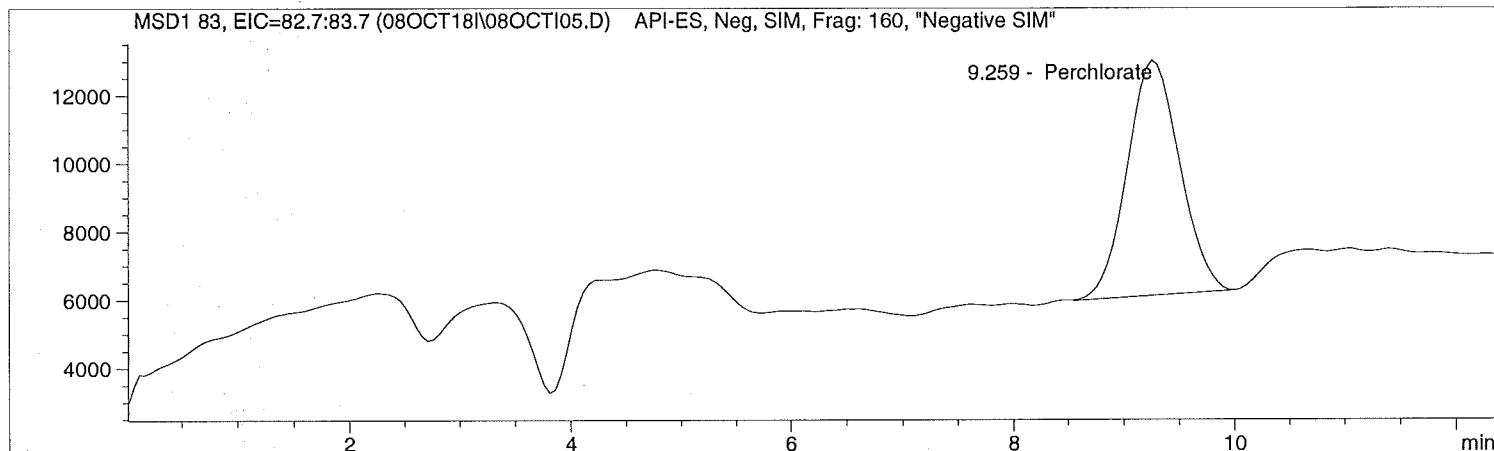
```

=====  
Injection Date: 10/08/2018 11:51:45  
Sample Name: CLO4@ 2.0ug/L  
Acq Operator: TNB

Seq Line: 5  
Location: Vial 75  
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

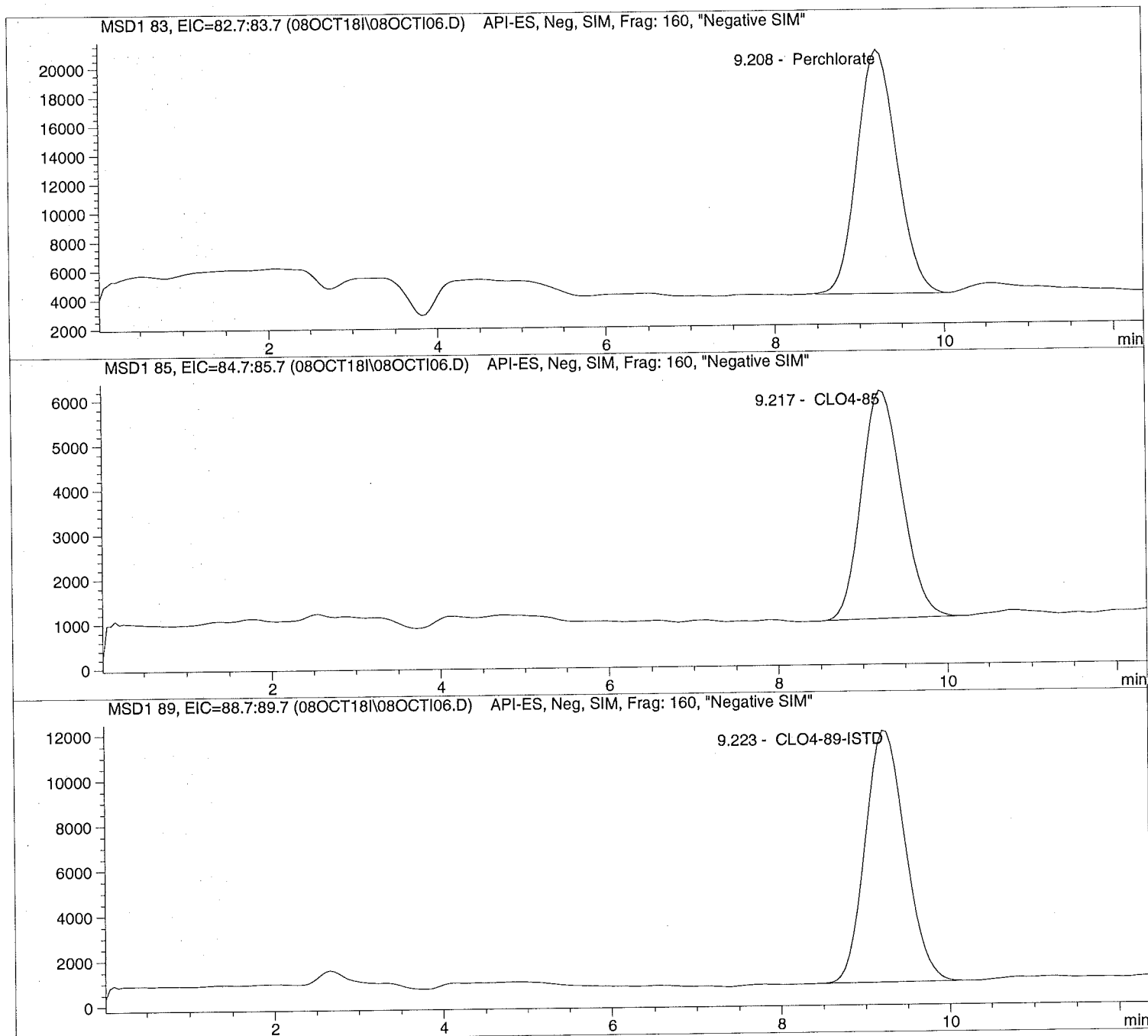
Sample Name: CLO4@ 5.0ug/L

Injection Date: 10/08/2018 12:05:59  
Sample Name: CLO4@ 5.0ug/L  
Acq Operator: TNB

Seq Line: 6  
Location: Vial 76  
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



```
=====  
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

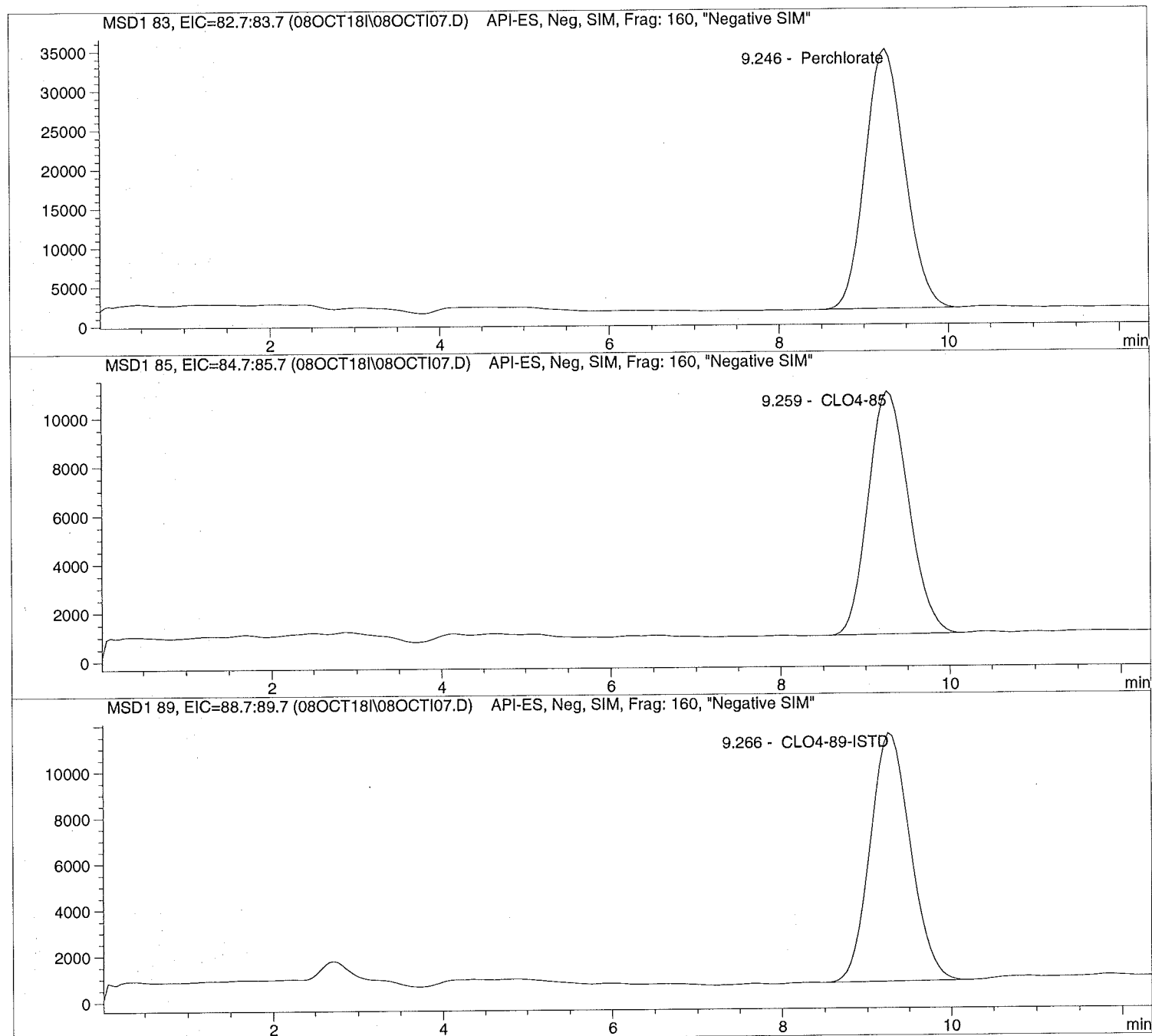
Sample Name: CLO4@ 10.ug/L

=====  
Injection Date: 10/08/2018 12:20:10  
Sample Name: CLO4@ 10.ug/L  
Acq Operator: TNB

Seq Line: 7  
Location: Vial 77  
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 ***
=====

```