

**LONGHORN ARMY
AMMUNITION PLANT
KARNACK, TEXAS**

**ADMINISTRATIVE
RECORD**

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KARNACK, TEXAS
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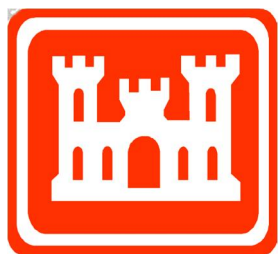
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**QUARTERLY EVALUATION REPORT
2ND QUARTER (April-June) 2017
GROUNDWATER TREATMENT PLANT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS**

Prepared For:



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

Prepared By:



AECOM Technical Services, Inc.

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Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
AMCV	Air Monitoring Concentration Value
amsl	Above Mean Sea Level
bgs	Below Ground Surface
CD	Compact Disc
CoC	Chemical of Concern
COD	Chemical Oxygen Demand
ESD	Explanation of Significant Differences
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	Ground Water Treatment Plant
HDPE	High Density Polyethylene
HCl	Hydrochloric Acid
ICT	Interception-Collection Trench
IRA	Interim Remedial Action
lbs/hr	Pounds Per Hour
L	Liter
LHAAP	Longhorn Army Ammunition Plant
MC	Methylene Chloride
Mg(OH) ₂	Magnesium Hydroxide
mV	Millivolt
NA	Not Applicable
NaOH	Sodium Hydroxide
ORP	Oxidation-Reduction Potential
pH	Negative logarithm of hydrogen ion concentration
PID	Photoionization Detector
ppmv	Parts Per Million by Volume

psi	Pounds Per Square Inch
ROD	Record of Decision
TAC	Texas Administrative Code
TCE	Trichloroethene
TCEQ	Texas Commission On Environmental Quality
TOC	Total Organic Carbon
tpy	Tons Per Year
UEP	Unlined Evaporation Pond
µg/L	Microgram Per Liter
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

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

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

The location of the extraction wells and ICTs are shown in **Figure A-1** of **Appendix A**. The process flow diagram of the GWTP is shown in **Figure A-2** of **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 January 2012 and June 2017.

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 tank (TK-140) were treated. The treated water was re-circulated through the fluidized bed reactor (FBR) to revive the FBR after three months of dormancy. Treated groundwater and air samples were collected and analyzed respectively for perchlorate, metals, and volatile organic compounds (VOCs); and VOCs only. On September 19, 2012, a second pilot run was performed at the GWTP and 107,264 gallons of water were treated. Based on the successful re-start of the GWTP, continuous groundwater extraction began again on September 24, 2012. While groundwater extraction occurs on a continuous basis, operation of the GWTP occurs intermittently due to the low volume of water available for treatment with respect to the design capacity of the GWTP. During the 3rd quarter 2012, groundwater extraction occurred only from LHAAP-18/24. Groundwater extraction from LHAAP-16 was not performed due to equipment failure. However, extraction from LHAAP-16 began in October 2012 and the extraction volumes increased steadily throughout the 4th quarter

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-130) 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 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 TK-140 Equalization Tank. Because of the acid release, extraction of groundwater from 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.

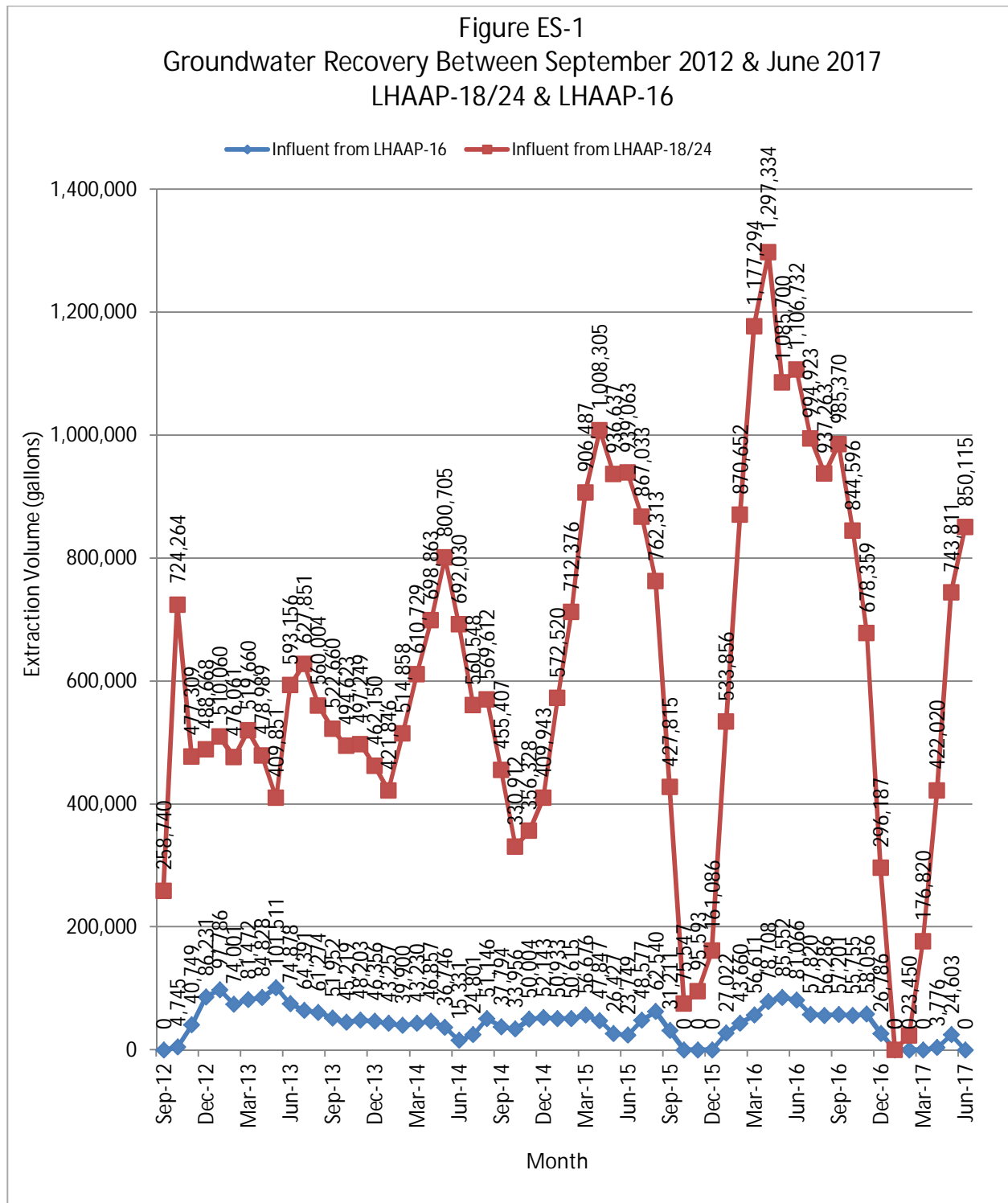
As indicated in **Figure ES-1**, the total extracted groundwater volume from LHAAP-18/24 during the 2nd quarter of 2017 increased from the previous quarter as the GWTP resumed normal operations after the spill. Extraction quantities in LHAAP-18/24 ranged between 422,021 gallons in April 2017 and 850,115 gallons in June 2017. Extraction from LHAAP-16 ranged between 0 gallons in June 2017 and 24,603 gallons in May 2017. Approximately 2,044,325 gallons of groundwater were extracted from LHAAP-18/24 and LHAAP 16 during the 2nd quarter of 2017 compared to approximately 200,270 gallons extracted during the 1st quarter of 2017. 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.

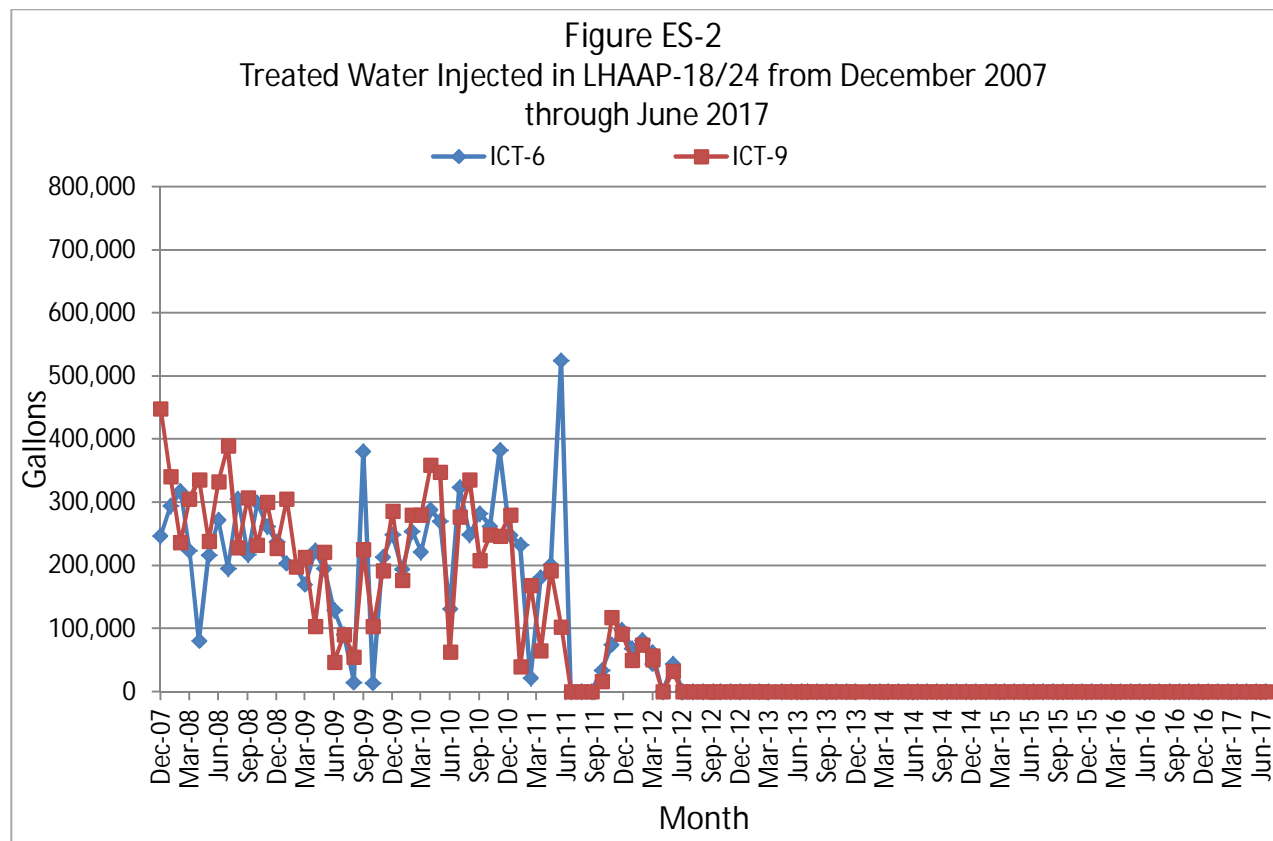
The average discharged flowrate from the GWTP was calculated as 15 gallons per minute (gpm) during the 2nd quarter of 2017, with 580,868 gallons of groundwater discharged to Harrison Bayou, and 1,102,798 gallons discharged to the INF Pond. Grab perchlorate samples from the GWTP influent were collected on April 5, April 12, April 19, April 26, May 3, May 10, May 24, and June 7 2017 and the following concentrations were reported: <0.2 micrograms per liter ($\mu\text{g/L}$), 6,630 $\mu\text{g/L}$, 8,930 $\mu\text{g/L}$, 10,800 $\mu\text{g/L}$, 10,100 $\mu\text{g/L}$, 10,800 $\mu\text{g/L}$, 12,000 $\mu\text{g/L}$, and 10,900 $\mu\text{g/L}$, respectively. The average perchlorate concentration in the GWTP influent during the quarter was 8,770 $\mu\text{g/L}$. No perchlorate concentrations in any effluent (TK-650) samples exceeded the effluent limits during the quarter. Release of treated groundwater from the GWTP occurred only after the perchlorate concentration was below the discharge limit, and flow in Harrison Bayou was adequate.

No treated water was returned to ICTs 6 and 9 during the 2nd quarter of 2017, because this practice was discontinued after system restart in September 2012. The treated water quantities returned to LHAAP-18/24 through the injection system each month since January 2008 are shown on **Figure ES-2**.

The groundwater volume processed at the GWTP ranged from a low of approximately 454,860 gallons in April 2017 to a high of approximately 896,514 gallons in May 2017. Total water processed for the 2nd quarter was approximately 2,241,765 gallons. The three month average was approximately 747,255 gallons per month. The water quantities treated each month since June 2012 are shown on **Figure ES-3**. The total volume of water processed in the 2nd quarter (2,241,765 gallons) is higher than the volume of water discharged (1,937,949 gallons). The reason for the difference is the change in volume stored in/released from the GWTP, the amount of water lost with the removed metals precipitation sludge, and the amount of evaporative water lost in the air stripper (which is included in the volume extracted, but not in the volume discharged). The difference is also affected by the amount of water returned to TK-140 directly from rain water, filter press water, and thickeners' decant water (these sources are captured in the water discharged, but not in the volume extracted).

The difference between the volume of water extracted (approximately 2,044,325 gallons) and the water volume discharged (approximately 1,937,949 gallons) can be due to storage within the GWTP and the INF Pond.





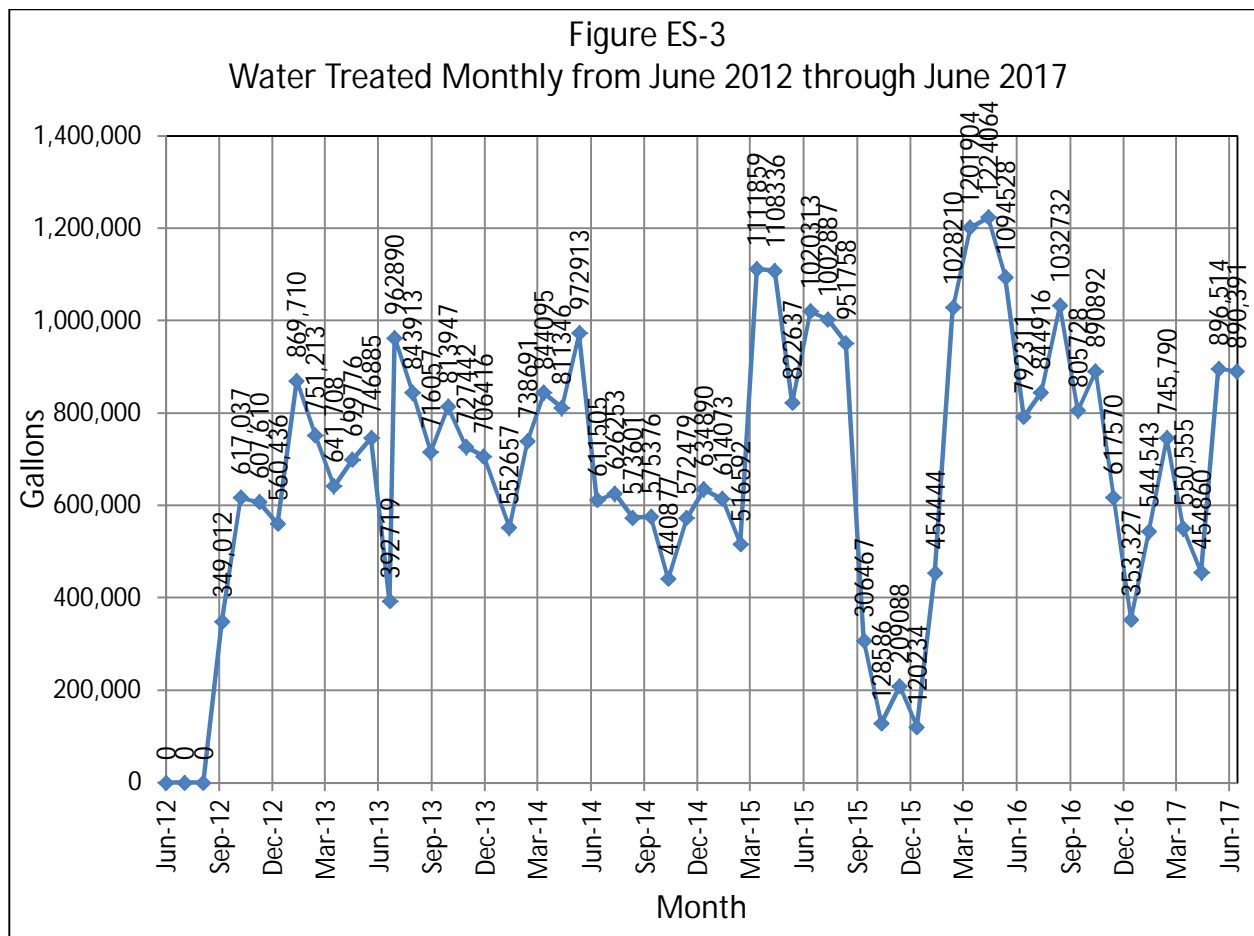


Table ES-1: Discharge Information to Harrison Bayou during 2nd Quarter 2017*

Date	HB Flow (gpm)	Maximum Rate Allowed (gpm)	Maximum Rate Allowed (gallons in 24 hours)	Released From GWTP To Harrison Bayou (gallons)	Released From INF Pond to Harrison Bayou (gallons)	Combined Total Released to Harrison Bayou
04/03/2017	FLOOD STAGE	MAXIMUM	300,000	5,531	0	5,531
04/04/2017	FLOOD STAGE	MAXIMUM	300,000	17,534	0	17,534
04/09/2017	725	38	54,720	29,002	0	29,002
04/10/2017	607	32	46,080	39,829	0	39,829
04/11/2017	757	40	57,600	21,142	0	21,142
06/01/2017	1585	433	623,520	32,880	0	32,880
06/02/2017	1170	320	460,800	33,500	0	33,500
06/03/2017	5714	697	1,003,680	21,620	0	21,620
06/04/2017	Flood Stage	MAXIMUM	300,000	33,298	136,515	169,813
06/05/2017	Flood Stage	MAXIMUM	300,000	42,721	125,560	168,281
06/06/2017	27152	4516	6,503,040	33,231	104,625	137,856
06/07/2017	12975	2793	4,021,920	32,510	83,694	116,204
06/08/2017	5865	1262	1,817,280	30,864	40,180	71,044
06/09/2017	4088	1194	1,719,360	25,578	0	25,578
06/10/2017	2521	736	1,059,840	16,021	0	16,021
06/11/2017	1819	531	764,640	25,722	0	25,722
06/12/2017	1395	358	515,520	36,332	0	36,332
06/13/2017	462	135	194,400	28,178	0	28,178
06/14/2017	218	63	90,720	31,410	0	31,410
06/15/2017	136	39	56,160	27,170	0	27,170
06/16/2017	99	28	40,320	16,795	0	16,795
TOTAL Discharged				580,868	490,574	1,071,442

* Days where discharge occurred are shown.

HB - Harrison Bayou

gpm - gallons per minute

GWTP - Groundwater Treatment Plant

1 EVALUATION OF GWTP

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 Treatment Plant (GWTP) was constructed as part of the Interim Remedial Action (IRA) at Burning Ground 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. 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 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 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., on a semi-continuous operational basis). During the 4th quarter 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 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 hydrochloric acid spill caused plant operations to shut down until the issue could be properly addressed. The FBR performance was challenged by the increased chlorides in the neutralized wastewater, but performance gradually returned to normal in the 1st quarter of 2017. Groundwater extraction was gradually increased to full rates during the 2nd quarter 2017:

- April 1 – ICTs 12E, 13A, 13B, 13C, 13D, 13E, 13F, 14A, 14B, 14C, 14D, and 14E;
- April 11 – All previous plus ICTs 12A and 12B;
- April 19 – All previous plus ICTs 4, 12C, and 12D; and
- May 8 – All ICTs.

Flow rates for the treatment processes for metals and VOCs ranged between 189 and 204 gpm with an average of approximately 206 gpm for the operating hours (i.e., this flow rate does not represent continuous flows). The GWTP operated for 182 hours during the quarter. The process flow diagram is included as **Figure A-2** of **Appendix A**. The treatment configuration of the plant at these rates (with minor variations) is as follows:

GWTP Metals Precipitation Operating Parameters

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

Notes:

gph gallons per hour Mg(OH)₂ magnesium hydroxide NA not applicable
 HCl hydrochloric acid NaOH sodium hydroxide

GWTP Air Compressors Operating Parameters

Air Compressors	K-700A	K-700B	K-701
Air Pressure Settings	88 psi	88 psi	105 psi

Notes:

psi pounds per square inch

GWTP Stripper Operating Parameters

Stripper Tower	
pH Settings	7.4
Inlet Pressure Gauge	Not operational
Stripper Pressure Gauge	Not operational
Air Flow Rate	Not operational

GWTP Fluidized Bed Reactor (FBR) Operating Parameters

Fluidized Bed Reactor	
Carbon Bed Height	12 feet & 8 to 11 inches
Recycle Flow Rate	200 gpm
pH	7 to 7.5
Recycle oxidation-reduction potential (ORP)	-430 mV to -452 mV

Notes:

gpm gallons per minute
 mV millivolts
 ORP oxidation reduction potential

1.2 Work Performed at the GWTP

Work performed at the GWTP during the 2nd quarter of 2017 is described in the following subsections.

1.2.1 Major Maintenance

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

- 4/18/17: Received three Ion Exchange Vessels.
- 4/26/17: Began installation of 2 Ion Exchange Vessels, bag filters and associated piping and pipe supports.
- 4/27/17: Cliff Barrington with Tri-State Electrical was on site to repair phone line at Army Trailer.
- 5/8/17: The Ion Exchange System was brought on-line and the GWTP began extracting, treating, and discharging continuously.
- 5/9/17: Installed a vent line on the 2nd Ion Exchange Vessel. Also installed a 1 ½” tee and pressure gauge in the discharge line of the 2nd Ion Exchange Vessel.
- 5/9/17: Re-started all extraction wells at Site 16. Work was performed on several pumps to allow them to start.
- 5/10/17: Repaired landline phone system and installed a new phone cable to the landline at Scott’s Desk.
- 5/11/17: Worked on computers and PLC to restore proper functionality. A power glitch occurred during a lightning storm, causing errors with the plant computers.
- 5/18/17: Discovered that the Lead Ion Exchange Vessel had a leak at the top of the vessel. Piping was installed to bypass this vessel until a replacement can be installed.
- 5/23/17: Replaced plugged ion exchange vessel with spare and reassembled the piping.
- 5/28/17: Power outage occurred at 5:30 PM on 5/28/17. SWEPCO on site to report outage. Power was restored at 4:30 PM on 5/29/17. FBR was restarted after being down for 23.5 hours.
- 6/2/17: Tri-State Electric (Cliff Barrington) on site to repair electrical problem at Site 16 pump house. He will return at a later date to install new breaker.

1.2.2 Routine Maintenance (GWTP)

The following routine maintenance items were completed at the GWTP during this quarterly reporting period:

- Mowed grass around all directional signs, GWTP, and the Army trailer.
- Performed housekeeping in GWTP, GWTP office, and Army trailer.
- Collected samples from old transformer to analyze for PCB’s and asbestos.

- Bush-hog and weed eat around MMRP signs at Site 003 and discharge valve at Harrison Bayou.
- Install new pump P-104 (acetic acid feed pump).

1.2.2.1 Safety

- No safety training or events 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

- 5/3/17: Ingersoll-Rand was on site to perform quarterly maintenance on K-701 air compressor.

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 Catalytic Oxidation & Continuous Emission Monitor System

- The catalytic oxidizer was not operated during the reporting period.

1.2.2.6 Sand Filter

- No maintenance or repairs were conducted on the sand filter.

1.2.2.7 Well Field at LHAAP-18/24

- Collected monthly water levels.
- Collect monthly flowmeter readings
- Repaired flow meter on ICT 12B.
- Replaced broken 1” tee on ICT 12C.
- Installed new manual flow meter in ICT 11.
- Collected monthly groundwater levels in all wells.
- Cleaned and adjusted low level probes on ICT’s 14C and 14D.
- Mowed around all wells to be sampled.
- Sampled wells at Site 18/24.
- Stored all sampling equipment in sampling connex.

1.2.2.8 Miscellaneous Activities

- Performed chloride and sulfate analysis.
- Collected velocity readings in Harrison Bayou.

- Removed foam insulated enclosure from around FBR chemical pumps.
- Cleared brush and mowed around wells to be painted at Site 46.
- Mixed new batch of nutrients for FBR.
- Cleaned and painted wells at Site 46.
- Installed new hinge on well LHSMW16 at Site 46.
- Repaired rutted road beside GWTP.
- Collected samples at Site 02.
- Assisted Bill Gabehart (AECOM) with sampling of old transformers.
- Replaced 18 “Danger” signs at MMRP site 003.
- Repaired rutted areas from equipment used to lift Ion Exchange Vessels over wall.
- Installed new staff gauge in Harrison Bayou.
- Installed new hinge on Well 12WW05 at Site 12.
- Collected quarterly air samples.
- Ark-La-Tex Electric on site to pick up unused conduit and old power poles.

1.2.3 Routine Maintenance at LHAAP-16

- Collected monthly groundwater levels in all wells.
- Mowed grass around extraction wells at Site 16.
- Repaired 4 extraction well pumps.

1.2.4 Routine Maintenance (Potable Water Wells)

- Worked to restore potable water to GWTP.

1.3 Filter Cake Operations and Management

- No filter cake operations took place during this reporting period.

1.4 Fluidized Bed Reactor Operations

The perchlorate mass loading to the FBR was gradually increased during April 2017, and the effluent was tested in batches to ensure compliance with the discharge criteria. Once the GWTP effluent was discharged and replaced with newly extracted groundwater, the chloride concentration in the FBR declined from 2,517 mg/L on April 3, 2017 to 408 mg/L on June 16, 2017. During the 2nd quarter of 2017, the indicator parameters steadily approached their optimal ranges. The ORP was -447 mV on April 3, 2017 and trended downwards to as low as -542 mV on June 13, 2017. The pH varied between 7 and 7.5 standard units during the quarter. Nutrients in the FBR were rather high at the beginning of the 2nd quarter of 2017 because the GWTP was in total recycle mode (no discharge). Once the GWTP began discharging

continuously, concentrations of ammonia nitrogen, orthophosphate, and total organic carbon (TOC) all decreased to levels recorded during previous quarters. Ammonia nitrogen ranged from a high of 26.4 mg/L on April 6, 2017 to a low of 5.01 mg/L on May 31, 2017. Orthophosphate ranged from 4.13 mg/L on April 6, 2017 to a low of 1.12 mg/L on May 24, 2017. TOC ranged from 264 mg/L on April 6, 2017 to a low of 49 mg/L on June 14, 2017. In early May 2017, the ion exchange vessels were installed downstream of the FBR to scavenge any residual perchlorate that was not removed across the FBR. The combined FBR and ion exchange system operated well during the 2nd quarter of 2017 with no exceedances of the perchlorate discharge criteria. After May 8, 2017, groundwater was extracted from all ICTs, treated in the GWTP to below all discharge criteria, and discharged continuously.

1.5 Process Chemical Usage at GWTP

Approximate chemical consumption and the quantity delivered during the 2nd quarter of 2017 are shown on **Table 1-1**.

Table 1-1: Process Chemicals Delivered and Used

Chemical	Usage 2nd Quarter 2017	Quantity Delivered 2nd Quarter 2017
Hydrochloric acid	660 gallons	--
Sodium hydroxide (35%)	1030 gallons	3,650 gallons
Acetic acid (50%)	660 gallons	1,100 gallons
Phosphoric acid (75%)	51.8 liters	--
Magnesium hydroxide	275 gallons	--
Urea	381.5 lbs.	500 lbs.
Polymer (magnafloc 110-L)	13.2 liters	--

Note(s):

L – liters

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 Sampling Activities

Semi-annual compliance sampling of the monitoring wells at LHAAP-18/24 occurred in December 2016. The results are presented in **Section 4**.

2.2 Performance of Plume Capture

The intent of the ICTs is to control groundwater gradients, prevent off-site migration of contaminated groundwater, and to 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 feet below ground surface).

In 2007 and 2008, in consultation with the 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-01 located in the northeast central portion of the site began in October 2008 and well 18WW17 located to the northeast of the ICT containment area began in January 2008. **Table B-1** in **Appendix B** presents a summary of extraction equipment replacement since 2011, as dictated by poor extraction performance (malfunctioning pumps, poor pump positioning with respect to groundwater, non-operational level probes, scale build up, etc.). Further discussion of extraction performance of various ICTs and extraction wells is presented in **Section 2.3**.

Potentiometric surface maps of the shallow zone groundwater in the vicinity of LHAAP-18/24, based on groundwater elevations measured on 14 April, 10 May, and 27 June 2017 are shown on **Figures B-1, B-2, and B-3** in **Appendix B**, respectively.

The potentiometric surface maps of the shallow zone were contoured by hand. The HDPE liners in the ICTs, where present, were interpreted as groundwater flow barriers. The potentiometric surface maps for April, May, and June 2017 continue to reflect high groundwater elevations in the northern/northwestern portion of the site with groundwater flow occurring radially from a groundwater high at monitor well 123 (176.2 ft above mean sea level [amsl], April 2017, 173.27 ft amsl, May 2017 and 174.92 ft amsl, June 2017) inside the ICT containment area. However, higher groundwater elevations were seen in wells BGPZ01, MW-20, and 18CPTMW22R during

the 2nd quarter 2017 between 180.34 and 175.16 ft amsl. These three wells are located just outside of the south corner of the ICT containment area. The elevated groundwater levels in these wells (BGPZ01, MW-20, and 18CPTMW22R) are likely due to wells being screened in the perched sand channel.

The elevated potentiometric surface contours within the ICTs compared to the lower potentiometric surface contours on the outside of the ICTs is likely due to a no flow boundary condition caused by the ICT liners and groundwater extraction along the ICTs. From the groundwater high at monitoring wells 123 and 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 north eastern third of the site, groundwater flow is primarily towards ICT 14 along the northeast site boundary.

Groundwater levels in Wilcox Formation wells (generally > 40 to 50 feet bgs) were measured during the 2nd quarter 2017 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 aquifer, based on static water levels measured during the April, May, and June 2017 gauging events, respectively. Groundwater in the Wilcox aquifer generally flows in a northerly direction, towards Caddo Lake. Generally there is a downward vertical gradient between the overlying shallow zone and Wilcox Formation. However, a groundwater high in the Wilcox occurs in the area of MW-14. The groundwater elevations in the Wilcox aquifer appeared generally stable between April and June 2017 with an average elevation decline of approximately 0.27 ft.

Periodic sampling was conducted between June 9 and June 26, 2017. Groundwater chemicals of concern (CoC) maps depicting the results of the June 2017 groundwater sampling event for perchlorate, trichloroethene (TCE), and methylene chloride (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**.

The highest perchlorate concentrations in the shallow zone are observed in 18WW17, MW-1, MW-3, MW-5, MW-7, MW-21, MW-23, and 120, with concentrations in these wells ranging between 14,400 µg/L in MW-1 and 86,000 µg/L in 18WW17 (**Figure C-1**). Perchlorate in groundwater has migrated off-site in all directions. The perchlorate concentration in 18CPTMW23 was reported at 3,220 µg/L in June 2017 as compared to the concentration of 91.3 µg/L in December 2016 and 2,310 µg/L in June 2016.. This well has a history of order of magnitude fluctuations in perchlorate concentrations. For example, a two orders of magnitude increase was observed between December 2014 and June 2015, a four orders of magnitude decrease was observed between June 2014 and December 2014, a four orders of magnitude increase was observed between December 2013 and June 2014, and a fourfold decrease was observed between May 2013 and December 2013. These changes in concentration 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 at a concentration of 32,900 $\mu\text{g/L}$ (**Figure C-2**), which is in the same order of magnitude as the concentration reported in December 2016 and June 2016 of 33,300 and 35,000 $\mu\text{g/L}$, 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 137,000 ng/L in June 2017 as compared to 84,200 ng/L in December 2016 and 229,000 ng/L (MW14B) in June 2016. 18CPTMW22SW also showed elevated concentration of perchlorate with 10,400 ng/L in June 2017 as compared to 10,200 ng/L in June 2016. The new Wilcox wells that were installed and sampled during the 2nd quarter 2016 were also sampled during the current quarter. Perchlorate concentrations in wells 18CPTMW19SW, 18CPTMW22DW, 18CPTMW23SW, and 18CPTMW26SW were reported as 3.58, <0.2, <0.2, and <0.2, respectively in December 2016 as compared to <0.2 in all four wells in June 2017. **Figure C-2** presents the concentrations of perchlorate in the Wilcox Formation.

TCE concentrations in the shallow zone remained consistent with the concentrations reported in December 2016 with the highest TCE concentration in June 2017 occurring in well MW-2 at a concentration of 15,300 ng/L that increased from a concentration of 11,800 ng/L in December 2016 and was similar to the concentration of 15,500 ng/L in June 2016 (**Figure C-3**). The greatest decrease of TCE in the shallow zone occurred in 120 (9,400 ng/L decrease in TCE) from 24,400 ng/L December 2016 to 15,000 ng/L in June 2017. This is likely due to fluctuations in groundwater elevations and rainfall amounts. The greatest increase in TCE in the shallow zone occurred in AWD-1 with a reported concentration of 6,050 $\mu\text{g/L}$ in December 2016 compared to 11,000 $\mu\text{g/L}$ in June 2017. The trend of TCE concentrations is such that the highest concentrations occur within the containment area and then decrease moving away from and outside of the containment area (**Figure C-3**).

TCE in the Wilcox Formation is present at low concentrations with the highest concentration of 8,260 ng/L identified in MW-14. This concentration has increased from a concentration of 6,630 ng/L in December 2016. A concentration of 34.8 $\mu\text{g/L}$ was reported in 18CPTMW01SW in June 2017. The concentration decreased from 78 $\mu\text{g/L}$ measured in December 2016. The concentration of TCE in this well is still below the concentration measured in December 2015 (368 $\mu\text{g/L}$). No detections of TCE were observed in new wells 18CPTMW19SW, 18CPTMW22DW, 18CPTMW23SW, or 18CPTMW26SW (**Figure C-4**).

The concentrations of MC in the shallow zone remains generally centered on MW-2 with a concentration of 604,000 $\mu\text{g/L}$ measured in June 2017 which is significantly higher than the concentration of 184,000 $\mu\text{g/L}$ measured in December 2016 and 21,300 $\mu\text{g/L}$ measured in June 2016. The concentration of MC in AWD-1 was reported as <50 $\mu\text{g/L}$ due to higher detection limit. MC was present in the well AWD-1 at the concentration of 55.1 $\mu\text{g/L}$ in December 2016 and 95.1 $\mu\text{g/L}$ (AWD1B) in June 2016. 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 913 $\mu\text{g/L}$ identified in 18CPTMW01SW which is lower than concentration reported in December 2016 of 1,590 $\mu\text{g/L}$. MC was present in the well MW-14 at the concentration of 216 $\mu\text{g/L}$ in June 2017 as compared to <25 $\mu\text{g/L}$ in December 2016. 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-06, C-08, MW-02, MW-07, MW-08, MW-16, MW-17, MW-20, MW-21, MW-22, MW-23, 18WW08, 18WW10, 18WW20, 109, 120, 126, 129, AWD-1, and AWD-3 are included. Graphs for Wilcox wells C-03, C-04, MW-14, and 18WW09 are also included. The following observations were made, based on the June 2017 groundwater monitoring results:

- MW-02 is located inside the containment in the shallow zone. The concentration of MC increased sharply from June 2016 and December 2016. MC concentrations increased from 21,300 µg/L in June 2016 and 184,000 µg/L in December 2016 to 604,000 µg/L in June 2017. The concentration of TCE increased slightly from 11,800 µg/L measured in December 2016 to 15,300 µg/L measured in June 2017. The concentration of perchlorate also increased from 1,290 µg/L measured in December 2016 to 4,830 µg/L measured in June 2017. Previous similar fluctuations in MC, TCE and perchlorate concentration have been observed.
- Concentrations of TCE, MC, and perchlorate in MW-22 inside the containment in the shallow zone remained similar to previous results in December 2016. Perchlorate and TCE concentrations in MW-23 also remained similar to previous results in December 2016. Perchlorate and TCE concentrations decreased in shallow zone monitoring well 120 inside the containment as compared to December 2016 results.
- MC and perchlorate remained below the detection limits in samples from C-08, to the northeast of the containment area. TCE decreased from 5.61 µg/L in June 2016 and 2.18 µg/L in December 2016 to 1.57 µg/L in June 2017. The other northeastern well, 109, showed a significant decrease in perchlorate concentration from 17,500 µg/L in December 2016 to 265 µg/L in June 2017.
- Wells to the southwest of the containment area include MW-07, MW-08, MW-17, and 129. MW-07 exhibited increases in perchlorate and TCE as compared to December 2016 results. A continued decreasing perchlorate trend was observed in MW-08 since March 2012. However, the perchlorate concentration in MW-08 increased from 2,160 µg/L in December 2016 to 5320 µg/L in June 2017. The concentration of TCE increased slightly in June 2017. Perchlorate, TCE, and MC concentrations in MW-17 remained below detection limit in June 2017.
- CoC concentrations in samples from wells MW-16 and 18WW08 in the shallow zone to the northwest of the containment area were graphed. Concentrations of TCE in MW-16 slightly increased in June 2017 as compared to the concentrations in December 2016. MC remained below the detection limit. Perchlorate concentrations were below detection limit in June 2017. Perchlorate concentrations decreased to below the detection limit in December 2016 from 1,060 µg/L and 0.615 µg/L in December 2015 and June 2016, respectively. Concentrations of perchlorate decreased sharply in 18WW08 from 2,390 µg/L in December 2016 to 16.6 µg/L in June 2017. Perchlorate concentrations were below the detection limit in June 2016. An evaluation was conducted to determine the cause of high perchlorate concentrations in December 2016 in 18WW08. Based on the evaluation, the disruption in the GWTP or the effect of perchlorate concentrations in the upgradient wells AWD-4 and 18CPTMW-15 on 18WW08 was eliminated. The fluctuation in ground water elevation in well 18WW08 was compared to the fluctuations in the perchlorate concentrations in this

well. It was determined that there were instances where the perchlorate concentrations increased in the wells with a corresponding decrease in ground water elevations. It appears that this may be the cause of the high concentration of perchlorate in 18WW08 (a decrease in ground water elevation from 170.29 in June 2015 to 167.21 in Dec 2016 and the corresponding increase of perchlorate concentration from 0.655 µg/L in June 2015 to 2,390 µg/L in December 2016).

- Wilcox well C-04 to the northeast of the containment area was not sampled in December 2016 or June 2017. The concentration of TCE, MC, and perchlorate was below detection limit in June 2016. C-03, also located northeast of the containment area, remained non-detect for TCE and MC in June 2017 but showed an increase in perchlorate from 35.6 µg/L in December 2016 to 72 µg/L in June 2017.
- Concentrations of TCE and perchlorate in Wilcox well MW-14 in June 2017 were higher than the concentrations in December 2016. The concentrations began increasing after May 2006, with June 2017 concentrations of 8,260 µg/L and 137,000 µg/L as compared to 6,630 µg/L and 84,200 µg/L in December 2016, respectively. The TCE and perchlorate concentrations decreased sharply in December 2016 as compared to concentrations in June 2016. MC concentration increased to 216 µg/L in June 2017 as compared to below the detection limit in December 2016.
- The concentration of perchlorate in Wilcox well 18WW09 to the northwest of the site remained non-detect in June 2017.

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. Higher concentrations have been reported in certain shallow wells including perchlorate concentrations in 18CPTMW23, MW-2, MW-7, MW-8, and MW-23; MC concentration in MW-2; and TCE concentrations in AWD-1, MW-1, and MW-2. The higher concentrations may be due to fluctuations in groundwater elevations in this area. Future changes in concentrations over time will allow identification of any CoC trends, if present.

2.3 Quantity of Water Extracted from LHAAP-18/24

Groundwater extraction rates from the ICTs were 422,021 gallons in April 2017, approximately 743,810 gallons in May 2017, and approximately 850,115 gallons in June 2017. Rainfall amounts recorded at the GWTP were 5.59 inches in April 2017, 5.80 inches in May 2017, and 2.67 inches in June 2017.

During the reporting period, approximately 1,071,442 gallons of treated groundwater was discharged to Harrison Bayou. No treated groundwater from the GWTP was returned to LHAAP-18/24 site via the sprinkler system. Overall groundwater levels decreased throughout the 2nd quarter of 2017 with an average Shallow zone groundwater elevation decrease of 0.68 ft. This decrease is likely a response to increased groundwater extraction rates from the ICTs during the 2nd quarter of 2017 combined with an average amount of precipitation for the quarter.

The average daily extraction rates from the ICTs were 14,067 gpd in April, approximately 23,994 gpd in May, and approximately 28,337 gpd in June 2017. Extraction rates were gradually increased as the GWTP recovered from the acid spill and returned to normal operation.

The volume of groundwater removed from LHAAP-18/24 and LHAAP-16 during the 2nd quarter of 2017 measured approximately 2,241,765 gallons, based on total flow measured at the GWTP headwork. **Figure 2-1** shows the historical trends of extracted volumes by quarter.

In contrast to the approximate total extracted volume based on total flow measured at the GWTP, the total estimated volume based on individual flow meter readings from LHAAP-18/24 and LHAAP-16 was approximately 2,044,325 gallons. The difference is approximately 9%, with flow volumes measured at the headwork of the GWTP considered more representative of the extracted groundwater volume due to inaccuracies in the individual flow meter readings.

As indicated by **Table 2-1**, 22 ICTs (including vertical extraction wells EW-01 and 18WW17) out of 27 produced water during the 2nd Quarter 2017. Below are brief explanations for the five ICT wells that were not productive:

- ICTs 1, 3, 5, and 10 were shut down on 18 February 2008 as part of a Pilot Study implementation and remain non-operational, and
- ICT 11 had a faulty motor.

2.4 Groundwater Treatment Plant Sampling and Analysis

As part of the GWTP operations, samples from various water streams are required to be collected and analyzed for the parameters cited in the Interim Record of Decision (ROD) and the TCEQ letter dated January 8, 2002. Besides the ROD sampling requirement, additional sample analyses are typically performed on the influent and effluent samples to monitor the effectiveness of the FBR process. **Sections 2.4.1** through **2.4.4** present the results of analyses conducted during the 2nd quarter of 2017. The complete laboratory results are provided on a compact disk (CD) (**Appendix E**).

2.4.1 Perchlorate Sampling

Table 2-2 presents the effluent perchlorate results for the 2nd quarter of 2017. All perchlorate concentrations in the effluent (TK-650) were lower than the daily maximum concentration discharge limit of 13 µg/L. 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 13 µg/L, and adequate flow in the bayou was observed.

Eight grab samples from the influent to the GWTP (Tank 140) were collected. The perchlorate concentrations in these samples ranged from <0.2 to 12,000 µg/L.

2.4.2 VOC Sampling

Tables 2-3 through **2-5** present the effluent VOC results for April, May, and June 2017. Sampling of the effluent for VOCs was conducted on a biweekly basis beginning on April 5, 2017. The results, where applicable, were below the discharge limits. The tables also provide monthly influent concentrations for VOCs and perchlorate.

2.4.3 Monthly Metals Sampling

As per the revised sampling and analysis plan (Shaw, 2007), the monthly metals sampling is reported in **Tables 2-3 through 2-5**. None of the metals exceeded the effluent discharge limits, however the selenium reporting limit of 20 mg/L exceeded the daily average limit of 5.7 mg/L and the daily maximum concentration of 12 mg/L. In addition, the silver reporting limit of 10 mg/L for the June 7 2017 effluent sample exceeded the daily average limit of 1.4 mg/L and the daily maximum concentration of 3 mg/L.

2.4.4 Quarterly Sampling

Sampling of the effluent for VOCs, anions, chemical oxygen demand (COD), oil and grease, perchlorate, and metals was conducted during this quarter and the results were below the discharge limits. **Table 2-6** presents the analytical results for the 2nd quarter of 2017.

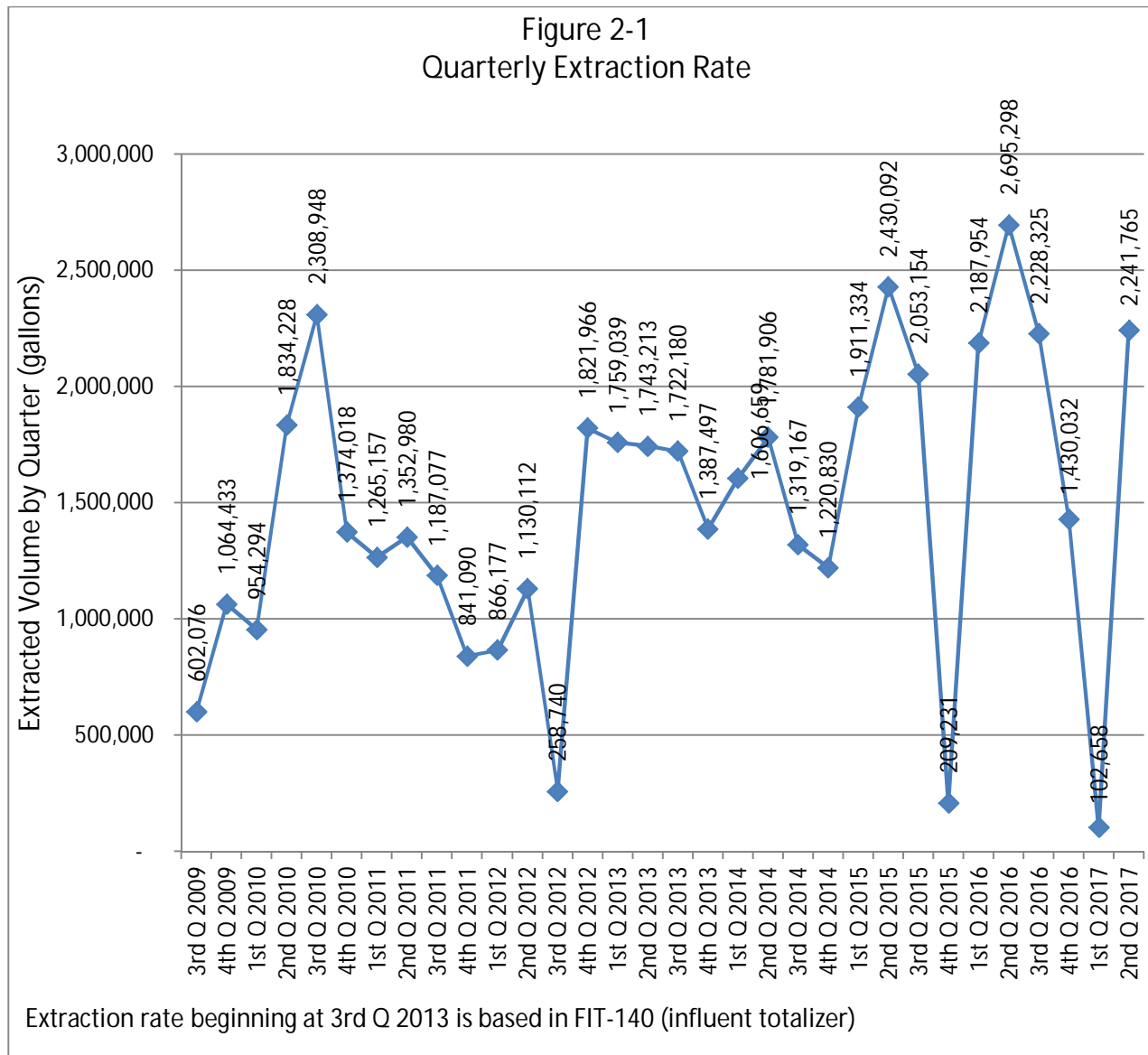


Table 2-1: Monthly Groundwater Extraction Quantities (Gallons)

Well #	Apr-17	May-17	Jun-17	Total
1	0	0	0	0
2	5,868	27,657	58,307	91,832
3	0	0	0	0
4	52,991	108,723	109,794	271,508
5	0	0	0	0
EW-01	520	2,303	2,896	5,719
7	2,332	8,417	10,525	21,274
8	21,035	93,099	132,361	246,495
18WW17	1,761	7,963	13,172	22,896
10	0	0	0	0
11	0	0	0	0
12A	5,211	9,606	11,429	26,246
12B	19,078	30,249	24,780	74,107
12C	8,900	25,809	27,885	62,594
12D	24,995	46,948	42,495	114,438
12E	23,021	19,810	19,215	62,046
13A	52,016	98,003	3,359	153,378
13B	26,285	54,660	58,090	139,035
13C	49,983	76,681	175,196	301,860
13D	1,208	624	847	2,679
13E	8,742	8,988	7,205	24,935
13F	1,211	1,871	2,341	5,423
14A	1,247	2,256	905	4,408
14B	18,154	20,697	23,430	62,281
14C	43,518	45,221	54,856	143,595
14D	45,680	52,457	71,004	169,141
14E	8,265	1,768	23	10,056
Total LHAAP-18/24	422,021	743,810	850,115	2,015,946
LHAAP-16	3,776	24,603	0	28,379
Total LHAAP-16	3,776	24,603	0	28,379
TOTAL	425,797	768,413	850,115	2,044,325

Table 2-2: Weekly Perchlorate Sample Results

Sample ID	Date Sampled	Sample Location	Effluent Limitation for Discharge (µg/L)		MAL	Influent	Effluent		Does Concentration Meet Discharge Limit? (Yes/No)
			Daily Average Concentration	Daily Maximum Concentration		Result (µg/L)	Result (µg/L)	DVQ	
LH18/24-SP140-7429	4/5/2017	TK-140	NA	NA	NA	<0.2	NA	U	NA
LH18/24-SP650-6429-GRAB	4/5/2017	TK650	3	13	2	NA	0.1	J	Yes
LH18/24-SP650-6430-GRAB	4/6/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP140-7431	4/12/2017	TK-140	NA	NA	NA	6,630	NA	U	NA
LH18/24-SP650-6433-GRAB	4/12/2017	TK650	6	13	2	NA	0.458		Yes
LH18/24-SP650-6432-GRAB	4/13/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP650-6433-GRAB	4/19/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP140-7433	4/19/2017	TK-140	NA	NA	NA	8,930	NA	U	NA
LH18/24-SP650-6434-GRAB	4/20/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP140-7435	4/26/2017	TK-140	NA	NA	NA	10,800	NA	U	NA
LH18/24-SP650-6435-GRAB	4/26/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP650-6436-GRAB	5/3/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP140-7436	5/3/2017	TK-140	NA	NA	NA	10,100	NA	U	NA
LH18/24-SP650-6437-GRAB	5/4/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP650-6438-GRAB	5/10/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP140-7438	5/10/2017	TK-140	NA	NA	NA	10,800	NA	U	NA
LH18/24-SP650-6439-GRAB	5/11/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP650-6440-GRAB	5/17/2017	TK650	6	13	2	NA	5.01	U	Yes
LH18/24-SP140-7442	5/24/2017	TK-140	NA	NA	NA	12,000	NA	U	NA
LH18/24-SP650-6442-GRAB	5/24/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP650-6444-GRAB	5/31/2017	TK650	6	13	2	NA	0.384	J	Yes
LH18/24-SP140-7447	6/7/2017	TK-140	NA	NA	NA	10,900	NA	U	NA
LH18/24-SP650-6447-GRAB	6/7/2017	TK650	6	13	2	NA	<0.2	U	Yes
LH18/24-SP650-6449-GRAB	6/14/2017	TK650	6	13	2	NA	0.911		Yes
LH18/24-SP650-6451-GRAB	6/21/2017	TK650	6	13	2	NA	1.34		Yes
LH18/24-SP650-6452-GRAB	6/28/2017	TK650	6	13	2	NA	1.13		Yes

Notes:

No discharge to Harrison Bayou occurred unless perchlorate concentration was below the daily maximum concentration of 13 µg/L.

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

ID - identification

J - Estimated concentration

MAL - minimum analytical level

NA - not applicable

U - non detect

Table 2-3: Bi-Weekly GWTP Analytical Sampling Results for April 2017

Sample Location Sample Identification Sample Date Sample Type			EFFLUENT		EFFLUENT		INFLUENT		EFFLUENT		Does Concentration Meet Effluent Discharge Limits? (Yes/No)	
			LH18/24-SP650-6429		LH18/24-SP650-6431		LH18/24-SP140-7431		LH18/24-SP650-6433			
			5-Apr-17		12-Apr-17		12-Apr-17		19-Apr-17			
			GRAB		GRAB		GRAB		GRAB			
Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ		
Daily Average Concentration	Daily Maximum Concentration	MAL										
VOLATILES			µg/L		µg/L		µg/L		µg/L			
1,1,1-Trichloroethane	3,417	7,230	10	<0.5	U	<0.5	U	NA		<1		U
1,1,2-Trichloroethane	102.5	216.9	10	<0.5	U	<0.5	U	NA		<1	U	Yes
1,1-Dichloroethane	6,633	14,032	10	<0.25	U	<0.25	U	NA		<0.5	U	Yes
1,1-Dichloroethene	119	253	NA	<1	U	<1	U	NA		<2	U	Yes
1,2-Dichloroethane	85	181	10	<0.5	U	<0.5	U	NA		<1	U	Yes
Acetone	1,132	2,395	NA	4.66	J	5.89	J	NA		3.83	J	Yes
Benzene	85	181	10	<0.25	U	<0.25	U	NA		<0.5	U	Yes
Carbon Tetrachloride	85	181	10	<0.5	U	<0.5	U	NA		<1	U	Yes
Chloroform	1,708	3,615	10	<0.25	U	<0.25	U	NA		<0.5	U	Yes
Ethylbenzene	26,954	57,025	10	<0.5	U	<0.5	U	NA		<1	U	Yes
m,p-Xylenes	39.5	83.6	NA	<1		<1		NA		<2	U	Yes
Methylene Chloride	803	1,699	20	0.699	J	0.701	J	NA		0.752	J	Yes
o-Xylene	39.5	83.6	NA	<0.5	U	<0.5	U	NA		<1	U	Yes
Styrene	2,829	5,987	NA	<0.25	U	<0.25	U	NA		<0.5	U	Yes
Tetrachloroethene	85.4	180.7	10	<0.5	U	<0.5	U	NA		<1	U	Yes
Toluene	1,980	4,189	10	<0.5	U	<0.5	U	NA		<1	U	Yes
Trichloroethene	85	181	10	3.65		4.18		NA		3.58		Yes
Vinyl Chloride	34	72	10	<0.5	U	<0.5	U	NA		<1	U	Yes
ANIONS			mg/L		mg/L		mg/L		mg/L			
Chloride	NA	NA	NA	1,780		NA		NA		906		NA
Sulfate	NA	NA	NA	64.7		NA		NA		44.0		NA
PERCHLORATE			µg/L		µg/L		µg/L		µg/L			
Perchlorate	6	13	2	0.1	J	0.458		6,630		<0.2	U	Yes
METALS			µg/L		µg/L		µg/L		µg/L			
Hexavalent Chromium	58	124	10	NA		<10	U	<10	U	NA		Yes
Lead	2.2	4.6	5	NA		<1	U	NA		NA		Yes
Selenium	5.7	12	5	NA		<20	U	<80	U	NA		Yes
Silver	1.4	3	2	NA		<1	U	<1	U	NA		Yes
Barium	1,000	2,000	10	NA		219		NA		NA		Yes
SEMI-VOLATILES			µg/L		µg/L		µg/L		µg/L			
1,4-Dioxane*	NA	134.2	NA	NA		15.8		NA		NA		Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
GWTP - Groundwater Treatment Plant

MAL - minimum analytical level
mg/L - milligrams per liter
NA - not applicable

ROD - Record of Decision
Grab samples are compared to the daily maximum and composite samples to the daily average.
* Calculated Effluent Limit

Table 2-4: Bi-Weekly GWTP Analytical Sampling Results for May 2017

	Sample Location			EFFLUENT		EFFLUENT		INFLUENT		EFFLUENT		EFFLUENT		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
	Sample Identification			LH18/24-SP650-6436		LH18/24-SP650-6438		LH18/24-SP140-7438		LH18/24-SP650-6440		LH18/24-SP650-6444		
	Sample Date			3-May-17		10-May-17		10-May-17		17-May-17		31-May-17		
	Sample Type			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	MAL											
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	10	<0.5	U	<0.5	U	NA		<1	U	<0.5	UJ	Yes
1,1,2-Trichloroethane	102.5	216.9	10	<0.5	U	<0.5	U	NA		<1	U	<0.5	UJ	Yes
1,1-Dichloroethane	6,633	14,032	10	<0.25	U	<0.25	U	NA		<0.5	U	<0.25	UJ	Yes
1,1-Dichloroethene	119	253	NA	<1	U	<1	U	NA		<2	U	<1	UJ	Yes
1,2-Dichloroethane	85	181	10	<0.5	U	<0.5	U	NA		<1	U	<0.5	UJ	Yes
Acetone	1,132	2,395	NA	<5	U	<13.3	U	NA		5.35	J	<5	UJ	Yes
Benzene	85	181	10	<0.25	U	<0.25	U	NA		<0.5	U	<0.25	UJ	Yes
Carbon Tetrachloride	85	181	10	<0.5	U	<0.5	U	NA		<1	U	<0.5	UJ	Yes
Chloroform	1,708	3,615	10	<0.25	U	<0.25	U	NA		<0.5	U	<0.25	UJ	Yes
Ethylbenzene	26,954	57,025	10	<0.5	U	<0.5	U	NA		<1	U	<0.5	UJ	Yes
m,p-Xylenes	39.5	83.6	NA	<1	U	<1	U	NA		<2	U	<1	UJ	Yes
Methylene Chloride	803	1,699	20	1.02		0.729	J	NA		0.501	J	<0.5	UJ	Yes
o-Xylene	39.5	83.6	NA	<0.5	U	<0.5	U	NA		<1	U	<0.5	UJ	Yes
Styrene	2,829	5,987	NA	<0.25	U	<0.25	U	NA		<0.5	U	<0.25	UJ	Yes
Tetrachloroethene	85.4	180.7	10	<0.5	U	<0.5	U	NA		<1	U	<0.5	UJ	Yes
Toluene	1,980	4,189	10	<0.5	U	<0.5	U	NA		<1	U	<0.5	UJ	Yes
Trichloroethene	85	181	10	3.37		3.23		NA		3.12		2.87	J	Yes
Vinyl Chloride	34	72	10	<0.5	U	<0.5	U	NA		<1	U	<0.5	UJ	Yes
ANIONS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		mg/L		
Chloride	NA	NA	NA	588		NA		NA		541		462	J	NA
Sulfate	NA	NA	NA	40.3		NA		NA		93.2		33.6	J	NA
PERCHLORATE	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		
Perchlorate	6	13	2	<0.2	U	<0.2	U	10,800		5.01		0.384	J	Yes
METALS	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		
Hexavalent Chromium	58	124	10	NA		<10	U	<10	U	NA		NA		Yes
Lead	2.2	4.6	5	NA		<1	U	NA		NA		NA		Yes
Selenium*	5.7	12	5	NA		<20	U	<80	U	NA		NA		Yes
Silver	1.4	3	2	NA		<1	U	<1	U	NA		NA		Yes
Barium	1,000	2,000	10	NA		130		NA		NA		NA		Yes
SEMI-VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		
1,4-Dioxane*	NA	134.2	NA	NA		21.8		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter

mg/L - milligrams per liter

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

DVQ - data validation qualifier

NA - not applicable

* Selenium reporting limit exceeds the daily average discharge limit.

GWTP - Groundwater Treatment Plant

ROD - Record of Decision

** Calculated Effluent Limit

MAL - minimum analytical level

U - non detect

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

Table 2-5: Bi-Weekly Analytical GWTP Sampling Results for June 2017

Sample Location Sample Identification Sample Date Sample Type	Sample Location			EFFLUENT		INFLUENT		EFFLUENT		EFFLUENT		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
	Sample Identification			LH18/24-SP650-6447		LH18/24-SP140-7447		LH18/24-SP650-6449		LH18/24-SP650-6452		
	Sample Date			7-Jun-17		7-Jun-17		14-Jun-17		28-Jun-17		
	Sample Type			GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	MAL									
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	10	<0.5	U	NA		<0.5	U	<0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	10	<0.5	U	NA		<0.5	U	<0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	10	<0.25	U	NA		<0.25	U	<0.25	U	Yes
1,1-Dichloroethene	119	253	NA	<1	U	NA		<1	U	<1	U	Yes
1,2-Dichloroethane	85	181	10	<0.5	U	NA		<0.5	U	<0.5	U	Yes
Acetone	1,132	2,395	NA	5.61	J	NA		5.61	J	<5	U	Yes
Benzene	85	181	10	<0.25	U	NA		<0.25	U	<0.25	U	Yes
Carbon Tetrachloride	85	181	10	<0.5	U	NA		<0.5	U	<0.5	U	Yes
Chloroform	1,708	3,615	10	<0.25	U	NA		<0.25	U	<0.25	U	Yes
Ethylbenzene	26,954	57,025	10	<0.5	U	NA		<0.5	U	<0.5	U	Yes
m,p-Xylenes	39.5	83.6	NA	<1	U	NA		<1	U	<1	U	NA
Methylene Chloride	803	1,699	20	<0.5	U	NA		<0.5	U	<0.5	U	Yes
o-Xylene	39.5	83.6	NA	<0.5	U	NA		<0.5	U	<0.5	U	Yes
Styrene	2,829	5,987	NA	<0.25	U	NA		<0.25	U	<0.25	U	NA
Tetrachloroethene	85.4	180.7	10	<0.5	U	NA		<0.5	U	<0.5	U	Yes
Toluene	1,980	4,189	10	<0.5	U	NA		<0.5	U	<0.5	U	Yes
Trichloroethene	85	181	10	1.18		NA		1.18		<0.5	U	Yes
Vinyl Chloride	34	72	10	<0.5	U	NA		<0.5	U	0.452	J	Yes
ANIONS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		
Chloride	NA	NA	NA	500		NA		500		533		NA
Sulfate	NA	NA	NA	22.5		NA		22.5		22.8		NA
PERCHLORATE	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
Perchlorate	6	13	2	<0.2	U	10,900		0.911		1.13		Yes
METALS	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
Hexavalent Chromium	58	124	10	<10	UJ	<10	UJ	NA		NA		Yes
Lead	2.2	4.6	5	0.6	J	NA		NA		NA		Yes
Selenium*	5.7	12	5	<20	U	<80	U	NA		NA		Yes
Silver	1.4	3	2	<10	U	<1	U	NA		NA		Yes
Barium	1,000	2,000	10	287		NA		NA		NA		Yes
SEMI-VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
1,4-Dioxane**	NA	134.2	NA	24.6	J	NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

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

* Selenium reporting limit exceeds the daily average discharge limit.

** Calculated Effluent Limit

J - estimated concentration

MAL - minimum analytical level

mg/L - milligrams per liter

Table 2-6: Quarterly GWTP Analytical Sampling Results for the 2nd Quarter 2017

Sample Location Sample Identification Sample Date Sample Type				EFFLUENT		INFLUENT		Does Concentration Meet Discharge Limits? (Yes/No)
				LH18/24-SP650-6442		LH18/24-SP140-7442		
				24-May-17		24-May-17		
				GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	MAL					
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	10	<0.5	U	3.19		Yes
1,1,2-Trichloroethane	102.5	216.9	10	<0.5	U	3.72		Yes
1,1-Dichloroethane	6,633	14,032	10	<0.25	U	16.3		Yes
1,1-Dichloroethene	119	253	NA	<1	U	121		Yes
1,2-Dichloroethane	85	181	10	<0.5	U	86.7		Yes
Acetone	1,132	2,395	NA	249		<5	U	Yes
Benzene	85	181	10	<0.25	U	3.6		Yes
Carbon Tetrachloride	85	181	10	<0.5	U	6.4		Yes
Chloroform	1,708	3,615	10	<0.25	U	20.7		Yes
Ethylbenzene	26,954	57,025	10	<0.5	U	3.18		Yes
m,p-Xylenes	39.5	83.6	NA	<1	U	1.26	J	Yes
Methylene Chloride	803	1,699	20	<0.5	U	8,020		Yes
o-Xylene	39.5	83.6	NA	<0.5	U	1.01	J	Yes
Styrene	2,829	5,987	NA	<0.25	U	1.38		Yes
Tetrachloroethene	85.4	180.7	10	<0.5	U	78.3		Yes
Toluene	1,980	4,189	10	<0.5	U	4.06	J	Yes
Trichloroethene	85	181	10	27.80		11,400		Yes
Vinyl Chloride	34	72	10	<0.5	U	154		Yes
ANIONS	mg/L	mg/L	mg/L	mg/L		mg/L		
Chloride	NA	NA	NA	433		460		NA
Sulfate	NA	NA	NA	51		121.0		NA
PERCHLORATE	µg/L	µg/L	µg/L	µg/L		µg/L		
Perchlorate	6	13	2	NA		12,000		Yes
METALS	µg/L	µg/L	µg/L	µg/L		µg/L		
Aluminum	777	1,644	20	123	J	<200	U	Yes
Antimony	NA	NA	NA	<1	U	<1	U	NA
Arsenic	365	772	10	2.11		0.78	J	Yes
Barium	1,000	2,000	10	686		197		Yes
Cadmium	1.6	3.4	1	<0.6	U	<0.6	U	Yes
Chromium	355	752	5	2.07	J	2.6	J	Yes
Cobalt	5,433	11,495	NA	11		<1	U	Yes
Iron	1,132	2,395	NA	868		57	J	Yes
Lead	2.2	4.6	5	<1	U	<1	U	Yes
Manganese	7,323	15,494	NA	605		79		Yes

Table 2-6: Quarterly GWTP Analytical Sampling Results for the 2nd Quarter 2017

	Sample Location			EFFLUENT		INFLUENT		Does Concentration Meet Discharge Limits? (Yes/No)
	Sample Identification			LH18/24-SP650-6442		LH18/24-SP140-7442		
	Sample Date			24-May-17		24-May-17		
	Sample Type			GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	MAL					
Nickel	87	184	10	13.2		<4	U	Yes
Selenium*	5.7	12	5	<20	U	<20	U	Yes
Silver	1.4	3	2	<1	U	<1	U	Yes
Thallium	NA	NA	NA	<0.2	U	<0.2	U	NA
Vanadium	1,698	3,592	NA	<1	U	<1	U	Yes
Zinc	146	310	5	28.6	J	<25	U	Yes
1,4-Dioxane	µg/L	µg/L	µg/L	µg/L		µg/L		
1,4-Dioxane	NA	134.4	2	18.1		17.7	J	Yes
	mg/L	mg/L	mg/L	mg/L		mg/L		
Chemical Oxygen Demand	NA	200	NA	<20	U	122		Yes
Oil and Grease	NA	15	NA	<2.8	U	<2.8	U	Yes

Notes:

µg/L - micrograms per liter

GWTP - Groundwater Treatment Plant

MAL - minimum analytical level

NA - not applicable

DVQ - data validation qualifier

J - Estimated concentration

mg/L - milligrams per liter

ROD - Record of Decision

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

U - non detect

* Selenium reporting limit exceeds the daily average concentration and the daily maximum concentration

3 EVALUATION OF LHAAP-16 EXTRACTION SYSTEM

Groundwater was extracted from LHAAP-16 during April (3,776 gallons) and May (24,603 gallons) of 2017, but not in June 2017. The volume of extracted groundwater from LHAAP-16 is shown in **Figure ES-1**.

3.1 Quantity of Groundwater Extracted from LHAAP-16

The quantity of groundwater extracted on a monthly basis is presented on **Table 3-1**. 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 April, May, and June 2017 are presented on **Table 3-2**. The potentiometric surface maps for the shallow and Upper Wilcox (intermediate) groundwater zones at LHAAP-16 for April, May, and June 2017 are presented in **Figures B-7 through B-12** in **Appendix B**. Based on the potentiometric surface maps, the general groundwater flow direction in the Shallow and Intermediate zone is towards the east and south-east.

Table 3-1: Groundwater Extraction Quantities from LHAAP-16 (gallons)

Apr-17	May-17	Jun-17
3,776	24,603	0

Table 3-2: Groundwater Elevations at LHAAP-16 Piezometers and Monitoring Wells**PIEZOMETER LEVELS**

Piezometers	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
16PZ-1	04/13/2017	199.44	26.90	172.54
16PZ-2	04/13/2017	199.75	27.36	172.39
16PZ-3	04/13/2017	198.61	26.05	172.56
16PZ-4	04/13/2017	198.81	26.50	172.31
16PZ-5	04/13/2017	198.31	25.81	172.50
16PZ-6	04/13/2017	198.61	26.39	172.22
16PZ-7	04/13/2017	200.10	27.29	172.81
16PZ-8	04/13/2017	199.93	27.49	172.44
16PZ-9	04/13/2017	196.49	24.29	172.20
16PZ-10	04/13/2017	196.65	24.50	172.15
16PZ-11	04/13/2017	198.88	26.30	172.58
16PZ-12	04/13/2017	199.00	26.60	172.40
16PZ-13	04/13/2017	196.58	24.13	172.45
16PZ-14	04/13/2017	196.09	23.80	172.29
16PZ-15	04/13/2017	191.93	19.48	172.45
16PZ-16	04/13/2017	190.79	18.79	172.00
16PZ-17	04/13/2017	186.67	14.35	172.32
16PZ-18	04/13/2017	185.99	14.25	171.74
16PZ-19	04/13/2017	183.98	11.88	172.10
16PZ-20	04/13/2017	183.12	11.16	171.96

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
16WW12	04/13/2017	188.81	16.91	171.90
16WW14	04/13/2017	198.87	25.45	173.42
16WW22	04/13/2017	200.13	27.60	172.53
16WW25	04/13/2017	188.77	16.07	172.70
16WW26	04/13/2017	188.83	17.00	171.83
16WW29	04/13/2017	178.24	5.85	172.39
16WW30	04/13/2017	178.47	6.09	172.38
16WW31	04/13/2017	202.78	29.98	172.80
16WW33	04/13/2017	203.09	30.01	173.08
16WW35	04/13/2017	191.23	18.14	173.09
16WW36	04/13/2017	190.94	17.60	173.34

Table 3-2: Groundwater Elevations at LHAAP-16 Piezometers and Monitoring Wells**PIEZOMETER LEVELS**

Piezometers	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
16PZ-1	05/11/2017	199.44	26.78	172.66
16PZ-2	05/11/2017	199.75	27.50	172.25
16PZ-3	05/11/2017	198.61	26.04	172.57
16PZ-4	05/11/2017	198.81	26.53	172.28
16PZ-5	05/11/2017	198.31	25.81	172.50
16PZ-6	05/11/2017	198.61	26.35	172.26
16PZ-7	05/11/2017	200.10	27.55	172.55
16PZ-8	05/11/2017	199.93	27.49	172.44
16PZ-9	05/11/2017	196.49	24.46	172.03
16PZ-10	05/11/2017	196.65	24.48	172.17
16PZ-11	05/11/2017	198.88	26.28	172.60
16PZ-12	05/11/2017	199.00	26.62	172.38
16PZ-13	05/11/2017	196.58	24.07	172.51
16PZ-14	05/11/2017	196.09	23.78	172.31
16PZ-15	05/11/2017	191.93	19.51	172.42
16PZ-16	05/11/2017	190.79	18.63	172.16
16PZ-17	05/11/2017	186.67	14.94	171.73
16PZ-18	05/11/2017	185.99	14.25	171.74
16PZ-19	05/11/2017	183.98	12.59	171.39
16PZ-20	05/11/2017	183.12	11.86	171.26

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
16WW12	05/11/2017	188.81	17.11	171.70
16WW14	05/11/2017	198.87	25.32	173.55
16WW22	05/11/2017	200.13	27.51	172.62
16WW25	05/11/2017	188.77	16.79	171.98
16WW26	05/11/2017	188.83	16.90	171.93
16WW29	05/11/2017	178.24	6.51	171.73
16WW30	05/11/2017	178.47	6.83	171.64
16WW31	05/11/2017	202.78	29.79	172.99
16WW33	05/11/2017	203.09	29.83	173.26
16WW35	05/11/2017	191.23	18.03	173.20
16WW36	05/11/2017	190.94	17.52	173.42

Table 3-2: Groundwater Elevations at LHAAP-16 Piezometers and Monitoring Wells**PIEZOMETER LEVELS**

Piezometers	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
16PZ-1	06/27/2017	199.44	26.95	172.49
16PZ-2	06/27/2017	199.75	27.59	172.16
16PZ-3	06/27/2017	198.61	26.21	172.40
16PZ-4	06/27/2017	198.81	26.70	172.11
16PZ-5	06/27/2017	198.31	25.97	172.34
16PZ-6	06/27/2017	198.61	26.48	172.13
16PZ-7	06/27/2017	200.10	27.67	172.43
16PZ-8	06/27/2017	199.93	27.60	172.33
16PZ-9	06/27/2017	196.49	24.59	171.90
16PZ-10	06/27/2017	196.65	24.56	172.09
16PZ-11	06/27/2017	198.88	26.40	172.48
16PZ-12	06/27/2017	199.00	26.77	172.23
16PZ-13	06/27/2017	196.58	24.24	172.34
16PZ-14	06/27/2017	196.09	23.91	172.18
16PZ-15	06/27/2017	191.93	19.64	172.29
16PZ-16	06/27/2017	190.79	18.79	172.00
16PZ-17	06/27/2017	186.67	15.07	171.60
16PZ-18	06/27/2017	185.99	14.36	171.63
16PZ-19	06/27/2017	183.98	12.72	171.26
16PZ-20	06/27/2017	183.12	11.98	171.14

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
16WW12	06/27/2017	188.81	17.29	171.52
16WW14	06/27/2017	198.87	25.51	173.36
16WW22	06/27/2017	200.13	27.67	172.46
16WW25	06/27/2017	188.77	16.93	171.84
16WW26	06/27/2017	188.83	17.05	171.78
16WW29	06/27/2017	178.24	6.93	171.31
16WW30	06/27/2017	178.47	7.21	171.26
16WW31	06/27/2017	202.78	29.94	172.84
16WW33	06/27/2017	203.09	29.97	173.12
16WW35	06/27/2017	191.23	18.20	173.03
16WW36	06/27/2017	190.94	17.65	173.29

Notes:

amsl - above mean sea level

4 GROUNDWATER MONITORING AT LHAAP-18/24

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 4-1**. No re-injection of treated groundwater or reapplication to LHAAP-18/24 grounds via the existing irrigation system occurred during the 2nd quarter of 2017. Potentiometric surface maps are presented in **Appendix B** and groundwater elevations from the 2nd quarter of 2017 are discussed in **Section 2.2**.

The following 71 monitoring wells were sampled in June 2017; 102, 109, 120, 123, 125, 126, 129, 130, 17WW08, 18CPTMW01DW, 18CPTMW01SW, 18CPTMW03SW, 18CPTMW04, 18CPTMW04SW, 18CPTMW06, 18CPTMW07, 18CPTMW08DW, 18CPTMW08SW, 18CPTMW10SW, 18CPTMW12SW, 18CPTMW14, 18CPTMW15, 18CPTMW16, 18CPTMW18, 18CPTMW19, 18CPTMW19SW, 18CPTMW22DW, 18CPTMW22SW, 18CPTMW22R, 18CPTMW23, 18CPTMW23SW, 18CPTMW24, 18CPTMW26SW, 18WW02, 18WW03, 18WW06, 18WW08, 18WW09, 18WW16, 18WW17, 18WW18, 18WW19, 18WW20, 18WW22, 18WW24, 18WW25, AWD1, AWD3, AWD4, CO2, CO3, CO8, MW1, MW2, MW3, MW5, MW6, MW7, MW8, MW9, MW10, MW12, MW13, MW14, MW16, MW17, MW18, MW19, MW21, MW22, and MW23. The analytical results are presented in **Table 4-2**. Parameters exceeding their respective Maximum Contaminant Levels (MCL) or Protective Concentration Levels (PCLs) are antimony, arsenic, barium, cadmium, chromium, manganese, nickel, perchlorate, 1,1-dichloroethene, 1,2-dichloroethane, benzene, cis-1,2-dichloroethene, methylene chloride, trichloroethene, and vinyl chloride.

Table 4-1: Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells and Surface Water

PIEZOMETER LEVELS

Piezometers	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
BGPZ-1	04/13/2017	184.99	4.65	180.34
BGPZ-2	04/13/2017	184.39	13.90	170.49
BGPZ-3	04/13/2017	180.35	8.95	171.40
BGPZ-4	04/13/2017	177.77	5.50	172.27
BGPZ-5	04/13/2017	180.76	10.12	170.64
BGPZ-6	04/13/2017	197.82	27.51	170.31
BGPZ-7	04/13/2017	195.96	26.93	169.03
BGPZ-8	04/13/2017	197.08	28.20	168.88
BGPZ-9	04/13/2017	196.45	26.85	169.60
BGPZ-10	04/13/2017	197.00	27.03	169.97
BGPZ-11	04/13/2017	196.99	25.62	171.37
BGPZ-12	04/13/2017	188.17	NA	Plugged

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
AWD-1	04/14/2017	182.27	7.92	174.35
AWD-2	04/14/2017	186.78	12.05	174.73
AWD-3	04/14/2017	200.13	27.21	172.92
AWD-4	04/14/2017	193.89	23.15	170.74
MW-1	04/14/2017	199.22	26.23	172.99
MW-2	04/14/2017	196.73	25.42	171.31
MW-3	04/14/2017	196.54	26.01	170.53
MW-4	04/14/2017	197.27	25.98	171.29
MW-5	04/14/2017	194.97	24.70	170.27
MW-6	04/14/2017	192.18	21.99	170.19
MW-7	04/14/2017	188.47	17.45	171.02
MW-8	04/14/2017	187.13	16.53	170.60
MW-9	04/14/2017	184.73	14.05	170.68
MW-10	04/14/2017	178.12	7.97	170.15
MW-11	04/14/2017	184.65	12.00	172.65
MW-12	04/14/2017	178.33	7.59	170.74
MW-13	04/14/2017	176.72	6.39	170.33
MW-14	04/14/2017	186.19	12.75	173.44
MW-16	04/14/2017	178.59	7.78	170.81
MW-17	04/14/2017	179.03	9.29	169.74
MW-18	04/14/2017	178.58	8.09	170.49
MW-19	04/14/2017	178.60	7.72	170.88
MW-20	04/14/2017	186.64	10.98	175.66
MW-21	04/14/2017	198.70	29.50	169.20
MW-22	04/14/2017	197.51	28.33	169.18
MW-23	04/14/2017	198.79	27.47	171.32
101	04/14/2017	197.53	4.15	193.38
102	04/14/2017	193.94	20.55	173.39
109	04/14/2017	197.02	27.44	169.58
120	04/14/2017	184.19	10.77	173.42
123	04/14/2017	186.21	10.01	176.20
125	04/14/2017	196.28	24.88	171.40
126	04/14/2017	199.37	28.95	170.42

Table 4-1: Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells and Surface Water

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
129	04/14/2017	197.24	24.74	172.50
130	04/14/2017	177.73	6.32	171.41
C-01	04/14/2017	193.89	23.44	170.45
C-02	04/14/2017	175.95	5.25	170.70
C-03	04/14/2017	196.34	26.35	169.99
C-04	04/14/2017	194.64	24.85	169.79
C-04A	04/14/2017	194.61	24.66	169.95
C-05	04/14/2017	180.74	11.96	168.78
C-06	04/14/2017	192.22	24.69	167.53
C-07	04/14/2017	196.80	27.11	169.69
C-08	04/14/2017	193.10	23.80	169.30
C-09	04/14/2017	202.35	32.53	169.82
C-10	04/14/2017	201.86	31.87	169.99
17WW08	04/14/2017	179.72	9.53	170.19
18WW01	04/14/2017	201.31	30.89	170.42
18WW02	04/14/2017	179.30	8.90	170.40
18WW03	04/14/2017	195.59	26.02	169.57
18WW04	04/14/2017	183.74	15.25	168.49
18WW05	04/14/2017	189.59	21.82	167.77
18WW06	04/14/2017	179.70	9.54	170.16
18WW07	04/14/2017	183.67	4.63	179.04
18WW08	04/14/2017	177.77	7.43	170.34
18WW09	04/14/2017	177.51	7.37	170.14
18WW10	04/14/2017	182.26	12.33	169.93
18WW11	04/14/2017	182.29	11.75	170.54
18WW14	04/14/2017	186.47	16.77	169.70
18WW15	04/14/2017	186.24	16.33	169.91
18WW16	04/14/2017	201.88	31.60	170.28
18WW18	04/14/2017	196.82	27.12	169.70
18WW19	04/14/2017	179.56	9.91	169.65
18WW20	04/14/2017	180.42	10.72	169.70
18WW21	04/14/2017	195.20	26.06	169.14
18WW22	04/14/2017	195.37	25.70	169.67
18WW24	04/14/2017	176.40	4.75	171.65
18WW25	04/14/2017	175.15	5.11	170.04
18CPTMW01SW	04/14/2017	198.20	27.18	171.02
18CPTMW01DW	04/14/2017	197.92	27.75	170.17
18CPTMW03SW	04/14/2017	198.53	28.43	170.10
18CPTMW04	04/14/2017	196.60	23.32	173.28
18CPTMW04SW	04/14/2017	196.42	26.37	170.05
18CPTMW06	04/14/2017	198.12	28.07	170.05
18CPTMW07	04/14/2017	197.32	27.45	169.87
18CPTMW08SW	04/14/2017	196.38	26.28	170.10
18CPTMW08DW	04/14/2017	196.59	26.55	170.04
18CPTMW10SW	04/14/2017	186.98	16.87	170.11
18CPTMW10DW	04/14/2017	187.38	17.30	170.08
18CPTMW12SW	04/14/2017	190.90	20.80	170.10
18CPTMW12DW	04/14/2017	190.25	20.20	170.05
18CPTMW14	04/14/2017	196.69	26.87	169.82

Table 4-1: Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells and Surface Water

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
18CPTMW15	04/14/2017	179.79	8.61	171.18
18CPTMW16	04/14/2017	175.37	4.95	170.42
18CPTMW18	04/14/2017	194.53	26.65	167.88
18CPTMW19	04/14/2017	193.59	23.58	170.01
18CPTMW19SW	04/14/2017	193.29	23.29	170.00
18CPTMW22SW	04/14/2017	187.79	18.02	169.77
18CPTMW22R	04/14/2017	187.23	10.08	177.15
18CPTMW22DW	04/14/2017	188.00	17.95	170.05
18CPTMW23	04/14/2017	177.47	6.15	171.32
18CPTMW23SW	04/14/2017	177.43	7.10	170.33
18CPTMW24	04/14/2017	194.89	26.17	168.72
18CPTMW26	04/14/2017	182.60	16.52	166.08
18CPTMW26SW	04/14/2017	182.00	11.98	170.02

HARRISON BAYOU SURFACE WATER ELEVATION

Harrison Bayou	Date	Reference Elevation (feet amsl)	Staff Reading (water depth) (feet)	Surface Water Elevation (feet amsl)
1824HBSW7	04/14/2017	167.92	0.55	168.47

Table 4-1: Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells and Surface Water

PIEZOMETER LEVELS

Piezometers	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
BGPZ-1	05/10/2017	184.99	7.49	177.50
BGPZ-2	05/10/2017	184.39	14.03	170.36
BGPZ-3	05/10/2017	180.35	10.62	169.73
BGPZ-4	05/10/2017	177.77	7.51	170.26
BGPZ-5	05/10/2017	180.76	10.39	170.37
BGPZ-6	05/10/2017	197.82	27.50	170.32
BGPZ-7	05/10/2017	195.96	27.11	168.85
BGPZ-8	05/10/2017	197.08	29.03	168.05
BGPZ-9	05/10/2017	196.45	27.10	169.35
BGPZ-10	05/10/2017	197.00	26.86	170.14
BGPZ-11	05/10/2017	196.99	26.30	170.69
BGPZ-12	05/10/2017	188.17	NA	Plugged

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
AWD-1	05/10/2017	182.27	9.20	173.07
AWD-2	05/10/2017	186.78	14.08	172.70
AWD-3	05/10/2017	200.13	27.50	172.63
AWD-4	05/10/2017	193.89	23.29	170.60
MW-1	05/10/2017	199.22	26.69	172.53
MW-2	05/10/2017	196.73	26.41	170.32
MW-3	05/10/2017	196.54	26.37	170.17
MW-4	05/10/2017	197.27	26.07	171.20
MW-5	05/10/2017	194.97	24.99	169.98
MW-6	05/10/2017	192.18	22.27	169.91
MW-7	05/10/2017	188.47	18.27	170.20
MW-8	05/10/2017	187.13	16.74	170.39
MW-9	05/10/2017	184.73	14.26	170.47
MW-10	05/10/2017	178.12	8.23	169.89
MW-11	05/10/2017	184.65	14.80	169.85
MW-12	05/10/2017	178.33	8.84	169.49
MW-13	05/10/2017	176.72	6.77	169.95
MW-14	05/10/2017	186.19	13.09	173.10
MW-16	05/10/2017	178.59	8.76	169.83
MW-17	05/10/2017	179.03	9.11	169.92
MW-18	05/10/2017	178.58	8.44	170.14
MW-19	05/10/2017	178.60	8.39	170.21
MW-20	05/10/2017	186.64	11.20	175.44
MW-21	05/10/2017	198.70	31.25	167.45
MW-22	05/10/2017	197.51	27.38	170.13
MW-23	05/10/2017	198.79	27.25	171.54
101	05/10/2017	197.53	6.20	191.33
102	05/10/2017	193.94	19.82	174.12
109	05/10/2017	197.02	28.59	168.43
120	05/10/2017	184.19	12.02	172.17
123	05/10/2017	186.21	12.94	173.27
125	05/10/2017	196.28	24.87	171.41
126	05/10/2017	199.37	28.87	170.50

Table 4-1: Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells and Surface Water

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
129	05/10/2017	197.24	25.78	171.46
130	05/10/2017	177.73	6.78	170.95
C-01	05/10/2017	193.89	23.53	170.36
C-02	05/10/2017	175.95	5.58	170.37
C-03	05/10/2017	196.34	26.54	169.80
C-04	05/10/2017	194.64	25.03	169.61
C-04A	05/10/2017	194.61	24.97	169.64
C-05	05/10/2017	180.74	12.28	168.46
C-06	05/10/2017	192.22	24.87	167.35
C-07	05/10/2017	196.80	26.85	169.95
C-08	05/10/2017	193.10	23.85	169.25
C-09	05/10/2017	202.35	32.43	169.92
C-10	05/10/2017	201.86	31.78	170.08
17WW08	05/10/2017	179.72	9.58	170.14
18WW01	05/10/2017	201.31	30.91	170.40
18WW02	05/10/2017	179.30	8.83	170.47
18WW03	05/10/2017	195.59	26.08	169.51
18WW04	05/10/2017	183.74	15.57	168.17
18WW05	05/10/2017	189.59	22.05	167.54
18WW06	05/10/2017	179.70	9.90	169.80
18WW07	05/10/2017	183.67	6.50	177.17
18WW08	05/10/2017	177.77	8.91	168.86
18WW09	05/10/2017	177.51	7.85	169.66
18WW10	05/10/2017	182.26	12.29	169.97
18WW11	05/10/2017	182.29	12.26	170.03
18WW14	05/10/2017	186.47	16.54	169.93
18WW15	05/10/2017	186.24	16.16	170.08
18WW16	05/10/2017	201.88	31.56	170.32
18WW18	05/10/2017	196.82	27.28	169.54
18WW19	05/10/2017	179.56	10.36	169.20
18WW20	05/10/2017	180.42	11.20	169.22
18WW21	05/10/2017	195.20	26.21	168.99
18WW22	05/10/2017	195.37	25.91	169.46
18WW24	05/10/2017	176.40	6.18	170.22
18WW25	05/10/2017	175.15	6.28	168.87
18CPTMW01SW	05/10/2017	198.20	27.45	170.75
18CPTMW01DW	05/10/2017	197.92	27.77	170.15
18CPTMW03SW	05/10/2017	198.53	28.74	169.79
18CPTMW04	05/10/2017	196.60	23.87	172.73
18CPTMW04SW	05/10/2017	196.42	26.66	169.76
18CPTMW06	05/10/2017	198.12	28.35	169.77
18CPTMW07	05/10/2017	197.32	27.63	169.69
18CPTMW08SW	05/10/2017	196.38	26.57	169.81
18CPTMW08DW	05/10/2017	196.59	26.85	169.74
18CPTMW10SW	05/10/2017	186.98	17.09	169.89
18CPTMW10DW	05/10/2017	187.38	17.56	169.82
18CPTMW12SW	05/10/2017	190.90	20.97	169.93
18CPTMW12DW	05/10/2017	190.25	20.38	169.87
18CPTMW14	05/10/2017	196.69	26.74	169.95

Table 4-1: Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells and Surface Water

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
18CPTMW15	05/10/2017	179.79	9.82	169.97
18CPTMW16	05/10/2017	175.37	5.72	169.65
18CPTMW18	05/10/2017	194.53	26.80	167.73
18CPTMW19	05/10/2017	193.59	23.52	170.07
18CPTMW19SW	05/10/2017	193.29	23.61	169.68
18CPTMW22SW	05/10/2017	187.79	18.05	169.74
18CPTMW22R	05/10/2017	187.23	10.11	177.12
18CPTMW22DW	05/10/2017	188.00	18.02	169.98
18CPTMW23	05/10/2017	177.47	7.61	169.86
18CPTMW23SW	05/10/2017	177.43	7.55	169.88
18CPTMW24	05/10/2017	194.89	26.26	168.63
18CPTMW26	05/10/2017	182.60	16.76	165.84
18CPTMW26SW	05/10/2017	182.00	12.00	170.00

HARRISON BAYOU SURFACE WATER ELEVATION

Harrison Bayou	Date	Reference Elevation (feet amsl)	Staff Reading (water depth) (feet)	Surface Water Elevation (feet amsl)
1824HBSW7	05/10/2017	167.92	0.85	168.77

Table 4-1: Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells and Surface Water

PIEZOMETER LEVELS

Piezometers	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
BGPZ-1	06/27/2017	184.99	8.06	176.93
BGPZ-2	06/27/2017	184.39	14.21	170.18
BGPZ-3	06/27/2017	180.35	10.75	169.60
BGPZ-4	06/27/2017	177.77	7.87	169.90
BGPZ-5	06/27/2017	180.76	10.52	170.24
BGPZ-6	06/27/2017	197.82	27.64	170.18
BGPZ-7	06/27/2017	195.96	27.28	168.68
BGPZ-8	06/27/2017	197.08	29.19	167.89
BGPZ-9	06/27/2017	196.45	27.22	169.23
BGPZ-10	06/27/2017	197.00	26.95	170.05
BGPZ-11	06/27/2017	196.99	26.44	170.55
BGPZ-12	06/27/2017	188.17	NA	Plugged

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
AWD-1	06/27/2017	182.27	9.90	172.37
AWD-2	06/27/2017	186.78	14.41	172.37
AWD-3	06/27/2017	200.13	27.75	172.38
AWD-4	06/27/2017	193.89	23.21	170.68
MW-1	06/27/2017	199.22	27.17	172.05
MW-2	06/27/2017	196.73	26.97	169.76
MW-3	06/27/2017	196.54	26.26	170.28
MW-4	06/27/2017	197.27	26.15	171.12
MW-5	06/27/2017	194.97	24.84	170.13
MW-6	06/27/2017	192.18	22.18	170.00
MW-7	06/27/2017	188.47	18.38	170.09
MW-8	06/27/2017	187.13	16.39	170.74
MW-9	06/27/2017	184.73	14.50	170.23
MW-10	06/27/2017	178.12	8.25	169.87
MW-11	06/27/2017	184.65	15.03	169.62
MW-12	06/27/2017	178.33	8.55	169.78
MW-13	06/27/2017	176.72	6.95	169.77
MW-14	06/27/2017	186.19	13.19	173.00
MW-16	06/27/2017	178.59	8.54	170.05
MW-17	06/27/2017	179.03	9.10	169.93
MW-18	06/27/2017	178.58	8.40	170.18
MW-19	06/27/2017	178.60	8.37	170.23
MW-20	06/27/2017	186.64	11.48	175.16
MW-21	06/27/2017	198.70	31.56	167.14
MW-22	06/27/2017	197.51	27.41	170.10
MW-23	06/27/2017	198.79	27.47	171.32
101	06/27/2017	197.53	7.08	190.45
102	06/27/2017	193.94	19.36	174.58
109	06/27/2017	197.02	28.51	168.51
120	06/27/2017	184.19	11.82	172.37
123	06/27/2017	186.21	11.29	174.92
125	06/27/2017	196.28	24.62	171.66
126	06/27/2017	199.37	28.85	170.52

Table 4-1: Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells and Surface Water

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
129	06/27/2017	197.24	26.00	171.24
130	06/27/2017	177.73	7.05	170.68
C-01	06/27/2017	193.89	23.75	170.14
C-02	06/27/2017	175.95	5.67	170.28
C-03	06/27/2017	196.34	26.43	169.91
C-04	06/27/2017	194.64	25.12	169.52
C-04A	06/27/2017	194.61	25.05	169.56
C-05	06/27/2017	180.74	12.44	168.30
C-06	06/27/2017	192.22	25.02	167.20
C-07	06/27/2017	196.80	27.09	169.71
C-08	06/27/2017	193.10	23.78	169.32
C-09	06/27/2017	202.35	32.55	169.80
C-10	06/27/2017	201.86	31.90	169.96
17WW08	06/27/2017	179.72	9.60	170.12
18WW01	06/27/2017	201.31	30.98	170.33
18WW02	06/27/2017	179.30	9.11	170.19
18WW03	06/27/2017	195.59	26.01	169.58
18WW04	06/27/2017	183.74	15.71	168.03
18WW05	06/27/2017	189.59	22.23	167.36
18WW06	06/27/2017	179.70	10.11	169.59
18WW07	06/27/2017	183.67	7.10	176.57
18WW08	06/27/2017	177.77	9.12	168.65
18WW09	06/27/2017	177.51	8.07	169.44
18WW10	06/27/2017	182.26	12.40	169.86
18WW11	06/27/2017	182.29	12.35	169.94
18WW14	06/27/2017	186.47	16.72	169.75
18WW15	06/27/2017	186.24	16.31	169.93
18WW16	06/27/2017	201.88	31.53	170.35
18WW18	06/27/2017	196.82	27.10	169.72
18WW19	06/27/2017	179.56	9.45	170.11
18WW20	06/27/2017	180.42	11.37	169.05
18WW21	06/27/2017	195.20	26.39	168.81
18WW22	06/27/2017	195.37	25.92	169.45
18WW24	06/27/2017	176.40	6.13	170.27
18WW25	06/27/2017	175.15	6.15	169.00
18CPTMW01SW	06/27/2017	198.20	27.28	170.92
18CPTMW01DW	06/27/2017	197.92	28.08	169.84
18CPTMW03SW	06/27/2017	198.53	29.75	168.78
18CPTMW04	06/27/2017	196.60	24.03	172.57
18CPTMW04SW	06/27/2017	196.42	26.57	169.85
18CPTMW06	06/27/2017	198.12	28.24	169.88
18CPTMW07	06/27/2017	197.32	27.74	169.58
18CPTMW08SW	06/27/2017	196.38	26.50	169.88
18CPTMW08DW	06/27/2017	196.59	26.94	169.65
18CPTMW10SW	06/27/2017	186.98	17.09	169.89
18CPTMW10DW	06/27/2017	187.38	17.63	169.75
18CPTMW12SW	06/27/2017	190.90	21.01	169.89
18CPTMW12DW	06/27/2017	190.25	20.47	169.78
18CPTMW14	06/27/2017	196.69	26.66	170.03

Table 4-1: Groundwater Elevations at LHAAP-18/24 Piezometers, Monitoring Wells and Surface Water

MONITORING WELL LEVELS

Monitoring Wells	Date	Reference Elevation (feet amsl)	Depth to Water (feet)	Groundwater Elevation (feet amsl)
18CPTMW15	06/27/2017	179.79	10.00	169.79
18CPTMW16	06/27/2017	175.37	5.92	169.45
18CPTMW18	06/27/2017	194.53	26.75	167.78
18CPTMW19	06/27/2017	193.59	23.49	170.10
18CPTMW19SW	06/27/2017	193.29	23.55	169.74
18CPTMW22SW	06/27/2017	187.79	18.05	169.74
18CPTMW22R	06/27/2017	187.23	9.64	177.59
18CPTMW22DW	06/27/2017	188.00	18.12	169.88
18CPTMW23	06/27/2017	177.47	7.49	169.98
18CPTMW23SW	06/27/2017	177.43	7.50	169.93
18CPTMW24	06/27/2017	194.89	26.24	168.65
18CPTMW26	06/27/2017	182.60	16.80	165.80
18CPTMW26SW	06/27/2017	182.00	12.00	170.00

HARRISON BAYOU SURFACE WATER ELEVATION

Harrison Bayou	Date	Reference Elevation (feet amsl)	Staff Reading (water depth) (feet)	Surface Water Elevation (feet amsl)
1824HBSW7	06/27/2017	167.92	1.22	169.14

Notes:

amsl - above mean sea level

NA - not applicable

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	102- 060917 6/9/2017	109- 060917 6/9/2017	120- 060917 6/9/2017	120F- 060917 6/9/2017	123- 060917 6/9/2017	125- 060917 6/9/2017	125F- 060917 6/9/2017	126- 061917 6/19/2017	126F- 061917 6/19/2017	126FD- 061917 6/19/2017	126FDF- 061917 6/19/2017
Metals (6010C)													
ALUMINUM	mg/L	100	1.03	1.22	NA	4.56	1.04	NA	0.406	NA	<0.2 U	NA	0.122 J
BERYLLIUM	mg/L	0.004	0.00106 J	<0.002 U	NA	NA	<0.002 U	NA	NA	NA	NA	NA	NA
CALCIUM	mg/L		12.4	1.09	NA	NA	12.6	NA	NA	NA	NA	NA	NA
IRON	mg/L		1.52	1.77	NA	7.2	0.731	NA	0.697	NA	3.47	NA	3.93
MAGNESIUM	mg/L		10.8	0.907	NA	NA	6.66	NA	NA	NA	NA	NA	NA
POTASSIUM	mg/L		1.21	<1 U	NA	NA	0.885 J	NA	NA	NA	NA	NA	NA
SELENIUM	mg/L	0.05	<0.02 U	<0.02 U	NA	<0.02 U	<0.02 U	NA	<0.02 U	NA	<0.02 U	NA	<0.02 U
SODIUM	mg/L		77.9	25.2	NA	NA	20.5	NA	NA	NA	NA	NA	NA
Metals (6020A)													
ANTIMONY	mg/L	0.006	<0.001 U	0.0266	NA	<0.001 U	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U
ARSENIC	mg/L	0.01	<0.001 U	0.00414	NA	0.00435	<0.001 U	NA	0.000682 J	NA	0.00816	NA	0.00812
BARIUM	mg/L	2	0.487	0.0317	NA	0.0502	0.173	NA	0.116	NA	9.89	NA	9.79
CADMIUM	mg/L	0.005	0.00033 J	<0.0006 U	NA	<0.0006 U	<0.0006 U	NA	<0.0006 U	NA	0.000363 J	NA	0.000412 J
CHROMIUM	mg/L	0.1	0.00197 J	0.00182 J	NA	0.00924	0.00102 J	NA	0.00273 J	NA	0.00284 J	NA	0.00289 J
COBALT	mg/L	6.1	0.0112	0.000731 J	NA	0.014	0.00128 J	NA	<0.001 U	NA	0.03	NA	0.0303
COPPER	mg/L	1.3	0.00187 J	0.00186 J	NA	NA	0.00132 J	NA	NA	NA	NA	NA	NA
LEAD	mg/L	0.015	0.00144 J	0.00402	NA	0.00464	0.000661 J	NA	0.000756 J	NA	<0.001 U	NA	<0.001 U
MANGANESE	mg/L	1.1	0.0418	0.011	NA	0.125	0.00453	NA	0.0102	NA	0.505	NA	0.51
NICKEL	mg/L	0.49	0.0251	0.00387 J	NA	0.0107	0.00234 J	NA	0.00283 J	NA	0.0204	NA	0.0205
SILVER	mg/L	0.51	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U
THALLIUM	mg/L	0.002	0.000162 J	<0.0002 U	NA	0.000184 J	<0.0002 U	NA	0.000118 J	NA	<0.0002 U	NA	<0.0002 U
VANADIUM	mg/L	0.72	0.00239	0.00323	NA	0.0186	0.00184 J	NA	0.00105 J	NA	<0.001 U	NA	<0.001 U
ZINC	mg/L	31	0.0539	<0.025 U	NA	0.201	<0.025 U	NA	<0.025 U	NA	0.0292 J	NA	0.0583
Perchlorate (6850)													
PERCHLORATE	µg/L	17	143	265	40,100	NA	2.31	3,120	NA	<0.2 U	NA	<0.2 U	NA
Mercury (7470A)													
MERCURY	mg/L	0.002	<0.0002 U	<0.0002 U	NA	NA	<0.0002 U	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds (8260B)													
1,1,1,2-TETRACHLOROETHANE	µg/L	35	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
1,1,1-TRICHLOROETHANE	µg/L	200	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
1,1,2,2-TETRACHLOROETHANE	µg/L	4.6	<0.4 U	<2 U	<40 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	NA	<0.4 U	NA
1,1,2-TRICHLOROETHANE	µg/L	5	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
1,1-DICHLOROETHANE	µg/L	4,900	<0.25 U	<1.25 U	<25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	NA	<0.25 U	NA
1,1-DICHLOROETHENE	µg/L	7	<1 U	5.23 J	115 J	NA	<1 U	<1 U	NA	<1 U	NA	<1 U	NA
1,1-DICHLOROPROPENE	µg/L	9.1	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
1,2,3-TRICHLOROBENZENE	µg/L	73	<0.3 U	<1.5 U	<30 U	NA	<0.3 U	<0.3 U	NA	<0.3 U	NA	<0.3 U	NA
1,2,3-TRICHLOROPROPANE	µg/L	0.03	<1 U	<5 U	<100 U	NA	<1 U	<1 U	NA	<1 U	NA	<1 U	NA
1,2,4-TRICHLOROBENZENE	µg/L	70	<0.4 U	<2 U	<40 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	NA	<0.4 U	NA
1,2,4-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	0.2	<2 U	<10 U	<200 U	NA	<2 U	<2 U	NA	<2 U	NA	<2 U	NA
1,2-DIBROMOETHANE	µg/L	0.05	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
1,2-DICHLOROBENZENE	µg/L	600	<0.25 U	<1.25 U	<25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	NA	<0.25 U	NA
1,2-DICHLOROETHANE	µg/L	5	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
1,2-DICHLOROPROPANE	µg/L	5	<0.4 U	<2 U	<40 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	NA	<0.4 U	NA
1,3,5-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
1,3-DICHLOROBENZENE	µg/L	730	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	102- 060917 6/9/2017	109- 060917 6/9/2017	120- 060917 6/9/2017	120F- 060917 6/9/2017	123- 060917 6/9/2017	125- 060917 6/9/2017	125F- 060917 6/9/2017	126- 061917 6/19/2017	126F- 061917 6/19/2017	126FD- 061917 6/19/2017	126FDF- 061917 6/19/2017
1,3-DICHLOROPROPANE	µg/L	9.1	<0.4 U	<2 U	<40 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	NA	<0.4 U	NA
1,4-DICHLOROBENZENE	µg/L	75	<0.25 U	<1.25 U	<25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	NA	<0.25 U	NA
2,2-DICHLOROPROPANE	µg/L	13	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
2-BUTANONE	µg/L	15,000	<5 U	<25 U	<500 U	NA	<5 U	<5 U	NA	<5 U	NA	<5 U	NA
2-CHLOROTOLUENE	µg/L	490	<0.25 U	<1.25 U	<25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	NA	<0.25 U	NA
2-HEXANONE	µg/L	120	<5 U	<25 U	<500 U	NA	<5 U	<5 U	NA	<5 U	NA	2.65 J	NA
4-CHLOROTOLUENE	µg/L	490	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
4-METHYL-2-PENTANONE	µg/L	2,000	<5 U	<25 U	<500 U	NA	<5 U	<5 U	NA	<5 U	NA	<5 U	NA
ACETONE	µg/L	22,000	4.06 J	<25 U	<500 U	NA	<5 U	<5 U	NA	<5 U	NA	4.12 J	NA
BENZENE	µg/L	5	<0.25 U	<1.25 U	<25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	NA	<0.25 U	NA
BROMOBENZENE	µg/L	200	<0.25 U	<1.25 U	<25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	NA	<0.25 U	NA
BROMOCHLOROMETHANE	µg/L	980	<0.4 U	<2 U	<40 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	NA	<0.4 U	NA
BROMODICHLOROMETHANE	µg/L	15	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
BROMOFORM	µg/L	120	<1 U	<5 U	<100 U	NA	<1 U	<1 U	NA	<1 U	NA	<1 U	NA
BROMOMETHANE	µg/L	34	<1 U	<5 U	<100 U	NA	<1 U	<1 U	NA	<1 U	NA	<1 U	NA
CARBON DISULFIDE	µg/L	2,400	<1 U	<5 U	<100 U	NA	<1 U	<1 U	NA	<1 U	NA	<1 U	NA
CARBON TETRACHLORIDE	µg/L	5	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
CHLOROBENZENE	µg/L	100	<0.25 U	<1.25 U	<25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	NA	<0.25 U	NA
CHLOROETHANE	µg/L	98,000	<1 U	<5 U	<100 U	NA	<1 U	<1 U	NA	<1 U	NA	<1 U	NA
CHLOROFORM	µg/L	240	<0.25 U	1.43 J	30.7 J	NA	<0.25 U	<0.25 U	NA	<0.25 U	NA	<0.25 U	NA
CHLOROMETHANE	µg/L	70	<1 U	<5 U	<100 U	NA	<1 U	<1 U	NA	0.513 J	NA	<1 U	NA
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	145	1,470	NA	<0.5 U	0.54 J	NA	<0.5 U	NA	<0.5 U	NA
CIS-1,3-DICHLOROPROPENE	µg/L	1.7	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
DIBROMOCHLOROMETHANE	µg/L	11	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
DIBROMOMETHANE	µg/L	120	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
DICHLORODIFLUOROMETHANE	µg/L	4,900	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
ETHYLBENZENE	µg/L	700	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
HEXACHLOROBUTADIENE	µg/L	12	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
ISOPROPYLBENZENE	µg/L	2,400	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
M,P-XYLENE	µg/L	10,000	<1 U	<5 U	<100 U	NA	<1 U	<1 U	NA	<1 U	NA	<1 U	NA
METHYLENE CHLORIDE	µg/L	5	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
NAPHTHALENE	µg/L	490	<0.4 U	<2 U	<40 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	NA	<0.4 U	NA
N-BUTYLBENZENE	µg/L	1,200	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
N-PROPYLBENZENE	µg/L	980	<0.25 U	<1.25 U	<25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	NA	<0.25 U	NA
O-XYLENE	µg/L	10,000	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
P-ISOPROPYLTOLUENE	µg/L	2,400	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
SEC-BUTYLBENZENE	µg/L	980	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
STYRENE	µg/L	100	<0.25 U	<1.25 U	<25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	NA	<0.25 U	NA
TERT-BUTYLBENZENE	µg/L	980	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
TETRACHLOROETHENE	µg/L	5	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	102- 060917 6/9/2017	109- 060917 6/9/2017	120- 060917 6/9/2017	120F- 060917 6/9/2017	123- 060917 6/9/2017	125- 060917 6/9/2017	125F- 060917 6/9/2017	126- 061917 6/19/2017	126F- 061917 6/19/2017	126FD- 061917 6/19/2017	126FDF- 061917 6/19/2017
TOLUENE	µg/L	1,000	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	1.69 J	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
TRANS-1,3-DICHLOROPROPENE	µg/L	9.1	<1 U	<5 U	<100 U	NA	<1 U	<1 U	NA	<1 U	NA	<1 U	NA
TRICHLOROETHENE	µg/L	5	<0.5 U	892	15,000	NA	1.13	1.81	NA	<0.5 U	NA	<0.5 U	NA
TRICHLOROFUOROMETHANE	µg/L	7,300	<0.5 U	<2.5 U	<50 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA
VINYL CHLORIDE	µg/L	2	<0.5 U	<2.5 U	81.7 J	NA	<0.5 U	<0.5 U	NA	<0.5 U	NA	<0.5 U	NA

Location IDs containing "F" indicate sample filtered in the field with 10 micron filter.

Location IDs containing "FD" indicate duplicate samples.

Blue Highlighting Indicates Analyte Detected Above MCL/PCL

Note: Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

NA - not analyzed

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

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

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

µg/L - micrograms per liter

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	129- 060917 6/9/2017	130- 062617 6/26/2017	17WW08- 062017 6/20/2017	18CPTMW01DW- 061317 6/13/2017	18CPTMW01SW- 061317 6/13/2017	18CPTMW03SW- 061917 6/19/2017	18CPTMW04- 061517 6/15/2017	18CPTMW04SW- 061517 6/15/2017	18CPTMW06- 061217 6/12/2017	18CPTMW06FD- 061217 6/12/2017
Metals (6010C)												
ALUMINUM	mg/L	100	0.398	0.386	<0.2 U	<0.2 U	<0.2 U	0.117 J	0.133 J	<0.2 U	<0.2 U	<0.2 U
BERYLLIUM	mg/L	0.004	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U
CALCIUM	mg/L		5.45	34	77.6 J	22.4	29.9	14.2	4.89	31.2	12.8	13.1
IRON	mg/L		0.277	1.79	9.39	2.89	60.2	2.69	0.18	14.6	5.8	6.06
MAGNESIUM	mg/L		4.31	23.9	51.7 J	9.66	21.5	4.54	3.88	18.3	8.64	8.87
POTASSIUM	mg/L		<1 U	1.21	2.14	86.2	5.16	238	0.95 J	35.4	176	175
SELENIUM	mg/L	0.05	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
SODIUM	mg/L		90.9	611	354 J	351	108	281	116	105	207	207
Metals (6020A)												
ANTIMONY	mg/L	0.006	<0.001 U	<0.001 U	0.000845 J	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U
ARSENIC	mg/L	0.01	0.000513 J	0.00429	0.00383	0.00465	0.016	0.00356	0.00222	0.00336	0.00498	0.00552
BARIUM	mg/L	2	0.128	0.0972	0.392	0.28	0.932	0.275	0.168	0.99	0.415	0.444
CADMIUM	mg/L	0.005	<0.0006 U	<0.0006 U	0.000486 J	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U
CHROMIUM	mg/L	0.1	0.0022 J	0.00255 J	0.023	0.0124	0.00242 J	0.0127	0.00205 J	0.00502	0.0312	0.0295
COBALT	mg/L	6.1	<0.001 U	0.00919	0.0137	0.00145 J	0.00131 J	0.00203	<0.001 U	0.0177	0.00207	0.00209
COPPER	mg/L	1.3	0.00114 J	0.00169 J	0.00302 J	<0.002 U	<0.002 U	<0.002 U	0.00109 J	<0.002 U	<0.002 U	<0.002 U
LEAD	mg/L	0.015	<0.001 U	0.000823 J	<0.001 U	<0.001 U	<0.001 U	0.000955 J	<0.001 U	<0.001 U	<0.001 U	<0.001 U
MANGANESE	mg/L	1.1	0.00805	1.05	1.21	0.14	0.587	0.0822	0.0179	0.931	0.175	0.176
NICKEL	mg/L	0.49	0.00308 J	0.00482 J	0.423	0.00481 J	0.00333 J	0.00954	<0.004 U	0.0124	0.00201 J	<0.004 U
SILVER	mg/L	0.51	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U
THALLIUM	mg/L	0.002	0.000105 J	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U
VANADIUM	mg/L	0.72	0.00127 J	0.000859 J	<0.001 U	0.000599 J	<0.001 U	<0.001 U	0.00242	<0.001 U	<0.001 U	<0.001 U
ZINC	mg/L	31	<0.025 U	<0.025 U	<0.025 U	<0.025 U	<0.025 U	<0.025 U	<0.025 U	0.0394 J	<0.025 U	<0.025 U
Perchlorate (6850)												
PERCHLORATE	µg/L	17	1,090	4.31	<0.2 U	<0.2 U	<0.2 U	154	1,160	<0.2 U	1.2	1.21
Mercury (7470A)												
MERCURY	mg/L	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U
Volatile Organic Compounds (8260B)												
1,1,1,2-TETRACHLOROETHANE	µg/L	35	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
1,1,1-TRICHLOROETHANE	µg/L	200	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
1,1,2,2-TETRACHLOROETHANE	µg/L	4.6	<2 U	<0.4 U	<0.4 U	<0.4 U	<4 U	<0.4 U	<4 U	<0.4 U	<0.4 U	<0.4 U
1,1,2-TRICHLOROETHANE	µg/L	5	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
1,1-DICHLOROETHANE	µg/L	4,900	<1.25 U	<0.25 U	<0.25 U	<0.25 U	<2.5 U	0.159 J	<2.5 U	<0.25 U	<0.25 U	<0.25 U
1,1-DICHLOROETHENE	µg/L	7	<5 U	<1 U	<1 U	<1 U	<10 U	<1 U	<10 U	<1 U	<1 U	<1 U
1,1-DICHLOROPROPENE	µg/L	9.1	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
1,2,3-TRICHLOROBENZENE	µg/L	73	<1.5 U	<0.3 U	<0.3 U	<0.3 U	<3 U	<0.3 U	<3 U	<0.3 U	<0.3 U	<0.3 U
1,2,3-TRICHLOROPROPANE	µg/L	0.03	<5 U	<1 U	<1 U	<1 U	<10 U	<1 U	<10 U	<1 U	<1 U	<1 U
1,2,4-TRICHLOROBENZENE	µg/L	70	<2 U	<0.4 U	<0.4 U	<0.4 U	<4 U	<0.4 U	<4 U	<0.4 U	<0.4 U	<0.4 U
1,2,4-TRIMETHYLBENZENE	µg/L	1,200	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	0.2	<10 U	<2 U	<2 U	<2 U	<20 U	<2 U	<20 U	<2 U	<2 U	<2 U
1,2-DIBROMOETHANE	µg/L	0.05	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
1,2-DICHLOROBENZENE	µg/L	600	<1.25 U	<0.25 U	<0.25 U	<0.25 U	<2.5 U	<0.25 U	<2.5 U	<0.25 U	<0.25 U	<0.25 U
1,2-DICHLOROETHANE	µg/L	5	10.9	<0.5 U	<0.5 U	<0.5 U	<5 U	6.01	3.09 J	<0.5 U	<0.5 U	<0.5 U
1,2-DICHLOROPROPANE	µg/L	5	<2 U	<0.4 U	<0.4 U	<0.4 U	<4 U	<0.4 U	<4 U	<0.4 U	<0.4 U	<0.4 U
1,3,5-TRIMETHYLBENZENE	µg/L	1,200	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
1,3-DICHLOROBENZENE	µg/L	730	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	129- 060917 6/9/2017	130- 062617 6/26/2017	17WW08- 062017 6/20/2017	18CPTMW01DW- 061317 6/13/2017	18CPTMW01SW- 061317 6/13/2017	18CPTMW03SW- 061917 6/19/2017	18CPTMW04- 061517 6/15/2017	18CPTMW04SW- 061517 6/15/2017	18CPTMW06- 061217 6/12/2017	18CPTMW06FD- 061217 6/12/2017
1,3-DICHLOROPROPANE	µg/L	9.1	<2 U	<0.4 U	<0.4 U	<0.4 U	<4 U	<0.4 U	<4 U	<0.4 U	<0.4 U	<0.4 U
1,4-DICHLOROBENZENE	µg/L	75	<1.25 U	<0.25 U	<0.25 U	<0.25 U	<2.5 U	<0.25 U	<2.5 U	<0.25 U	<0.25 U	<0.25 U
2,2-DICHLOROPROPANE	µg/L	13	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
2-BUTANONE	µg/L	15,000	<25 U	<5 U	<5 U	<5 U	<50 U	<5 U	<50 U	<5 U	<5 U	<5 U
2-CHLOROTOLUENE	µg/L	490	<1.25 U	<0.25 U	<0.25 U	<0.25 U	<2.5 U	<0.25 U	<2.5 U	<0.25 U	<0.25 U	<0.25 U
2-HEXANONE	µg/L	120	<25 U	<5 U	<5 U	<5 U	<50 U	<5 U	<50 U	<5 U	<5 U	<5 U
4-CHLOROTOLUENE	µg/L	490	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
4-METHYL-2-PENTANONE	µg/L	2,000	<25 U	<5 U	<5 U	<5 U	<50 U	<5 U	<50 U	<5 U	<5 U	<5 U
ACETONE	µg/L	22,000	<25 U	3.63 J	<5 U	<5 U	<50 U	<5 U	<50 U	3.64 J	4.74 J	4.28 J
BENZENE	µg/L	5	<1.25 U	<0.25 U	<0.25 U	<0.25 U	5.56 J	3.42	<2.5 U	<0.25 U	<0.25 U	<0.25 U
BROMOBENZENE	µg/L	200	<1.25 U	<0.25 U	<0.25 U	<0.25 U	<2.5 U	<0.25 U	<2.5 U	<0.25 U	<0.25 U	<0.25 U
BROMOCHLOROMETHANE	µg/L	980	<2 U	<0.4 U	<0.4 U	<0.4 U	<4 U	<0.4 U	<4 U	<0.4 U	<0.4 U	<0.4 U
BROMODICHLOROMETHANE	µg/L	15	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
BROMOFORM	µg/L	120	<5 U	<1 U	<1 U	<1 U	<10 U	<1 U	<10 U	<1 U	<1 U	<1 U
BROMOMETHANE	µg/L	34	<5 U	<1 U	<1 U	<1 U	<10 U	<1 U	<10 U	<1 U	<1 U	<1 U
CARBON DISULFIDE	µg/L	2,400	<5 U	<1 UJ	<1 U	<1 U	<10 U	0.66 J	<10 U	<1 U	<1 U	<1 U
CARBON TETRACHLORIDE	µg/L	5	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
CHLOROBENZENE	µg/L	100	<1.25 U	<0.25 U	<0.25 U	<0.25 U	<2.5 U	<0.25 U	<2.5 U	<0.25 U	<0.25 U	<0.25 U
CHLOROETHANE	µg/L	98,000	<5 U	<1 U	<1 U	<1 U	<10 U	<1 U	<10 U	<1 U	<1 U	<1 U
CHLOROFORM	µg/L	240	3.24 J	<0.25 U	<0.25 U	<0.25 U	<2.5 U	<0.25 U	<2.5 U	<0.25 U	<0.25 U	<0.25 U
CHLOROMETHANE	µg/L	70	<5 U	0.575 J	<1 U	<1 U	<10 U	<1 U	<10 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	4 J	<0.5 U	<0.5 U	0.847 J	3.79 J	10.8	39.9	<0.5 U	<0.5 U	<0.5 U
CIS-1,3-DICHLOROPROPENE	µg/L	1.7	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
DIBROMOCHLOROMETHANE	µg/L	11	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
DIBROMOMETHANE	µg/L	120	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
DICHLORODIFLUOROMETHANE	µg/L	4,900	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
ETHYLBENZENE	µg/L	700	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
HEXACHLOROBUTADIENE	µg/L	12	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
ISOPROPYLBENZENE	µg/L	2,400	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
M,P-XYLENE	µg/L	10,000	<5 U	<1 U	<1 U	<1 U	<10 U	<1 U	<10 U	<1 U	<1 U	<1 U
METHYLENE CHLORIDE	µg/L	5	<2.5 U	<0.5 U	<0.5 U	6.67	913	0.806 J	<5 U	<0.5 U	3.91	3.89
NAPHTHALENE	µg/L	490	<2 U	<0.4 U	<0.4 U	<0.4 U	<4 U	<0.4 U	<4 U	<0.4 U	<0.4 U	<0.4 U
N-BUTYLBENZENE	µg/L	1,200	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
N-PROPYLBENZENE	µg/L	980	<1.25 U	<0.25 U	<0.25 U	<0.25 U	<2.5 U	<0.25 U	<2.5 U	<0.25 U	<0.25 U	<0.25 U
O-XYLENE	µg/L	10,000	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
P-ISOPROPYLTOLUENE	µg/L	2,400	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
SEC-BUTYLBENZENE	µg/L	980	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
STYRENE	µg/L	100	<1.25 U	<0.25 U	<0.25 U	<0.25 U	<2.5 U	<0.25 U	<2.5 U	<0.25 U	<0.25 U	<0.25 U
TERT-BUTYLBENZENE	µg/L	980	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	129- 060917 6/9/2017	130- 062617 6/26/2017	17WW08- 062017 6/20/2017	18CPTMW01DW- 061317 6/13/2017	18CPTMW01SW- 061317 6/13/2017	18CPTMW03SW- 061917 6/19/2017	18CPTMW04- 061517 6/15/2017	18CPTMW04SW- 061517 6/15/2017	18CPTMW06- 061217 6/12/2017	18CPTMW06FD- 061217 6/12/2017
TOLUENE	µg/L	1,000	<2.5 U	<0.5 U	<0.5 U	<0.5 U	3.81 J	0.307 J	<5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	3.66	<5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,3-DICHLOROPROPENE	µg/L	9.1	<5 U	<1 U	<1 U	<1 U	<10 U	<1 U	<10 U	<1 U	<1 U	<1 U
TRICHLOROETHENE	µg/L	5	867	1.26	<0.5 U	1.5	34.8	65.7	1,110	<0.5 U	1.36	1.34
TRICHLOROFUOROMETHANE	µg/L	7,300	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	0.792 J	<5 U	<0.5 U	<0.5 U	<0.5 U

Location IDs containing "F" indicate sample filtered in the field with 10 micron filter.

Location IDs containing "FD" indicate duplicate samples.

Blue Highlighting Indicates Analyte Detected Above MCL/PCL

Note: Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

NA - not analyzed

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

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

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

µg/L - micrograms per liter

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18CPTMW07- 062617 6/26/2017	18CPTMW07F- 062617 6/26/2017	18CPTMW08DW- 061417 6/14/2017	18CPTMW08SW- 061417 6/14/2017	18CPTMW10SW- 062317 6/23/2017	18CPTMW12SW- 062317 6/23/2017	18CPTMW14- 061617 6/16/2017	18CPTMW14FD- 061617 6/16/2017	18CPTMW15- 062017 6/20/2017	18CPTMW16- 062117 6/21/2017
Metals (6010C)												
ALUMINUM	mg/L	100	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.293	0.284	0.174 J	NA
BERYLLIUM	mg/L	0.004	NA	NA	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	0.00231	NA
CALCIUM	mg/L		NA	NA	3.83	28.9	34.8	46.9	486	483	47.9	NA
IRON	mg/L		NA	24.9	1.02	0.153	82.1	4.01	0.235	0.214	14.2	NA
MAGNESIUM	mg/L		NA	NA	3.37	31.1	21.7	35.4	72.6	71	47.1	NA
POTASSIUM	mg/L		NA	NA	125	49.1	8.89	56.7	31.9	31.2	4.79	NA
SELENIUM	mg/L	0.05	NA	<0.02 U	<0.02 U	<0.02 U	0.0125 J	<0.02 U	<0.02 U	<0.02 U	<0.02 U	NA
SODIUM	mg/L		NA	NA	159	124	121	207	512	511	398	NA
Metals (6020A)												
ANTIMONY	mg/L	0.006	NA	<0.001 U	0.00085 J	<0.001 U	<0.001 U	<0.001 U	0.000507 J	<0.001 U	<0.001 U	NA
ARSENIC	mg/L	0.01	NA	0.00354	0.0032	0.000796 J	0.00429	0.00477	0.00826	0.0084	0.00395	NA
BARIUM	mg/L	2	NA	1.32	0.0807	1.01	0.583	1	4.31	4.21	0.432	NA
CADMIUM	mg/L	0.005	NA	<0.0006 U	<0.0006 U	0.000349 J	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U	0.00131	NA
CHROMIUM	mg/L	0.1	NA	<0.002 U	0.00789	0.0279	0.0109	0.00943	0.0445	0.0451	0.00145 J	NA
COBALT	mg/L	6.1	NA	0.00115 J	<0.001 U	0.00921	0.00734	0.0153	0.00368	0.00372	0.21	NA
COPPER	mg/L	1.3	NA	NA	0.00133 J	<0.002 U	<0.002 U	0.00101 J	0.00285 J	0.00282 J	0.00106 J	NA
LEAD	mg/L	0.015	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA
MANGANESE	mg/L	1.1	NA	0.624	0.0545	0.502	0.955	1.42	0.139	0.142	1.26	NA
NICKEL	mg/L	0.49	NA	<0.004 U	<0.004 U	0.0097	0.0106	0.011	0.0115	0.0115	0.136	NA
SILVER	mg/L	0.51	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA
THALLIUM	mg/L	0.002	NA	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	NA
VANADIUM	mg/L	0.72	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	0.00127 J	0.00134 J	<0.001 U	NA
ZINC	mg/L	31	NA	<0.025 U	<0.025 U	0.0253 J	0.0486 J	0.0191 J	<0.025 U	<0.025 U	0.118	NA
Perchlorate (6850)												
PERCHLORATE	µg/L	17	0.45	NA	407	32,900	<0.2 U	1	990	985	512	<0.2 U
Mercury (7470A)												
MERCURY	mg/L	0.002	NA	NA	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	NA
Volatile Organic Compounds (8260B)												
1,1,1,2-TETRACHLOROETHANE	µg/L	35	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
1,1,1-TRICHLOROETHANE	µg/L	200	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
1,1,2,2-TETRACHLOROETHANE	µg/L	4.6	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.8 U	<0.4 U	<0.4 U
1,1,2-TRICHLOROETHANE	µg/L	5	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
1,1-DICHLOROETHANE	µg/L	4,900	<0.25 U	NA	<0.25 U	5.31	<0.25 U	<0.25 U	<0.5 U	<0.5 U	<0.25 U	<0.25 U
1,1-DICHLOROETHENE	µg/L	7	<1 U	NA	<1 U	1.05 J	<1 U	<1 U	<2 U	<2 U	<1 U	<1 U
1,1-DICHLOROPROPENE	µg/L	9.1	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
1,2,3-TRICHLOROBENZENE	µg/L	73	<0.3 U	NA	<0.3 U	<0.3 U	<0.3 U	<0.3 U	<0.6 U	<0.6 U	<0.3 U	<0.3 U
1,2,3-TRICHLOROPROPANE	µg/L	0.03	<1 U	NA	<1 U	<1 U	<1 U	<1 U	<2 U	<2 U	<1 U	<1 U
1,2,4-TRICHLOROBENZENE	µg/L	70	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.8 U	<0.4 U	<0.4 U
1,2,4-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	0.2	<2 U	NA	<2 U	<2 U	<2 U	<2 U	<4 U	<4 U	<2 U	<2 U
1,2-DIBROMOETHANE	µg/L	0.05	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
1,2-DICHLOROBENZENE	µg/L	600	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.5 U	<0.25 U	<0.25 U
1,2-DICHLOROETHANE	µg/L	5	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	2.95	2.71	<0.5 U	<0.5 U
1,2-DICHLOROPROPANE	µg/L	5	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.8 U	<0.4 U	<0.4 U
1,3,5-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
1,3-DICHLOROBENZENE	µg/L	730	<0.5 U	NA	<0.5 U	0.594 J	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18CPTMW07- 062617 6/26/2017	18CPTMW07F- 062617 6/26/2017	18CPTMW08DW- 061417 6/14/2017	18CPTMW08SW- 061417 6/14/2017	18CPTMW10SW- 062317 6/23/2017	18CPTMW12SW- 062317 6/23/2017	18CPTMW14- 061617 6/16/2017	18CPTMW14FD- 061617 6/16/2017	18CPTMW15- 062017 6/20/2017	18CPTMW16- 062117 6/21/2017
1,3-DICHLOROPROPANE	µg/L	9.1	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.8 U	<0.4 U	<0.4 U
1,4-DICHLOROBENZENE	µg/L	75	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.5 U	<0.25 U	<0.25 U
2,2-DICHLOROPROPANE	µg/L	13	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
2-BUTANONE	µg/L	15,000	<5 U	NA	<5 U	<5 U	<5 U	<5 U	<10 U	<10 U	<5 U	<5 U
2-CHLOROTOLUENE	µg/L	490	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.5 U	<0.25 U	<0.25 U
2-HEXANONE	µg/L	120	<5 U	NA	<5 U	<5 U	<5 U	<5 U	<10 U	<10 U	<5 U	<5 U
4-CHLOROTOLUENE	µg/L	490	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
4-METHYL-2-PENTANONE	µg/L	2,000	<5 U	NA	<5 U	<5 U	<5 U	<5 U	<10 U	<10 U	<5 U	<5 U
ACETONE	µg/L	22,000	3.43 J	NA	3.39 J	3.37 J	7.03 J	3.68 J	<10 U	<10 U	4.41 J	<5 U
BENZENE	µg/L	5	<0.25 U	NA	<0.25 U	0.164 J	<0.25 U	<0.25 U	0.916 J	0.879 J	<0.25 U	<0.25 U
BROMOBENZENE	µg/L	200	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.5 U	<0.25 U	<0.25 U
BROMOCHLOROMETHANE	µg/L	980	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.8 U	<0.4 U	<0.4 U
BROMODICHLOROMETHANE	µg/L	15	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
BROMOFORM	µg/L	120	<1 U	NA	<1 U	<1 U	<1 U	<1 U	<2 U	<2 U	<1 U	<1 U
BROMOMETHANE	µg/L	34	<1 U	NA	<1 U	<1 U	<1 U	<1 U	<2 U	<2 U	<1 U	<1 U
CARBON DISULFIDE	µg/L	2,400	<1 UJ	NA	<1 U	<1 U	<1 U	<1 U	<2 U	<2 U	<1 U	<1 U
CARBON TETRACHLORIDE	µg/L	5	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
CHLOROBENZENE	µg/L	100	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.5 U	<0.25 U	<0.25 U
CHLOROETHANE	µg/L	98,000	<1 U	NA	<1 U	<1 U	<1 U	<1 U	<2 U	<2 U	<1 U	<1 U
CHLOROFORM	µg/L	240	<0.25 U	NA	<0.25 U	0.435 J	<0.25 U	<0.25 U	5.76	5.29	<0.25 U	<0.25 U
CHLOROMETHANE	µg/L	70	0.534 J	NA	<1 U	<1 U	<1 U	<1 U	<2 U	<2 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	NA	0.318 J	17.4	<0.5 U	<0.5 U	10.7	9.81	0.595 J	<0.5 U
CIS-1,3-DICHLOROPROPENE	µg/L	1.7	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
DIBROMOCHLOROMETHANE	µg/L	11	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
DIBROMOMETHANE	µg/L	120	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
DICHLORODIFLUOROMETHANE	µg/L	4,900	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
ETHYLBENZENE	µg/L	700	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
HEXACHLOROBUTADIENE	µg/L	12	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
ISOPROPYLBENZENE	µg/L	2,400	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
M,P-XYLENE	µg/L	10,000	<1 U	NA	<1 U	<1 U	<1 U	<1 U	<2 U	<2 U	<1 U	<1 U
METHYLENE CHLORIDE	µg/L	5	<0.5 U	NA	1.39	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
NAPHTHALENE	µg/L	490	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.8 U	<0.4 U	<0.4 U
N-BUTYLBENZENE	µg/L	1,200	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
N-PROPYLBENZENE	µg/L	980	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.5 U	<0.25 U	<0.25 U
O-XYLENE	µg/L	10,000	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
P-ISOPROPYLTOLUENE	µg/L	2,400	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
SEC-BUTYLBENZENE	µg/L	980	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
STYRENE	µg/L	100	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.5 U	<0.25 U	<0.25 U
TERT-BUTYLBENZENE	µg/L	980	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	NA	<0.5 U	0.302 J	<0.5 U	<0.5 U	0.555 J	0.591 J	<0.5 U	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18CPTMW07- 062617 6/26/2017	18CPTMW07F- 062617 6/26/2017	18CPTMW08DW- 061417 6/14/2017	18CPTMW08SW- 061417 6/14/2017	18CPTMW10SW- 062317 6/23/2017	18CPTMW12SW- 062317 6/23/2017	18CPTMW14- 061617 6/16/2017	18CPTMW14FD- 061617 6/16/2017	18CPTMW15- 062017 6/20/2017	18CPTMW16- 062117 6/21/2017
TOLUENE	µg/L	1,000	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	NA	<0.5 U	0.313 J	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
TRANS-1,3-DICHLOROPROPENE	µg/L	9.1	<1 U	NA	<1 U	<1 U	<1 U	<1 U	<2 U	<2 U	<1 U	<1 U
TRICHLOROETHENE	µg/L	5	0.759 J	NA	1.43	70.7	<0.5 U	1.15	472	430	2.97	<0.5 U
TRICHLOROFUOROMETHANE	µg/L	7,300	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	NA	<0.5 U	5.37	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U

Location IDs containing "F" indicate sample filtered in the field with 10 micron filter.

Location IDs containing "FD" indicate duplicate samples.

Blue Highlighting Indicates Analyte Detected Above MCL/PCL

Note: Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

NA - not analyzed

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

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

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

µg/L - micrograms per liter

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18CPTMW16F- 062117 6/21/2017	18CPTMW18- 062117 6/21/2017	18CPTMW19- 061417 6/14/2017	18CPTMW19F- 061417 6/14/2017	18CPTMW19SW- 061417 6/14/2017	18CPTMW22DW- 061517 6/15/2017	18CPTMW22SW- 061517 6/15/2017	18CPTMW22R- 061517 6/15/2017	18CPTMW22RF- 061517 6/15/2017	18CPTMW23- 061317 6/13/2017
Metals (6010C)												
ALUMINUM	mg/L	100	<0.2 U	<0.2 U	NA	0.319	0.258	<0.2 U	0.155 J	NA	7.93	NA
BERYLLIUM	mg/L	0.004	NA	<0.002 U	NA	NA	<0.002 U	<0.002 U	<0.002 U	NA	NA	NA
CALCIUM	mg/L		NA	288	NA	NA	14.9	12.2	133	NA	NA	NA
IRON	mg/L		5.02	1.15	NA	1.21	11.6	1.95	<0.1 U	NA	7.71	NA
MAGNESIUM	mg/L		NA	195	NA	NA	6.29	5.65	5.62	NA	NA	NA
POTASSIUM	mg/L		NA	7.98	NA	NA	2.75	2.64	177	NA	NA	NA
SELENIUM	mg/L	0.05	<0.02 U	<0.02 U	NA	<0.02 U	<0.02 U	<0.02 U	<0.02 U	NA	<0.02 U	NA
SODIUM	mg/L		NA	744	NA	NA	31.6	225	263	NA	NA	NA
Metals (6020A)												
ANTIMONY	mg/L	0.006	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	<0.001 U	NA
ARSENIC	mg/L	0.01	0.00139 J	0.00781	NA	0.0027	0.00455	0.00623	0.00384	NA	0.00211	NA
BARIUM	mg/L	2	0.173	0.654	NA	0.122	0.188	0.103	0.232	NA	0.151	NA
CADMIUM	mg/L	0.005	<0.0006 U	<0.0006 U	NA	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U	NA	<0.0006 U	NA
CHROMIUM	mg/L	0.1	<0.002 U	0.00813	NA	0.00197 J	0.00547	<0.002 U	0.023	NA	0.0055	NA
COBALT	mg/L	6.1	0.00147 J	0.0162	NA	0.00218	0.00196 J	0.000661 J	<0.001 U	NA	0.00863	NA
COPPER	mg/L	1.3	NA	0.00225 J	NA	NA	0.00164 J	<0.002 U	<0.002 U	NA	NA	NA
LEAD	mg/L	0.015	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	0.00329	NA
MANGANESE	mg/L	1.1	0.288	2.04	NA	0.0819	0.499	0.125	0.0151	NA	0.0637	NA
NICKEL	mg/L	0.49	<0.004 U	0.0186	NA	0.00282 J	0.00203 J	<0.004 U	0.00303 J	NA	0.00557 J	NA
SILVER	mg/L	0.51	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	<0.001 U	NA
THALLIUM	mg/L	0.002	0.000112 J	<0.0002 U	NA	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	NA	0.000128 J	NA
VANADIUM	mg/L	0.72	<0.001 U	<0.001 U	NA	0.00182 J	0.00073 J	<0.001 U	0.000871 J	NA	0.00845	NA
ZINC	mg/L	31	<0.025 U	0.0209 J	NA	<0.025 U	<0.025 U	0.0135 J	<0.025 U	NA	0.302 J	NA
Perchlorate (6850)												
PERCHLORATE	µg/L	17	NA	0.324 J	14	NA	<0.2 U	<0.2 U	10,400	0.402	NA	3,220
Mercury (7470A)												
MERCURY	mg/L	0.002	NA	<0.0002 U	NA	NA	<0.0002 U	<0.0002 U	<0.0002 U	NA	NA	NA
Volatile Organic Compounds (8260B)												
1,1,1,2-TETRACHLOROETHANE	µg/L	35	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
1,1,1-TRICHLOROETHANE	µg/L	200	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
1,1,2,2-TETRACHLOROETHANE	µg/L	4.6	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<4 U
1,1,2-TRICHLOROETHANE	µg/L	5	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
1,1-DICHLOROETHANE	µg/L	4,900	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<2.5 U
1,1-DICHLOROETHENE	µg/L	7	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U	<1 U	NA	7.65 J
1,1-DICHLOROPROPENE	µg/L	9.1	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
1,2,3-TRICHLOROBENZENE	µg/L	73	NA	<0.3 U	<0.3 U	NA	<0.3 U	<0.3 U	<0.3 U	<0.3 U	NA	<3 U
1,2,3-TRICHLOROPROPANE	µg/L	0.03	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U	<1 U	NA	<10 U
1,2,4-TRICHLOROBENZENE	µg/L	70	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<4 U
1,2,4-TRIMETHYLBENZENE	µg/L	1,200	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	0.2	NA	<2 U	<2 U	NA	<2 U	<2 U	<2 U	<2 U	NA	<20 U
1,2-DIBROMOETHANE	µg/L	0.05	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
1,2-DICHLOROBENZENE	µg/L	600	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<2.5 U
1,2-DICHLOROETHANE	µg/L	5	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	244
1,2-DICHLOROPROPANE	µg/L	5	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<4 U
1,3,5-TRIMETHYLBENZENE	µg/L	1,200	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
1,3-DICHLOROBENZENE	µg/L	730	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18CPTMW16F- 062117 6/21/2017	18CPTMW18- 062117 6/21/2017	18CPTMW19- 061417 6/14/2017	18CPTMW19F- 061417 6/14/2017	18CPTMW19SW- 061417 6/14/2017	18CPTMW22DW- 061517 6/15/2017	18CPTMW22SW- 061517 6/15/2017	18CPTMW22R- 061517 6/15/2017	18CPTMW22RF- 061517 6/15/2017	18CPTMW23- 061317 6/13/2017
1,3-DICHLOROPROPANE	µg/L	9.1	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<4 U
1,4-DICHLOROBENZENE	µg/L	75	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<2.5 U
2,2-DICHLOROPROPANE	µg/L	13	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
2-BUTANONE	µg/L	15,000	NA	<5 U	<5 U	NA	<5 U	<5 U	<5 U	<5 U	NA	<50 U
2-CHLOROTOLUENE	µg/L	490	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<2.5 U
2-HEXANONE	µg/L	120	NA	<5 U	<5 U	NA	<5 U	<5 U	<5 U	<5 U	NA	<50 U
4-CHLOROTOLUENE	µg/L	490	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
4-METHYL-2-PENTANONE	µg/L	2,000	NA	<5 U	<5 U	NA	<5 U	<5 U	<5 U	<5 U	NA	<50 U
ACETONE	µg/L	22,000	NA	6.18 J	3.38 J	NA	3.66 J	3.41 J	18.5	3.12 J	NA	<50 U
BENZENE	µg/L	5	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	1.56 J
BROMOBENZENE	µg/L	200	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<2.5 U
BROMOCHLOROMETHANE	µg/L	980	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<4 U
BROMODICHLOROMETHANE	µg/L	15	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
BROMOFORM	µg/L	120	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U	<1 U	NA	<10 U
BROMOMETHANE	µg/L	34	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U	<1 U	NA	<10 U
CARBON DISULFIDE	µg/L	2,400	NA	<1 U	<1 U	NA	1.37 J	<1 U	<1 U	<1 U	NA	<10 U
CARBON TETRACHLORIDE	µg/L	5	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
CHLOROBENZENE	µg/L	100	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<2.5 U
CHLOROETHANE	µg/L	98,000	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U	<1 U	NA	<10 U
CHLOROFORM	µg/L	240	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<2.5 U
CHLOROMETHANE	µg/L	70	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U	<1 U	NA	<10 U
CIS-1,2-DICHLOROETHENE	µg/L	70	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	206
CIS-1,3-DICHLOROPROPENE	µg/L	1.7	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
DIBROMOCHLOROMETHANE	µg/L	11	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
DIBROMOMETHANE	µg/L	120	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
DICHLORODIFLUOROMETHANE	µg/L	4,900	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
ETHYLBENZENE	µg/L	700	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
HEXACHLOROBUTADIENE	µg/L	12	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
ISOPROPYLBENZENE	µg/L	2,400	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
M,P-XYLENE	µg/L	10,000	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U	<1 U	NA	<10 U
METHYLENE CHLORIDE	µg/L	5	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	0.276 J	<0.5 U	NA	<5 U
NAPHTHALENE	µg/L	490	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<4 U
N-BUTYLBENZENE	µg/L	1,200	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
N-PROPYLBENZENE	µg/L	980	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<2.5 U
O-XYLENE	µg/L	10,000	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
P-ISOPROPYLTOLUENE	µg/L	2,400	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
SEC-BUTYLBENZENE	µg/L	980	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
STYRENE	µg/L	100	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<2.5 U
TERT-BUTYLBENZENE	µg/L	980	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
TETRACHLOROETHENE	µg/L	5	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18CPTMW16F- 062117 6/21/2017	18CPTMW18- 062117 6/21/2017	18CPTMW19- 061417 6/14/2017	18CPTMW19F- 061417 6/14/2017	18CPTMW19SW- 061417 6/14/2017	18CPTMW22DW- 061517 6/15/2017	18CPTMW22SW- 061517 6/15/2017	18CPTMW22R- 061517 6/15/2017	18CPTMW22RF- 061517 6/15/2017	18CPTMW23- 061317 6/13/2017
TOLUENE	µg/L	1,000	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	3.41 J
TRANS-1,3-DICHLOROPROPENE	µg/L	9.1	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U	<1 U	NA	<10 U
TRICHLOROETHENE	µg/L	5	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	0.373 J	<0.5 U	NA	4,060
TRICHLOROFUOROMETHANE	µg/L	7,300	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<5 U
VINYL CHLORIDE	µg/L	2	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	3.5 J

Location IDs containing "F" indicate sample filtered in the field with 10 micron filter.

Location IDs containing "FD" indicate duplicate samples.

Blue Highlighting Indicates Analyte Detected Above MCL/PCL

Note: Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

NA - not analyzed

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

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

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

µg/L - micrograms per liter

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18CPTMW23F- 061317 6/13/2017	18CPTMW23SW- 061317 6/13/2017	18CPTMW24- 060917 6/9/2017	18CPTMW26SW- 062017 6/20/2017	18WW02- 062617 6/26/2017	18WW03- 060917 6/9/2017	18WW03FD- 060917 6/9/2017	18WW06- 062617 6/26/2017	18WW06F- 062617 6/26/2017	18WW08- 062317 6/23/2017	18WW09- 062317 6/23/2017
Metals (6010C)													
ALUMINUM	mg/L	100	<0.2 U	0.194 J	<0.2 U	0.129 J	0.63	<0.2 U	<0.2 U	NA	<0.2 U	0.258	0.601
BERYLLIUM	mg/L	0.004	NA	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	NA	NA	<0.002 U	<0.002 U
CALCIUM	mg/L		NA	23.6	404	56.2	7.37	8.21	8.16	NA	NA	5.4	17
IRON	mg/L		11.8	60.4	11.4	63.9	2.16	4.73	4.8	NA	45.6	3.77	40.5
MAGNESIUM	mg/L		NA	11.7	254	30	1.39	5.84	6.1	NA	NA	7.28	9.51
POTASSIUM	mg/L		NA	3.1	5.71	2.46	2.11	1.95	1.87	NA	NA	1.1	3.06
SELENIUM	mg/L	0.05	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	NA	<0.02 U	<0.02 U	0.0106 J
SODIUM	mg/L		NA	83.9	1020	317	16.3	103	104	NA	NA	134	22.6
Metals (6020A)													
ANTIMONY	mg/L	0.006	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U
ARSENIC	mg/L	0.01	0.000761 J	0.00258	0.0156	0.0092	0.000641 J	0.00135 J	0.00128 J	NA	0.00322	0.00267	0.0066
BARIUM	mg/L	2	0.37	0.33	9.57	0.693	0.0489	0.189	0.187	NA	0.328	0.0719	0.314
CADMIUM	mg/L	0.005	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U	NA	<0.0006 U	<0.0006 U	0.000409 J
CHROMIUM	mg/L	0.1	<0.002 U	<0.002 U	0.00519	0.00103 J	0.00558	0.00323 J	0.00326 J	NA	0.0079	0.07	0.0505
COBALT	mg/L	6.1	0.0343	<0.001 U	0.00635	0.00249	<0.001 U	<0.001 U	<0.001 U	NA	0.00138 J	0.0134	0.00141 J
COPPER	mg/L	1.3	NA	<0.002 U	0.00302 J	0.00135 J	0.00777	<0.002 U	<0.002 U	NA	NA	0.0036 J	0.00266 J
LEAD	mg/L	0.015	<0.001 U	<0.001 U	0.00102 J	0.000866 J	0.00148 J	<0.001 U	<0.001 U	NA	<0.001 U	0.000903 J	0.00101 J
MANGANESE	mg/L	1.1	0.452	0.854	0.557	1.36	0.0942	0.0916	0.0936	NA	0.821	0.46	0.995
NICKEL	mg/L	0.49	0.0306	<0.004 U	0.0204	0.00444 J	0.00431 J	<0.004 U	<0.004 U	NA	0.051	0.00992	0.0143
SILVER	mg/L	0.51	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U
THALLIUM	mg/L	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	0.000112 J	<0.0002 U	NA	<0.0002 U	<0.0002 U	<0.0002 U
VANADIUM	mg/L	0.72	<0.001 U	0.000532 J	0.00238	0.000563 J	0.00296	<0.001 U	<0.001 U	NA	0.00102 J	0.00335	0.00469
ZINC	mg/L	31	0.0409 J	<0.025 U	<0.025 U	<0.025 U	<0.025 U	<0.025 U	<0.025 U	NA	<0.025 U	0.0148 J	0.0146 J
Perchlorate (6850)													
PERCHLORATE	µg/L	17	NA	<0.2 U	136	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA	16.6	<0.2 U
Mercury (7470A)													
MERCURY	mg/L	0.002	NA	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	NA	NA	<0.0002 U	<0.0002 U
Volatile Organic Compounds (8260B)													
1,1,1,2-TETRACHLOROETHANE	µg/L	35	NA	<0.5 U	<0.5 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	<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	4.6	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U
1,1,2-TRICHLOROETHANE	µg/L	5	NA	<0.5 U	<0.5 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	4,900	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U
1,1-DICHLOROETHENE	µg/L	7	NA	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	NA	<1 U	<1 U
1,1-DICHLOROPROPENE	µg/L	9.1	NA	<0.5 U	<0.5 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	73	NA	<0.3 U	<0.3 U	<0.3 U	<0.3 U	<0.3 U	<0.3 U	<0.3 U	NA	<0.3 U	<0.3 U
1,2,3-TRICHLOROPROPANE	µg/L	0.03	NA	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	NA	<1 U	<1 U
1,2,4-TRICHLOROBENZENE	µg/L	70	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U
1,2,4-TRIMETHYLBENZENE	µg/L	1,200	NA	<0.5 U	<0.5 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	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	NA	<2 U	<2 U
1,2-DIBROMOETHANE	µg/L	0.05	NA	<0.5 U	<0.5 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	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U
1,2-DICHLOROETHANE	µg/L	5	NA	<0.5 U	<0.5 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-DICHLOROPROPANE	µg/L	5	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U
1,3,5-TRIMETHYLBENZENE	µg/L	1,200	NA	<0.5 U	<0.5 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	730	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18CPTMW23F- 061317 6/13/2017	18CPTMW23SW- 061317 6/13/2017	18CPTMW24- 060917 6/9/2017	18CPTMW26SW- 062017 6/20/2017	18WW02- 062617 6/26/2017	18WW03- 060917 6/9/2017	18WW03FD- 060917 6/9/2017	18WW06- 062617 6/26/2017	18WW06F- 062617 6/26/2017	18WW08- 062317 6/23/2017	18WW09- 062317 6/23/2017
1,3-DICHLOROPROPANE	µg/L	9.1	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U
1,4-DICHLOROBENZENE	µg/L	75	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U
2,2-DICHLOROPROPANE	µg/L	13	NA	<0.5 U	<0.5 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	15,000	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	NA	<5 U	<5 U
2-CHLOROTOLUENE	µg/L	490	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U
2-HEXANONE	µg/L	120	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	NA	<5 U	<5 U
4-CHLOROTOLUENE	µg/L	490	NA	<0.5 U	<0.5 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	2,000	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	NA	<5 U	<5 U
ACETONE	µg/L	22,000	NA	<5 U	<5 U	3.48 J	2.8 J	<5 U	<5 U	3.24 J	NA	<5 U	3.44 J
BENZENE	µg/L	5	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U
BROMOBENZENE	µg/L	200	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U
BROMOCHLOROMETHANE	µg/L	980	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U
BROMODICHLOROMETHANE	µg/L	15	NA	<0.5 U	<0.5 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	120	NA	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	NA	<1 U	<1 U
BROMOMETHANE	µg/L	34	NA	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	NA	<1 U	<1 U
CARBON DISULFIDE	µg/L	2,400	NA	<1 U	<1 U	<1 U	<1 UJ	<1 U	<1 U	<1 UJ	NA	<1 UJ	<1 UJ
CARBON TETRACHLORIDE	µg/L	5	NA	<0.5 U	<0.5 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	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U
CHLOROETHANE	µg/L	98,000	NA	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	NA	<1 U	<1 U
CHLOROFORM	µg/L	240	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U
CHLOROMETHANE	µg/L	70	NA	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	0.62 J	NA	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	NA	<0.5 U	20.8	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U
CIS-1,3-DICHLOROPROPENE	µg/L	1.7	NA	<0.5 U	<0.5 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	11	NA	<0.5 U	<0.5 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	120	NA	<0.5 U	<0.5 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	4,900	NA	<0.5 U	<0.5 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	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U
HEXACHLOROBUTADIENE	µg/L	12	NA	<0.5 U	<0.5 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	2,400	NA	<0.5 U	<0.5 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 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	NA	<1 U	<1 U
METHYLENE CHLORIDE	µg/L	5	NA	0.373 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U
NAPHTHALENE	µg/L	490	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U
N-BUTYLBENZENE	µg/L	1,200	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U
N-PROPYLBENZENE	µg/L	980	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U
O-XYLENE	µg/L	10,000	NA	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U
P-ISOPROPYLTOLUENE	µg/L	2,400	NA	<0.5 U	<0.5 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	980	NA	<0.5 U	<0.5 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	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U
TERT-BUTYLBENZENE	µg/L	980	NA	<0.5 U	<0.5 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	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18CPTMW23F- 061317 6/13/2017	18CPTMW23SW- 061317 6/13/2017	18CPTMW24- 060917 6/9/2017	18CPTMW26SW- 062017 6/20/2017	18WW02- 062617 6/26/2017	18WW03- 060917 6/9/2017	18WW03FD- 060917 6/9/2017	18WW06- 062617 6/26/2017	18WW06F- 062617 6/26/2017	18WW08- 062317 6/23/2017	18WW09- 062317 6/23/2017
TOLUENE	µg/L	1,000	NA	<0.5 U	<0.5 U	<0.5 U	0.333 J	<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	<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	9.1	NA	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	NA	<1 U	<1 U
TRICHLOROETHENE	µg/L	5	NA	<0.5 U	7.34	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U
TRICHLOROFUOROMETHANE	µg/L	7,300	NA	<0.5 U	<0.5 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	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U

Location IDs containing "F" indicate sample filtered in the field with 10 micron filter.

Location IDs containing "FD" indicate duplicate samples.

Blue Highlighting Indicates Analyte Detected Above MCL/PCL

Note: Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

NA - not analyzed

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

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

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

µg/L - micrograms per liter

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18WW16- 062617 6/26/2017	18WW16F- 062617 6/26/2017	18WW17- 060917 6/9/2017	18WW18- 060917 6/9/2017	18WW18F- 060917 6/9/2017	18WW19- 062117 6/21/2017	18WW20- 062117 6/21/2017	18WW20F- 062117 6/21/2017	18WW22- 061917 6/19/2017	18WW22FD- 061917 6/19/2017	18WW24- 062117 6/21/2017
Metals (6010C)													
ALUMINUM	mg/L	100	NA	0.437	<0.2 U	NA	<0.2 U	<0.2 U	NA	<0.2 U	0.967	1.03	0.174 J
BERYLLIUM	mg/L	0.004	NA	NA	<0.002 U	NA	NA	<0.002 U	NA	NA	<0.002 U	<0.002 U	<0.002 U
CALCIUM	mg/L		NA	NA	351	NA	NA	8.48	NA	NA	128	130	32.1
IRON	mg/L		NA	41.5	1.31	NA	103	16.4	NA	0.971	0.316	0.322	0.159
MAGNESIUM	mg/L		NA	NA	247	NA	NA	3.26	NA	NA	1.34	1.64	28.9
POTASSIUM	mg/L		NA	NA	2.03	NA	NA	2.02	NA	NA	7.16	6.8	0.816 J
SELENIUM	mg/L	0.05	NA	0.0233	<0.02 U	NA	<0.02 U	<0.02 U	NA	<0.02 U	<0.02 U	<0.02 U	<0.02 U
SODIUM	mg/L		NA	NA	1130	NA	NA	17.4	NA	NA	54.5	53.8	605
Metals (6020A)													
ANTIMONY	mg/L	0.006	NA	0.0024	<0.001 U	NA	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U
ARSENIC	mg/L	0.01	NA	0.0128	0.00334	NA	0.00638	0.00123 J	NA	<0.001 U	0.00338	0.00346	0.00441
BARIIUM	mg/L	2	NA	0.126	3.92	NA	1.23	0.11	NA	0.0976	0.392	0.389	0.0786
CADMIUM	mg/L	0.005	NA	0.00556	0.000448 J	NA	<0.0006 U	<0.0006 U	NA	<0.0006 U	<0.0006 U	<0.0006 U	0.000328 J
CHROMIUM	mg/L	0.1	NA	7.59	0.146	NA	<0.002 U	0.00128 J	NA	0.00116 J	0.0573	0.0554	0.00165 J
COBALT	mg/L	6.1	NA	0.464	0.00142 J	NA	0.000996 J	0.00094 J	NA	0.000584 J	0.000764 J	0.000783 J	0.0121
COPPER	mg/L	1.3	NA	NA	0.0049	NA	NA	<0.002 U	NA	NA	0.00267 J	0.00263 J	0.00259 J
LEAD	mg/L	0.015	NA	0.00193 J	0.000502 J	NA	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U
MANGANESE	mg/L	1.1	NA	4.12	0.0327	NA	1.86	0.336	NA	0.0894	0.00409	0.00446	2.36
NICKEL	mg/L	0.49	NA	14.2	0.059	NA	0.0348	0.0034 J	NA	0.00352 J	0.00306 J	0.00325 J	0.0878
SILVER	mg/L	0.51	NA	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U	<0.001 U
THALLIUM	mg/L	0.002	NA	<0.0002 U	<0.0002 U	NA	<0.0002 U	<0.0002 U	NA	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U
VANADIUM	mg/L	0.72	NA	0.0267	<0.001 U	NA	<0.001 U	0.000893 J	NA	0.00051 J	0.0317	0.03	<0.001 U
ZINC	mg/L	31	NA	0.367	0.135	NA	<0.025 U	<0.025 U	NA	<0.025 U	<0.025 U	<0.025 U	0.0496 J
Perchlorate (6850)													
PERCHLORATE	µg/L	17	5.24	NA	86,000	<0.2 U	NA	<0.2 U	<0.2 U	NA	1.84	1.46	<0.2 U
Mercury (7470A)													
MERCURY	mg/L	0.002	NA	NA	<0.0002 U	NA	NA	<0.0002 U	NA	NA	<0.0002 U	<0.0002 U	<0.0002 U
Volatile Organic Compounds (8260B)													
1,1,1,2-TETRACHLOROETHANE	µg/L	35	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
1,1,1-TRICHLOROETHANE	µg/L	200	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
1,1,2,2-TETRACHLOROETHANE	µg/L	4.6	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U
1,1,2-TRICHLOROETHANE	µg/L	5	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
1,1-DICHLOROETHANE	µg/L	4,900	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U
1,1-DICHLOROETHENE	µg/L	7	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U
1,1-DICHLOROPROPENE	µg/L	9.1	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
1,2,3-TRICHLOROBENZENE	µg/L	73	<0.3 U	NA	<0.3 U	<0.3 U	NA	<0.3 U	<0.3 U	NA	<0.3 U	<0.3 U	<0.3 U
1,2,3-TRICHLOROPROPANE	µg/L	0.03	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U
1,2,4-TRICHLOROBENZENE	µg/L	70	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U
1,2,4-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	0.2	<2 U	NA	<2 U	<2 U	NA	<2 U	<2 U	NA	<2 U	<2 U	<2 U
1,2-DIBROMOETHANE	µg/L	0.05	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
1,2-DICHLOROBENZENE	µg/L	600	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U
1,2-DICHLOROETHANE	µg/L	5	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
1,2-DICHLOROPROPANE	µg/L	5	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U
1,3,5-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
1,3-DICHLOROBENZENE	µg/L	730	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18WW16- 062617 6/26/2017	18WW16F- 062617 6/26/2017	18WW17- 060917 6/9/2017	18WW18- 060917 6/9/2017	18WW18F- 060917 6/9/2017	18WW19- 062117 6/21/2017	18WW20- 062117 6/21/2017	18WW20F- 062117 6/21/2017	18WW22- 061917 6/19/2017	18WW22FD- 061917 6/19/2017	18WW24- 062117 6/21/2017
1,3-DICHLOROPROPANE	µg/L	9.1	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U
1,4-DICHLOROBENZENE	µg/L	75	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U
2,2-DICHLOROPROPANE	µg/L	13	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
2-BUTANONE	µg/L	15,000	<5 U	NA	<5 U	<5 U	NA	<5 U	<5 U	NA	<5 U	<5 U	<5 U
2-CHLOROTOLUENE	µg/L	490	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U
2-HEXANONE	µg/L	120	<5 U	NA	<5 U	<5 U	NA	<5 U	<5 U	NA	<5 U	<5 U	<5 U
4-CHLOROTOLUENE	µg/L	490	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
4-METHYL-2-PENTANONE	µg/L	2,000	<5 U	NA	<5 U	<5 U	NA	<5 U	<5 U	NA	<5 U	<5 U	<5 U
ACETONE	µg/L	22,000	3.43 J	NA	<5 U	<5 U	NA	<5 U	3.13 J	NA	<5 U	<5 U	11.6
BENZENE	µg/L	5	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U
BROMOBENZENE	µg/L	200	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U
BROMOCHLOROMETHANE	µg/L	980	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U
BROMODICHLOROMETHANE	µg/L	15	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
BROMOFORM	µg/L	120	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U
BROMOMETHANE	µg/L	34	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U
CARBON DISULFIDE	µg/L	2,400	<1 UJ	NA	<1 U	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U
CARBON TETRACHLORIDE	µg/L	5	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
CHLOROBENZENE	µg/L	100	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U
CHLOROETHANE	µg/L	98,000	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U
CHLOROFORM	µg/L	240	<0.25 U	NA	0.247 J	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U
CHLOROMETHANE	µg/L	70	0.813 J	NA	<1 U	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	NA	0.72 J	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
CIS-1,3-DICHLOROPROPENE	µg/L	1.7	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
DIBROMOCHLOROMETHANE	µg/L	11	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
DIBROMOMETHANE	µg/L	120	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
DICHLORODIFLUOROMETHANE	µg/L	4,900	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
ETHYLBENZENE	µg/L	700	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
HEXACHLOROBUTADIENE	µg/L	12	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
ISOPROPYLBENZENE	µg/L	2,400	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
M,P-XYLENE	µg/L	10,000	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U
METHYLENE CHLORIDE	µg/L	5	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
NAPHTHALENE	µg/L	490	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	NA	<0.4 U	<0.4 U	<0.4 U
N-BUTYLBENZENE	µg/L	1,200	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
N-PROPYLBENZENE	µg/L	980	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U
O-XYLENE	µg/L	10,000	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
P-ISOPROPYLTOLUENE	µg/L	2,400	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
SEC-BUTYLBENZENE	µg/L	980	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
STYRENE	µg/L	100	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	NA	<0.25 U	<0.25 U	<0.25 U
TERT-BUTYLBENZENE	µg/L	980	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18WW16- 062617 6/26/2017	18WW16F- 062617 6/26/2017	18WW17- 060917 6/9/2017	18WW18- 060917 6/9/2017	18WW18F- 060917 6/9/2017	18WW19- 062117 6/21/2017	18WW20- 062117 6/21/2017	18WW20F- 062117 6/21/2017	18WW22- 061917 6/19/2017	18WW22FD- 061917 6/19/2017	18WW24- 062117 6/21/2017
TOLUENE	µg/L	1,000	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
TRANS-1,3-DICHLOROPROPENE	µg/L	9.1	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	NA	<1 U	<1 U	<1 U
TRICHLOROETHENE	µg/L	5	<0.5 U	NA	48.9	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
TRICHLOROFUOROMETHANE	µg/L	7,300	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	NA	<0.5 U	<0.5 U	<0.5 U

Location IDs containing "F" indicate sample filtered in the field with 10 micron filter.

Location IDs containing "FD" indicate duplicate samples.

Blue Highlighting Indicates Analyte Detected Above MCL/PCL

Note: Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

NA - not analyzed

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

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

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

µg/L - micrograms per liter

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18WW25- 061617 6/16/2017	18WW25FD- 061617 6/16/2017	AWD1- 062617 6/26/2017	AWD1F- 062617 6/26/2017	AWD3- 061517 6/15/2017	AWD3F- 061517 6/15/2017	AWD4- 061417 6/14/2017	AWD4F- 061417 6/14/2017	CO2- 062017 6/20/2017	CO2F- 062017 6/20/2017	CO3- 061217 6/12/2017
Metals (6010C)													
ALUMINUM	mg/L	100	<0.2 U	<0.2 U	NA	14.1	NA	<0.2 U	NA	0.239	NA	<0.2 U	<0.2 U
BERYLLIUM	mg/L	0.004	<0.002 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	NA	<0.002 U
CALCIUM	mg/L		17.5	17.1	NA	NA	NA	NA	NA	NA	NA	NA	56.8
IRON	mg/L		22.1	21.6	NA	14.9	NA	0.124	NA	0.526	NA	36.4	110
MAGNESIUM	mg/L		11	10.4	NA	NA	NA	NA	NA	NA	NA	NA	37.7
POTASSIUM	mg/L		1.23	1.23	NA	NA	NA	NA	NA	NA	NA	NA	3.87
SELENIUM	mg/L	0.05	<0.02 U	<0.02 U	NA	<0.02 U	NA	<0.02 U	NA	<0.02 U	NA	<0.02 U	<0.02 U
SODIUM	mg/L		40.2	39.3	NA	NA	NA	NA	NA	NA	NA	NA	179
Metals (6020A)													
ANTIMONY	mg/L	0.006	<0.001 U	<0.001 U	NA	0.000678 J	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	<0.001 U
ARSENIC	mg/L	0.01	0.003	0.00303	NA	0.0133	NA	<0.001 U	NA	0.000603 J	NA	0.000839 J	0.00622
BARIUM	mg/L	2	0.296	0.265	NA	0.567	NA	0.0471	NA	0.254	NA	0.485	1.54
CADMIUM	mg/L	0.005	<0.0006 U	<0.0006 U	NA	<0.0006 U	NA	<0.0006 U	NA	<0.0006 U	NA	<0.0006 U	<0.0006 U
CHROMIUM	mg/L	0.1	0.00114 J	0.00129 J	NA	0.0147	NA	0.0251	NA	0.0713	NA	<0.002 U	<0.002 U
COBALT	mg/L	6.1	0.00188 J	0.002 J	NA	0.0113	NA	0.000686 J	NA	0.0231	NA	0.000597 J	0.000531 J
COPPER	mg/L	1.3	<0.002 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	NA	0.00107 J
LEAD	mg/L	0.015	<0.001 U	<0.001 U	NA	0.00751	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	<0.001 U
MANGANESE	mg/L	1.1	2.32	2.07	NA	0.339	NA	0.00615	NA	0.204	NA	1.47	1.72
NICKEL	mg/L	0.49	<0.004 U	<0.004 U	NA	0.0225	NA	0.0315	NA	1.29	NA	<0.004 U	0.00261 J
SILVER	mg/L	0.51	<0.001 U	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	<0.001 U
THALLIUM	mg/L	0.002	<0.0002 U	<0.0002 U	NA	0.000155 J	NA	<0.0002 U	NA	<0.0002 U	NA	<0.0002 U	<0.0002 U
VANADIUM	mg/L	0.72	<0.001 U	0.000619 J	NA	0.0177	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U	<0.001 U
ZINC	mg/L	31	<0.025 U	<0.025 U	NA	0.704	NA	<0.025 U	NA	<0.025 U	NA	<0.025 U	0.016 J
Perchlorate (6850)													
PERCHLORATE	µg/L	17	0.357 J	0.344 J	<0.2 U	NA	95.4	NA	1,770	NA	<0.2 U	NA	72
Mercury (7470A)													
MERCURY	mg/L	0.002	<0.0002 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	NA	<0.0002 U
Volatile Organic Compounds (8260B)													
1,1,1,2-TETRACHLOROETHANE	µg/L	35	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
1,1,1-TRICHLOROETHANE	µg/L	200	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
1,1,2,2-TETRACHLOROETHANE	µg/L	4.6	<0.4 U	<0.4 U	<40 U	NA	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA	<0.4 U
1,1,2-TRICHLOROETHANE	µg/L	5	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
1,1-DICHLOROETHANE	µg/L	4,900	<0.25 U	<0.25 U	183	NA	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA	<0.25 U
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	216	NA	<2 U	NA	<1 U	NA	<1 U	NA	<1 U
1,1-DICHLOROPROPENE	µg/L	9.1	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
1,2,3-TRICHLOROBENZENE	µg/L	73	<0.3 U	<0.3 U	<30 U	NA	<0.6 U	NA	<0.3 U	NA	<0.3 U	NA	<0.3 U
1,2,3-TRICHLOROPROPANE	µg/L	0.03	<1 U	<1 U	<100 U	NA	<2 U	NA	<1 U	NA	<1 U	NA	<1 U
1,2,4-TRICHLOROBENZENE	µg/L	70	<0.4 U	<0.4 U	<40 U	NA	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA	<0.4 U
1,2,4-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	0.2	<2 U	<2 U	<200 U	NA	<4 U	NA	<2 U	NA	<2 U	NA	<2 U
1,2-DIBROMOETHANE	µg/L	0.05	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
1,2-DICHLOROBENZENE	µg/L	600	<0.25 U	<0.25 U	<25 U	NA	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA	<0.25 U
1,2-DICHLOROETHANE	µg/L	5	<0.5 U	<0.5 U	248	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
1,2-DICHLOROPROPANE	µg/L	5	<0.4 U	<0.4 U	<40 U	NA	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA	<0.4 U
1,3,5-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
1,3-DICHLOROBENZENE	µg/L	730	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18WW25- 061617 6/16/2017	18WW25FD- 061617 6/16/2017	AWD1- 062617 6/26/2017	AWD1F- 062617 6/26/2017	AWD3- 061517 6/15/2017	AWD3F- 061517 6/15/2017	AWD4- 061417 6/14/2017	AWD4F- 061417 6/14/2017	CO2- 062017 6/20/2017	CO2F- 062017 6/20/2017	CO3- 061217 6/12/2017
1,3-DICHLOROPROPANE	µg/L	9.1	<0.4 U	<0.4 U	<40 U	NA	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA	<0.4 U
1,4-DICHLOROBENZENE	µg/L	75	<0.25 U	<0.25 U	<25 U	NA	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA	<0.25 U
2,2-DICHLOROPROPANE	µg/L	13	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
2-BUTANONE	µg/L	15,000	<5 U	<5 U	<500 U	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 U
2-CHLOROTOLUENE	µg/L	490	<0.25 U	<0.25 U	<25 U	NA	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA	<0.25 U
2-HEXANONE	µg/L	120	<5 U	<5 U	<500 U	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 U
4-CHLOROTOLUENE	µg/L	490	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
4-METHYL-2-PENTANONE	µg/L	2,000	<5 U	<5 U	<500 U	NA	<10 U	NA	<5 U	NA	<5 U	NA	<5 U
ACETONE	µg/L	22,000	<5 U	<5 U	<500 U	NA	<10 U	NA	<5 U	NA	2.79 J	NA	2.92 J
BENZENE	µg/L	5	<0.25 U	<0.25 U	<25 U	NA	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA	<0.25 U
BROMOBENZENE	µg/L	200	<0.25 U	<0.25 U	<25 U	NA	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA	<0.25 U
BROMOCHLOROMETHANE	µg/L	980	<0.4 U	<0.4 U	<40 U	NA	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA	<0.4 U
BROMODICHLOROMETHANE	µg/L	15	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
BROMOFORM	µg/L	120	<1 U	<1 U	<100 U	NA	<2 U	NA	<1 U	NA	<1 U	NA	<1 U
BROMOMETHANE	µg/L	34	<1 U	<1 U	<100 U	NA	<2 U	NA	<1 U	NA	<1 U	NA	<1 U
CARBON DISULFIDE	µg/L	2,400	<1 U	<1 U	<100 UJ	NA	<2 U	NA	<1 U	NA	<1 U	NA	<1 U
CARBON TETRACHLORIDE	µg/L	5	<0.5 U	<0.5 U	<50 U	NA	5.06	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
CHLOROBENZENE	µg/L	100	<0.25 U	<0.25 U	<25 U	NA	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA	<0.25 U
CHLOROETHANE	µg/L	98,000	<1 U	<1 U	<100 U	NA	<2 U	NA	<1 U	NA	<1 U	NA	<1 U
CHLOROFORM	µg/L	240	<0.25 U	<0.25 U	<25 U	NA	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA	<0.25 U
CHLOROMETHANE	µg/L	70	<1 U	<1 U	<100 U	NA	<2 U	NA	<1 U	NA	<1 U	NA	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	26,200	NA	1.21 J	NA	0.886 J	NA	<0.5 U	NA	<0.5 U
CIS-1,3-DICHLOROPROPENE	µg/L	1.7	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
DIBROMOCHLOROMETHANE	µg/L	11	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
DIBROMOMETHANE	µg/L	120	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
DICHLORODIFLUOROMETHANE	µg/L	4,900	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
ETHYLBENZENE	µg/L	700	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
HEXACHLOROBUTADIENE	µg/L	12	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
ISOPROPYLBENZENE	µg/L	2,400	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
M,P-XYLENE	µg/L	10,000	<1 U	<1 U	<100 U	NA	<2 U	NA	<1 U	NA	<1 U	NA	<1 U
METHYLENE CHLORIDE	µg/L	5	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
NAPHTHALENE	µg/L	490	<0.4 U	<0.4 U	<40 U	NA	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA	<0.4 U
N-BUTYLBENZENE	µg/L	1,200	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
N-PROPYLBENZENE	µg/L	980	<0.25 U	<0.25 U	<25 U	NA	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA	<0.25 U
O-XYLENE	µg/L	10,000	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
P-ISOPROPYLTOLUENE	µg/L	2,400	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
SEC-BUTYLBENZENE	µg/L	980	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
STYRENE	µg/L	100	<0.25 U	<0.25 U	<25 U	NA	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA	<0.25 U
TERT-BUTYLBENZENE	µg/L	980	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<50 U	NA	0.604 J	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	18WW25- 061617 6/16/2017	18WW25FD- 061617 6/16/2017	AWD1- 062617 6/26/2017	AWD1F- 062617 6/26/2017	AWD3- 061517 6/15/2017	AWD3F- 061517 6/15/2017	AWD4- 061417 6/14/2017	AWD4F- 061417 6/14/2017	CO2- 062017 6/20/2017	CO2F- 062017 6/20/2017	CO3- 061217 6/12/2017
TOLUENE	µg/L	1,000	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	30 J	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
TRANS-1,3-DICHLOROPROPENE	µg/L	9.1	<1 U	<1 U	<100 U	NA	<2 U	NA	<1 U	NA	<1 U	NA	<1 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	11,000	NA	122	NA	2.54	NA	<0.5 U	NA	<0.5 U
TRICHLOROFUOROMETHANE	µg/L	7,300	<0.5 U	<0.5 U	<50 U	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	266	NA	<1 U	NA	<0.5 U	NA	<0.5 U	NA	<0.5 U

Location IDs containing "F" indicate sample filtered in the field with 10 micron filter.

Location IDs containing "FD" indicate duplicate samples.

Blue Highlighting Indicates Analyte Detected Above MCL/PCL

Note: Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

NA - not analyzed

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

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

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

µg/L - micrograms per liter

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	CO8- 061217 6/12/2017	MW1- 061917 6/19/2017	MW2- 061317 6/13/2017	MW2FD- 061317 6/13/2017	MW3- 061317 6/13/2017	MW5- 061417 6/14/2017	MW6- 061517 6/15/2017	MW7- 62317 6/23/2017	MW8- 061617 6/16/2017	MW9- 062317 6/23/2017	MW10- 062017 6/20/2017
Metals (6010C)													
ALUMINUM	mg/L	100	0.719	0.129 J	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA
BERYLLIUM	mg/L	0.004	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	NA
CALCIUM	mg/L		283	48	84.9	86.8	28.3	22.7	29.3	12	9.42	24.5	NA
IRON	mg/L		1.86	59.3	15.3	15.5	0.293	1.43	1.45	4.23	1.23	1.72	NA
MAGNESIUM	mg/L		182	44	69.8	70.9	17.6	25.9	26.9	7.7	7.69	6.5	NA
POTASSIUM	mg/L		2.78	2.95	3.68	3.62	1.8	2.3	2.44	1.13	<1 U	0.757 J	NA
SELENIUM	mg/L	0.05	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U	NA
SODIUM	mg/L		937	289	264	268	249	122	208	194	119	16.9	NA
Metals (6020A)													
ANTIMONY	mg/L	0.006	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	0.00116 J	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA
ARSENIC	mg/L	0.01	0.00563	0.00206	0.00475	0.0047	<0.001 U	0.000825 J	0.00197 J	0.00121 J	0.000973 J	<0.001 U	NA
BARIUM	mg/L	2	6.27	1.68 J	3.14	3.36	0.524	0.977	0.895	0.152	0.123	0.269	NA
CADMIUM	mg/L	0.005	0.000807 J	0.00108 J	0.000337 J	0.0004 J	0.000347 J	0.000903 J	<0.0006 U	<0.0006 U	<0.0006 U	<0.0006 U	NA
CHROMIUM	mg/L	0.1	0.00549	12.9 J	0.0268	0.0313	0.00281 J	0.305	0.141	0.748	0.328	0.341	NA
COBALT	mg/L	6.1	0.00765	0.168 J	0.0633	0.0698	0.006	0.00494	0.00323	0.0114	0.0181	0.00119 J	NA
COPPER	mg/L	1.3	0.00863	0.00401	0.00265 J	0.00286 J	0.00159 J	0.00837	0.00412	0.0188	0.0126	0.00262 J	NA
LEAD	mg/L	0.015	0.00141 J	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	0.000615 J	NA
MANGANESE	mg/L	1.1	1.81	3.62 J	3.88	4.14	1.89	0.138	0.12	0.183	0.235	0.0556	NA
NICKEL	mg/L	0.49	0.0186	6.55 J	0.06	0.067	0.00866	0.237	0.153	2	0.569	0.0237	NA
SILVER	mg/L	0.51	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U	NA
THALLIUM	mg/L	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	0.000143 J	<0.0002 U	<0.0002 U	NA
VANADIUM	mg/L	0.72	<0.001 U	<0.1 U	0.00141 J	0.0019 J	<0.001 U	<0.001 U	0.0016 J	0.00169 J	<0.001 U	<0.001 U	NA
ZINC	mg/L	31	0.0357 J	0.0196 J	0.135	0.153	<0.025 U	0.0444 J	0.015 J	<0.025 U	0.0142 J	<0.025 U	NA
Perchlorate (6850)													
PERCHLORATE	µg/L	17	<0.2 U	14,400	4,830	5,200	16,100	29,600	5,200	22,200	5,320	86.9	<0.2 U
Mercury (7470A)													
MERCURY	mg/L	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	NA
Volatile Organic Compounds (8260B)													
1,1,1,2-TETRACHLOROETHANE	µg/L	35	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
1,1,1-TRICHLOROETHANE	µg/L	200	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
1,1,2,2-TETRACHLOROETHANE	µg/L	4.6	<0.4 U	<2 U	<800 U	<800 U	<1 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.4 U	<0.4 U
1,1,2-TRICHLOROETHANE	µg/L	5	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
1,1-DICHLOROETHANE	µg/L	4,900	<0.25 U	<1.25 U	<500 U	<500 U	5.45	3.84	2.58	0.349 J	<0.5 U	0.296 J	<0.25 U
1,1-DICHLOROETHENE	µg/L	7	<1 U	3.51 J	<2,000 U	<2,000 U	42.1	1.12 J	0.597 J	8.83	<2 U	0.794 J	<1 U
1,1-DICHLOROPROPENE	µg/L	9.1	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
1,2,3-TRICHLOROBENZENE	µg/L	73	<0.3 U	<1.5 U	<600 U	<600 U	<0.75 U	<0.3 U	<0.3 U	<0.3 U	<0.6 U	<0.3 U	<0.3 U
1,2,3-TRICHLOROPROPANE	µg/L	0.03	<1 U	<5 U	<2,000 U	<2,000 U	<2.5 U	<1 U	<1 U	<1 U	<2 U	<1 U	<1 U
1,2,4-TRICHLOROBENZENE	µg/L	70	<0.4 U	<2 U	<800 U	<800 U	<1 U	<0.4 U	<0.4 U	0.274 J	<0.8 U	<0.4 U	<0.4 U
1,2,4-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	0.2	<2 U	<10 U	<4,000 U	<4000 U	<5 U	<2 U	<2 U	<2 U	<4 U	<2 U	<2 U
1,2-DIBROMOETHANE	µg/L	0.05	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
1,2-DICHLOROBENZENE	µg/L	600	<0.25 U	<1.25 U	<500 U	<500 U	<0.626 U	<0.25 U	<0.25 U	0.128 J	<0.5 U	<0.25 U	<0.25 U
1,2-DICHLOROETHANE	µg/L	5	<0.5 U	183	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	36.2	2.55	<0.5 U	<0.5 U
1,2-DICHLOROPROPANE	µg/L	5	<0.4 U	<2 U	<800 U	<800 U	<1 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.4 U	<0.4 U
1,3,5-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
1,3-DICHLOROBENZENE	µg/L	730	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	0.376 J	0.858 J	<0.5 U	<1 U	<0.5 U	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	CO8- 061217 6/12/2017	MW1- 061917 6/19/2017	MW2- 061317 6/13/2017	MW2FD- 061317 6/13/2017	MW3- 061317 6/13/2017	MW5- 061417 6/14/2017	MW6- 061517 6/15/2017	MW7- 62317 6/23/2017	MW8- 061617 6/16/2017	MW9- 062317 6/23/2017	MW10- 062017 6/20/2017
1,3-DICHLOROPROPANE	µg/L	9.1	<0.4 U	<2 U	<800 U	<800 U	<1 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.4 U	<0.4 U
1,4-DICHLOROBENZENE	µg/L	75	<0.25 U	<1.25 U	<500 U	<500 U	<0.626 U	<0.25 U	<0.25 U	1.04	<0.5 U	0.195 J	<0.25 U
2,2-DICHLOROPROPANE	µg/L	13	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
2-BUTANONE	µg/L	15,000	<5 U	<25 U	<10,000 U	<10,000 U	<12.5 U	<5 U	<5 U	<5 U	<10 U	<5 U	<5 U
2-CHLOROTOLUENE	µg/L	490	<0.25 U	<1.25 U	<500 U	<500 U	<0.626 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.25 U	<0.25 U
2-HEXANONE	µg/L	120	<5 U	<25 U	<10,000 U	<10,000 U	<12.5 U	<5 U	<5 U	<5 U	<10 U	<5 U	<5 U
4-CHLOROTOLUENE	µg/L	490	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
4-METHYL-2-PENTANONE	µg/L	2,000	<5 U	<25 U	<10,000 U	<10,000 U	<12.5 U	<5 U	<5 U	<5 U	<10 U	<5 U	<5 U
ACETONE	µg/L	22,000	2.67 J	<25 U	<10,000 U	<10,000 U	<12.5 U	<5 U	3.37 J	22.1	<10 U	6.33 J	14.1
BENZENE	µg/L	5	<0.25 U	2.69 J	<500 U	<500 U	0.315 J	<0.25 U	0.146 J	0.957 J	0.354 J	<0.25 U	<0.25 U
BROMOBENZENE	µg/L	200	<0.25 U	<1.25 U	<500 U	<500 U	<0.626 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.25 U	<0.25 U
BROMOCHLOROMETHANE	µg/L	980	<0.4 U	<2 U	<800 U	<800 U	<1 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.4 U	<0.4 U
BROMODICHLOROMETHANE	µg/L	15	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
BROMOFORM	µg/L	120	<1 U	<5 U	<2,000 U	<2,000 U	<2.5 U	<1 U	<1 U	<1 U	<2 U	<1 U	<1 U
BROMOMETHANE	µg/L	34	<1 U	<5 U	<2,000 U	<2,000 U	<2.5 U	<1 U	<1 U	<1 U	<2 U	<1 U	<1 U
CARBON DISULFIDE	µg/L	2,400	<1 U	<5 U	<2,000 U	<2,000 U	<2.5 U	<1 U	<1 U	<1 UJ	<2 U	<1 U	<1 U
CARBON TETRACHLORIDE	µg/L	5	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	3.76	<1 U	<0.5 U	<0.5 U
CHLOROBENZENE	µg/L	100	<0.25 U	<1.25 U	<500 U	<500 U	<0.626 U	<0.25 U	<0.25 U	0.161 J	<0.5 U	<0.25 U	<0.25 U
CHLOROETHANE	µg/L	98,000	<1 U	<5 U	<2,000 U	<2,000 U	<2.5 U	<1 U	<1 U	<1 U	<2 U	<1 U	<1 U
CHLOROFORM	µg/L	240	<0.25 U	7.27	<500 U	<500 U	1.85 J	0.238 J	<0.25 U	18.6	0.556 J	1.63	<0.25 U
CHLOROMETHANE	µg/L	70	<1 U	<5 U	<2,000 U	<2,000 U	<2.5 U	<1 U	<1 U	<1 U	<2 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	1,540	35,400	36,300	88	14	8.29	18.4	1.88 J	39.4	<0.5 U
CIS-1,3-DICHLOROPROPENE	µg/L	1.7	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
DIBROMOCHLOROMETHANE	µg/L	11	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
DIBROMOMETHANE	µg/L	120	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
DICHLORODIFLUOROMETHANE	µg/L	4,900	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
ETHYLBENZENE	µg/L	700	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
HEXACHLOROBUTADIENE	µg/L	12	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
ISOPROPYLBENZENE	µg/L	2,400	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
M,P-XYLENE	µg/L	10,000	<1 U	<5 U	<2,000 U	<2,000 U	<2.5 U	<1 U	<1 U	<1 U	<2 U	<1 U	<1 U
METHYLENE CHLORIDE	µg/L	5	<0.5 U	1.89 J	604,000	564,000	1.06 J	<0.5 U	<0.5 U	0.314 J	<1 U	<0.5 U	<0.5 U
NAPHTHALENE	µg/L	490	<0.4 U	<2 U	<800 U	<800 U	<1 U	<0.4 U	<0.4 U	<0.4 U	<0.8 U	<0.4 U	<0.4 U
N-BUTYLBENZENE	µg/L	1,200	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
N-PROPYLBENZENE	µg/L	980	<0.25 U	<1.25 U	<500 U	<500 U	<0.626 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.25 U	<0.25 U
O-XYLENE	µg/L	10,000	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
P-ISOPROPYLTOLUENE	µg/L	2,400	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
SEC-BUTYLBENZENE	µg/L	980	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
STYRENE	µg/L	100	<0.25 U	<1.25 U	<500 U	<500 U	<0.626 U	<0.25 U	<0.25 U	<0.25 U	<0.5 U	<0.25 U	<0.25 U
TERT-BUTYLBENZENE	µg/L	980	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<2.5 U	<1,000 U	<1,000 U	1.3 J	<0.5 U	<0.5 U	0.421 J	<1 U	<0.5 U	<0.5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	CO8- 061217 6/12/2017	MW1- 061917 6/19/2017	MW2- 061317 6/13/2017	MW2FD- 061317 6/13/2017	MW3- 061317 6/13/2017	MW5- 061417 6/14/2017	MW6- 061517 6/15/2017	MW7- 62317 6/23/2017	MW8- 061617 6/16/2017	MW9- 062317 6/23/2017	MW10- 062017 6/20/2017
TOLUENE	µg/L	1,000	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	2.9 J	<1,000 U	<1,000 U	4.15	<0.5 U	<0.5 U	<0.5 U	<1 U	0.336 J	<0.5 U
TRANS-1,3-DICHLOROPROPENE	µg/L	9.1	<1 U	<5 U	<2,000 U	<2,000 U	<2.5 U	<1 U	<1 U	<1 U	<2 U	<1 U	<1 U
TRICHLOROETHENE	µg/L	5	1.57	2,990	15,300	16,100	558	45.8	18.7	2,230	296	661	0.701 J
TRICHLOROFUOROMETHANE	µg/L	7,300	<0.5 U	<2.5 U	<1,000 U	<1,000 U	<1.25 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	2.79 J	<1,000 U	<1,000 U	31.8	5.5	2.51	0.372 J	<1 U	<0.5 U	<0.5 U

Location IDs containing "F" indicate sample filtered in the field with 10 micron filter.

Location IDs containing "FD" indicate duplicate samples.

Blue Highlighting Indicates Analyte Detected Above MCL/PCL

Note: Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

NA - not analyzed

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

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

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

µg/L - micrograms per liter

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	MW10F- 062017 6/20/2017	MW12- 062017 6/20/2017	MW12F- 062017 6/20/2017	MW13- 062017 6/20/2017	MW14- 062617 6/26/2017	MW16- 061317 6/13/2017	MW16F- 061317 6/13/2017	MW17- 062117 6/21/2017	MW17F- 062117 6/21/2017	MW18- 062117 6/21/2017	MW18F- 062117 6/21/2017
Metals (6010C)													
ALUMINUM	mg/L	100	<0.2 U	NA	<0.2 U	0.13 J	<0.2 U	NA	<0.2 U	NA	<0.2 U	NA	2.25
BERYLLIUM	mg/L	0.004	NA	NA	NA	<0.002 U	<0.002 U	NA	NA	NA	NA	NA	NA
CALCIUM	mg/L		NA	NA	NA	30.7	81.6	NA	NA	NA	NA	NA	NA
IRON	mg/L		44.3	NA	91.9	93.9	66.8	NA	66.3	NA	9.65	NA	5.81
MAGNESIUM	mg/L		NA	NA	NA	16.7	42.6	NA	NA	NA	NA	NA	NA
POTASSIUM	mg/L		NA	NA	NA	4.08	27.8	NA	NA	NA	NA	NA	NA
SELENIUM	mg/L	0.05	<0.02 U	NA	<0.02 U	<0.02 U	<0.02 U	NA	<0.02 U	NA	<0.02 U	NA	<0.02 U
SODIUM	mg/L		NA	NA	NA	94.5	307	NA	NA	NA	NA	NA	NA
Metals (6020A)													
ANTIMONY	mg/L	0.006	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U
ARSENIC	mg/L	0.01	0.00121 J	NA	0.00317	0.00251	0.00473	NA	0.0198	NA	0.00229	NA	0.00202
BARIUM	mg/L	2	0.618	NA	1	0.631	0.528	NA	0.489	NA	0.352	NA	0.0979
CADMIUM	mg/L	0.005	0.000831 J	NA	0.000426 J	<0.0006 U	0.000702 J	NA	<0.0006 U	NA	<0.0006 U	NA	0.00155
CHROMIUM	mg/L	0.1	0.0015 J	NA	0.00187 J	0.0299	0.197	NA	0.00637	NA	0.00502	NA	0.0296
COBALT	mg/L	6.1	0.00413	NA	0.00104 J	0.00127 J	0.024	NA	0.00561	NA	0.0161	NA	0.00714
COPPER	mg/L	1.3	NA	NA	NA	0.00247 J	0.00422	NA	NA	NA	NA	NA	NA
LEAD	mg/L	0.015	<0.001 U	NA	<0.001 U	0.000788 J	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	0.000604 J
MANGANESE	mg/L	1.1	0.947	NA	2	1.56	3.82	NA	0.782	NA	1.63	NA	0.301
NICKEL	mg/L	0.49	0.0187	NA	0.0123	0.0513	0.45	NA	0.02	NA	0.0571	NA	0.103
SILVER	mg/L	0.51	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	<0.001 U
THALLIUM	mg/L	0.002	<0.0002 U	NA	0.000185 J	<0.0002 U	<0.0002 U	NA	<0.0002 U	NA	<0.0002 U	NA	<0.0002 U
VANADIUM	mg/L	0.72	<0.001 U	NA	<0.001 U	<0.001 U	<0.001 U	NA	<0.001 U	NA	<0.001 U	NA	0.00165 J
ZINC	mg/L	31	0.0214 J	NA	0.0256 J	0.0178 J	0.362	NA	<0.025 U	NA	<0.025 U	NA	0.0397 J
Perchlorate (6850)													
PERCHLORATE	µg/L	17	NA	<0.2 U	NA	<0.2 U	137,000	<0.2 U	NA	<0.2 U	NA	<0.2 U	NA
Mercury (7470A)													
MERCURY	mg/L	0.002	NA	NA	NA	<0.0002 U	<0.0002 U	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds (8260B)													
1,1,1,2-TETRACHLOROETHANE	µg/L	35	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
1,1,1-TRICHLOROETHANE	µg/L	200	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
1,1,2,2-TETRACHLOROETHANE	µg/L	4.6	NA	<0.4 U	NA	<0.4 U	<20 U	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA
1,1,2-TRICHLOROETHANE	µg/L	5	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
1,1-DICHLOROETHANE	µg/L	4,900	NA	2.55	NA	<0.25 U	31.1 J	1.61 J	NA	<0.25 U	NA	<0.25 U	NA
1,1-DICHLOROETHENE	µg/L	7	NA	4.94	NA	<1 U	130	8.38	NA	<1 U	NA	<1 U	NA
1,1-DICHLOROPROPENE	µg/L	9.1	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
1,2,3-TRICHLOROBENZENE	µg/L	73	NA	<0.3 U	NA	<0.3 U	<15 U	<0.6 U	NA	<0.3 U	NA	<0.3 U	NA
1,2,3-TRICHLOROPROPANE	µg/L	0.03	NA	<1 U	NA	<1 U	<50 U	<2 U	NA	<1 U	NA	<1 U	NA
1,2,4-TRICHLOROBENZENE	µg/L	70	NA	<0.4 U	NA	<0.4 U	<20 U	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA
1,2,4-TRIMETHYLBENZENE	µg/L	1,200	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	0.2	NA	<2 U	NA	<2 U	<100 U	<4 U	NA	<2 U	NA	<2 U	NA
1,2-DIBROMOETHANE	µg/L	0.05	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
1,2-DICHLOROBENZENE	µg/L	600	NA	<0.25 U	NA	<0.25 U	<12.5 U	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA
1,2-DICHLOROETHANE	µg/L	5	NA	2.11	NA	<0.5 U	92.4	54.8	NA	<0.5 U	NA	<0.5 U	NA
1,2-DICHLOROPROPANE	µg/L	5	NA	<0.4 U	NA	<0.4 U	<20 U	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA
1,3,5-TRIMETHYLBENZENE	µg/L	1,200	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
1,3-DICHLOROBENZENE	µg/L	730	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	MW10F- 062017 6/20/2017	MW12- 062017 6/20/2017	MW12F- 062017 6/20/2017	MW13- 062017 6/20/2017	MW14- 062617 6/26/2017	MW16- 061317 6/13/2017	MW16F- 061317 6/13/2017	MW17- 062117 6/21/2017	MW17F- 062117 6/21/2017	MW18- 062117 6/21/2017	MW18F- 062117 6/21/2017
1,3-DICHLOROPROPANE	µg/L	9.1	NA	<0.4 U	NA	<0.4 U	<20 U	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA
1,4-DICHLOROBENZENE	µg/L	75	NA	<0.25 U	NA	<0.25 U	<12.5 U	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA
2,2-DICHLOROPROPANE	µg/L	13	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
2-BUTANONE	µg/L	15,000	NA	<5 U	NA	<5 U	<250 U	<10 U	NA	<5 U	NA	<5 U	NA
2-CHLOROTOLUENE	µg/L	490	NA	<0.25 U	NA	<0.25 U	<12.5 U	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA
2-HEXANONE	µg/L	120	NA	<5 U	NA	<5 U	<250 U	<10 U	NA	<5 U	NA	<5 U	NA
4-CHLOROTOLUENE	µg/L	490	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
4-METHYL-2-PENTANONE	µg/L	2,000	NA	<5 U	NA	<5 U	<250 U	<10 U	NA	<5 U	NA	<5 U	NA
ACETONE	µg/L	22,000	NA	10.8	NA	3.19 J	<250 U	<10 U	NA	3.78 J	NA	2.64 J	NA
BENZENE	µg/L	5	NA	0.234 J	NA	<0.25 U	<12.5 U	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA
BROMOBENZENE	µg/L	200	NA	<0.25 U	NA	<0.25 U	<12.5 U	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA
BROMOCHLOROMETHANE	µg/L	980	NA	<0.4 U	NA	<0.4 U	<20 U	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA
BROMODICHLOROMETHANE	µg/L	15	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
BROMOFORM	µg/L	120	NA	<1 U	NA	<1 U	<50 U	<2 U	NA	<1 U	NA	<1 U	NA
BROMOMETHANE	µg/L	34	NA	<1 U	NA	<1 U	<50 U	<2 U	NA	<1 U	NA	<1 U	NA
CARBON DISULFIDE	µg/L	2,400	NA	<1 U	NA	<1 U	<50 U	<2 U	NA	<1 U	NA	<1 U	NA
CARBON TETRACHLORIDE	µg/L	5	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
CHLOROBENZENE	µg/L	100	NA	<0.25 U	NA	<0.25 U	<12.5 U	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA
CHLOROETHANE	µg/L	98,000	NA	<1 U	NA	<1 U	<50 U	<2 U	NA	<1 U	NA	<1 U	NA
CHLOROFORM	µg/L	240	NA	<0.25 U	NA	<0.25 U	<12.5 U	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA
CHLOROMETHANE	µg/L	70	NA	<1 U	NA	<1 U	<50 U	<2 U	NA	<1 U	NA	<1 U	NA
CIS-1,2-DICHLOROETHENE	µg/L	70	NA	33.3	NA	<0.5 U	2,000	25	NA	<0.5 U	NA	0.978 J	NA
CIS-1,3-DICHLOROPROPENE	µg/L	1.7	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
DIBROMOCHLOROMETHANE	µg/L	11	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
DIBROMOMETHANE	µg/L	120	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
DICHLORODIFLUOROMETHANE	µg/L	4,900	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
ETHYLBENZENE	µg/L	700	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
HEXACHLOROBUTADIENE	µg/L	12	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
ISOPROPYLBENZENE	µg/L	2,400	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
M,P-XYLENE	µg/L	10,000	NA	<1 U	NA	<1 U	<50 U	<2 U	NA	<1 U	NA	<1 U	NA
METHYLENE CHLORIDE	µg/L	5	NA	<0.5 U	NA	<0.5 U	216	<1 U	NA	<0.5 U	NA	<0.5 U	NA
NAPHTHALENE	µg/L	490	NA	<0.4 U	NA	<0.4 U	<20 U	<0.8 U	NA	<0.4 U	NA	<0.4 U	NA
N-BUTYLBENZENE	µg/L	1,200	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
N-PROPYLBENZENE	µg/L	980	NA	<0.25 U	NA	<0.25 U	<12.5 U	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA
O-XYLENE	µg/L	10,000	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
P-ISOPROPYLTOLUENE	µg/L	2,400	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
SEC-BUTYLBENZENE	µg/L	980	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
STYRENE	µg/L	100	NA	<0.25 U	NA	<0.25 U	<12.5 U	<0.5 U	NA	<0.25 U	NA	<0.25 U	NA
TERT-BUTYLBENZENE	µg/L	980	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
TETRACHLOROETHENE	µg/L	5	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	MW10F- 062017 6/20/2017	MW12- 062017 6/20/2017	MW12F- 062017 6/20/2017	MW13- 062017 6/20/2017	MW14- 062617 6/26/2017	MW16- 061317 6/13/2017	MW16F- 061317 6/13/2017	MW17- 062117 6/21/2017	MW17F- 062117 6/21/2017	MW18- 062117 6/21/2017	MW18F- 062117 6/21/2017
TOLUENE	µg/L	1,000	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
TRANS-1,2-DICHLOROETHENE	µg/L	100	NA	0.744 J	NA	<0.5 U	17.9 J	0.968 J	NA	<0.5 U	NA	<0.5 U	NA
TRANS-1,3-DICHLOROPROPENE	µg/L	9.1	NA	<1 U	NA	<1 U	<50 U	<2 U	NA	<1 U	NA	<1 U	NA
TRICHLOROETHENE	µg/L	5	NA	303	NA	<0.5 U	8,260	695	NA	<0.5 U	NA	5.7	NA
TRICHLOROFUOROMETHANE	µg/L	7,300	NA	<0.5 U	NA	<0.5 U	<25 U	<1 U	NA	<0.5 U	NA	<0.5 U	NA
VINYL CHLORIDE	µg/L	2	NA	0.494 J	NA	<0.5 U	<25 U	0.681 J	NA	<0.5 U	NA	<0.5 U	NA

Location IDs containing "F" indicate sample filtered in the field with 10 micron filter.

Location IDs containing "FD" indicate duplicate samples.

Blue Highlighting Indicates Analyte Detected Above MCL/PCL

Note: Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

NA - not analyzed

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

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

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

µg/L - micrograms per liter

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	MW19- 062017 6/20/2017	MW21- 061617 6/16/2017	MW21FD- 061617 6/16/2017	MW22- 061217 6/12/2017	MW23- 061917 6/19/2017
Metals (6010C)							
ALUMINUM	mg/L	100	1.1	<0.2 U	<0.2 U	<0.2 U	0.141 J
BERYLLIUM	mg/L	0.004	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U
CALCIUM	mg/L		42.4	213	216	106	82.8
IRON	mg/L		60.1	11.2	11.9	2.15	1.31
MAGNESIUM	mg/L		20.5	174	177	30	47.8
POTASSIUM	mg/L		3.43	2.27	2.38	2.78	2.57
SELENIUM	mg/L	0.05	<0.02 U	<0.02 U	<0.02 U	<0.02 U	<0.02 U
SODIUM	mg/L		239	557	562	386	333
Metals (6020A)							
ANTIMONY	mg/L	0.006	<0.001 U	<0.001 U	<0.001 U	<0.001 U	0.0009 J
ARSENIC	mg/L	0.01	0.00944	0.0056	0.00589	0.00181 J	0.00188 J
BARIUM	mg/L	2	0.55	7.39	7.38	1.31	1.55 J
CADMIUM	mg/L	0.005	0.000617 J	0.00141	0.00137	0.00242	0.000372 J
CHROMIUM	mg/L	0.1	0.0218	1.64	1.71	0.272	0.123 J
COBALT	mg/L	6.1	0.0286	0.124	0.125	0.049	0.00423
COPPER	mg/L	1.3	0.00592	0.041	0.0419	0.00746	0.0077
LEAD	mg/L	0.015	0.00159 J	0.000533 J	0.000573 J	<0.001 U	<0.001 U
MANGANESE	mg/L	1.1	3.51	2.63	2.61	0.743	0.201
NICKEL	mg/L	0.49	0.0852	1.5	1.49	0.969	0.409
SILVER	mg/L	0.51	<0.001 U	<0.001 U	<0.001 U	<0.001 U	<0.001 U
THALLIUM	mg/L	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U
VANADIUM	mg/L	0.72	0.00453	<0.05 U	<0.001 U	<0.001 U	0.00152 J
ZINC	mg/L	31	0.0473 J	0.0341 J	0.0349 J	<0.025 U	<0.025 U
Perchlorate (6850)							
PERCHLORATE	µg/L	17	<0.2 U	28,300	28,500	214	74,500
Mercury (7470A)							
MERCURY	mg/L	0.002	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.0002 U
Volatile Organic Compounds (8260B)							
1,1,1,2-TETRACHLOROETHANE	µg/L	35	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
1,1,1-TRICHLOROETHANE	µg/L	200	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
1,1,2,2-TETRACHLOROETHANE	µg/L	4.6	<0.4 U	<20 U	<20 U	<2 U	<4 U
1,1,2-TRICHLOROETHANE	µg/L	5	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
1,1-DICHLOROETHANE	µg/L	4,900	<0.25 U	<12.5 U	<12.5 U	<1.25 U	<2.5 U
1,1-DICHLOROETHENE	µg/L	7	<1 U	<50 U	<50 U	<5 U	<10 U
1,1-DICHLOROPROPENE	µg/L	9.1	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
1,2,3-TRICHLOROBENZENE	µg/L	73	<0.3 U	<15 U	<15 U	<1.5 U	<3 U
1,2,3-TRICHLOROPROPANE	µg/L	0.03	<1 U	<50 U	<50 U	<5 U	<10 U
1,2,4-TRICHLOROBENZENE	µg/L	70	<0.4 U	<20 U	<20 U	<2 U	<4 U
1,2,4-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	0.2	<2 U	<100 U	<100 U	<10 U	<20 U
1,2-DIBROMOETHANE	µg/L	0.05	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
1,2-DICHLOROBENZENE	µg/L	600	<0.25 U	<12.5 U	<12.5 U	<1.25 U	<2.5 U
1,2-DICHLOROETHANE	µg/L	5	0.465 J	36.8 J	39.2 J	5.06	78.9
1,2-DICHLOROPROPANE	µg/L	5	<0.4 U	<20 U	<20 U	<2 U	<4 U
1,3,5-TRIMETHYLBENZENE	µg/L	1,200	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
1,3-DICHLOROBENZENE	µg/L	730	<0.5 U	<25 U	<25 U	<2.5 U	<5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	MW19- 062017 6/20/2017	MW21- 061617 6/16/2017	MW21FD- 061617 6/16/2017	MW22- 061217 6/12/2017	MW23- 061917 6/19/2017
1,3-DICHLOROPROPANE	µg/L	9.1	<0.4 U	<20 U	<20 U	<2 U	<4 U
1,4-DICHLOROBENZENE	µg/L	75	<0.25 U	<12.5 U	<12.5 U	<1.25 U	<2.5 U
2,2-DICHLOROPROPANE	µg/L	13	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
2-BUTANONE	µg/L	15,000	<5 U	<250 U	<250 U	<25 U	<50 U
2-CHLOROTOLUENE	µg/L	490	<0.25 U	<12.5 U	<12.5 U	<1.25 U	<2.5 U
2-HEXANONE	µg/L	120	<5 U	<250 U	<250 U	<25 U	<50 U
4-CHLOROTOLUENE	µg/L	490	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
4-METHYL-2-PENTANONE	µg/L	2,000	<5 U	<250 U	<250 U	<25 U	<50 U
ACETONE	µg/L	22,000	2.69 J	<250 U	<250 U	<25 U	<50 U
BENZENE	µg/L	5	<0.25 U	<12.5 U	<12.5 U	2.1 J	<2.5 U
BROMOBENZENE	µg/L	200	<0.25 U	<12.5 U	<12.5 U	<1.25 U	<2.5 U
BROMOCHLOROMETHANE	µg/L	980	<0.4 U	<20 U	<20 U	<2 U	<4 U
BROMODICHLOROMETHANE	µg/L	15	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
BROMOFORM	µg/L	120	<1 U	<50 U	<50 U	<5 U	<10 U
BROMOMETHANE	µg/L	34	<1 U	<50 U	<50 U	<5 U	<10 U
CARBON DISULFIDE	µg/L	2,400	<1 U	<50 U	<50 U	<5 U	<10 U
CARBON TETRACHLORIDE	µg/L	5	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
CHLOROBENZENE	µg/L	100	<0.25 U	<12.5 U	<12.5 U	<1.25 U	<2.5 U
CHLOROETHANE	µg/L	98,000	<1 U	<50 U	<50 U	<5 U	<10 U
CHLOROFORM	µg/L	240	<0.25 U	11.7 J	11.6 J	<1.25 U	6.08 J
CHLOROMETHANE	µg/L	70	<1 U	<50 U	<50 U	<5 U	<10 U
CIS-1,2-DICHLOROETHENE	µg/L	70	4.96	76.8	77.4	4.88 J	14.6
CIS-1,3-DICHLOROPROPENE	µg/L	1.7	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
DIBROMOCHLOROMETHANE	µg/L	11	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
DIBROMOMETHANE	µg/L	120	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
DICHLORODIFLUOROMETHANE	µg/L	4,900	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
ETHYLBENZENE	µg/L	700	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
HEXACHLOROBUTADIENE	µg/L	12	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
ISOPROPYLBENZENE	µg/L	2,400	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
M,P-XYLENE	µg/L	10,000	<1 U	<50 U	<50 U	<5 U	<10 U
METHYLENE CHLORIDE	µg/L	5	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
NAPHTHALENE	µg/L	490	<0.4 U	<20 U	<20 U	<2 U	<4 U
N-BUTYLBENZENE	µg/L	1,200	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
N-PROPYLBENZENE	µg/L	980	<0.25 U	<12.5 U	<12.5 U	<1.25 U	<2.5 U
O-XYLENE	µg/L	10,000	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
P-ISOPROPYLTOLUENE	µg/L	2,400	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
SEC-BUTYLBENZENE	µg/L	980	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
STYRENE	µg/L	100	<0.25 U	<12.5 U	<12.5 U	<1.25 U	<2.5 U
TERT-BUTYLBENZENE	µg/L	980	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<25 U	<25 U	<2.5 U	<5 U

Table 4-2: LHAAP-18/24 Sampling - June 2017

Location ID: Sample Date:	Units	MCL/ PCL	MW19- 062017 6/20/2017	MW21- 061617 6/16/2017	MW21FD- 061617 6/16/2017	MW22- 061217 6/12/2017	MW23- 061917 6/19/2017
TOLUENE	µg/L	1,000	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.481 J	<25 U	<25 U	<2.5 U	<5 U
TRANS-1,3-DICHLOROPROPENE	µg/L	9.1	<1 U	<50 U	<50 U	<5 U	<10 U
TRICHLOROETHENE	µg/L	5	9.87	7,140	7,140	500	1,950
TRICHLOROFUOROMETHANE	µg/L	7,300	<0.5 U	<25 U	<25 U	<2.5 U	<5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	39.5 J	40.8 J	<2.5 U	<5 U

Location IDs containing "F" indicate sample filtered in the field with 10 micron filter.

Location IDs containing "FD" indicate duplicate samples.

Blue Highlighting Indicates Analyte Detected Above MCL/PCL

Note: Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

NA - not analyzed

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

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

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

µg/L - micrograms per liter

5 QUALITY CONTROL

This report summarizes the data for samples collected during April, May, and June 2017. The samples were collected in accordance with the Sampling and Analysis Plan for the GWTP (USACE, July 2007) that treats water from LHAAP-18/24 and LHAAP-16. 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 2nd quarter of 2017 were rejected due to quality control problems.

Microbac analyzed the compliance samples collected from the GWTP. Independent data verification and validation was performed by the AECOM project chemist (**Appendix E**); the laboratory reports for the 2nd quarter of 2017 are included in **Appendix E**.

6 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 discharge criteria was discharged to Harrison Bayou or the INF Pond in accordance with the Protocol for Discharging GWTP Effluent (**Appendix G**). **Table 6-1** summarizes flow rates in Harrison Bayou, the maximum flow rate allowed by chloride and sulfate concentrations, and the actual flow rate discharged during the 2nd quarter of 2017.

Table 6-1: Treated Groundwater Discharged to Harrison Bayou - April 2017 through June 2017

Date	Harrison Bayou Flow (gpm)	Maximum Rate Allowed (gpm)	Released From GWTP To Harrison Bayou (gpm)	Released From INF Pond To Harrison Bayou (gpm)	Combined Total Released To Harrison Bayou (gpm)
04/01/2017	No Release	N/A	0.0	0.0	0.0
04/02/2017	No Release	N/A	0.0	0.0	0.0
04/03/2017	FLOOD STAGE	MAXIMUM	3.8	0.0	3.8
04/04/2017	FLOOD STAGE	MAXIMUM	12.2	0.0	12.2
04/05/2017	No Release	N/A	0.0	0.0	0.0
04/06/2017	No Release	N/A	0.0	0.0	0.0
04/07/2017	No Release	N/A	0.0	0.0	0.0
04/08/2017	857	45	0.0	0.0	0.0
04/09/2017	725	38	20.1	0.0	20.1
04/10/2017	607	32	27.7	0.0	27.7
04/11/2017	757	40	14.7	0.0	14.7
04/12/2017	No Release	N/A	0.0	0.0	0.0
04/13/2017	No Release	N/A	0.0	0.0	0.0
04/14/2017	No Release	N/A	0.0	0.0	0.0
04/15/2017	No Release	N/A	0.0	0.0	0.0
04/16/2017	No Release	N/A	0.0	0.0	0.0
04/17/2017	No Release	N/A	0.0	0.0	0.0
04/18/2017	No Release	N/A	0.0	0.0	0.0
04/19/2017	No Release	N/A	0.0	0.0	0.0
04/20/2017	No Release	N/A	0.0	0.0	0.0
04/21/2017	No Release	N/A	0.0	0.0	0.0
04/22/2017	No Release	N/A	0.0	0.0	0.0
04/23/2017	No Release	N/A	0.0	0.0	0.0
04/24/2017	No Release	N/A	0.0	0.0	0.0
04/25/2017	No Release	N/A	0.0	0.0	0.0
04/26/2017	No Release	N/A	0.0	0.0	0.0
04/27/2017	No Release	N/A	0.0	0.0	0.0
04/28/2017	No Release	N/A	0.0	0.0	0.0
04/29/2017	No Release	N/A	0.0	0.0	0.0
04/30/2017	No Release	N/A	0.0	0.0	0.0

Table 6-1: Treated Groundwater Discharged to Harrison Bayou - April 2017 through June 2017

Date	Harrison Bayou Flow (gpm)	Maximum Rate Allowed (gpm)	Released From GWTP To Harrison Bayou (gpm)	Released From INF Pond To Harrison Bayou (gpm)	Combined Total Released To Harrison Bayou (gpm)
05/01/2017	No Release	N/A	0.0	0.0	0.0
05/02/2017	No Release	N/A	0.0	0.0	0.0
05/03/2017	No Release	N/A	0.0	0.0	0.0
05/04/2017	No Release	N/A	0.0	0.0	0.0
05/05/2017	No Release	N/A	0.0	0.0	0.0
05/06/2017	No Release	N/A	0.0	0.0	0.0
05/07/2017	No Release	N/A	0.0	0.0	0.0
05/08/2017	No Release	N/A	0.0	0.0	0.0
05/09/2017	No Release	N/A	0.0	0.0	0.0
05/10/2017	No Release	N/A	0.0	0.0	0.0
05/11/2017	No Release	N/A	0.0	0.0	0.0
05/12/2017	No Release	N/A	0.0	0.0	0.0
05/13/2017	No Release	N/A	0.0	0.0	0.0
05/14/2017	No Release	N/A	0.0	0.0	0.0
05/15/2017	No Release	N/A	0.0	0.0	0.0
05/16/2017	No Release	N/A	0.0	0.0	0.0
05/17/2017	No Release	N/A	0.0	0.0	0.0
05/18/2017	No Release	N/A	0.0	0.0	0.0
05/19/2017	No Release	N/A	0.0	0.0	0.0
05/20/2017	No Release	N/A	0.0	0.0	0.0
05/21/2017	No Release	N/A	0.0	0.0	0.0
05/22/2017	No Release	N/A	0.0	0.0	0.0
05/23/2017	3129	502	6.8	0.0	6.8
05/24/2017	2984	528	21.6	0.0	21.6
05/25/2017	2362	418	22.6	0.0	22.6
05/26/2017	1391	303	9.9	0.0	9.9
05/27/2017	807	175	15.0	0.0	15.0
05/28/2017	389	84	14.9	0.0	14.9
05/29/2017	Flood Stage	MAXIMUM	7.0	0.0	7.0
05/30/2017	Flood Stage	MAXIMUM	21.9	0.0	21.9
05/31/2017	3529	965	23.0	0.0	23.0

Table 6-1: Treated Groundwater Discharged to Harrison Bayou - April 2017 through June 2017

Date	Harrison Bayou Flow (gpm)	Maximum Rate Allowed (gpm)	Released From GWTP To Harrison Bayou (gpm)	Released From INF Pond To Harrison Bayou (gpm)	Combined Total Released To Harrison Bayou (gpm)
06/01/2017	1585	433	22.8	0.0	22.8
06/02/2017	1170	320	23.3	0.0	23.3
06/03/2017	5714	697	15.0	0.0	15.0
06/04/2017	Flood Stage	MAXIMUM	23.1	94.8	117.9
06/05/2017	Flood Stage	MAXIMUM	29.7	87.2	116.9
06/06/2017	27152	4516	23.1	72.7	95.7
06/07/2017	12975	2793	22.6	58.1	80.7
06/08/2017	5865	1262	21.4	27.9	49.3
06/09/2017	4088	1194	17.8	0.0	17.8
06/10/2017	2521	736	11.1	0.0	11.1
06/11/2017	1819	531	17.9	0.0	17.9
06/12/2017	1395	358	25.2	0.0	25.2
06/13/2017	462	135	19.6	0.0	19.6
06/14/2017	218	63	21.8	0.0	21.8
06/15/2017	136	39	18.9	0.0	18.9
06/16/2017	99	28	11.7	0.0	11.7
06/17/2017	No Release	N/A	0.0	0.0	0.0
06/18/2017	No Release	N/A	0.0	0.0	0.0
06/19/2017	No Release	N/A	0.0	0.0	0.0
06/20/2017	No Release	N/A	0.0	0.0	0.0
06/21/2017	No Release	N/A	0.0	0.0	0.0
06/22/2017	No Release	N/A	0.0	0.0	0.0
06/23/2017	No Release	N/A	0.0	0.0	0.0
06/24/2017	No Release	N/A	0.0	0.0	0.0
06/25/2017	No Release	N/A	0.0	0.0	0.0
06/26/2017	No Release	N/A	0.0	0.0	0.0
06/27/2017	No Release	N/A	0.0	0.0	0.0
06/28/2017	No Release	N/A	0.0	0.0	0.0
06/29/2017	No Release	N/A	0.0	0.0	0.0
06/30/2017	No Release	N/A	0.0	0.0	0.0

gpm - gallons per minute

N/A - not applicable

7 AIR MONITORING

7.1 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 on 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 receptor¹. 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 EPA 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. The GWTP report includes a summary of analytical results and 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. 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 (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). All emission rates have been lower than the

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

allowable emission rates to the conservatively-selected off-site receptor¹. The calculated emission rate in tpy is compared to the allowable limit of 5 tpy per chemical. All emission rates have been lower than the allowable emission rates.

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

On February 18, 2013, AECOM presented analysis of the approach applicable to obtaining a variance for operating the GWTP without air abatement equipment to the TCEQ and EPA. The analysis indicated that the use of Explanation of Significant Difference (ESD) is the appropriate approach for the site. Approval of use of ESD was obtained from the EPA via email on March 21, 2013. The ESD was developed, reviewed, and accepted by EPA 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.

7.2 Air Monitoring Results for the 2nd Quarter of 2017

A summary of the air sampling results is presented in **Appendix F**. Air samples during the 2nd quarter were collected on June 5, 2017. All results met the criteria described in **Section 7.1**.

7.2.1 Summa Canister Monitoring Results

One sampling event was conducted during the 2nd quarter 2017 using Summa canisters. The samples were collected and analyzed as described in **Section 7.1** 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 7.1**.

7.2.1.1 Ambient Air Results

Acetone, tetrachloroethene, n-Hexane, toluene, m,p-Xylenes, dichlorodifluoromethane, ethanol, trichlorofluoromethane, trichlorotrifluoroethane, and alpha-Pinene were detected in June 2017 in ambient air downwind of the GWTP.

Compounds originating at the GWTP would be expected to have lower concentrations in the downwind sampling location than at the GWTP sampling location. Likewise, compounds like acetone, tetrachloroethene, n-Hexane, toluene, m,p-Xylenes, dichlorodifluoromethane, ethanol, trichlorofluoromethane, and alpha-Pinene with similar concentrations in both GWTP ambient air and downwind ambient air are suspected to be present in the ambient (background) air.

All ambient air results during the quarter met the ambient air criteria.

7.2.1.2 Air Stripper Effluent Results

The VOCs present in groundwater that are removed via the air stripper include 1,1-Dichloroethene, 1,2-dichloroethane, cis-1,2-dichloroethene, methylene chloride, trichloroethene, vinyl chloride, and trichlorotrifluoroethane. The highest reported concentrations are for

trichloroethene, trichlorotrifluoroethane, cis-1,2-Dichloroethene, and methylene chloride. 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.

All air stripper effluent concentrations were below the emission criteria.

7.2.2 PID Results

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

8 COMMENTS AND RESPONSES

No comments were received from TCEQ or EPA on the 1st 2017 Quarterly Report.

APPENDIX A: ICT Layout and GWTP Process Flow Diagram

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):

Sump elevation calculated by subtracting total depth from TOC elevation.

ICTs were installed in 1998.

Elevations are reported as feet above mean sea level.

Total depths are reported as feet below TOC.

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

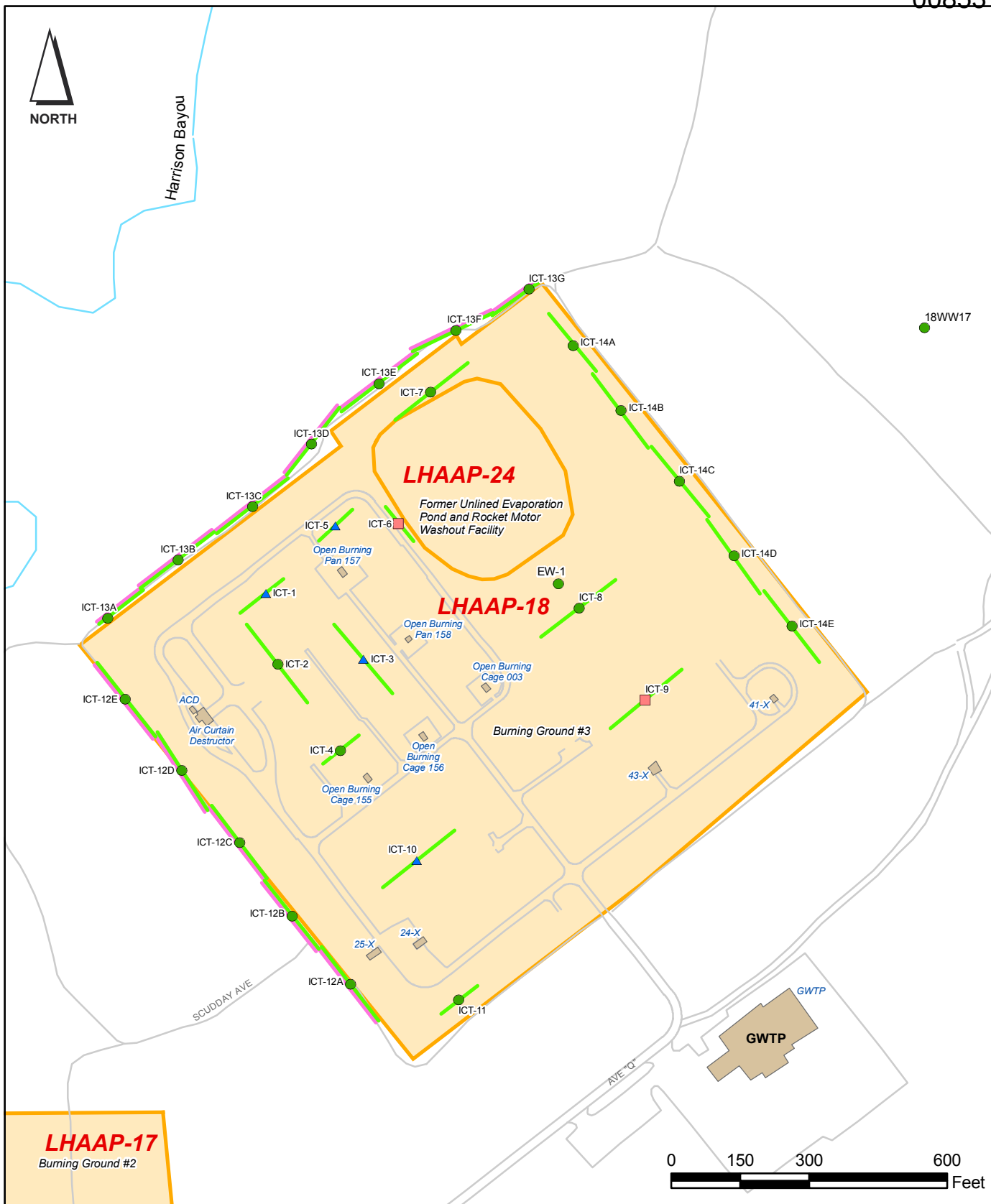
TOC Elevations and total depth measured in October 2003, 4th Quarter 2003, GWTP Report.

ICT - interception-collection trench

TOC - top of casing, measuring point for groundwater elevations



Harrison Bayou



LHAAP-17
Burning Ground #2

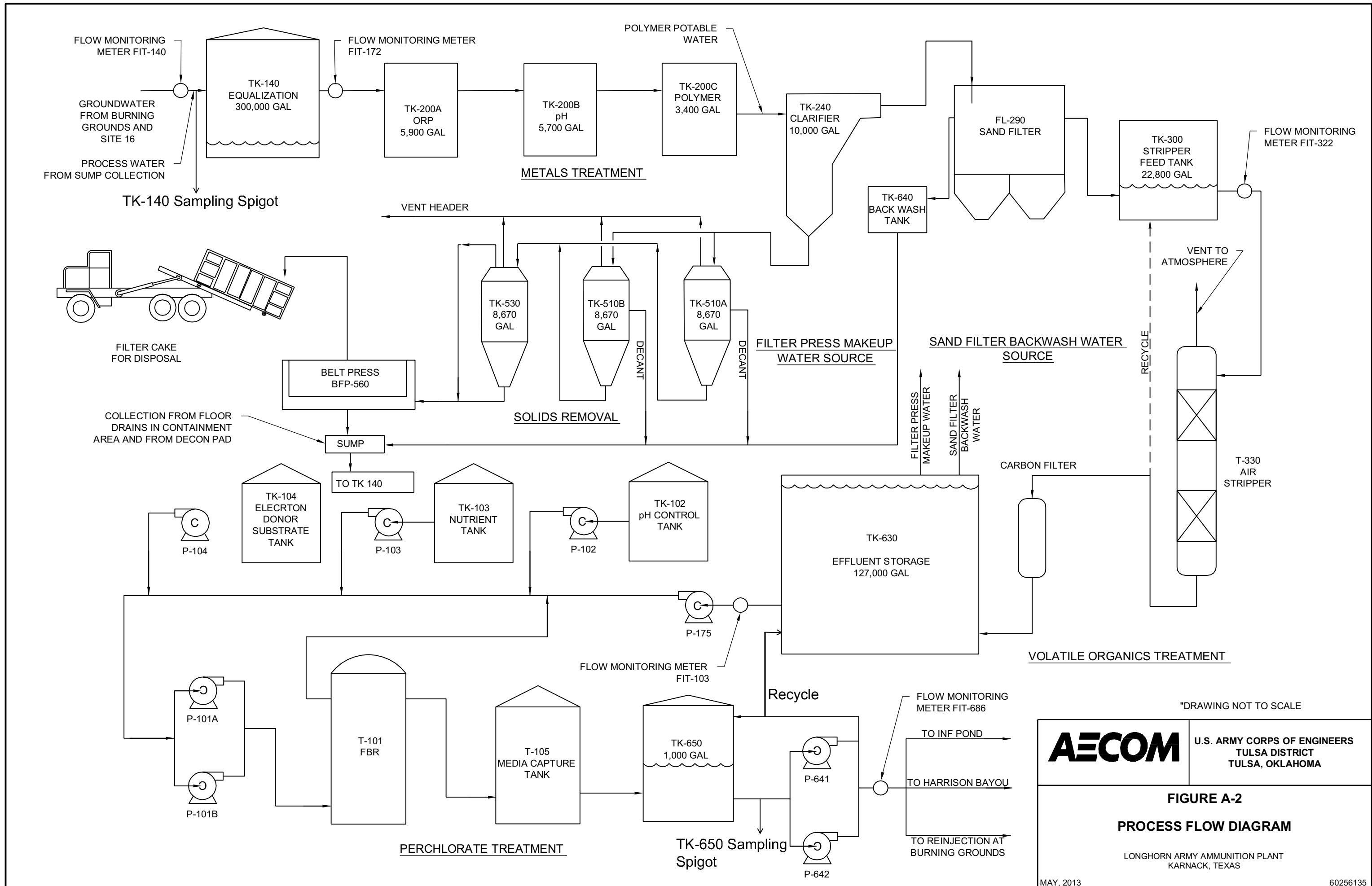
LEGEND

- Extraction Location
- ▲ Deactivated ICT Sump
- Injection Point – inactive since May 24, 2012
- ICT Location
- HDPE Liner Installed on the Outside of the ICT
- Stream
- Road
- Building or Pad
- Site



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

FIGURE A-1
SITE VICINITY MAP
LHAAP-18/24



"DRAWING NOT TO SCALE"

AECOM	U.S. ARMY CORPS OF ENGINEERS TULSA DISTRICT TULSA, OKLAHOMA
FIGURE A-2	
PROCESS FLOW DIAGRAM	
LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS	

MAY, 2013 60256135

APPENDIX B: Groundwater Elevation Contour Maps

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

Table B-1: Extraction Equipment Maintenance Since 2011

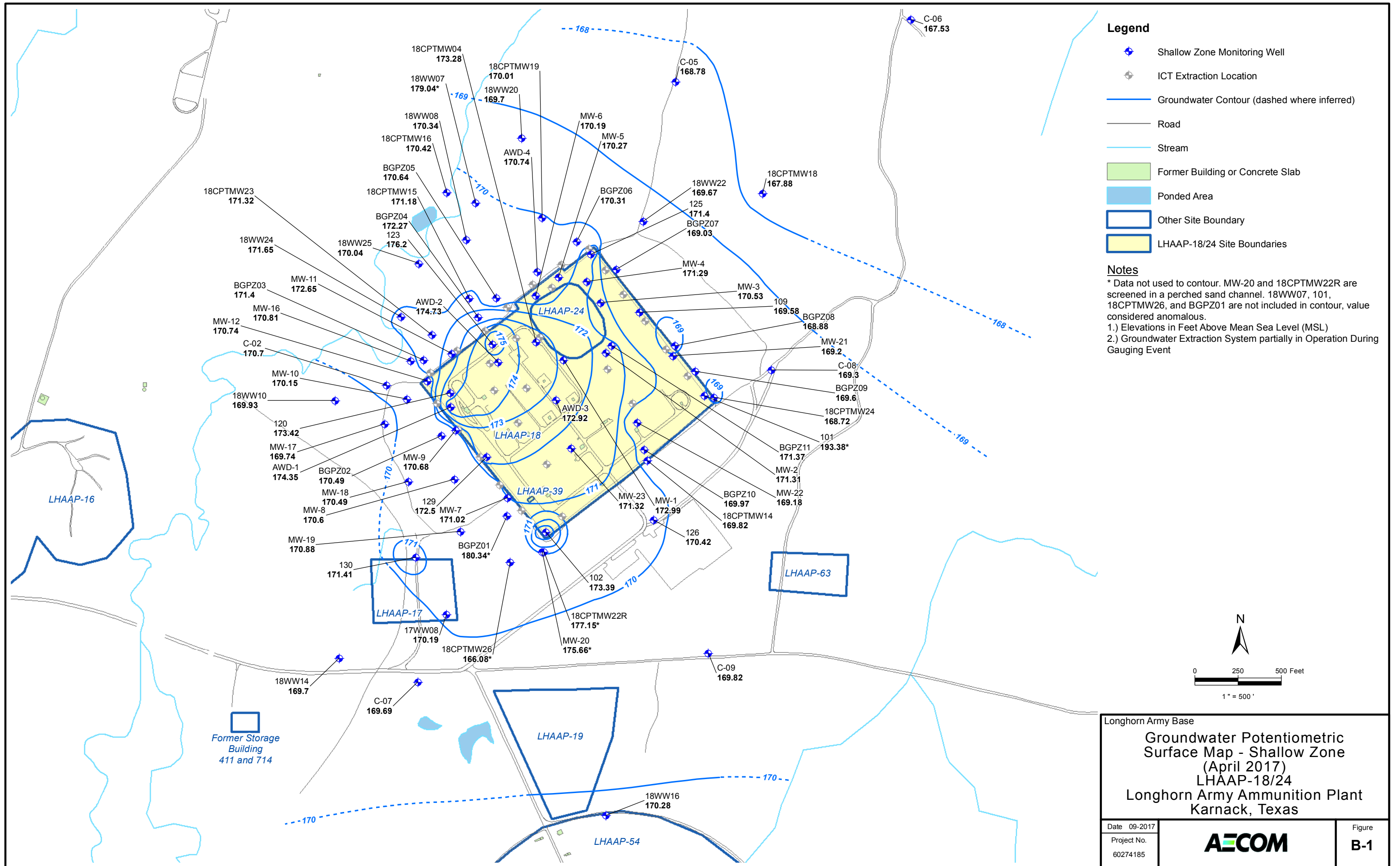
Well I.D.	Replaced Parts	Date	Contractor
ICT 14C	Cleaned level probes	4/1/2015	AECOM
ICT 14D	Cleaned level probes	4/1/2015	AECOM
ICT 13A	Cleaned level probes	4/21/2015	AECOM
ICT 14C	Cleaned level probes	4/21/2015	AECOM
ICT 8	Low level probe	7/24/2015	AECOM
ICT 13C	Installed New Pump	7/28/2015	AECOM
ICT 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

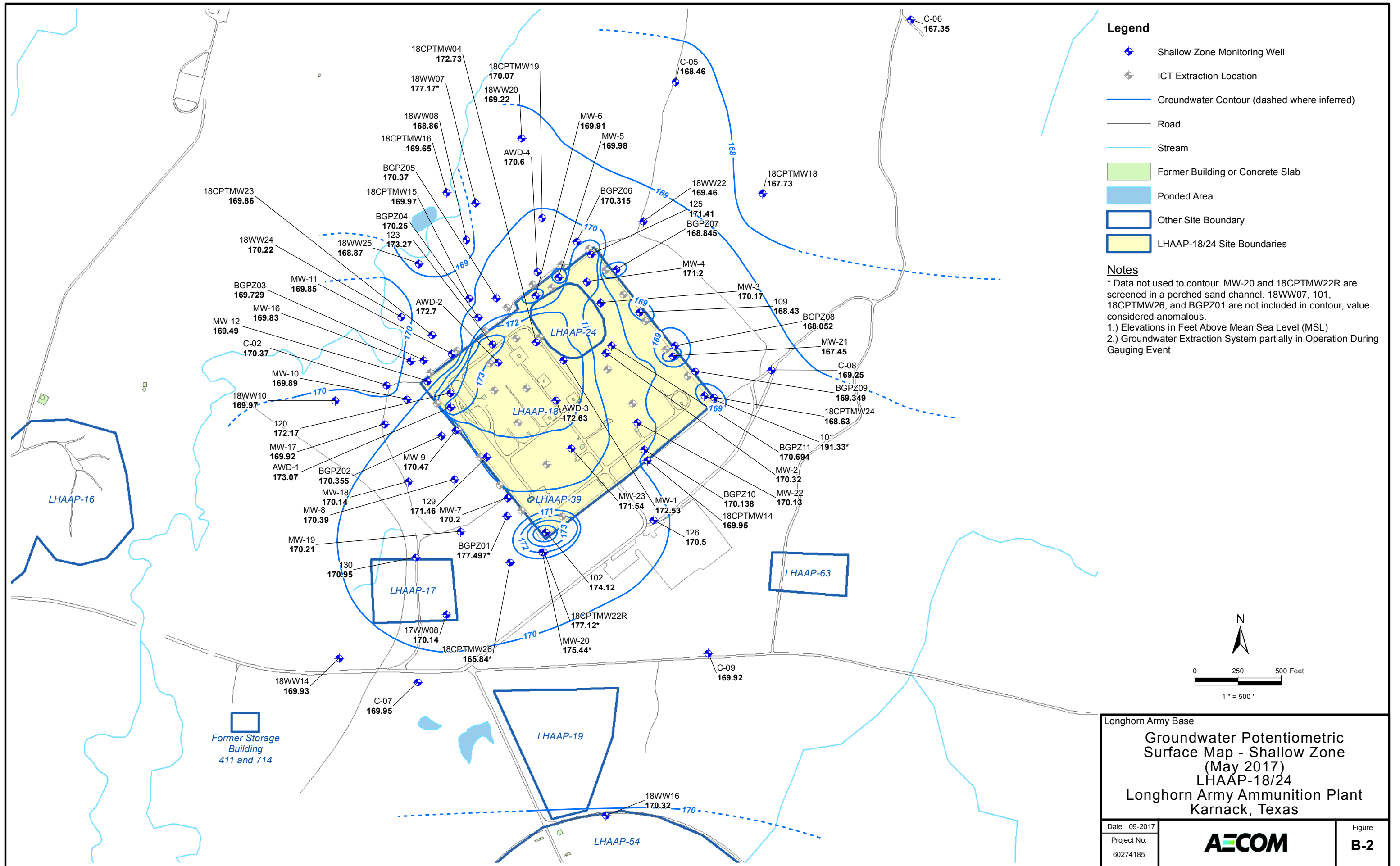
Table B-1: Extraction Equipment Maintenance Since 2011

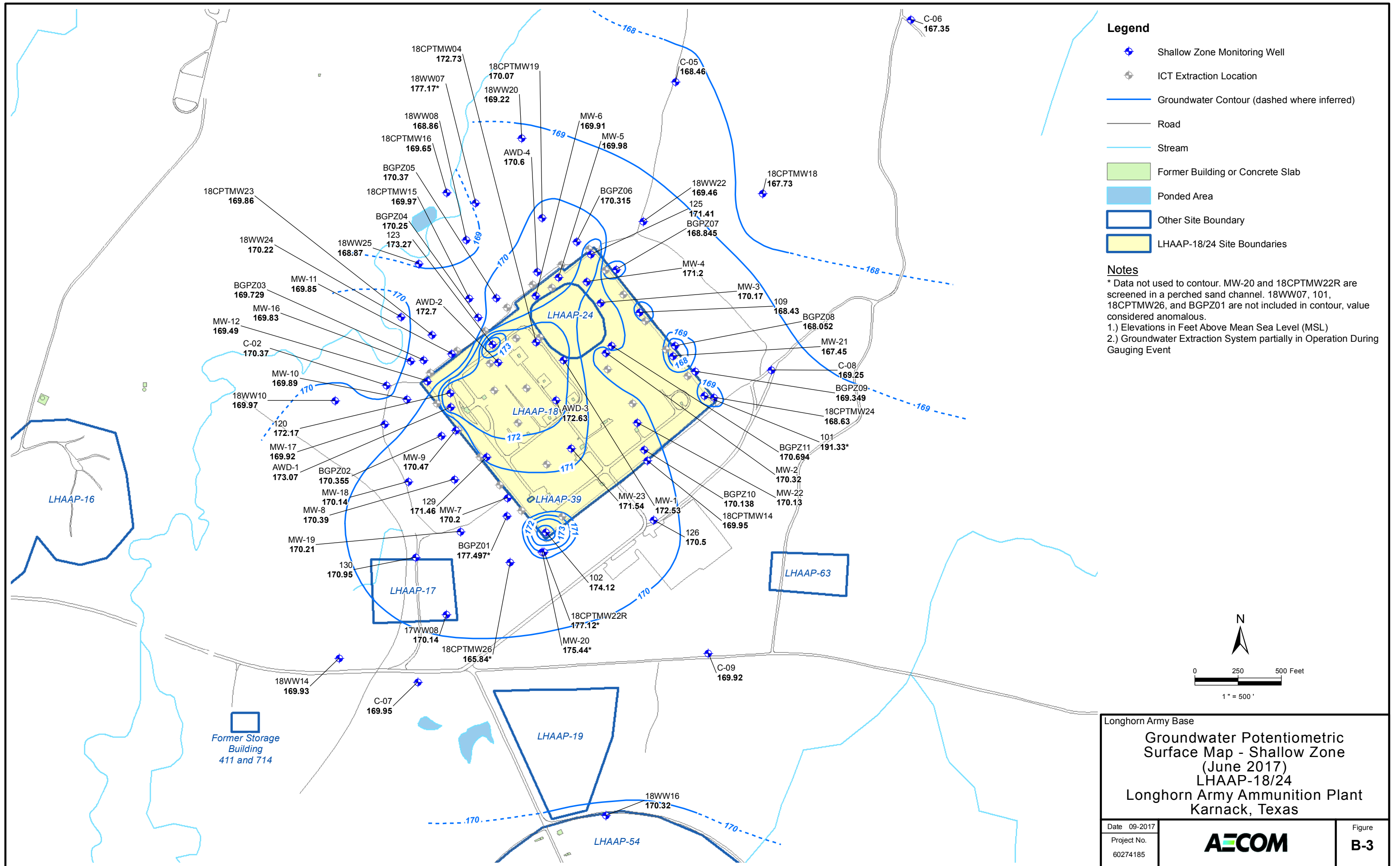
Well I.D.	Replaced Parts	Date	Contractor
ICT 14C	Cleaned and adjusted level probes	10/14/2016	Aerotek
ICT 13C	Cleaned and adjusted level probes	10/21/2016	Aerotek
ICT 13B	Installed rebuilt pump	10/25/2016	Aerotek
ICT 14D	Installed rebuilt pump	10/27/2016	Aerotek
ICT 13C	Replace low level probe	11/8/2016	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

LHAAP-16

Well I.D.	Replaced Parts	Date	Contractor
EW08	New pump	2/28/2011	Shaw
EW01	Rebuild pump	8/25/2011	Shaw
EW06	Rebuild pump	8/25/2011	Shaw
EW02	Rebuild pump	2/12/2012	Shaw
EW03	Rebuild pump	2/12/2012	Shaw
EW08	Rebuild pump	11/8/2012	AECOM
EW01	Rebuild pump	11/8/2012	AECOM
EW04	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

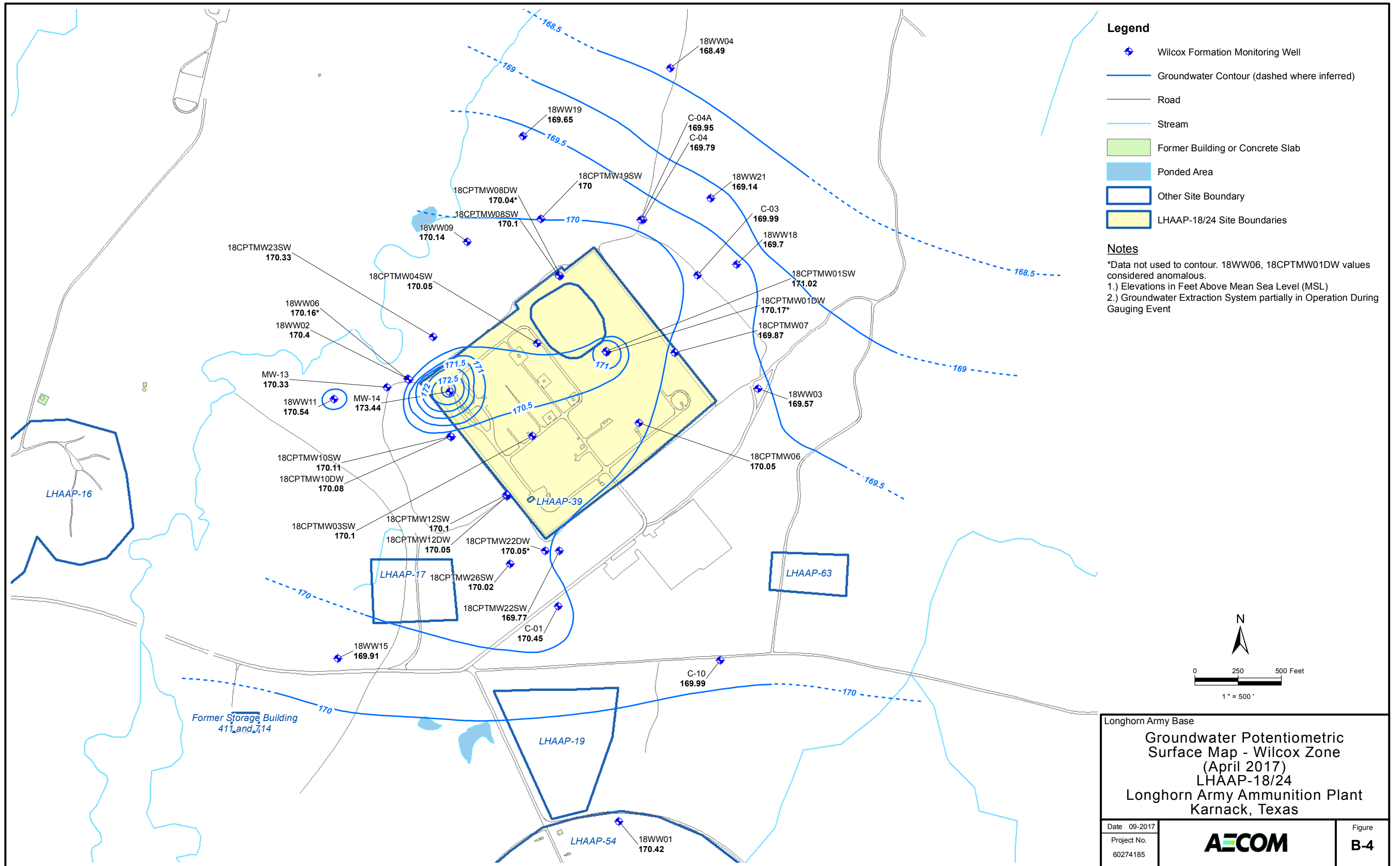




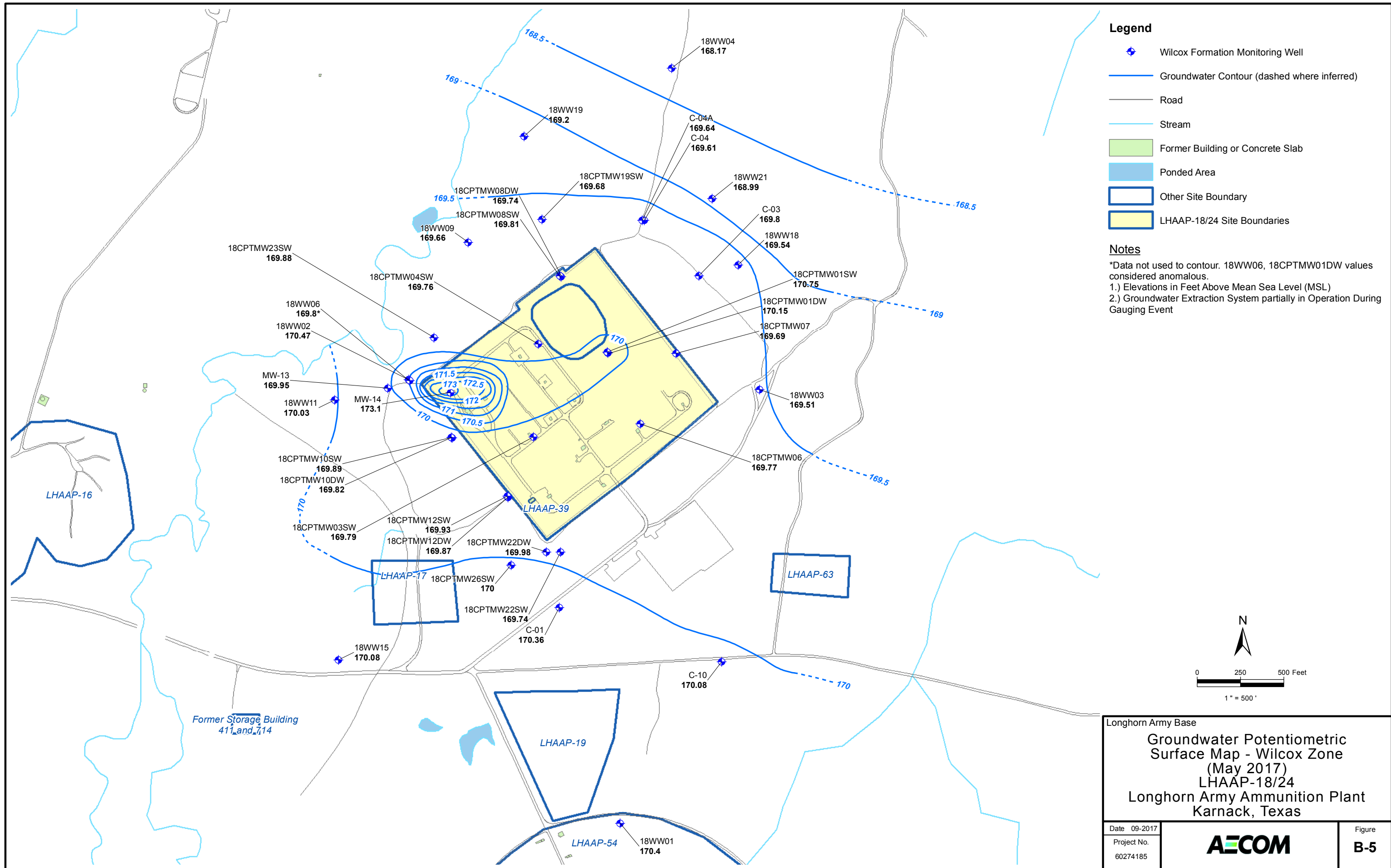


Longhorn Army Base
**Groundwater Potentiometric
 Surface Map - Shallow Zone
 (June 2017)**
 LHAAP-18/24
 Longhorn Army Ammunition Plant
 Karnack, Texas

Date	09-2017		Figure
Project No.	60274185		B-3



Longhorn Army Base		
Groundwater Potentiometric Surface Map - Wilcox Zone (April 2017)		
LHAAP-18/24		
Longhorn Army Ammunition Plant Karnack, Texas		
Date	09-2017	AECOM
Project No.	60274185	
Figure	B-4	



Legend

- ◆ Wilcox Formation Monitoring Well
- Groundwater Contour (dashed where inferred)
- Road
- Stream
- Former Building or Concrete Slab
- Poned Area
- Other Site Boundary
- LHAAP-18/24 Site Boundaries

Notes

*Data not used to contour. 18WW06, 18CPTMW01DW values considered anomalous.

- 1.) Elevations in Feet Above Mean Sea Level (MSL)
- 2.) Groundwater Extraction System partially in Operation During Gauging Event

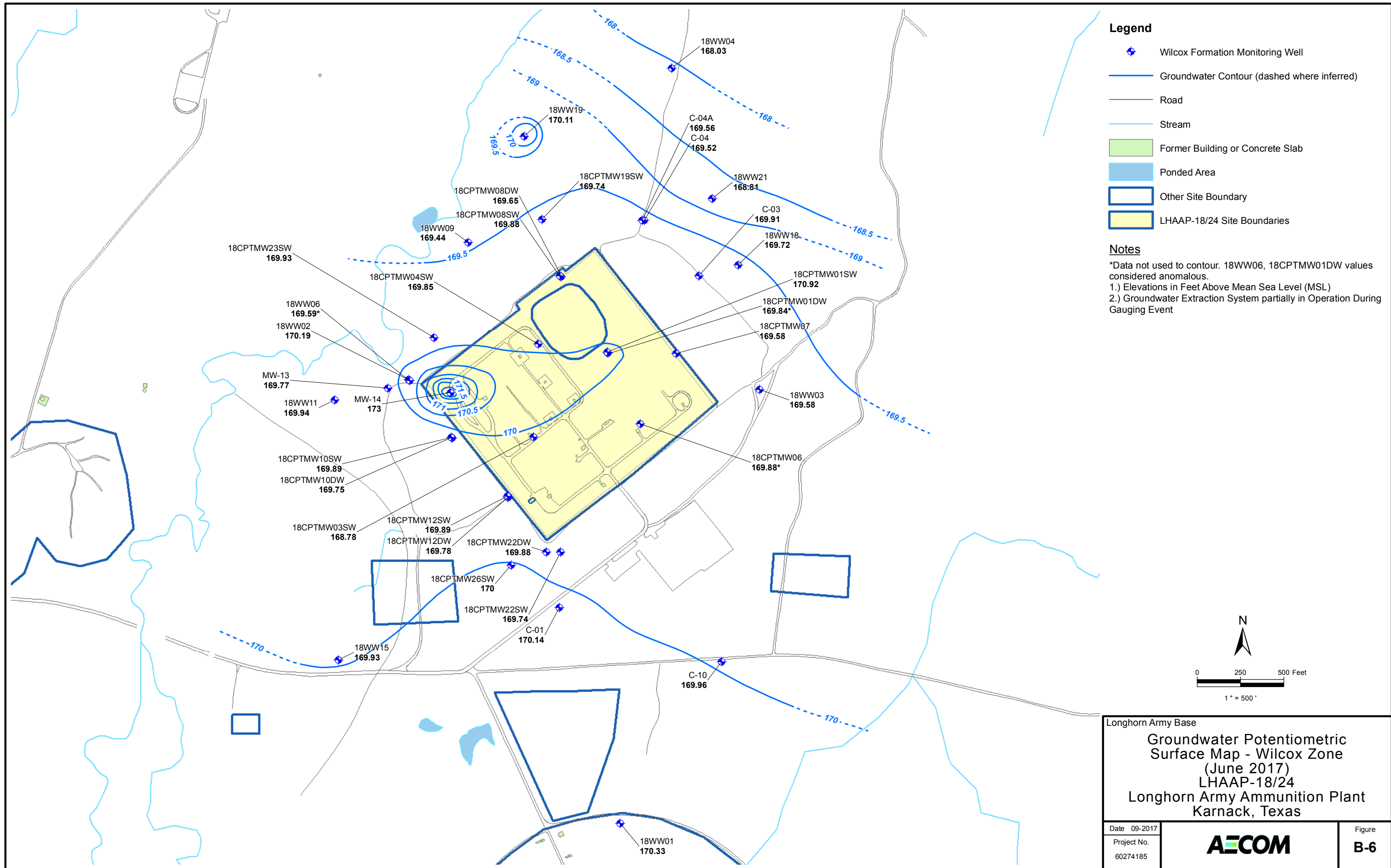
Longhorn Army Base

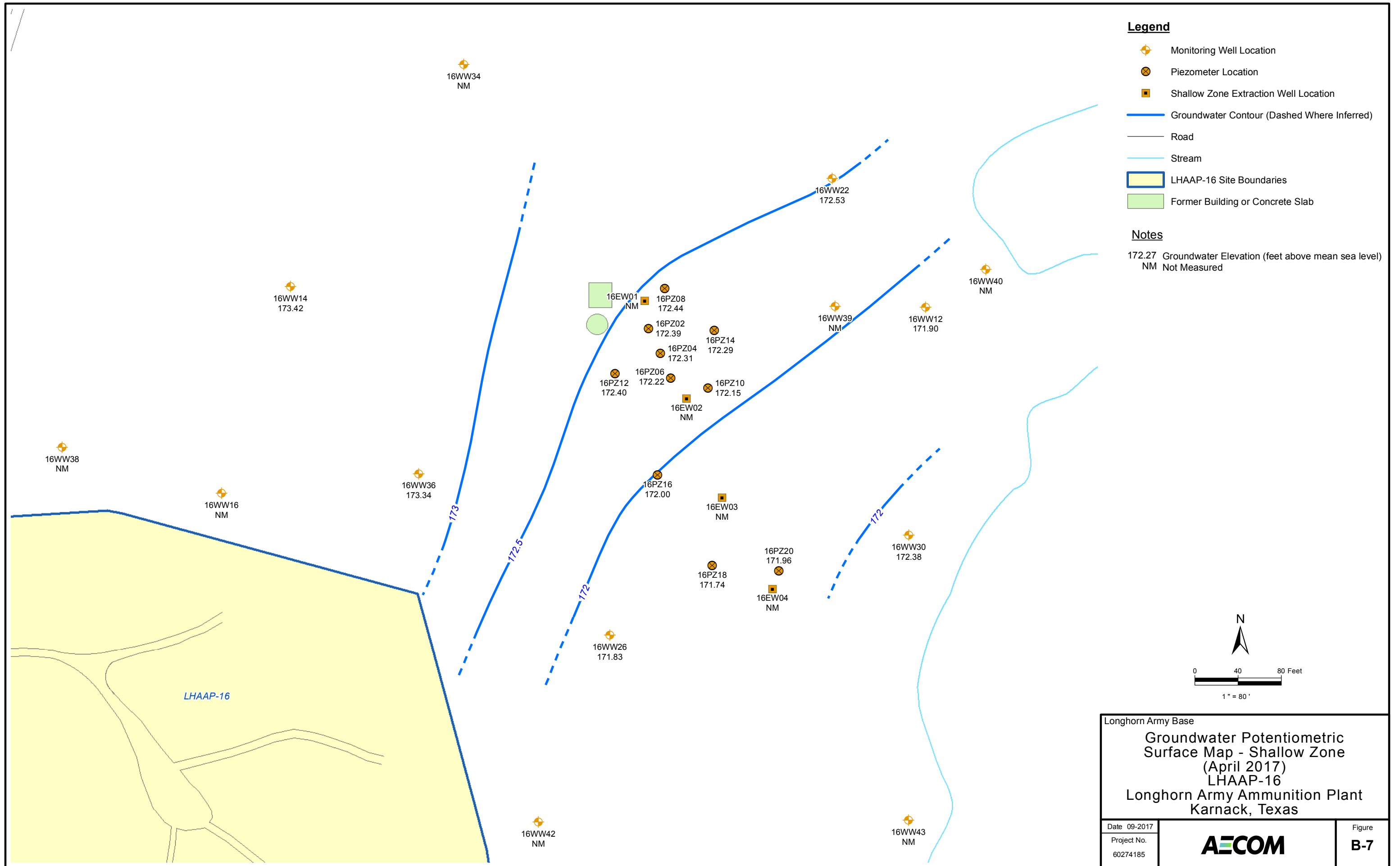
Groundwater Potentiometric Surface Map - Wilcox Zone (May 2017)

LHAAP-18/24

Longhorn Army Ammunition Plant Karnack, Texas

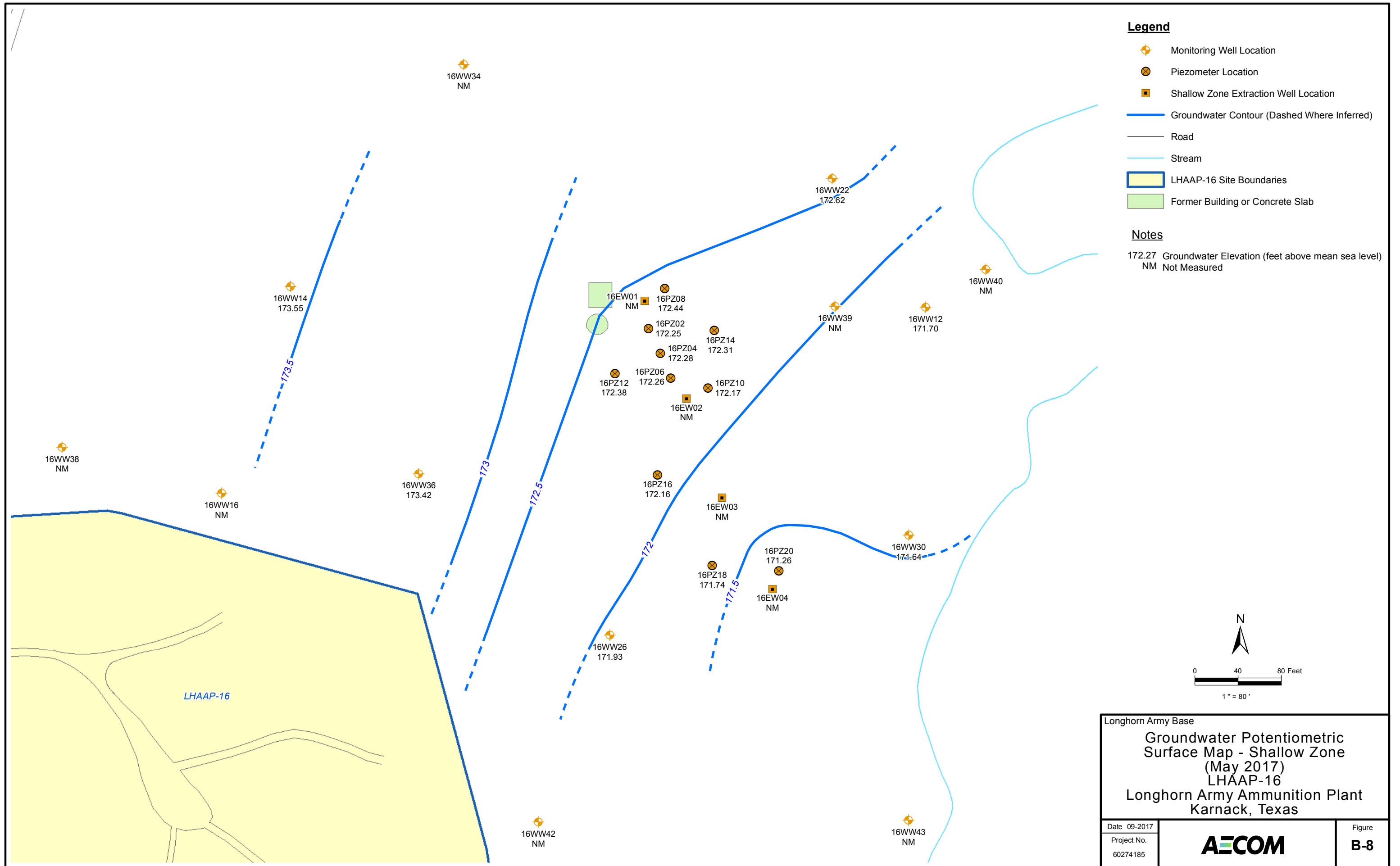
Date 09-2017		Figure
Project No. 60274185		B-5



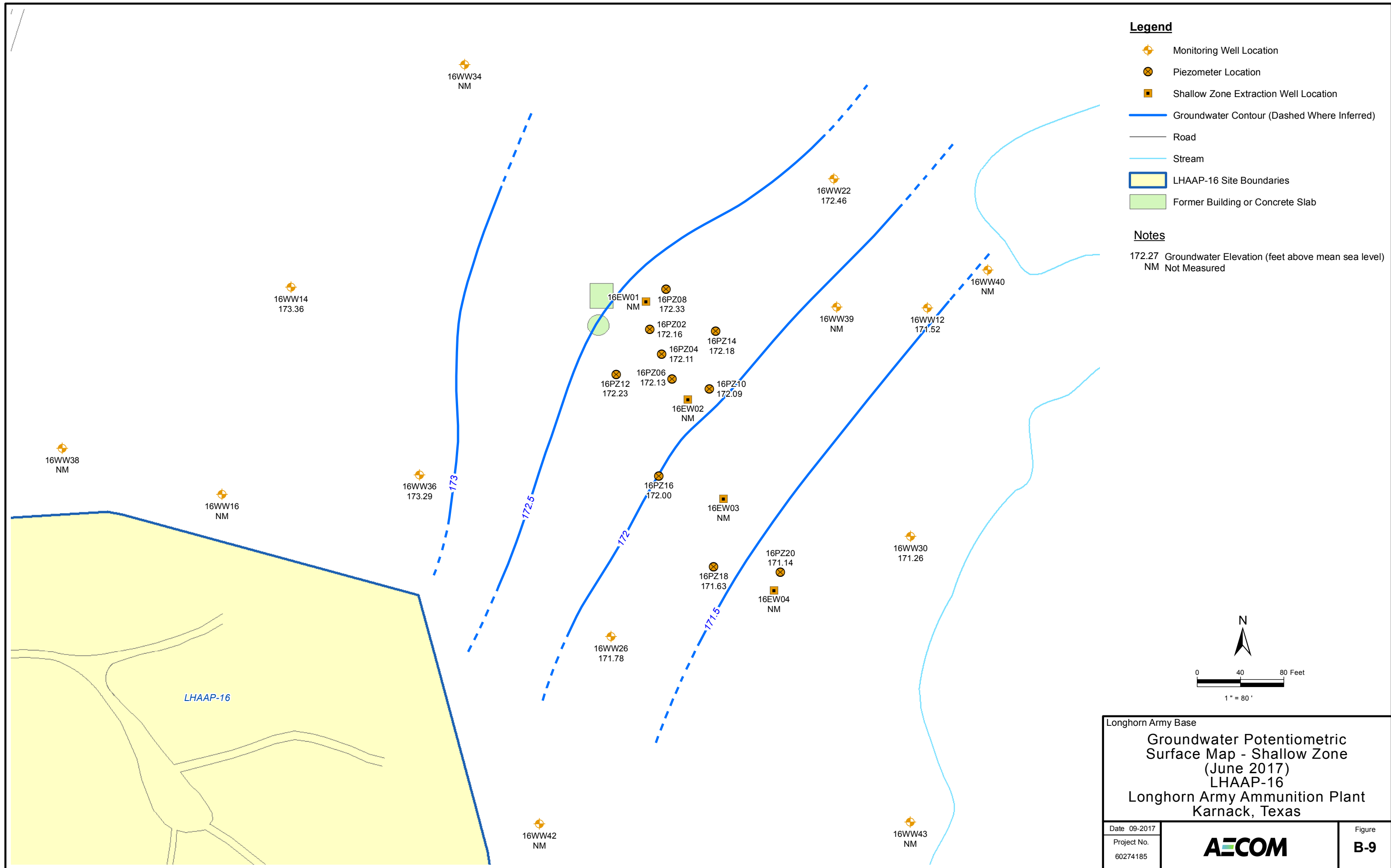


Longhorn Army Base
 Groundwater Potentiometric
 Surface Map - Shallow Zone
 (April 2017)
 LHAAP-16
 Longhorn Army Ammunition Plant
 Karnack, Texas

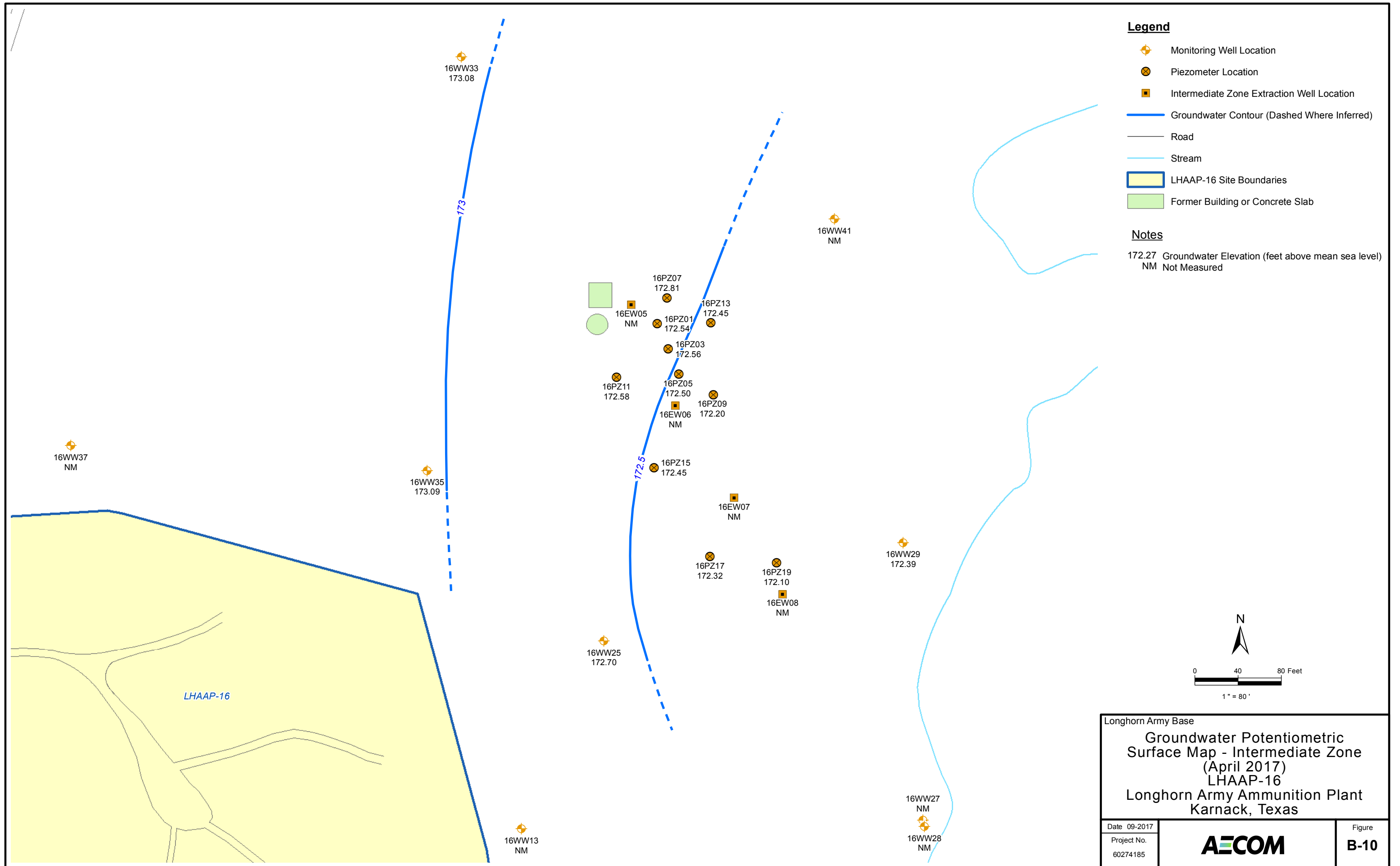
Date 09-2017	AECOM	Figure
Project No. 60274185		B-7

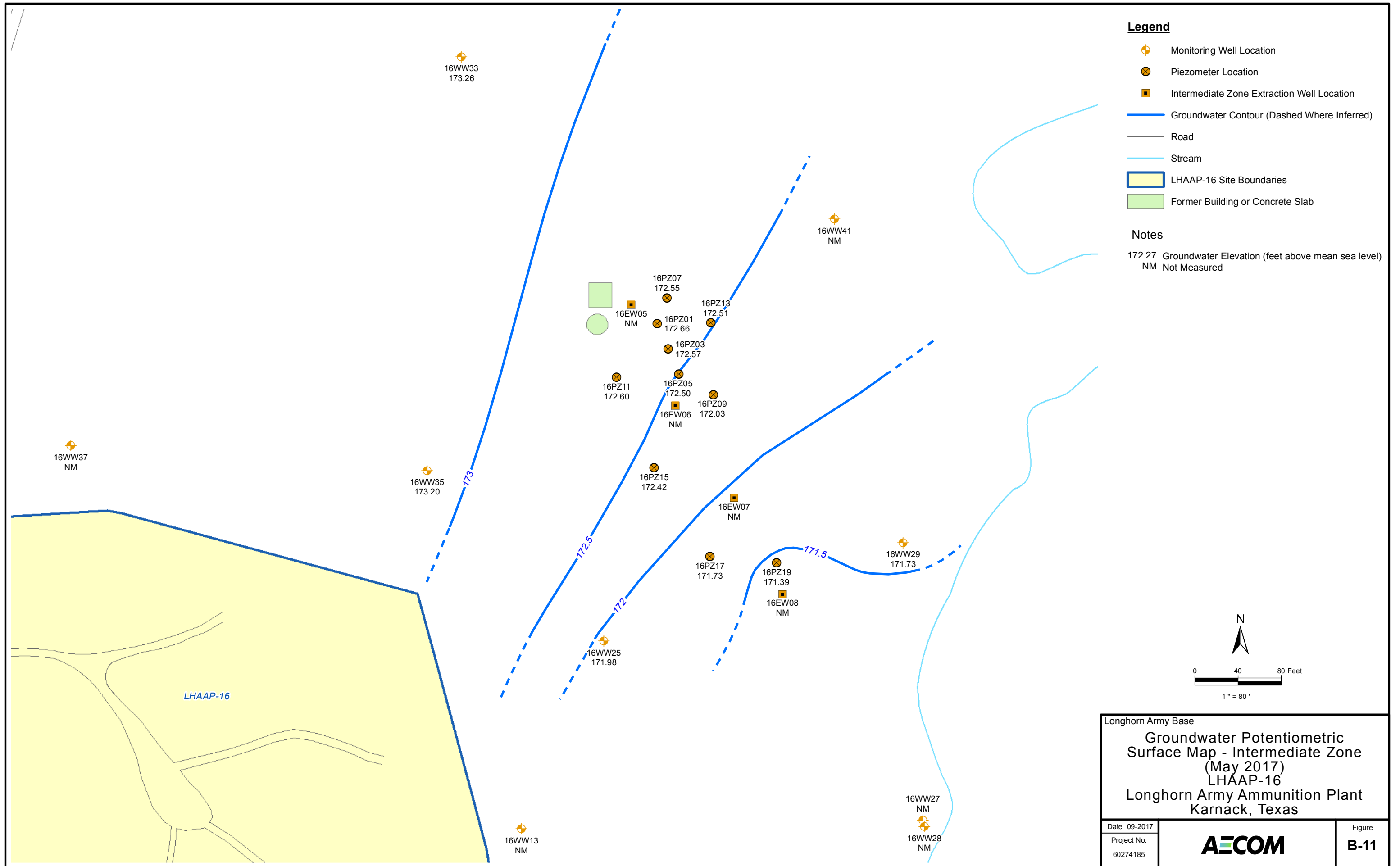


Longhorn Army Base		
Groundwater Potentiometric Surface Map - Shallow Zone (May 2017) LHAAP-16		
Longhorn Army Ammunition Plant Karnack, Texas		
Date 09-2017	AECOM	Figure
Project No. 60274185		B-8



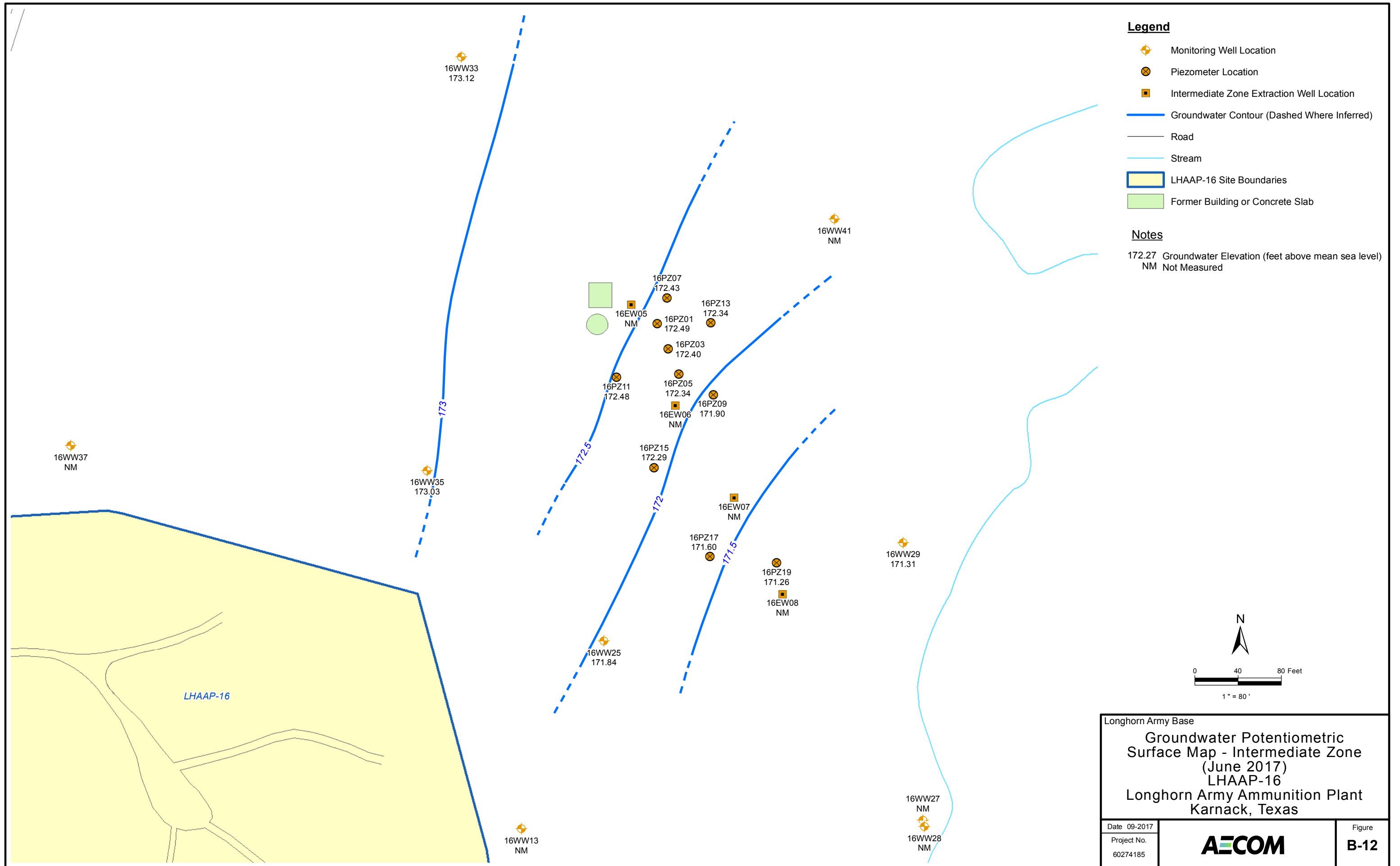
Longhorn Army Base		
Groundwater Potentiometric Surface Map - Shallow Zone (June 2017) LHAAP-16 Longhorn Army Ammunition Plant Karnack, Texas		
Date 09-2017	AECOM	Figure
Project No. 60274185		B-9





Longhorn Army Base
Groundwater Potentiometric Surface Map - Intermediate Zone (May 2017)
 LHAAP-16
 Longhorn Army Ammunition Plant
 Karnack, Texas

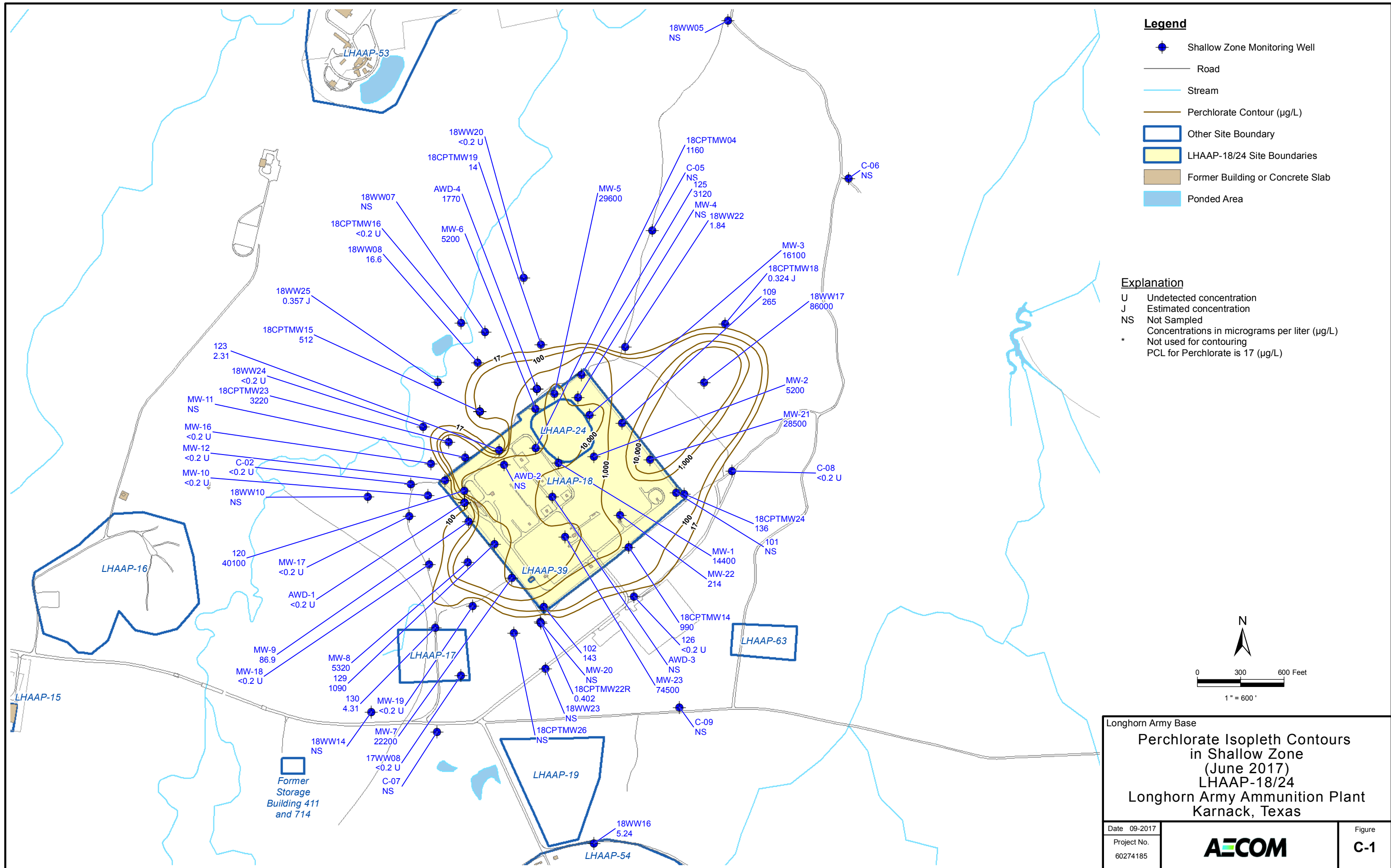
Date 09-2017	AECOM	Figure
Project No. 60274185		B-11



Longhorn Army Base
Groundwater Potentiometric Surface Map - Intermediate Zone (June 2017)
 LHAAP-16
 Longhorn Army Ammunition Plant
 Karnack, Texas

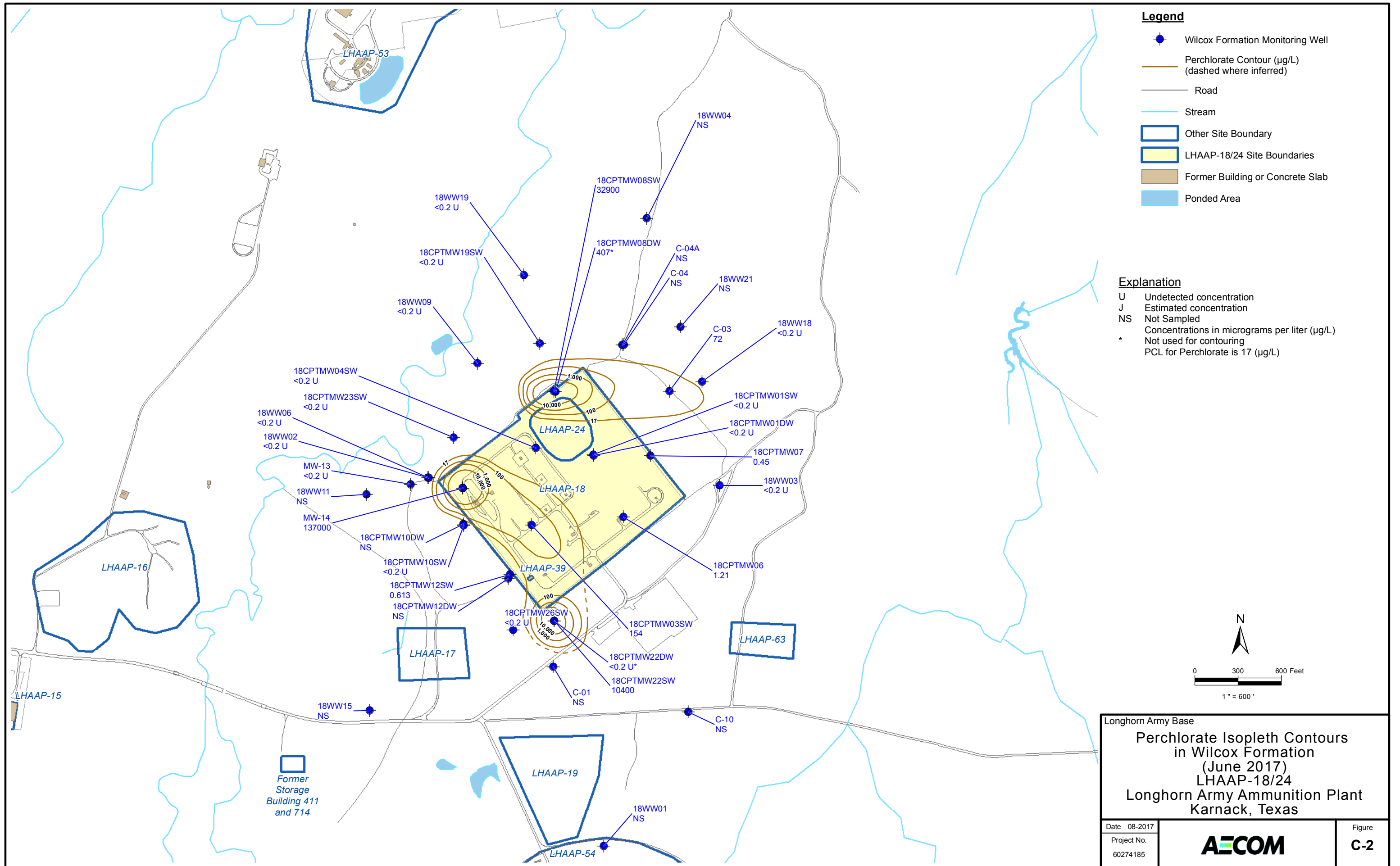
Date 09-2017	AECOM	Figure
Project No. 60274185		B-12

APPENDIX C: Isoconcentration Maps



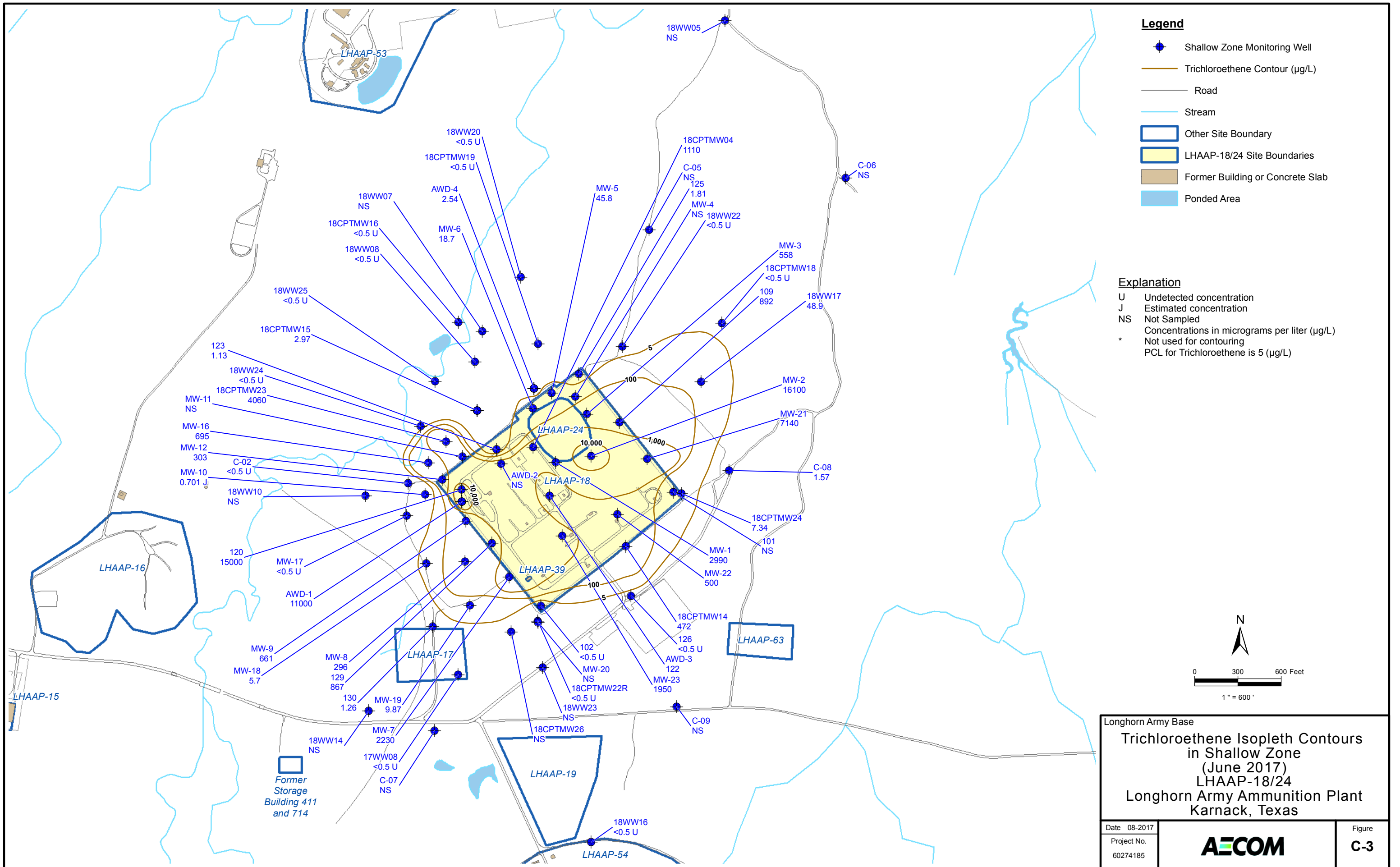
Longhorn Army Base
**Perchlorate Isopleth Contours
in Shallow Zone
(June 2017)
LHAAP-18/24**
Longhorn Army Ammunition Plant
Karnack, Texas

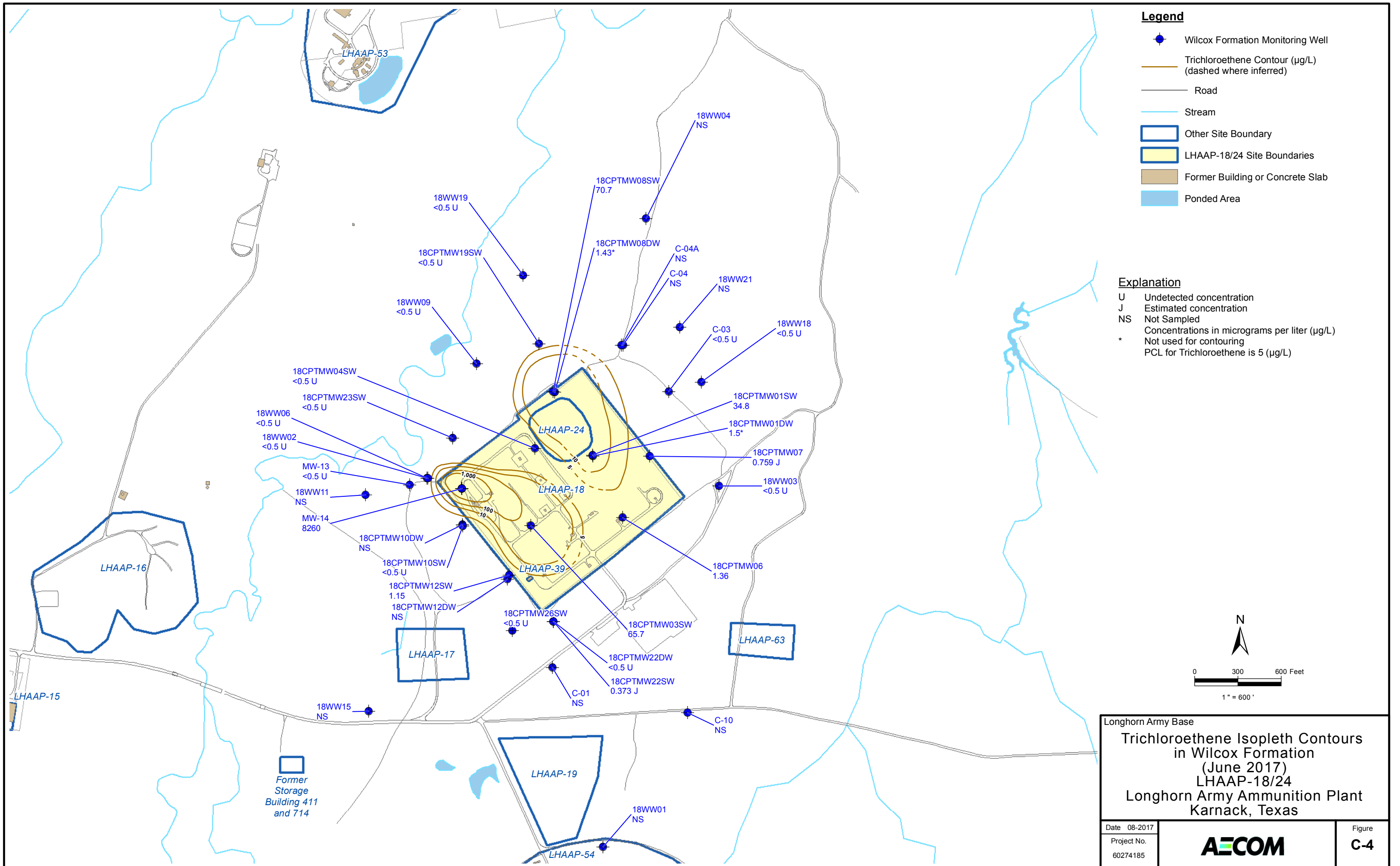
Date	09-2017		Figure C-1
Project No.	60274185		



Longhorn Army Base
**Perchlorate Isopleth Contours
in Wilcox Formation
(June 2017)
LHAAP-18/24
Longhorn Army Ammunition Plant
Karnack, Texas**

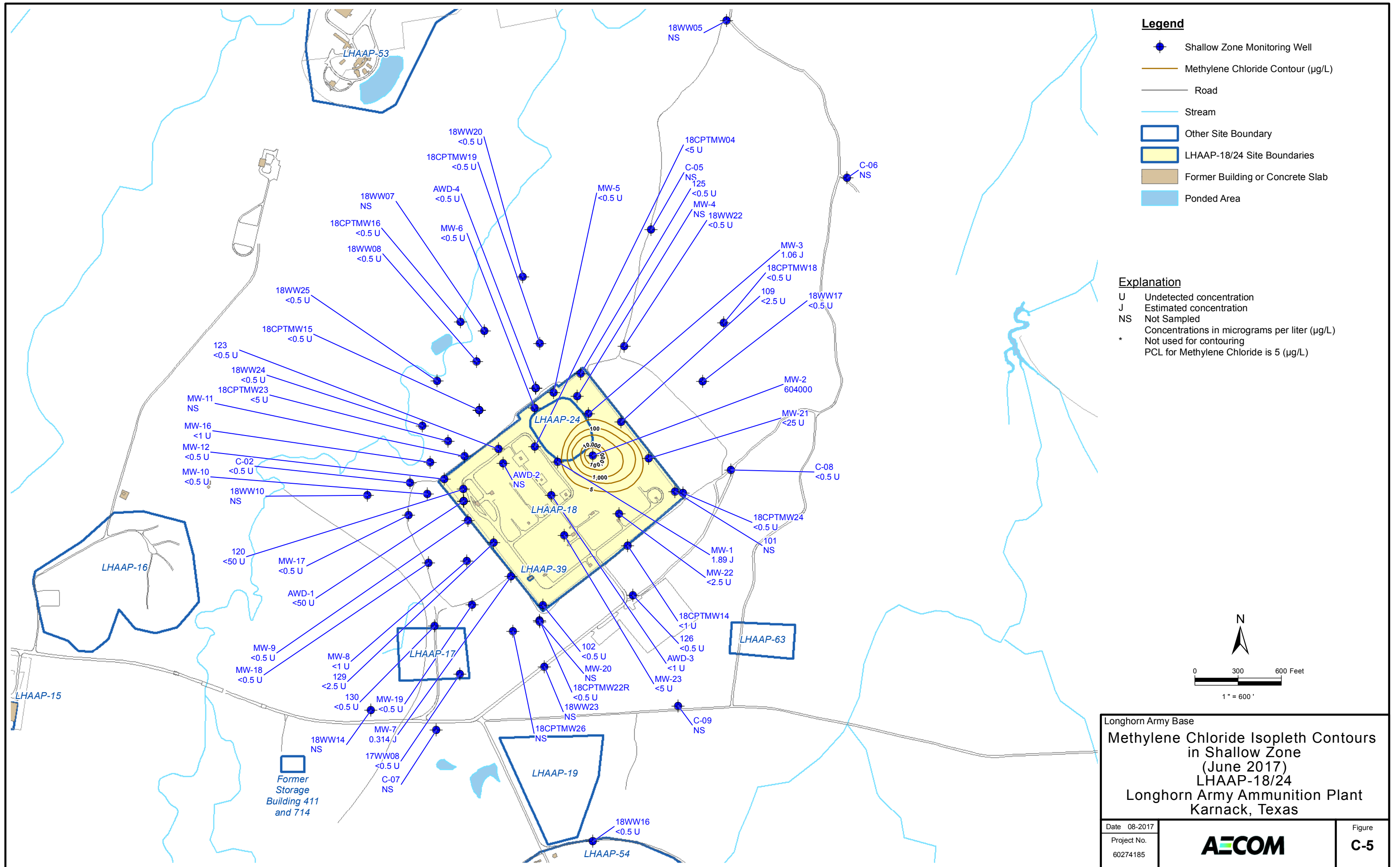
Date 08-2017	AECOM	Figure
Project No. 60274185		C-2





Longhorn Army Base
**Trichloroethene Isopleth Contours
in Wilcox Formation
(June 2017)
LHAAP-18/24
Longhorn Army Ammunition Plant
Karnack, Texas**

Date 08-2017	AECOM	Figure
Project No. 60274185		C-4

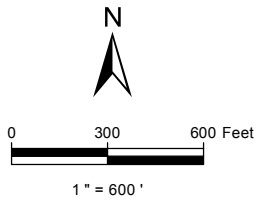


Legend

- Shallow Zone Monitoring Well
- Methylene Chloride Contour (µg/L)
- Road
- Stream
- Other Site Boundary
- ▭ LHAAP-18/24 Site Boundaries
- Former Building or Concrete Slab
- Ponded Area

Explanation

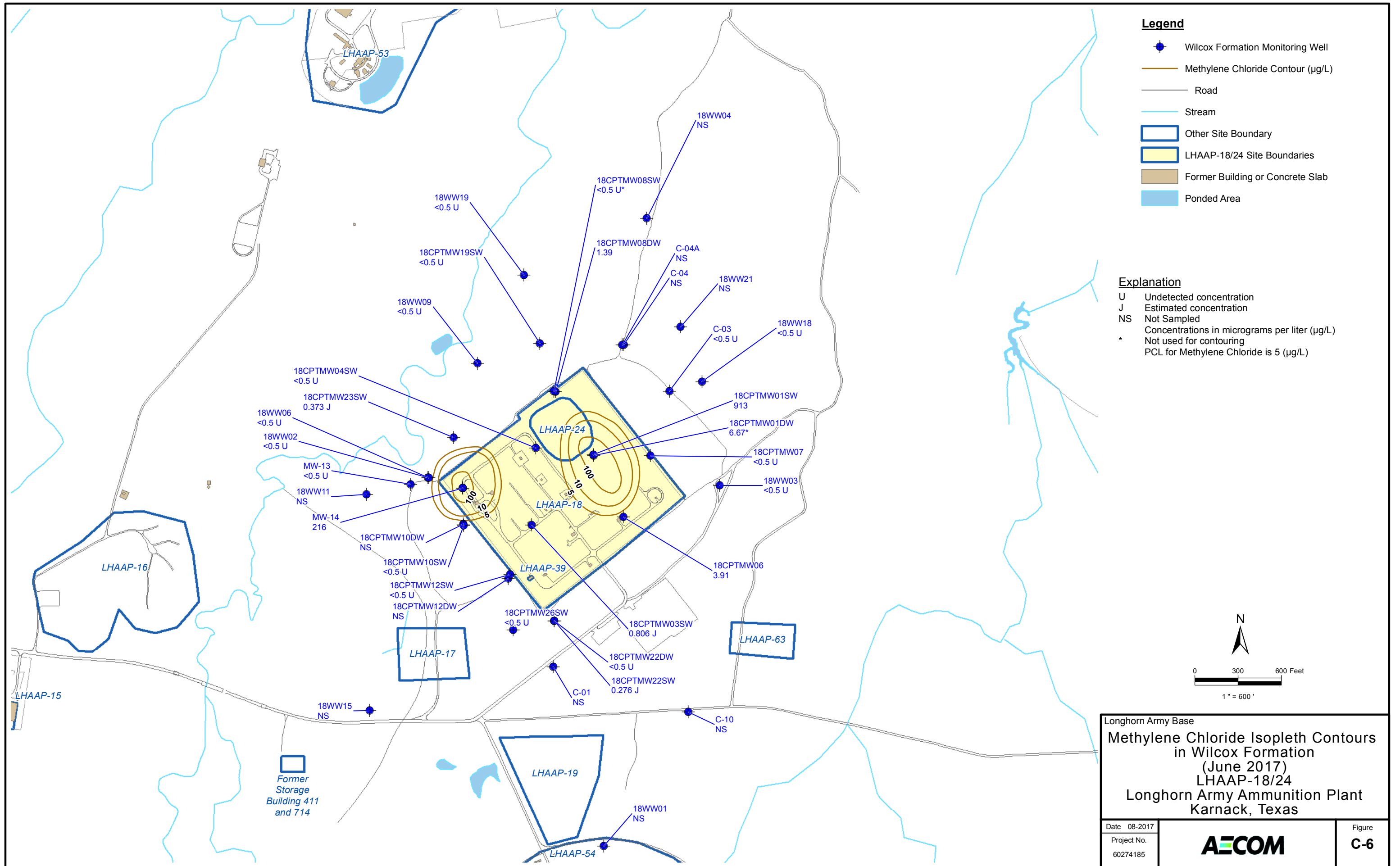
- U Undetected concentration
- J Estimated concentration
- NS Not Sampled
- * Concentrations in micrograms per liter (µg/L)
- * Not used for contouring
- * PCL for Methylene Chloride is 5 (µg/L)



Longhorn Army Base
**Methylene Chloride Isopleth Contours
 in Shallow Zone
 (June 2017)**
 LHAAP-18/24
 Longhorn Army Ammunition Plant
 Karnack, Texas

Date	08-2017		Figure
Project No.	60274185		C-5

File: L:\AGE\GIS\AUS\GIS\GIS_P\Projects\Longhorn_AA\01_Reports\LHAAP18_24\2017_June\Fig C-5 MethChlor_Shallow_2017Jun103.mxd
 Date: Monday, August 28, 2017 3:03:45 PM

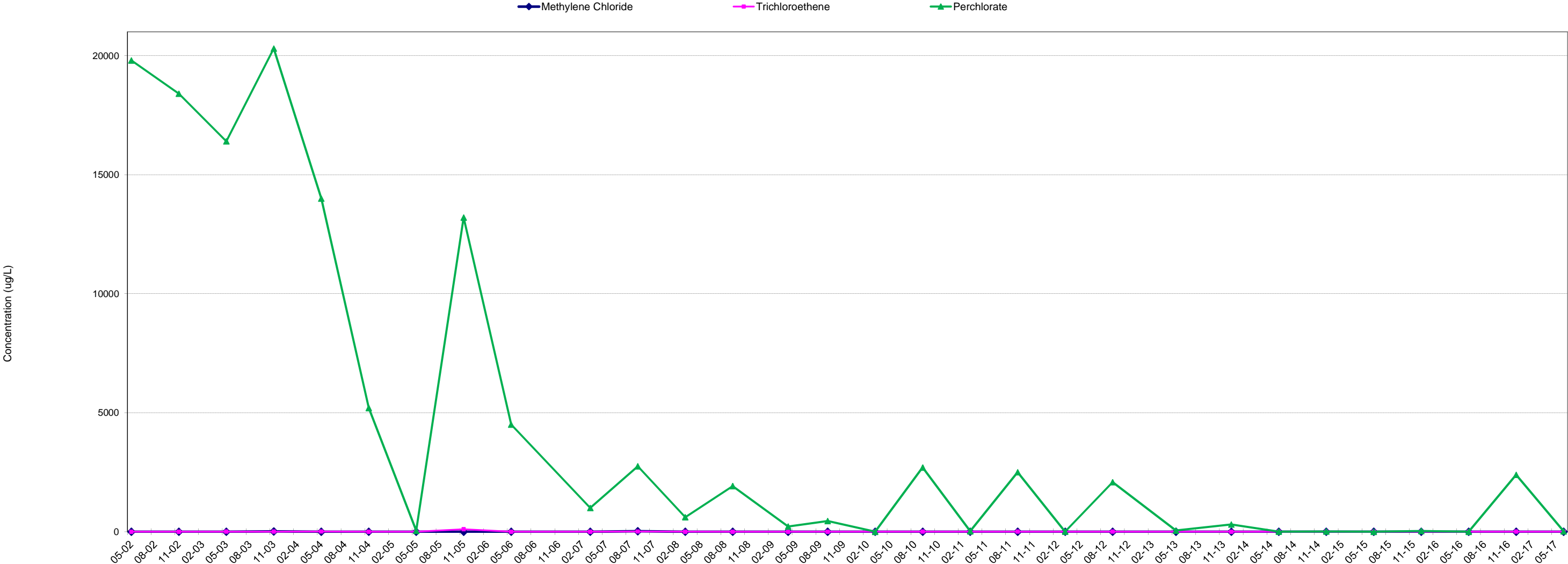


Longhorn Army Base
**Methylene Chloride Isopleth Contours
 in Wilcox Formation
 (June 2017)**
 LHAAP-18/24
 Longhorn Army Ammunition Plant
 Karnack, Texas

Date 08-2017	AECOM	Figure
Project No. 60274185		C-6

APPENDIX D: Trend Analysis

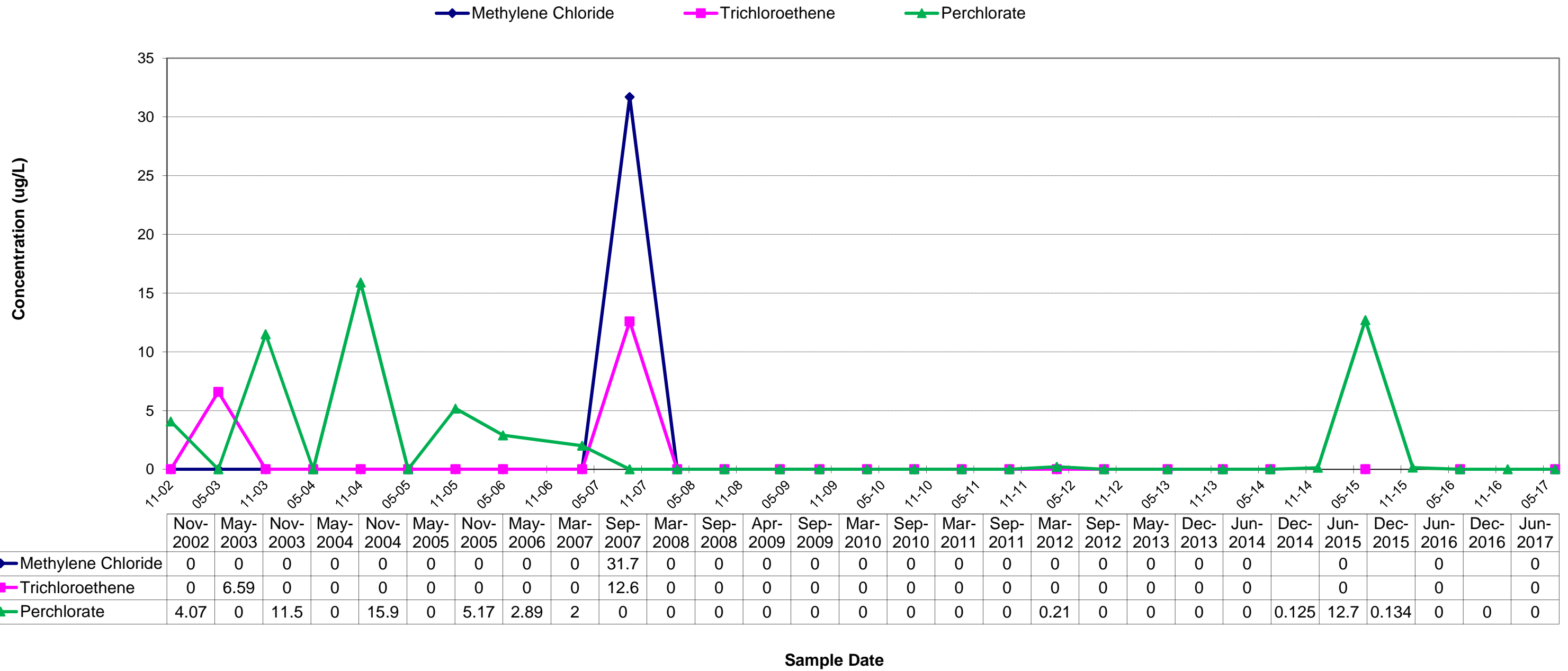
Monitoring Well 18WW08



	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	Jun-2017
◆ 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
■ 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
▲ 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	16.6

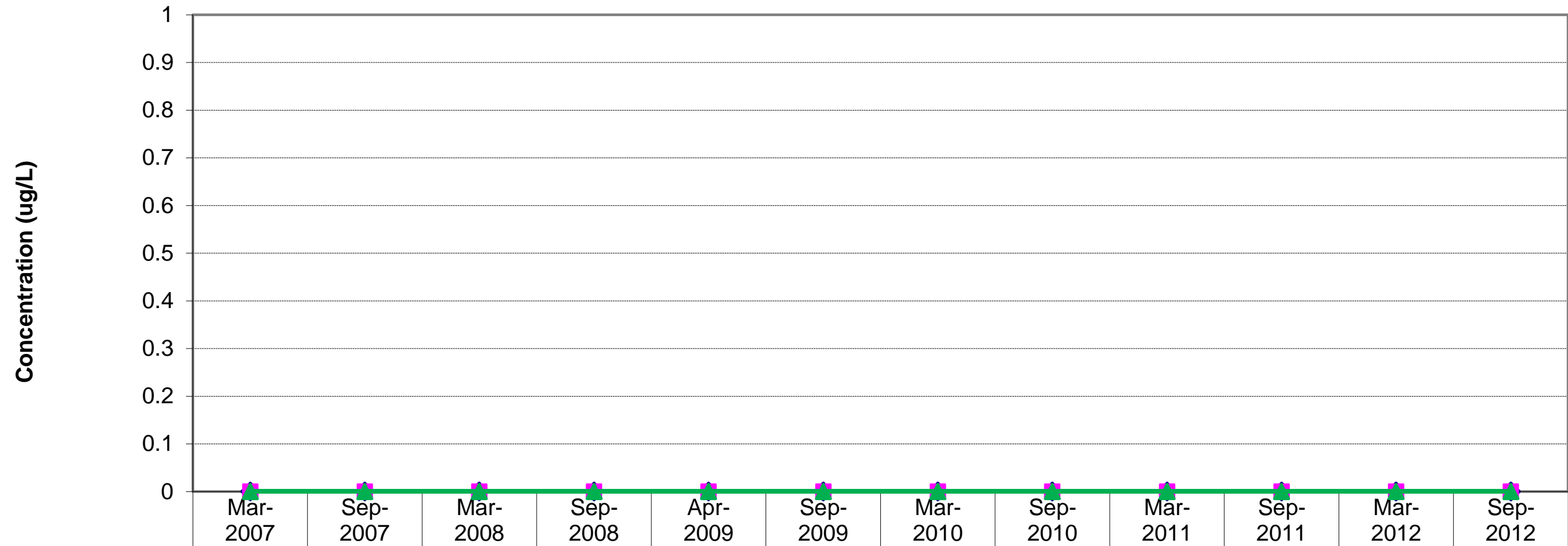
Sample Date

Monitoring Well 18WW09



Monitoring Well 18WW10

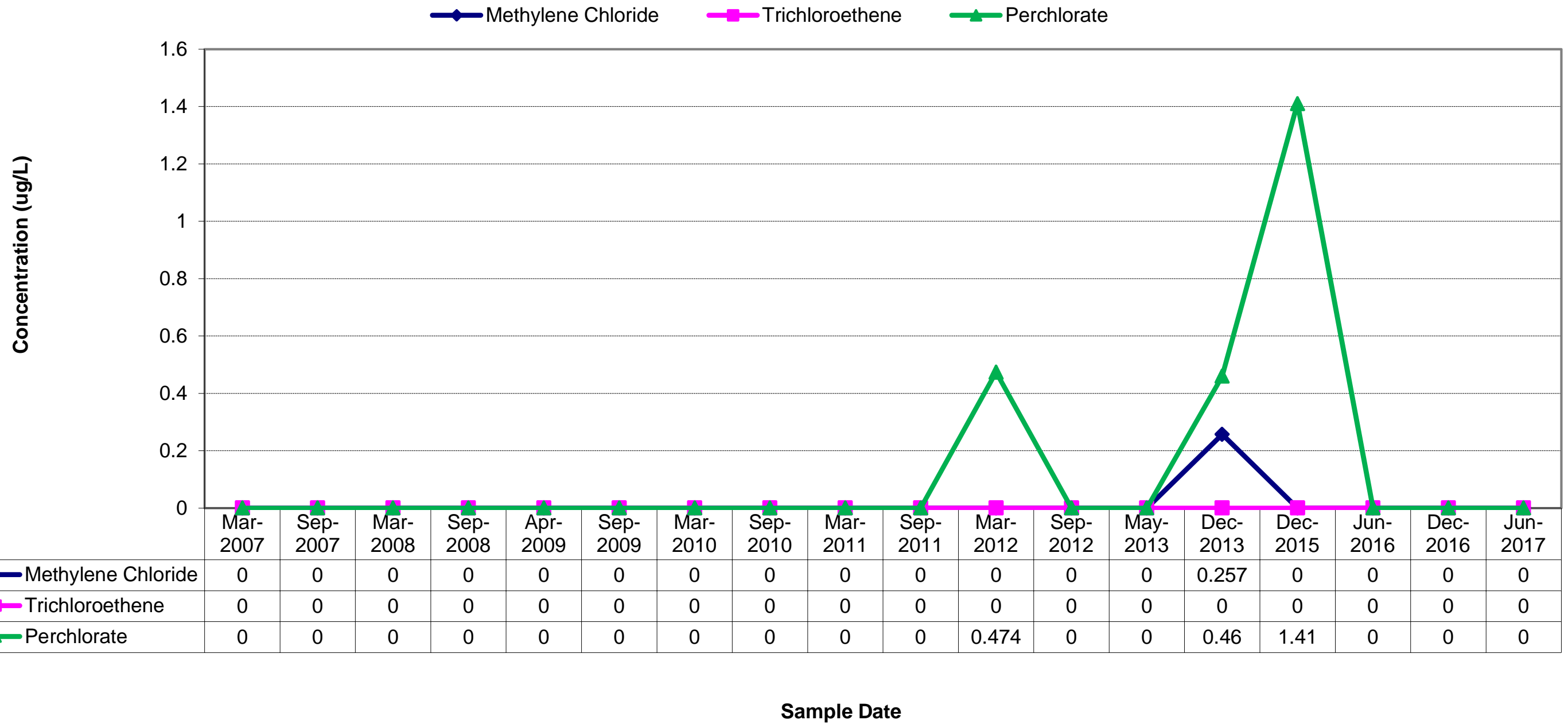
Methylene Chloride Trichloroethene Perchlorate

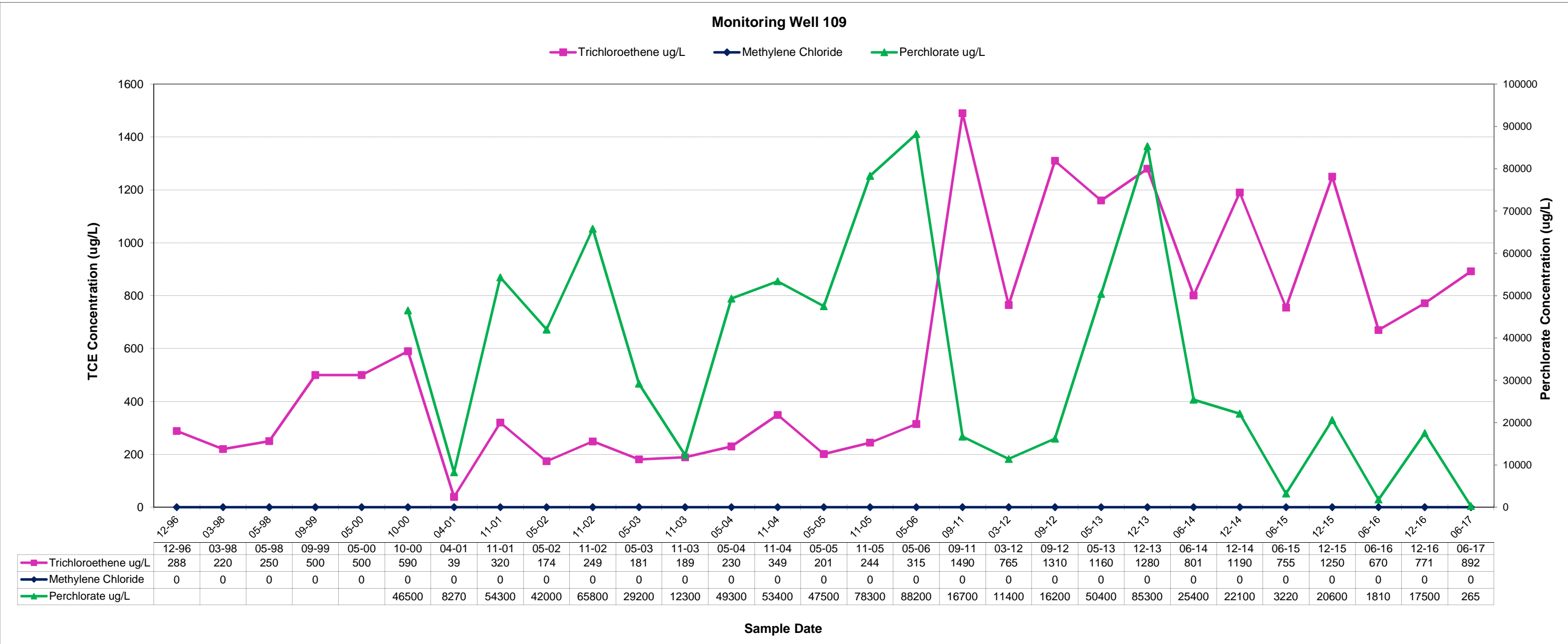


	Mar-2007	Sep-2007	Mar-2008	Sep-2008	Apr-2009	Sep-2009	Mar-2010	Sep-2010	Mar-2011	Sep-2011	Mar-2012	Sep-2012
Methylene Chloride	0	0	0	0	0	0	0	0	0	0	0	0
Trichloroethene	0	0	0	0	0	0	0	0	0	0	0	0
Perchlorate	0	0	0	0	0	0	0	0	0	0	0	0

Sample Date

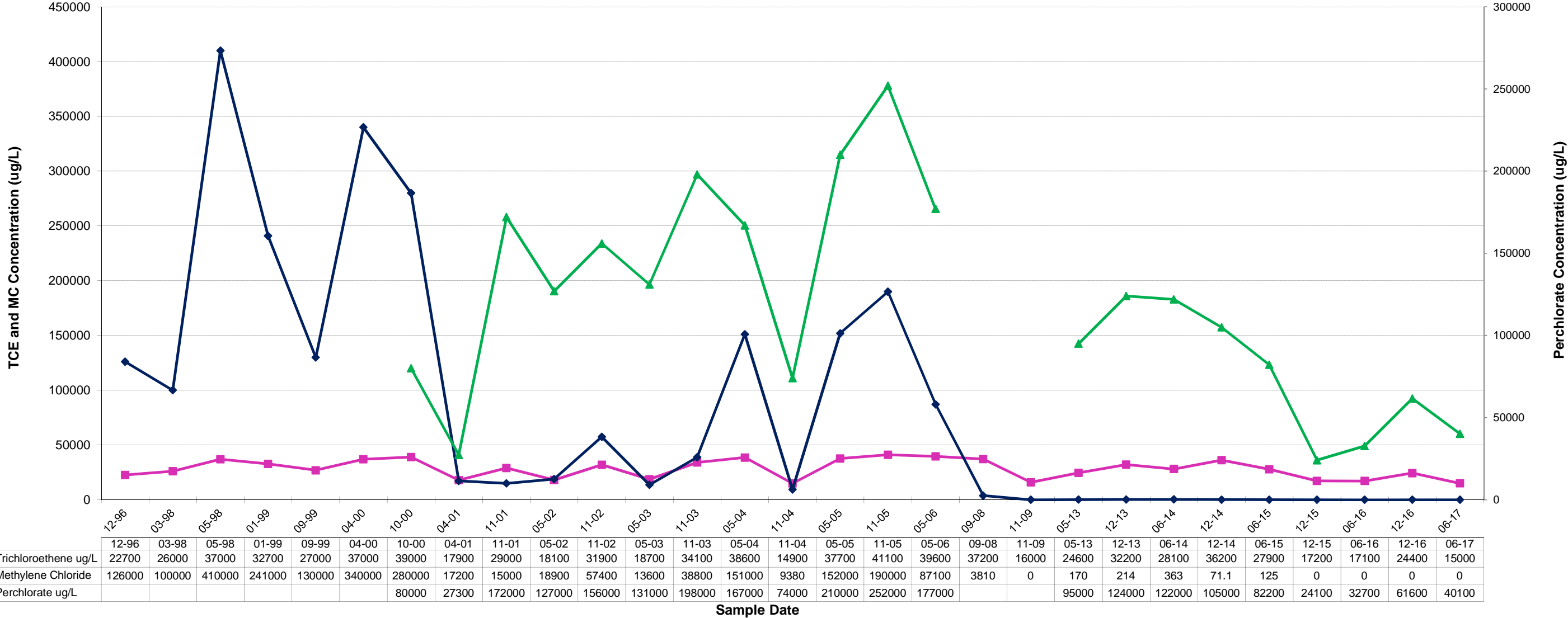
Monitoring Well 18WW20





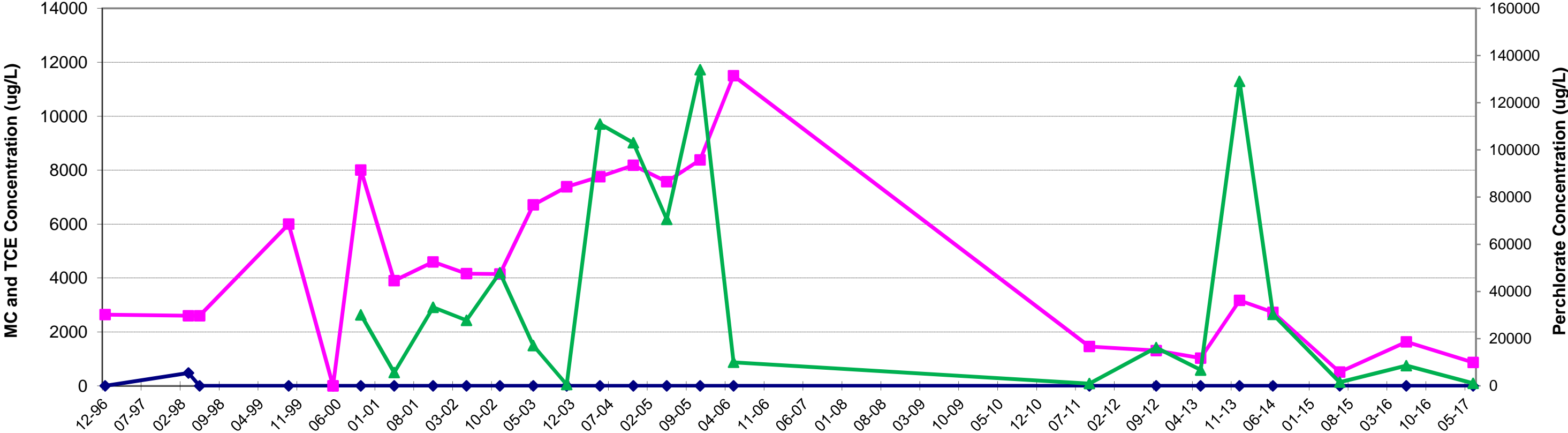
Monitoring Well 120

Trichloroethene ug/L Methylene Chloride Perchlorate ug/L



Monitoring Well 129

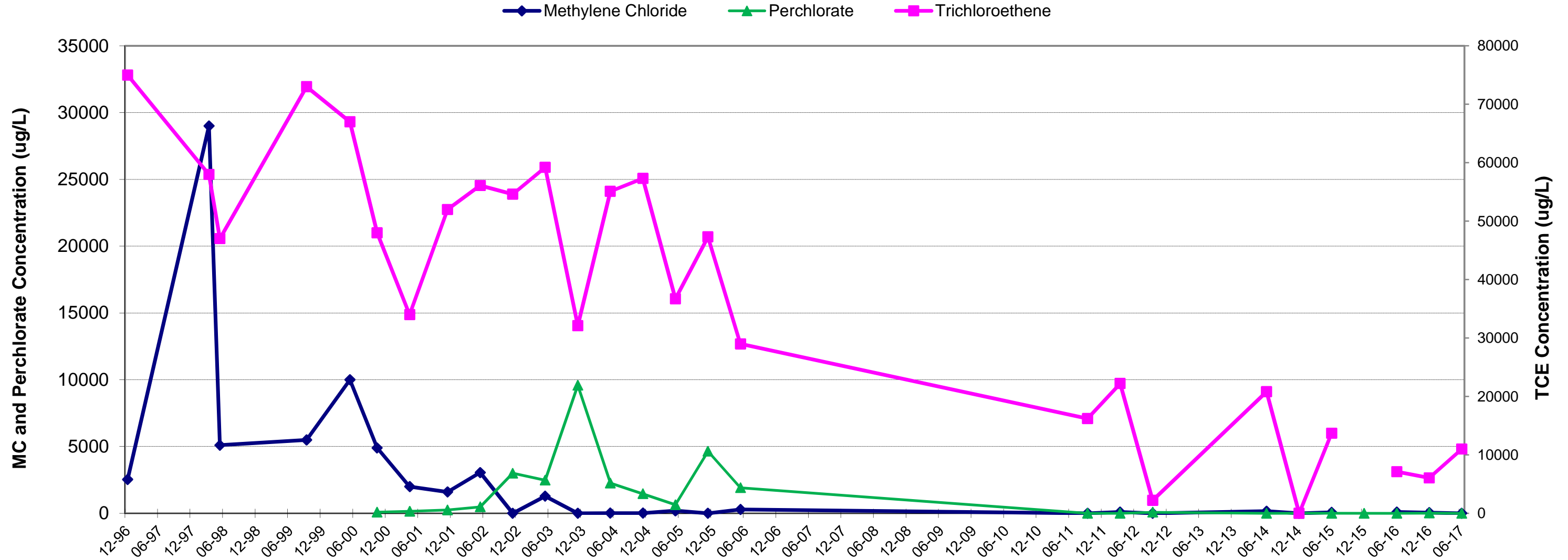
◆ Methylene Chloride ■ Trichloroethene ▲ Perchlorate



	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	09-12	May-2013	Dec-2013	Jun-2014	Jun-2015	Jun-2016	Jun-2017
◆ Methylene Chloride	0	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.64J	4.14	3.37	0	0	0	0	0
■ Trichloroethene	2640	2600	2600	6000	0	8000	3900	4,600	4160	4150	6710	7380	7760	8180	7570	8380	11500	1460	1310	1030	3170	2730	509	1630	867
▲ Perchlorate						30100	5650	33,300	27800	48000	17100	557	111000	103000	70600	134000	10000	959	16200	6750	129000	30300	1570	8590	1090

Sample Date

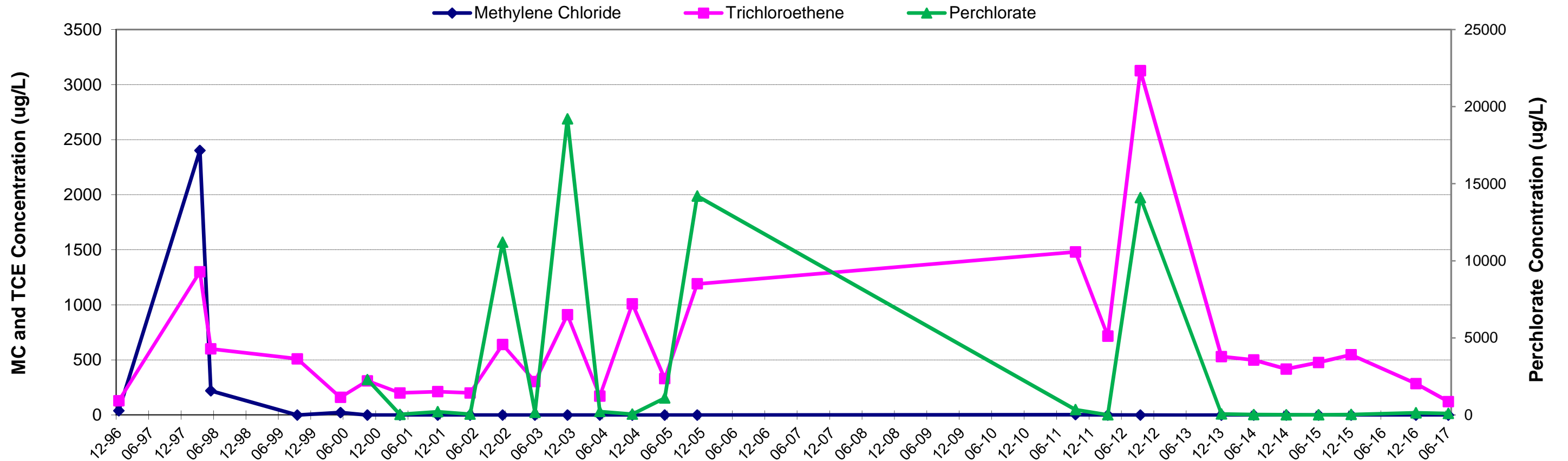
Monitoring Well AWD-1



	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	Jun-2014	Dec-2014	Jun-2015	Dec-2015	Jun-2016	Dec-2016	Jun-2017
◆ Methylene Chloride	2540	29000	5100	5500	10000	4900	2000	1,600	3050	0	1280	0	17.5	13.1	194	0	287	0	93.9	0	160	0	69.2		95.1	55.1	0
▲ Perchlorate						82.6	150	249	479	3000	2480	9580	2260	1460	642	4640	1910	0	0.404	79.6	0.287	0.625	5.24	0.533	4.92	12.9	0
■ Trichloroethene	75000	58000	47000	73000	67000	48000	34000	52,000	56100	54600	59200	32100	55100	57300	36700	47300	29000	16200	22200	2210	20800	0	13700		7120	6050	11000

Sample Date

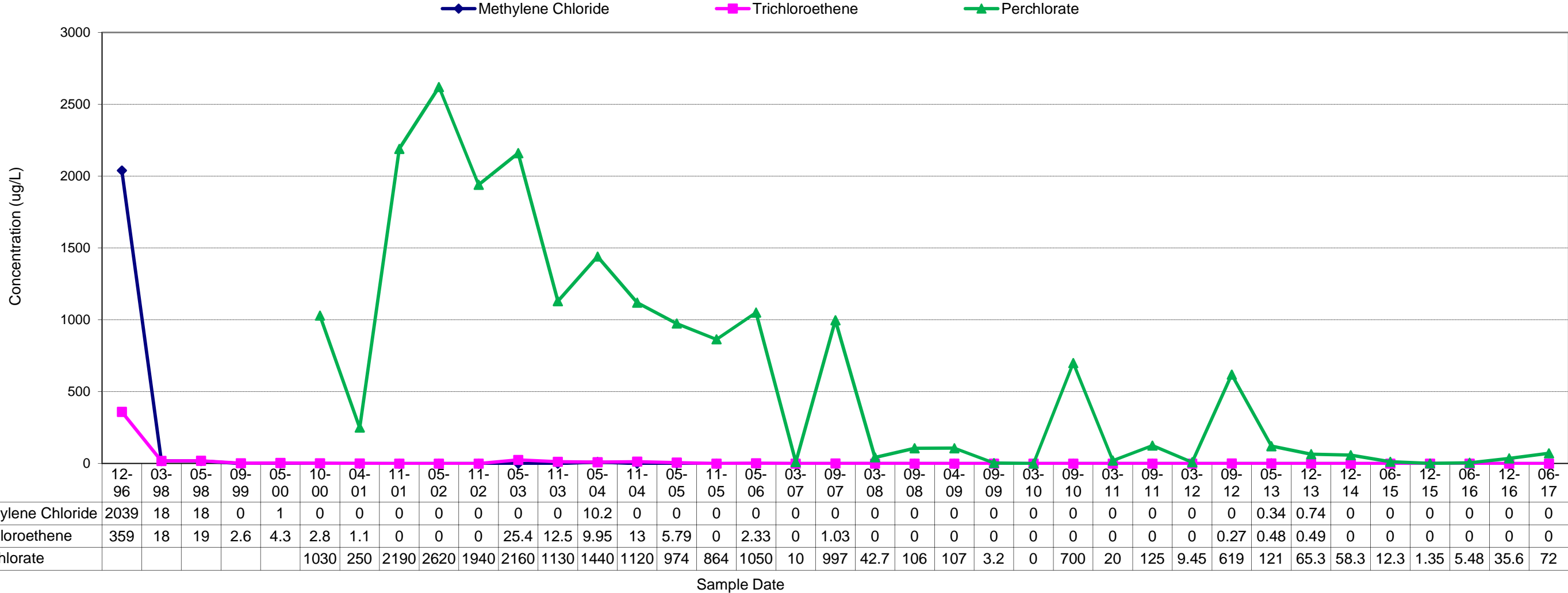
Monitoring Well AWD-3



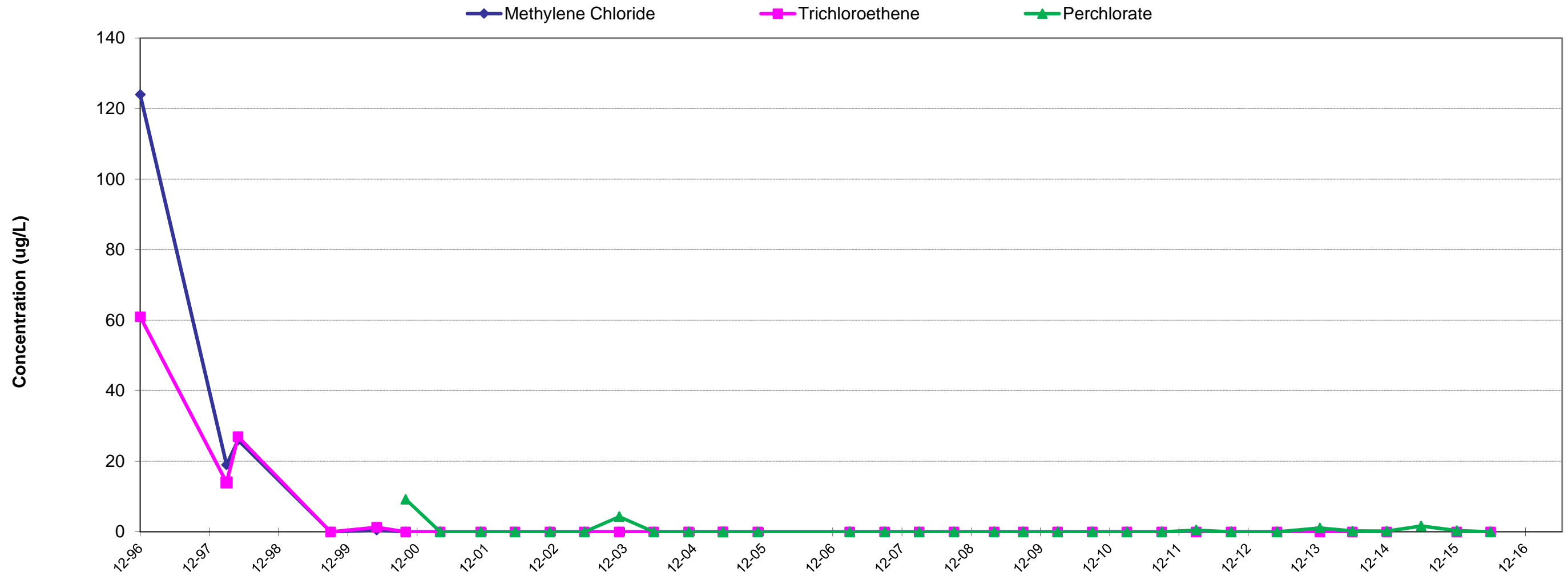
	Dec 1996	Mar 1998	May 1998	Sep 1999	May 2000	Oct 2000	Apr 2001	Nov 2001	May 2002	Nov-2002	May 2003	Nov-2003	May-2004	Nov-2004	May-2005	Nov-2005	Sep-2011	Mar-2012	Sep-2012	Dec-2013	Jun-2014	Dec-2014	Jun-2015	Dec-2015	Dec-2016	Jun-2017
◆ Methylene Chloride	39	2400	220	0	23	0	0	0	0	0	0	0	0	0	0	0	2.92J	0	0	0	0	0	0	0	0	0
■ 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
▲ 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

Sample Date

Monitoring Well C-03



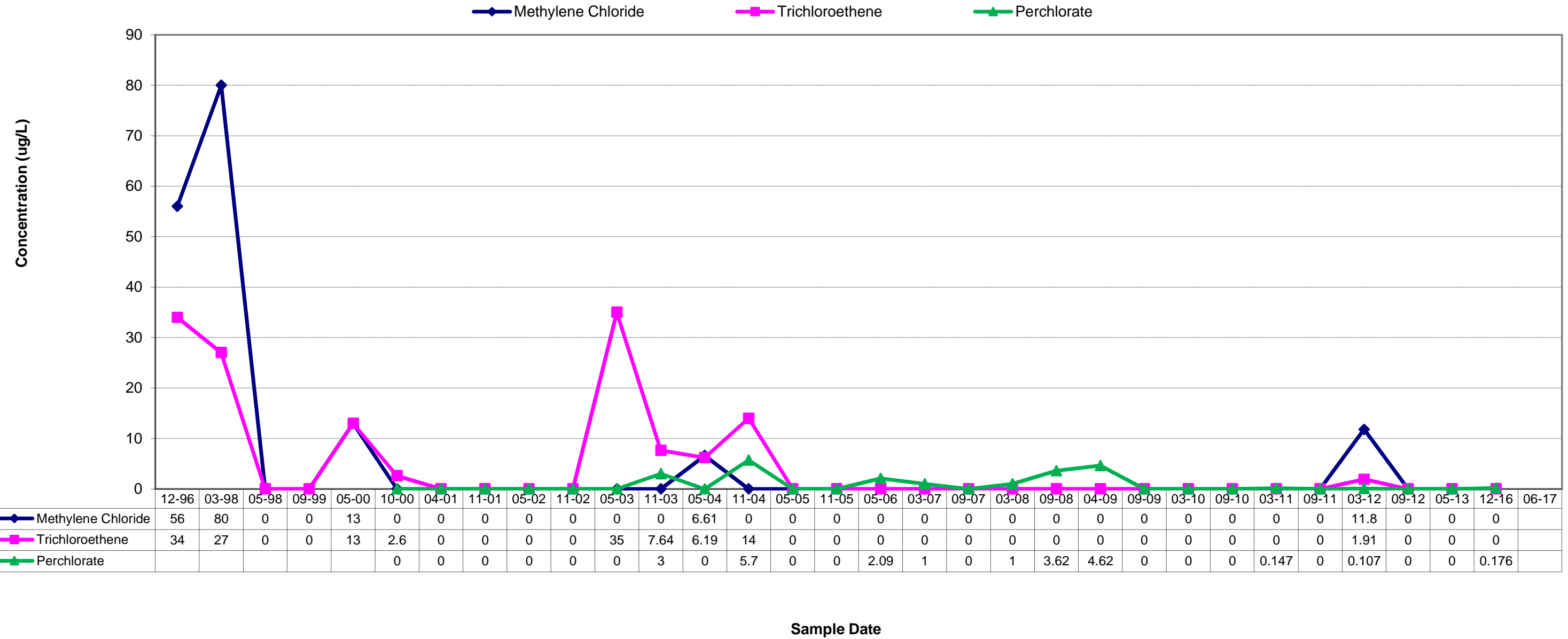
Monitoring Well C-04



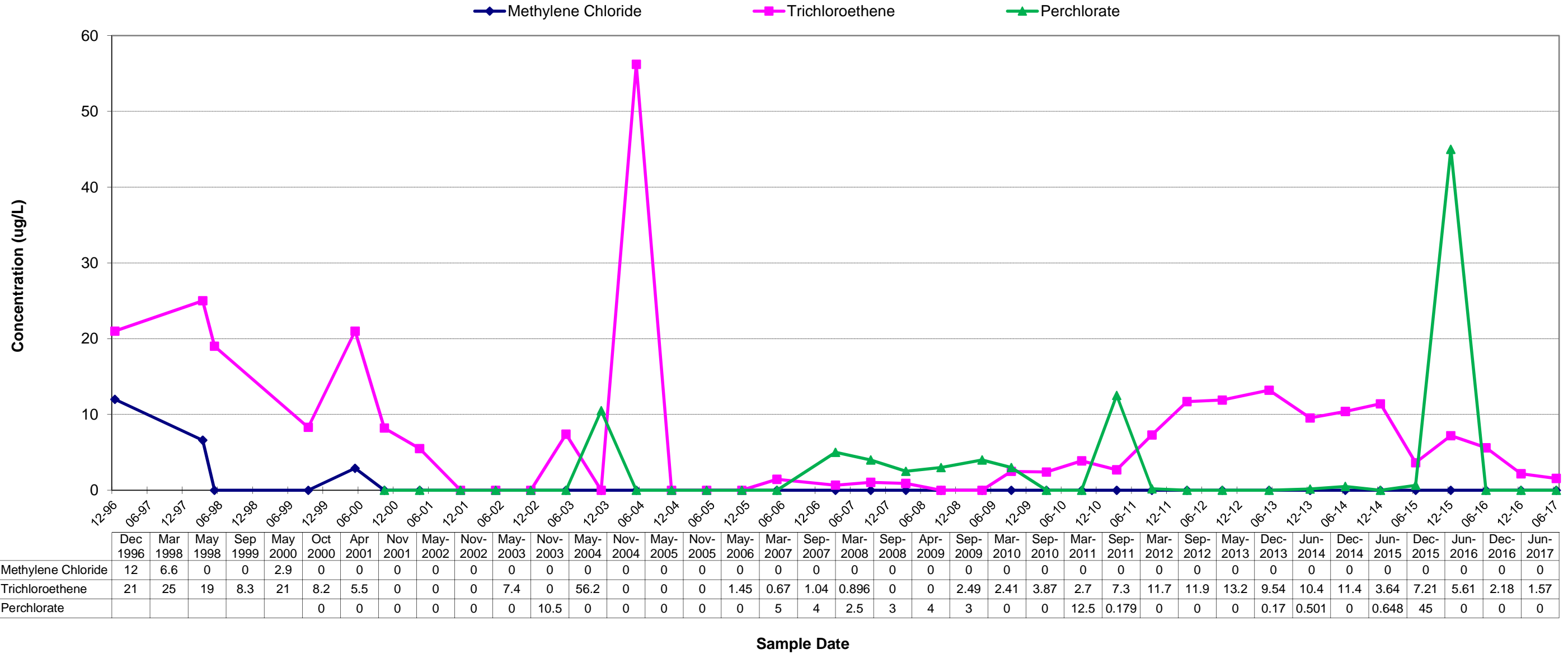
	Dec-96	Mar-98	May-98	Sep-99	May-00	Oct-00	Apr-01	Nov-01	May-02	Nov-02	May-03	Nov-03	May-04	Nov-04	May-05	May-05	Nov-05	Mar-07	Sep-07	Mar-08	Sep-08	Apr-09	Sep-09	Mar-10	Sep-10	Mar-11	Sep-11	Mar-12	Sep-12	May-13	Dec-13	Jun-14	Dec-14	Jun-15	Dec-15	Jun-16	Dec-16	Jun-17		
◆ Methylene Chloride	124	19	26	0	0.53	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	0	
■ Trichloroethene	61	14	27	0	1.3	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	0	
▲ Perchlorate						9.21	0	0	0	0	0	4.31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.48	0	0	0	1.1	0.24	0.23	1.66	0.35	0		

Sample Date

Monitoring Well C-06

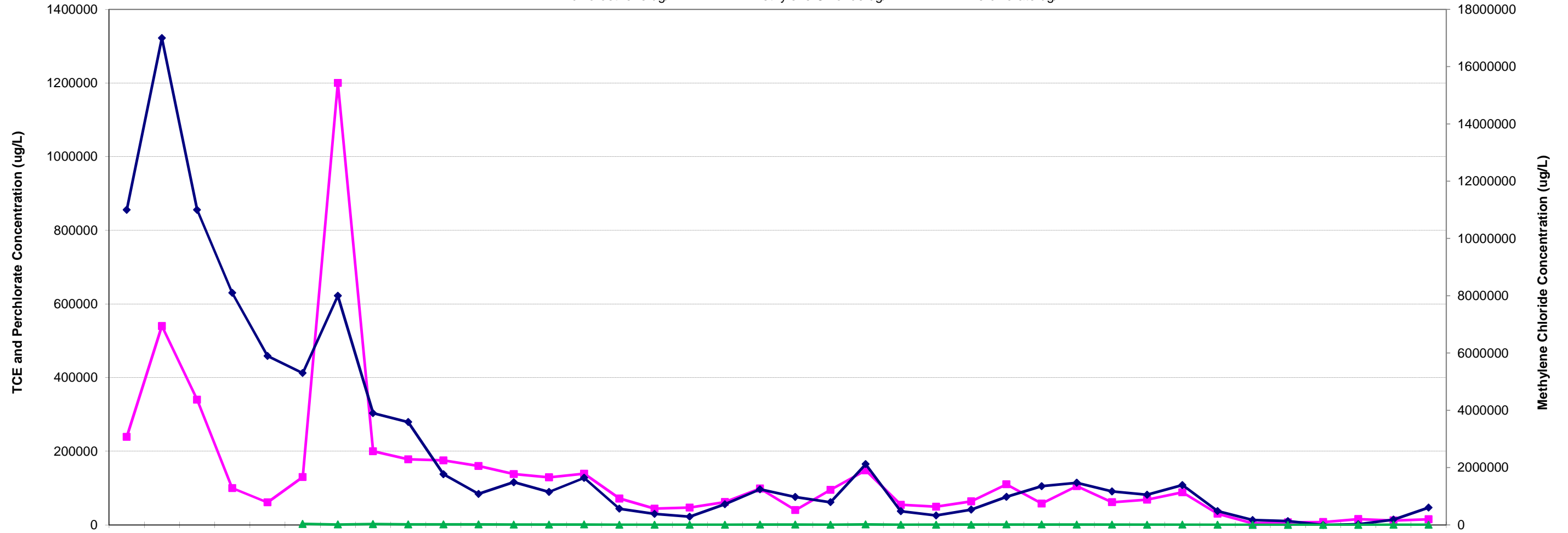


Monitoring Well C-08



Monitoring Well MW-02

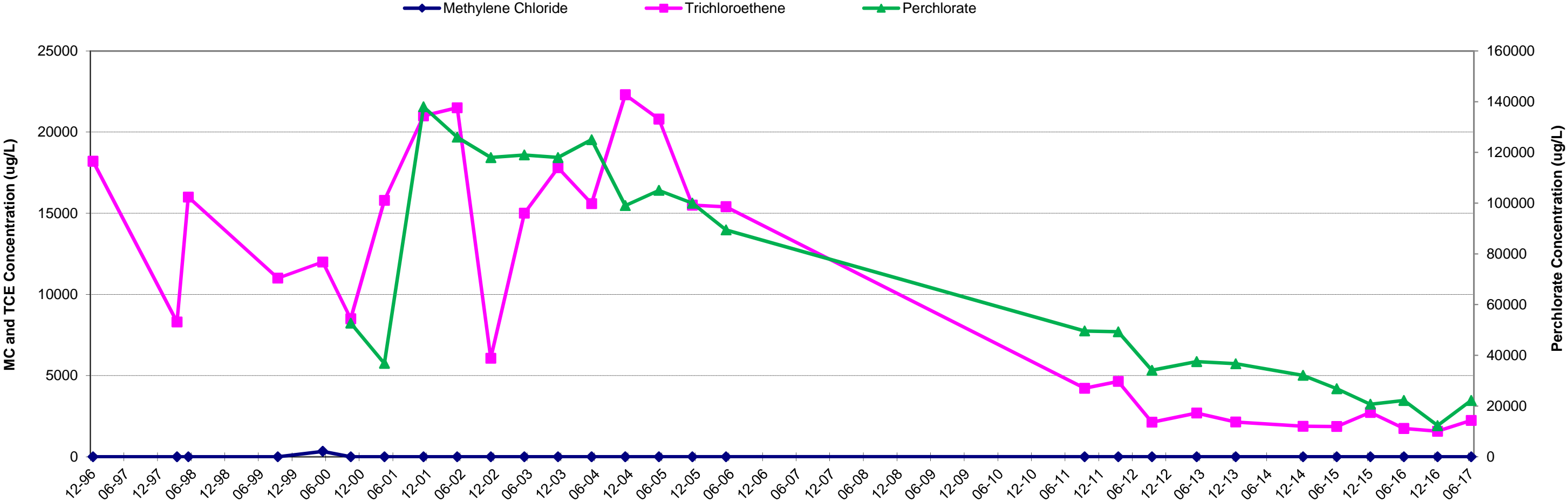
Trichloroethene ug/L Methylene Chloride ug/L Perchlorate ug/L



	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	03-07	09-07	03-08	09-08	04-09	09-09	03-10	09-10	03-11	09-11	03-12	09-12	05-13	12-13	06-14	12-14	06-15	12-15	06-16	12-16	06-17
Trichloroethene ug/L	239000	540000	340000	100000	61000	130000	1E+06	200000	178000	175000	160000	138000	129000	139000	71700	44100	47000	62000	98700	40000	95100	148000	54500	49400	63800	110000	57800	105000	61500	68400	88400	30100	4240	6760	7450	15500	11800	15300
Methylene Chloride ug/L	1E+07	2E+07	1E+07	8E+06	6E+06	5E+06	8E+06	4E+06	4E+06	2E+06	1E+06	1E+06	1E+06	2E+06	564000	384000	287000	720000	1E+06	974000	790000	2E+06	478000	327000	533000	979000	135000	1E+06	1E+06	1E+06	1E+06	484000	167000	130000	189	21300	184000	604000
Perchlorate ug/L						32200	12400	27500	15900	13500	15500	11500	9900	12900	5550	2860	3130	4900	11200	9180	5660	14000	4000	3100	5700	11900	13100	8470	6940	4780	7920	2900	16.5	428	0.847	33.3	1290	4830

Sample Date

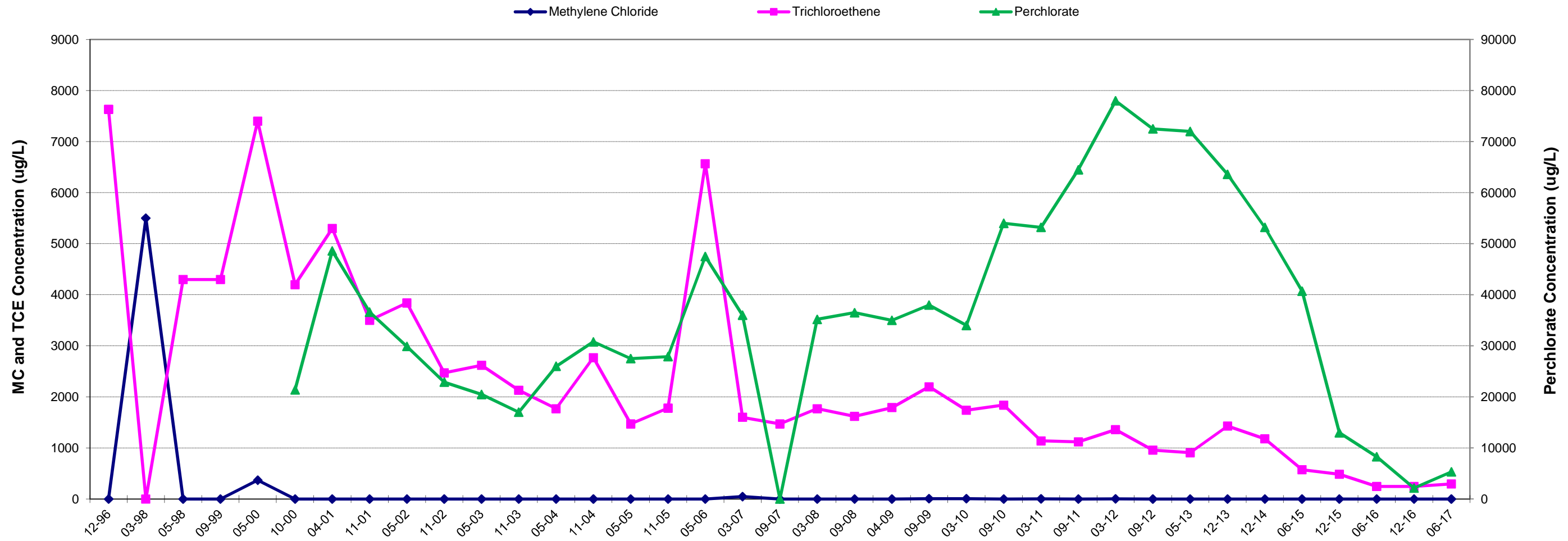
Monitoring Well MW-07



	12-96	06-97	12-97	06-98	12-98	06-99	12-99	06-00	12-00	06-01	12-01	06-02	12-02	06-03	12-03	06-04	12-04	06-05	12-05	06-06	12-06	06-07	12-07	06-08	12-08	06-09	12-09	06-10	12-10	06-11	12-11	06-12	12-12	06-13	12-13	06-14	12-14	06-15	12-15	06-16	12-16	06-17					
	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	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																			
◆ Methylene Chloride	0	0	0	0	330	0	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	0	0	0	0	7.81	0	0.352	0	0	0	0	0	0	0.314					
■ 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																			
▲ Perchlorate						52700	36800	138000	126000	118000	119000	118000	125000	99000	105000	100000	89400	49600	49300	34100	37500	36700	32100	26800	20700	22200	12300	22200																			

Sample Date

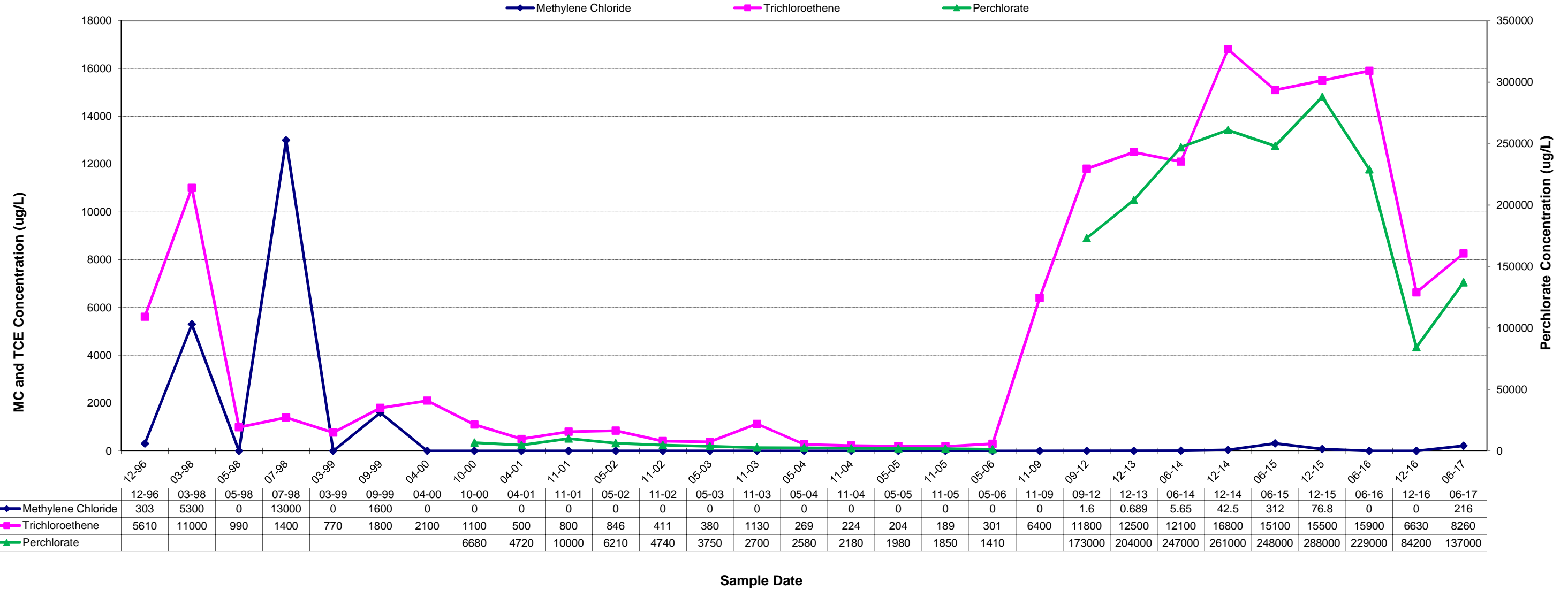
Monitoring Well MW-08



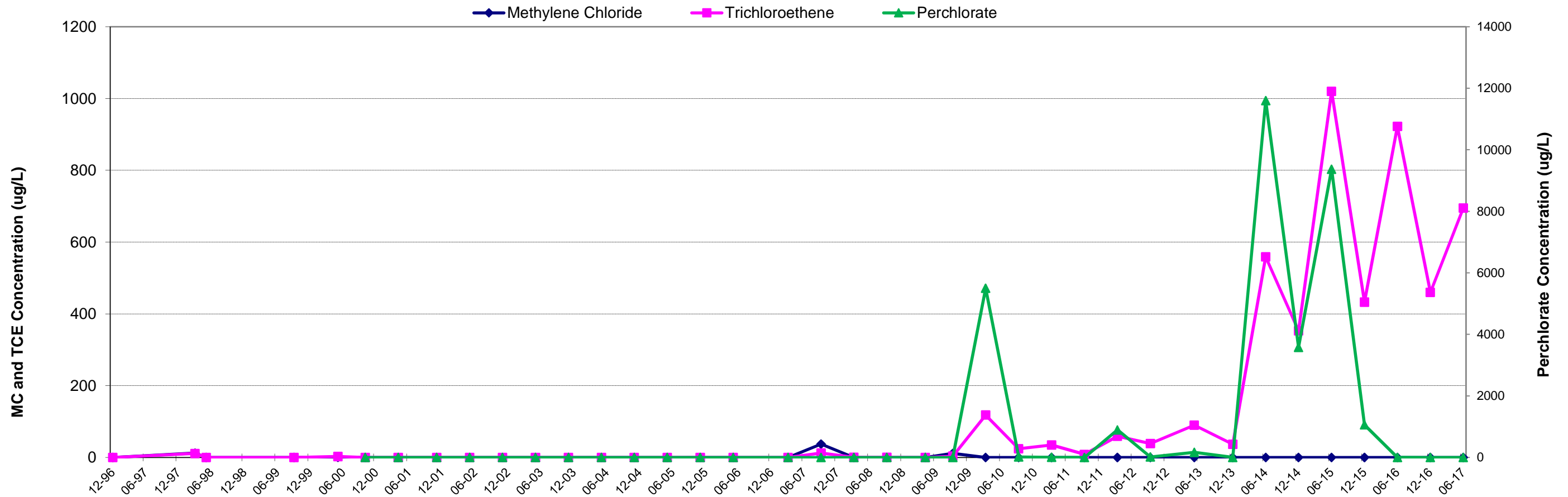
	12-96	03-98	05-98	09-99	05-00	10-00	04-01	11-01	05-02	11-02	05-03	11-03	05-04	11-04	05-05	11-05	05-06	03-07	09-07	03-08	09-08	04-09	09-09	03-10	09-10	03-11	09-11	03-12	09-12	05-13	12-13	12-14	06-15	12-15	06-16	12-16	06-17
◆ Methylene Chloride	0	5500	0	0	370	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	6.07	6.27	0	4.11	0	3.25	0	0.351	0	0	0	1.44	0	0	0
■ Trichloroethene	7630	0	4300	4300	7400	4200	5300	3,500	3840	2470	2620	2130	1770	2770	1470	1780	6570	1600	1470	1770	1620	1790	2200	1740	1840	1140	1120	1360	959	907	1430	1180	575	487	247	245	296
▲ Perchlorate						21400	48600	36600	29900	22900	20500	17000	26000	30800	27500	27900	47500	36000	0	35200	36500	35000	38000	34000	54000	53200	64500	78000	72500	72000	63600	53200	40700	13000	8290	2160	5320

Sample Date

Monitoring Well MW-14



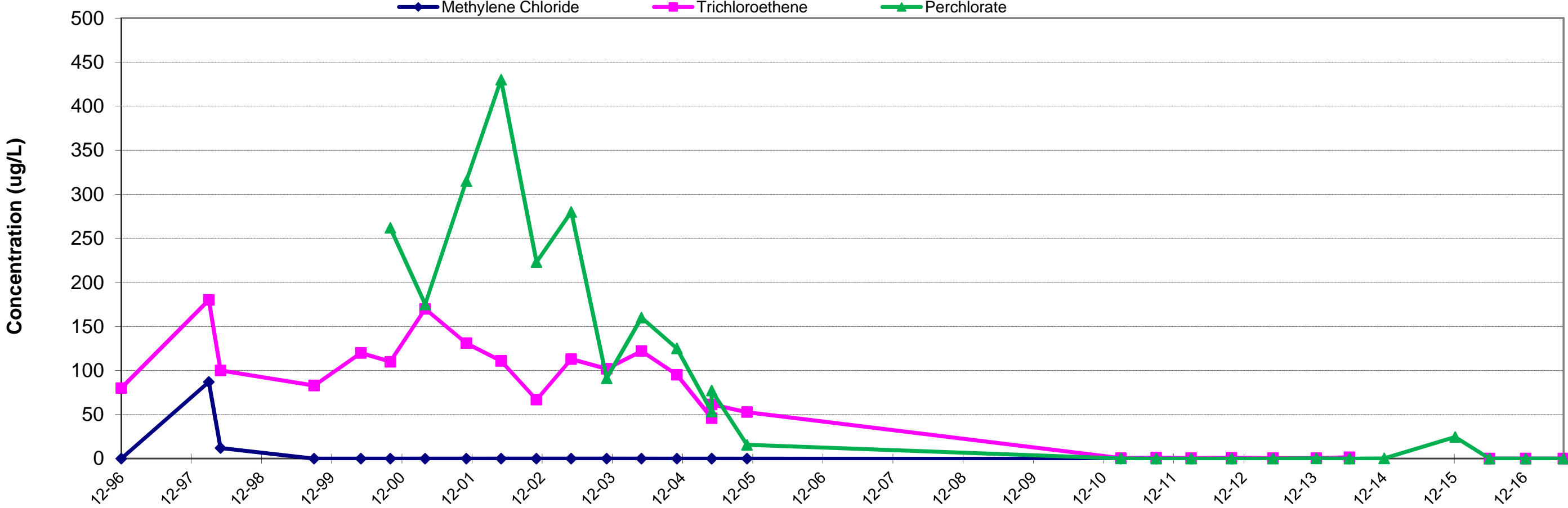
Monitoring Well MW-16



	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	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	Jun-2017		
◆ Methylene Chloride	0	12	0	0	0.66	0	0	0	0	0	0	0	0	0	0	0	0	0	37.3	0	0	0	11.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
■ Trichloroethene	0	11	0	0	2.7	0	0	0	0	0	0	0	0	0	0	0	0	0	12.1	0.467	0.316	0	3.49	118	24.3	34.5	8.52	59.1	38.7	89.9	36.6	559	353	1020	433	922	460	695		
▲ Perchlorate						0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	5500	17	5.24	0	896	16.5	166	1.25	11600	3580	9370	1060	0.615	0	0		

Sample Date

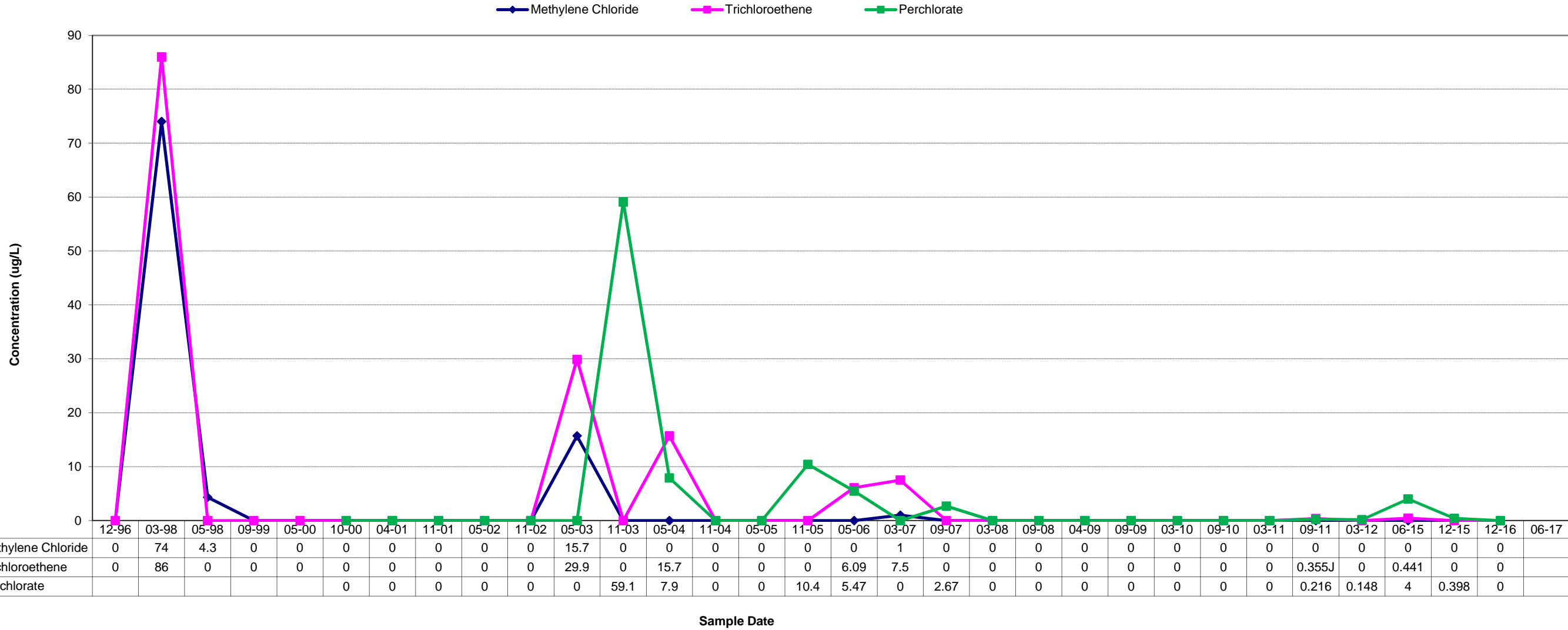
Monitoring Well MW-17



	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
◆ 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

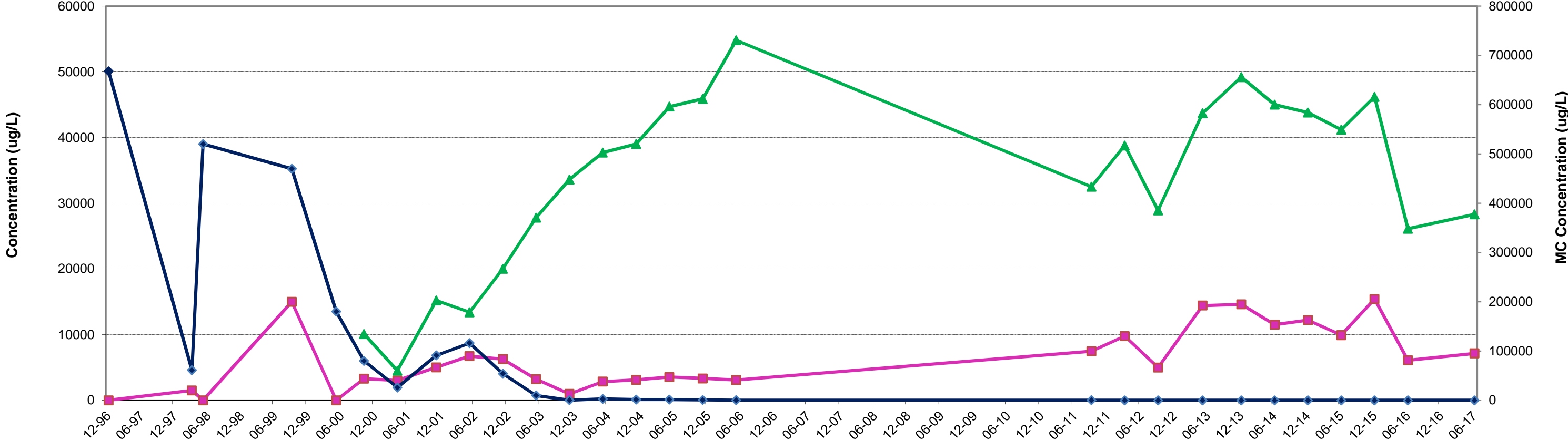
Sample Date

Monitoring Well MW-20



Monitoring Well MW-21

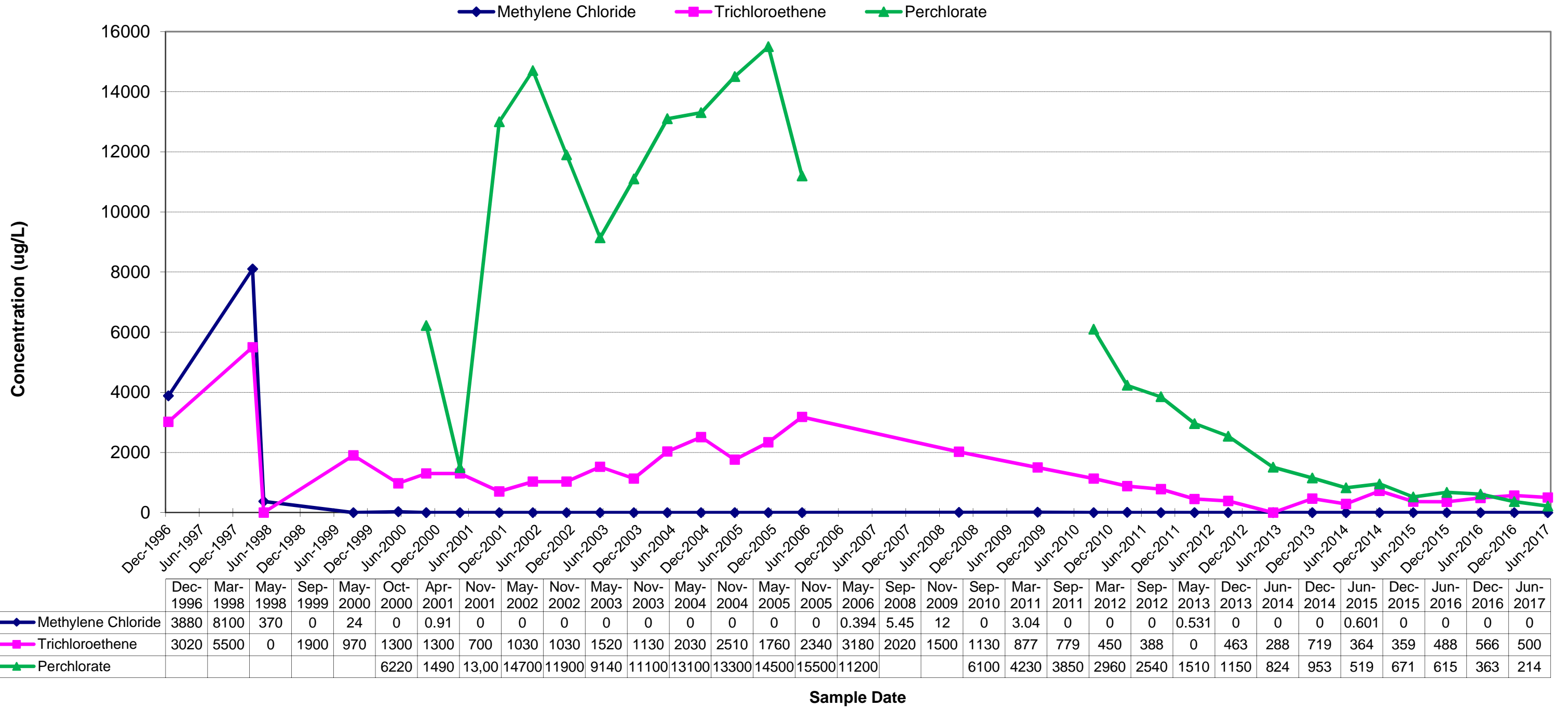
Trichloroethene Perchlorate Methylene Chloride



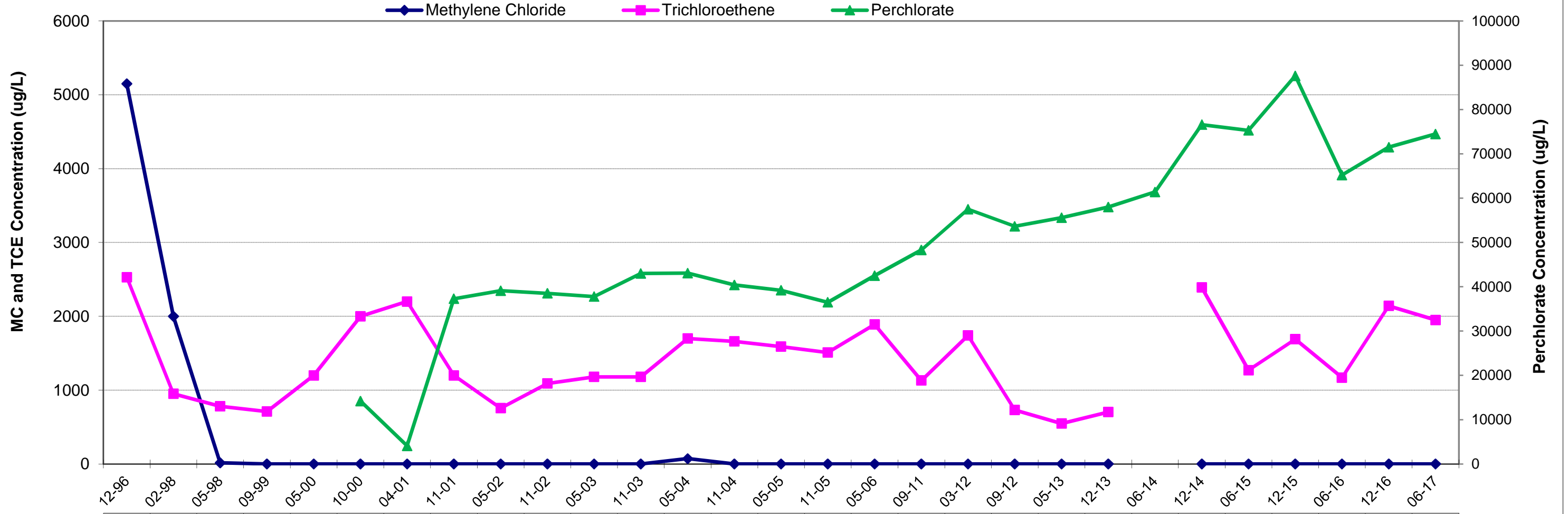
	Dec 1996	Mar 1998	May 1998	Sep 1999	May 2000	Oct 2000	Apr 2001	Nov 2001	May-2002	Nov-2002	May-2003	Nov-2003	May-2004	Nov-2004	May-2005	Nov-2005	May-2006	Sep-2011	Mar-2012	Sep-2012	May-2013	Dec-2013	Jun-2014	Dec-2014	Jun-2015	Dec-2015	Jun-2016	Jun-2017
Trichloroethene	0	1500	0	15000	0	3300	3000	5,000	6730	6260	3200	965	2830	3110	3540	3330	3090	7470	9760	4980	14400	14600	11500	12200	9910	15400	6080	7140
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
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

Sample Date

Monitoring Well MW-22



Monitoring Well MW-23



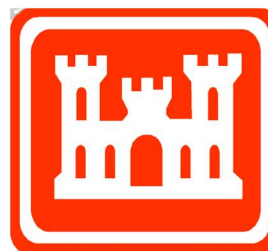
	12-96	02-98	05-98	09-99	05-00	10-00	04-01	11-01	05-02	11-02	05-03	11-03	05-04	11-04	05-05	11-05	05-06	09-11	03-12	09-12	05-13	12-13	06-14	12-14	06-15	12-15	06-16	12-16	06-17
◆ Methylene Chloride	5150	2000	16	0	0	0	0.6	0	0	0	0	0	72.5	0	0	0	0.708	0	0	1.34	0	0.338		0	0.492	0	0	0	0
■ Trichloroethene	2530	950	780	710	1200	2000	2200	1,200	756	1090	1180	1180	1700	1660	1590	1510	1890	1130	1740	731	547	703		2390	1270	1690	1170	2140	1950
▲ Perchlorate						14200	4080	37,30	39100	38500	37800	43000	43100	40400	39200	36500	42500	48300	57500	53650	55600	58000	61400	76600	75300	87600	65200	71500	74500

Sample Date

APPENDIX E: Data Validation and Analytical Data – 2nd Quarter 2017

QUALITY CONTROL SUMMARY REPORT
2nd QUARTER (April - June) 2017
FOR
GROUNDWATER TREATMENT PLANT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared For:



U.S. Army Corps of Engineers

Prepared By:

AECOM

AECOM Technical Services

September 2017

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1 INTRODUCTION

AECOM reviewed 39 data packages from Microbac Laboratory Services, Marietta, OH. Groundwater samples were collected April 5, 2017 through June 28, 2017 at the Groundwater Treatment Plant (GWTP) at Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. Air samples were collected and sent to ALS Columbia, Simi Valley, CA. AECOM reviewed 1 air data package. Data were reviewed for conformance to the requirements of the following guidance documents: Automated Data Review by Laboratory Data Consultants (ADR.net), United States Environmental Protection Agency (EPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, (EPA, January 2017), and EPA Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review, (EPA, January 2017).

1.1 Intended Use of Data

The objective of sampling at the GWTP is to monitor effluent streams to confirm compliance with discharge limits.

Analyses performed include:

- SW6850 or 6850M – Perchlorates
- E350.1 – Nitrogen, Ammonia
- E365.2 – Orthophosphate
- E415.1 – Total Organic Carbon
- SW8260B- Volatiles
- SW8270D- 1,4-Dioxane
- SW6010C – Al, Fe, and Se
- SW6020A – As, Ba, Cd, Cr, Co, Pb, Mn, Ni, Ag, V, Zn
- SW9056 – Common Anions
- SW7196A – Hexavalent Chromium
- E410.4 – Chemical Oxygen Demand
- E1664A – Oil and Grease
- TO-15- Air

Table 1 lists the sample identification numbers (IDs) and their associated laboratory IDs. **Table 2** lists qualified results with the associated quality control parameter that was exceeded.

1.2 Preservation and Holding Times

Sample identification data were evaluated for agreement with the chain-of-custody (COC). All samples were received in appropriate containers, within the proper temperature range, in good condition, and with the required signatures with the exception of samples LH18/24-SP650-6444 and LH18/24-SP650-6445 collected on 5/31/17. The cooler was received at 8 degrees Celsius

(°C), outside the acceptable temperature range of $\leq 6^{\circ}\text{C}$. The results for these samples are qualified J/UJ.

The laboratory received samples LH18/24-SP140-7447 and LH18/24-SP650-6447 one day past the recommended holding time for hexavalent chromium analyses. The hexavalent chromium results in these samples are non-detects and are qualified UJ.

Table 2 shows qualified analytical data.

1.3 Calibrations

Initial calibration acceptance criteria are a relative standard deviation (RSD) less than or equal to 15 percent (%) or a correlation coefficient (r^2) ≥ 0.99 . All calibration curves met criteria.

1.3.1 Continuing Calibration Verifications (CCV)

If the continuing calibration verification (CCV) compound exceeds 20% difference, the compound is checked in the LCS, if both are outside recovery limits, the compound is rejected, R. If only the CCV exceeds recovery criteria and is less than $\pm 20\%$ difference, then the compound is qualified J or UJ.

The continuing calibration verification (CCV) criteria are 20 percent difference (%D) for VOCs and SVOCs. Metals and general chemistry has 10% D and perchlorate has 15% D.

The %D for carbon tetrachloride in the CCV associated with the SW8260B analyses of sample LH18/24-SP650-6447 was above 20%. This compound was not detected in this sample; therefore, no results were qualified due to this potential high bias.

All other CCVs are within acceptance criteria.

1.4 Blanks

Contamination by a target analyte of one of the various blanks was found. If the sample result for an associated sample was non-detect or less than 5X (10X for common laboratory contaminants) the analyte concentration in the blank, the corresponding sample result for the analyte was qualified U. Where the sample result for the affected analyte was greater than 5X the amount in the blank, no qualifier was applied.

Blank	Analyte	Result	units
Trip Blank (5/3/17)	Acetone	3.12	$\mu\text{g/L}$
Trip Blank (5/10/17)	Acetone	2.69	$\mu\text{g/L}$
Trip Blank (5/24/17)	Acetone	5.25	$\mu\text{g/L}$
Trip Blank (5/24/17)	Acetone	3.01	$\mu\text{g/L}$
Method Blank (5/26/17)	COD	10.0	mg/L
Trip Blank (5/31/17)	Acetone	4.36	$\mu\text{g/L}$
Trip Blank (6/7/17)	Acetone	5.37	$\mu\text{g/L}$
Method Blank (6/20/17)	Methylene chloride	0.346	$\mu\text{g/L}$
Trip Blank (6/28/17)	Acetone	13.1	$\mu\text{g/L}$

Table 2 shows qualified analytical data.

1.5 Surrogates

Surrogates were evaluated using limits defined by method in project-specific QAPP in Worksheet 28.

1.5.1 SW8270D

The recovery for surrogate compound 1,4-dioxane-d8 (1810%) is above the upper control limit of 129% in sample LH18/24-SP140-7442. The 1-4-dioxane result for in this sample is qualified J.

Table 2 shows qualified analytical data.

1.6 Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

LCS/LCSD recoveries were evaluated using limits defined by method in project-specific QAPP in Worksheet 15.

1.6.1 SW8260B

LCS/LCSD WG615570-02/03 recoveries for o-xylene (126% and 119%) and toluene (125% and 120%) are above the upper control limit of 120%. The detected results for these compounds in associated sample LH18/24-SP140-7442 are qualified J.

1.6.2 SW8270D

LCS/LCSD WG617401-02/03 recoveries for 1,4-dioxane (174% and 159%) are above the upper control limit of 104%. The detected result for this compound in the associated sample LH18/24-SP650-6447-grab is qualified J.

Table 2 shows qualified analytical data.

1.7 Matrix Spike (MS)/Matrix Spike Duplicate Sample (MSD)

MS/MSD recoveries were evaluated using limits defined by method in project-specific QAPP in Worksheet 15.

1.7.1 SW8270D

1,4-Dioxane was not recovered in the MS/MSD of sample 1,4 LH18/24-SP140-7431-Grab. Similarly, 1,4-dioxane was recovered below the lower control limit of 80% in the MS/MSD of sample LH18/24-SP650-6436 (65% and 70%). These MS/MSD recoveries were not used to qualify associated sample data since the sample results are greater than 4x the spike added.

1.8 Internal Standards

If the %R for an internal standard in a sample is not within the limit, the associated sample is qualified for those analytes associated with the internal standard(s) outside of the limit.

Internal standards are within acceptance criteria.

1.9 Field Precision

Precision is the measure of variability of individual sample measurements. Evaluation of field duplicates for precision was done using the Relative Percent Difference (RPD). The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD limits were set at 0-25% for groundwater matrices. No data required qualification based field duplicate RPD outliers. Overall field precision was acceptable.

2 DATA USABILITY SUMMARY

The data are usable for the intended purposes of the project (see Table 3). The data quality objectives have been met for the project.

Table 1: Field Sample Identification and Laboratory Identification

Client Sample ID	Laboratory Sample ID	Subcontract Laboratory ID	SW6850/6850M	E350.1	E365.2	E415.1	SW8270D	SW8260B	SW6010C	SW6020A	SW9056	SW7196A	E410.4	E1664	TO-15
GWTP Samples															
LH18/24-SP650-6429	L17040221-01							X			X				
Trip Blank	L17040221-02							X							
LH18/24-SP650-6429	L17040255-01	420016001	X												
LH18/24-SP140-7429	L17040255-02	420016002	X												
LH18/24-SP650-6430-Grab	L17040345-01			X	X	X									
LH18/24-SP650-6431-Grab	L17040618-01						X	X	X	X		X			
Trip Blank	L17040618-02							X							
LH18/24-SP140-7431-Grab	L17040620-01								X	X		X			
LH18/24-SP650-6432-Grab	L17040687-01			X	X	X									
LH18/24-SP650-6431-Grab	L17040745-01	420570001	X												
LH18/24-SP140-7431-Grab	L17040746-01	420545001	X												
LH18/24-SP650-6432-Grab	L17040781-01	420730001	X												
LH18/24-SP650-6433	L17040971-01							X			X				
Trip Blank	L17040971-02							X							
LH18/24-SP650-6430-Grab	L17041002-01	420114001	X												
LH18/24-SP650-6433	L17041003-01	421097001	X												
LH18/24-SP140-7433	L17041003-02	421097002	X												
LH18/24-SP650-6434-Grab	L17041032-01			X	X	X									
LH18/24-SP650-6434-Grab	L17041147-01	421250001	X												
LH18/24-SP650-6435	L17041302-01		X												
LH18/24-SP140-7435	L17041302-02		X												
LH18/24-SP650-6435-Grab	L17041304-01			X	X	X									
LH18/24-SP650-6436	L17050243-01		X												
LH18/24-SP140-7436	L17050243-02		X												
LH18/24-SP650-6436	L17050257-01							X			X				
Trip Blank	L17050257-02							X							
LH18/24-SP650-6437-Grab	L17050427-01		X	X	X	X									
LH18/24-SP140-7438-Grab	L17050687-01		X						X	X		X			
LH18/24-SP650-6438-Grab	L17050688-01		X				X	X	X	X		X			
Trip Blank	L17050688-02							X							

Client Sample ID	Laboratory Sample ID	Subcontract Laboratory ID	SW6850/6850M	E350.1	E365.2	E415.1	SW8270D	SW8260B	SW6010C	SW6020A	SW9056	SW7196A	E410.4	E1664	TO-15
LH18/24-SP650-6439-Grab	L17050768-01		X	X	X	X									
LH18/24-SP650-6440-Grab	L17051050-01		X					X			X				
Trip Blank	L17051050-02							X							
LH18/24-SP650-6441-Grab	L17051123-01			X	X	X									
LH18/24-SP650-6443-grab	L17051371-01			X	X	X									
LH18/24-SP140-7442-Grab	L17051389-01		X				X	X	X	X	X		X	X	
Trip Blank	L17051389-02							X							
LH18/24-SP650-6442-grab	L17051391-01		X				X	X	X	X	X		X	X	
Trip Blank	L17051391-02							X							
LH18/24-SP650-6445-Grab	L17060105-01			X	X	X									
LH18/24-SP650-6444	L17060106-01		X					X			X				
Trip Blank	L17060106-02							X							
LH18/24-SP140-7447-Ggrab	L17060482-01		X					X		X		X			
LH18/24-SP650-6448-Grab	L17060483-01			X	X	X									
LH18/24-SP650-6447-Ggrab	L17060484-01		X				X	X		X		X			
Trip Blank	L17060484-02							X							
LH18/24-SP650-6450	L17060853-01			X	X	X									
LH18/24-SP650-6449	L17060856-01		X					X			X				
Trip Blank	L17060856-02							X							
LH18/24-SP650-6451	L17061127-01		X	X	X	X									
LH18/24-SP650-6453	L17061495-01			X	X	X									
LH18/24-SP650-6452	L17061531-01		X					X			X				
Trip Blank	L17061531-02							X							
Air Samples															
LH18/24-air-5646-Stripper	P1702773-01														X
LH18/24-air-5646-Stripper dup	P1702773-02														X
LH18/24-air-5646-GWTP	P1702773-03														X
LH18/24-air-5646-Downwind-North	P1702773-04														X

E – U.S. Environmental Protection Agency method.

Laboratory – Micorbac Laboratories in Marietta, Ohio (groundwater) and ALS Environmental in Simi Valley, California (air).

Subcontracted Laboratory – GEL Laboratories, LLC in Charleston, South Carolina.

SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.

X – Sample analyzed for indicated parameter.

Table 2: Qualified Analytical Data

Client Sample ID	Laboratory Sample ID	Analyte Name	Data Validation Qualifier	Reason for Qualification
GWTP Samples				
LH18/24-SP650-6436	L17050257-01	Acetone	U	Trip blank contamination
LH18/24-SP650-6438	L17050688-01	Acetone	U	Trip blank contamination
LH18/24-SP650-6442	L17051391-01	COD	U	Method blank contamination
LH18/24-SP140-7442	L17051389-01	o-Xylene	J	LCS/LCSD above control limits
LH18/24-SP140-7442	L17051389-01	Toluene	J	LCS/LCSD above control limits
LH18/24-SP140-7442	L17051389-01	1,4-Dioxane	J	Surrogate above control limits
LH18/24-SP650-6445	L17060105-01	Nitrogen, Ammonia	J	Cooler temperature outside criteria
LH18/24-SP650-6445	L17060105-01	Orthophosphate	J	Cooler temperature outside criteria
LH18/24-SP650-6445	L17060105-01	Total organic carbon	J	Cooler temperature outside criteria
LH18/24-SP650-6444	L17060106-01	SW8260B analytes	J/UJ	Cooler temperature outside criteria
LH18/24-SP650-6444	L17060106-01	Perchlorate	J	Cooler temperature outside criteria
LH18/24-SP650-6444	L17060106-01	Sulfate	J	Cooler temperature outside criteria
LH18/24-SP650-6444	L17060106-01	Chloride	J	Cooler temperature outside criteria
LH18/24-SP140-7447	L17060482-01	Hexavalent chromium	UJ	Hold time exceedence
LH18/24-SP650-6447	L17060484-01	Acetone	U	Trip blank contamination
LH18/24-SP650-6447	L17060484-01	1,4-Dioxane	J	LCS/LCSD above control limits
LH18/24-SP650-6447	L17060484-01	Hexavalent chromium	UJ	Hold time exceedence
LH18/24-SP650-6452	L17061531-01	Acetone	U	Trip blank contamination

Table 3: Completeness by Method

Method	No. of Rejected Results	% Completeness
SW6850/6850M	0	100
E350.1	0	100
E365.2	0	100
E415.1	0	100
SW8270D	0	100
SW8260B	0	100
SW6010C	0	100
SW6020A	0	100
SW9056	0	100
SW7196A	0	100
E410.4	0	100
E1664	0	100
TO-15	0	100

E – U.S. Environmental Protection Agency method.

SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.



Laboratory Report Number: L17040221

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on April 14 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



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Lab Report #: L17040221

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00114094	I	3.0		J4616882176	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	Yes

**Lab Report #:** L17040221**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP650-6429	L17040221-01	04/05/2017 15:00	04/06/2017 09:58
TRIP BLANK	L17040221-02	04/05/2017 00:01	04/06/2017 09:58



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	8260
Prep Batch Number(s):	609502	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-12 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Sarah Vandenberg	<i>Sarah Vandenberg</i>		2017-04-12 16:29:09



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	8260
Prep Batch Number(s):	609502	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-12 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?	X				
Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	8260
Prep Batch Number(s):	609502	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-12 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	8260
Prep Batch Number(s):	609502	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-12 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	8260
Prep Batch Number(s):	609502	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-12 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	8260
Prep Batch Number(s):	609502	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-12 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	9056
Prep Batch Number(s):	WG609177	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-07 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2017-04-07 15:57:04



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	9056
Prep Batch Number(s):	WG609177	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-07 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?	X				
Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	9056
Prep Batch Number(s):	WG609177	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-07 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	9056
Prep Batch Number(s):	WG609177	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-07 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	9056
Prep Batch Number(s):	WG609177	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-07 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040221
Project Name:		Method:	9056
Prep Batch Number(s):	WG609177	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-07 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.

Lab Report #: L17040221

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040221-01	PrePrep Method: N/A	Instrument: HPMS6
Client ID: LH18/24-SP650-6429	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 04/05/2017 22:09
Workgroup #: WG609502	Analyst: TMB	Run Date: 04/10/2017 18:29
Collect Date: 04/05/2017 15:00	Dilution: 1	File ID: 6M146320
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	4.66	J	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.699	J	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	3.65		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	102	70	120	
4-Bromofluorobenzene	103	75	120	
Dibromofluoromethane	99.7	85	115	
Toluene-d8	102	85	120	
J	Estimated value ; the analyte concentration was less than the LOQ.			
U	Analyte was not detected. The concentration is below the reported LOD.			

Lab Report #: L17040221
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040221-01	PrePrep Method: N/A	Instrument: IC2
Client ID: LH18/24-SP650-6429	Prep Method: 9056	Prep Date: 04/06/2017 16:49
Matrix: Water	Analytical Method: 9056	Cal Date: 10/12/2016 15:28
Workgroup #: WG609177	Analyst: CAS	Run Date: 04/06/2017 19:42
Collect Date: 04/05/2017 15:00	Dilution: 10	File ID: I2_040617-12
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	1190	J	4.00	2.00	1.00
Sulfate	14808-79-8	64.7		20.0	10.0	5.00
J	Estimated value ; the analyte concentration was greater than the highest standard					

Lab Report #: L17040221
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040221-01	PrePrep Method: N/A	Instrument: IC2
Client ID: LH18/24-SP650-6429	Prep Method: 9056	Prep Date: 04/06/2017 16:49
Matrix: Water	Analytical Method: 9056	Cal Date: 10/12/2016 15:28
Workgroup #: WG609177	Analyst: CAS	Run Date: 04/06/2017 20:01
Collect Date: 04/05/2017 15:00	Dilution: 100	File ID: I2_040617-13
Sample Tag: DL02	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	1780		40.0	20.0	10.0
J	Estimated value ; the analyte concentration was less than the LOQ.					

Certificate of Analysis

Sample #: L17040221-02	PrePrep Method: N/A	Instrument: HPMS6
Client ID: TRIP BLANK	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 04/05/2017 22:09
Workgroup #: WG609502	Analyst: TMB	Run Date: 04/10/2017 17:59
Collect Date: 04/05/2017 00:01	Dilution: 1	File ID: 6M146319
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	101	70	120	
4-Bromofluorobenzene	103	75	120	
Dibromofluoromethane	102	85	115	
Toluene-d8	101	85	120	

U	Analyte was not detected. The concentration is below the reported LOD.
---	--

2.1 Volatiles Data

2.1.1 Volatiles GCMS Data (8260)

2.1.1.1 Summary Data

Certificate of Analysis

Sample #: L17040221-01	PrePrep Method: N/A	Instrument: HPMS6
Client ID: LH18/24-SP650-6429	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 04/05/2017 22:09
Workgroup #: WG609502	Analyst: TMB	Run Date: 04/10/2017 18:29
Collect Date: 04/05/2017 15:00	Dilution: 1	File ID: 6M146320
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	4.66	J	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.699	J	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	3.65		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	102	70	120	
4-Bromofluorobenzene	103	75	120	
Dibromofluoromethane	99.7	85	115	
Toluene-d8	102	85	120	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Certificate of Analysis

Sample #: L17040221-02

PrePrep Method: N/A

Instrument: HPMS6

Client ID: TRIP BLANK

Prep Method: 5030B/5030C/5035A

Prep Date: N/A

Matrix: Water

Analytical Method: 8260B

Cal Date: 04/05/2017 22:09

Workgroup #: WG609502

Analyst: TMB

Run Date: 04/10/2017 17:59

Collect Date: 04/05/2017 00:01

Dilution: 1

File ID: 6M146319

Sample Tag: 01

Units: ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,2-Dichloroethane-d4	101	70	120			
4-Bromofluorobenzene	103	75	120			
Dibromofluoromethane	102	85	115			
Toluene-d8	101	85	120			
U	Analyte was not detected. The concentration is below the reported LOD.					

2.1.1.2 QC Summary Data

Example 8260 Calculations

1.0 Calculating the Response Factor (RF) from the initial calibration (ICAL) data:

$$RF = [(Ax) (Cis)] / [(Ais) (Cx)]$$

where:

Ax = Area of the characteristic ion for the compound being measured:	3399156
Cis = Concentration of the specific internal standard (ug/mL)	25
Ais = Area of the characteristic ion of the specific internal standard	846471
Cx = Concentration of the compound in the standard being measured (ug/mL)	100
RF = Calculated Response Factor	1.0039

Example

2.0 Calculating the concentration (C) of a compound in water using the average RF: *

$$Cx = [(Ax) (Cis) (Vn)(D)] / [(Ais) (RF) (Vs)]$$

where:

Ax = Area of the characteristic ion for the compound being measured	3122498
Cis = Concentration of the specific internal standard (ug/L)	25
D = Dilution factor for sample as a multiplier (10x = 10)	1
Ais = Area of the characteristic ion of the specific internal standard	611048
RF = Average RF from the ICAL	1.004
Vs = Purge volume of sample (mL)	10
Vn = Nominal purge volume of sample (mL) (10.0 mL)	10
Cx = Concentration of the compound in the sample being measured (ug/L)	127.2428

Example

3.0 Calculating the concentration (C) of a compound in soil using the average RF: *

$$Cx = [(Ax) (Cis) (Wn)(D)] / [(Ais) (RF) (Ws)]$$

where:

Ax = Area of the characteristic ion for the compound being measured	3122498
Cis = Concentration of the specific internal standard (ug/L)	25
D = Dilution factor for sample as a multiplier (10x = 10)	1
Ais = Area of the characteristic ion of the specific internal standard	611048
RF = Average RF from the ICAL	1.004
Ws = Weight of sample purged (g)	5
Wn = Nominal purge weight (g) (5.0 g)	5
Cx = Concentration of the compound in the sample being measured (ug/L)	127.2428

Example

Dry weight correction:

Percent solids (PCT_S)	50
Cd = (Cx) (100)/PCT_S	254.4856

* Concentrations appearing on the instrument quantitation reports are on-column results and do not take into account initial volume, final volume, and the dilution factor.

4.0 Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, $y = mx + b$

y = response ratio = response of analyte / response of IS = Ax/Ais

x = amount ratio = concentration analyte/concentration internal standard = Cx / Cis

m = slope from curve = 0.213

b = intercept from curve = - 0.00642

Step 2: Calculate y from Quantitation Report

$$y = 86550/593147 = 0.1459$$

Step 3: Solve for x

$$x = (y - b)/m = [(0.1459 - (-0.00642))/0.213] = 0.7152$$

Step 4: Solve for analyte concentration Cx

$$Cx = Cis (x) = (25.0)(0.7152) = 17.88$$

Example Spreadsheet Calculation:

Slope from curve, m:	0.213
Intercept from curve, b:	-0.00642
Area of analyte, Ax:	86550
Area of Internal Standard, Ais:	593147
Concentration of IS, Cis	25.00
Response Ratio:	0.145917
Amount Ratio:	0.715195
Concentration:	17.87988
Units of Internal Standard:	ug/L

5.0 Concentration from Quadratic Regression**Step 1 - Retrieve Curve Data from Plot, $y = Ax^2 + Bx + C$**

Where:

$$Ax^2 + Bx + (C - y) = 0$$

A, B, C = constants from the ICAL quadratic regression

y = Response ratio = Area of analyte/Area of internal standard (IS)

x = Amount ratio = Concentration of analyte/concentration of IS

Step 2: Calculate y from Quantitation Report

$$y = Ax/Ais$$

Step 3: Solve for x using the quadratic formula

$$Ax^2 + Bx + C - y = 0$$

$$x = \frac{b \pm \sqrt{(b^2 - 4a(c - y))}}{2a} \quad (\text{Two possible solutions})$$

Step 4: Solve for analyte concentration Cx

$$Cx = (Cis)(\text{Amount ratio})$$

Example Spreadsheet Calculation:

Value of A from plot:	-0.00629
Value of B from plot:	0.511
Value of C from plot:	-0.0276
Area of unknown from quantitation report:	293821
Area of IS from quantitation report:	784848
Response ratio, y:	0.374367
C - y:	-0.40197
Root 1 - Computed amount ratio, X1:	80.44567
Root 2 - Computed amount ratio, X2:	0.794396 use this solution
Concentration of IS, Cis:	25.00
Concentration of analyte, Cx:	19.86 ug/L

Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 011217
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01 Rev: 24
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01 Rev: 18
 Maintenance Log ID: 54037

Internal Standard: STD79772 Surrogate Standard: STD79772
 CCV: STD79829; STD79571 LCS: STD79908; STD79496 MS/MSD: STD79909
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG598323; WG598431

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M144707	WG598323-01 50ng BFB STD 8260	NA	1	1	STD79474	01/12/17 08:36
6M144708	WG598323-02 5ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 09:02
6M144709	WG598323-03 20ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 09:37
6M144710	WG598323-04 50ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 10:10
6M144711	WG598323-05 100ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 10:42
6M144712	WG598323-06 200ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 11:14
6M144713	WG598323-07 300ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 11:47
6M144714	WG598323-08 400ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 12:19
6M144715	WG598323-09 500ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 12:52
6M144716	rinse	NA	1	1		01/12/17 13:25
6M144717	WG598323-10 100ug/L ALT SRC STD A9/F	NA	1	1	STD79496	01/12/17 13:56
6M144718	WG598430-01 50ng BFB STD 8260	NA	1	1	STD79474	01/12/17 14:27
6M144719	WG598430-02 50ug/L CCV STD 8260	NA	1	1	STD79829	01/12/17 14:52
6M144720	WG598452-01 100ug/L A9 CCV STD 8260	NA	1	1	STD79571	01/12/17 15:27
6M144721	WG598431-01 VBLK0112 BLANK STD 826	NA	1	1		01/12/17 15:59
6M144722	WG598431-02 20ug/L LCS STD 8260	NA	1	1	STD79908	01/12/17 16:32
6M144723	L16120615-05 B MS 826-A9-SPE	7	1	1	STD79909	01/12/17 17:04
6M144724	L16120615-06 B MSD 826-A9-SPE	7	1	1	STD79909	01/12/17 17:37
6M144725	WG598431-03 100ug/L A9/FOO LCS	NA	1	1	STD79496	01/12/17 18:09
6M144726	L16120718-01 B TB 826-AP-SPE	<2	1	1		01/12/17 18:42
6M144727	L16120973-01 B TB 826-AP-SPE	<2	1	1		01/12/17 19:14
6M144728	L16120615-01 B 826-AP-SPE	7	1	1		01/12/17 19:46
6M144729	L16120615-02 B 826-AP-SPE	7	1	1		01/12/17 20:19
6M144730	L16120615-03 B EB 826-AP-SPE	4	1	1		01/12/17 20:51
6M144731	L16120615-04 B RS 826-AP-SPE	7	1	1		01/12/17 21:23
6M144732	L16120615-07 B 826-AP-SPE	4	1	1		01/12/17 21:55
6M144733	L16120615-08 B 826-AP-SPE	7	1	1		01/12/17 22:27
6M144734	L16120615-09 B 826-AP-SPE	7	1	1		01/12/17 22:59
6M144735	L16120718-02 B 826-AP-SPE	7	1	1		01/12/17 23:31
6M144736	L16120718-03 B 826-AP-SPE	7	1	1		01/13/17 00:03
6M144737	L16120718-04 B 826-AP-SPE	4	1	1		01/13/17 00:36
6M144738	L16120718-05 B 826-AP-SPE	4	1	1		01/13/17 01:08
6M144739	L16120718-06 B 826-AP-SPE	7	1	1		01/13/17 01:40
6M144740	L16120718-07 B 826-AP-SPE	7	1	1		01/13/17 02:12

Approved: January 13, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 011217
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01 Rev: 24
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01 Rev: 18
 Maintenance Log ID: 54037

Internal Standard: STD79772 Surrogate Standard: STD79772
 CCV: STD79829; STD79571 LCS: STD79908; STD79496 MS/MSD: STD79909
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG598323; WG598431

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M144741	RINSE	NA	1	1		01/13/17 02:44
6M144742	WG598431-07 VBLK0112 BLANK STD 624	NA	2	1		01/13/17 03:16
6M144743	L17010300-04 A 624	7	2	1		01/13/17 03:47
6M144744	L17010466-03 A 624-SPE	7	2	1		01/13/17 04:20
6M144745	L17010446-02 A 624-SPE1	7	2	1		01/13/17 04:52
6M144746	CCV	NA	1	1		01/13/17 05:24
6M144747	RINSE	NA	1	1		01/13/17 05:56
6M144748	RINSE	NA	1	1		01/13/17 06:28

Approved: January 13, 2017

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Sarah Vandenberg



Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 040517
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54116

Internal Standard: STD81235 Surrogate Standard: STD81235
 CCV: STD81194 LCS: STD81257 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG608938

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M146219	WG608938-01 50ng BFB STD 8260	NA	1	1	STD80989	04/05/17 14:24
6M146220	WG608938-01 50ng BFB STD 8260	NA	1	1	STD80989	04/05/17 14:38
6M146221	WG608938-01 50ng BFB STD 8260	NA	1	1	STD80989	04/05/17 16:29
6M146222	RINSE	NA	1	1	STD80989	04/05/17 16:54
6M146223	WG608938-02 0.3ug/L STD 8260	NA	1	1	STD81194	04/05/17 17:25
6M146224	WG608938-03 0.4ug/L STD 8260	NA	1	1	STD81194	04/05/17 17:57
6M146225	WG608938-04 1ug/L STD 8260	NA	1	1	STD81194	04/05/17 18:28
6M146226	WG608938-05 2ug/L STD 8260	NA	1	1	STD81194	04/05/17 19:00
6M146227	WG608938-06 5ug/L STD 8260	NA	1	1	STD81194	04/05/17 19:31
6M146228	WG608938-07 20ug/L STD 8260	NA	1	1	STD81194	04/05/17 20:02
6M146229	WG608938-08 50ug/L STD 8260	NA	1	1	STD81194	04/05/17 20:34
6M146230	WG608938-09 100ug/L STD 8260	NA	1	1	STD81194	04/05/17 21:06
6M146231	WG608938-10 200ug/L STD 8260	NA	1	1	STD81194	04/05/17 21:37
6M146232	WG608938-11 300ug/L STD 8260	NA	1	1	STD81194	04/05/17 22:09
6M146233	RINSE	NA	1	1		04/05/17 22:40

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1	X			
File ID: 6M146219				
Tune failed, DNR.				
2	X			
File ID: 6M146220				
Tune failed, DNR. Clipped the column and repalced the ferrule on the column.				

Approved: April 07, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 040617
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1

Maintenance Log ID: _____

Internal Standard: STD81235 Surrogate Standard: STD81235
 CCV: STD81194; STD80642 LCS: STD81257 MS/MSD: STD81257
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG608987

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M146234	RINSE	NA	1	1		04/06/17 12:16
6M146235	RINSE	NA	1	1		04/06/17 13:19
6M146236	WG609128-01 50ng BFB STD 8260	NA	1	1	STD80989	04/06/17 13:59
6M146237	WG609128-02 50ug/L CCV STD 8260	NA	1	1	STD81194	04/06/17 14:24
6M146238	WG608979-01 100ug/L A9 CCV STD 8260	NA	1	1	STD80642	04/06/17 14:54
6M146239	WG608987-01 VBLK0406 BLANK STD 826	NA	1	1		04/06/17 15:26
6M146240	WG608938-12 20ug/L ALT SRC STD 8260	NA	1	1	STD81257	04/06/17 15:57
6M146241	WG608987-02 20ug/L LCS STD 8260	NA	1	1	STD81257	04/06/17 16:28
6M146242	L17040128-01 B 1000X 826-SPE D1	<2	1	1000		04/06/17 16:59
6M146243	L17031533-15 A 826-SPE	<2	1	1		04/06/17 17:30
6M146244	L17031574-17 A RS 826-SPE	NA	1	1		04/06/17 18:01
6M146245	L17031574-18 A MS 826-SPE	NA	1	1	STD81257	04/06/17 18:32
6M146246	L17031574-19 A MSD 826-SPE	NA	1	1	STD81257	04/06/17 19:02
6M146247	L17040128-02 B 200X 826-SPE D1	10	1	200		04/06/17 19:32
6M146248	L17031574-28 TB A 826-SPE	<2	1	1		04/06/17 20:03
6M146249	L17031690-02 TB A 826-SPE	<2	1	1		04/06/17 20:33
6M146250	L17040002-01 LOQ 826-SPE	NA	1	1	STD81310	04/06/17 21:03
6M146251	L17040004-01 LOD 826-SPE	NA	1	1	STD81310	04/06/17 21:33
6M146252	L17031690-01 A 826-SPE	<2	1	1		04/06/17 22:04
6M146253	L17031574-25 A 826-SPE	<2	1	1		04/06/17 22:34
6M146254	L17031574-24 A 826-SPE	<2	1	1		04/06/17 23:04
6M146255	L17031574-27 A 2.5X 826-SPE	<2	1	2.5		04/06/17 23:35
6M146256	L17031574-26 A 826-SPE	<2	1	1		04/07/17 00:05
6M146257	L17031574-23 A 826-SPE	<2	1	1		04/07/17 00:35
6M146258	L17040173-01 A 10X 826-TC	5	17	10		04/07/17 01:06
6M146259	ccv	NA	1	1		04/07/17 01:36
6M146260	rinse	NA	1	1		04/07/17 02:06
6M146261	rinse	NA	1	1		04/07/17 02:36
6M146262	WG608867-01 A FBLK 10X 826-TC	NA	17	10		04/07/17 03:06

Comments

Seq.	Rerun	Dil.	Reason	Analytes
14	X	1000	Over Calibration Range	D.ETHER

Approved: April 07, 2017

Sarah Vandenberg

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 040617
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/ OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/ OVAP PAT01 Rev: 18/1
 Maintenance Log ID: _____

Internal Standard: STD81235 Surrogate Standard: STD81235
 CCV: STD81194; STD80642 LCS: STD81257 MS/MSD: STD81257
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG608987

Comments:

Comments

Seq.	Rerun	Dil.	Reason	Analytes
File ID: 6M146247				
20	X	5	Over Calibration Range	CIS12-DCE
File ID: 6M146253				
21	X	5	Over Calibration Range	CIS12-DCE
File ID: 6M146254				

Approved: April 07, 2017

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Sarah Vandenberg



Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 041017
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54122

Internal Standard: STD81235 Surrogate Standard: STD81235
 CCV: STD81375 LCS: STD81257 MS/MSD: STD81257
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG609502; WG609583

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M146305	RINSE	NA	1	1		04/10/17 08:47
6M146306	WG609500-01 50ng BFB STD 8260	NA	1	1	STD80989	04/10/17 11:26
6M146307	WG609500-02 50ug/L CCV STD 8260	NA	1	1	STD81375	04/10/17 11:52
6M146308	WG609535-01 100ug/L A9 CCV STD 8260	NA	1	1	STD80642	04/10/17 12:21
6M146309	WG609502-01 VBLK0410 BLANK STD 826	NA	1	1		04/10/17 12:52
6M146310	WG609502-02 20ug/L LCS STD 8260	NA	1	1	STD81257	04/10/17 13:23
6M146311	WG609502-03 20ug/L LCS2 STD 8260	NA	1	1	STD81257	04/10/17 13:54
6M146312	L17040161-01 B 5X 826-SPE	<2	1	5		04/10/17 14:24
6M146313	L17040161-02 B 100X 826-SPE	<2	1	100		04/10/17 14:55
6M146314	L17040161-04 B 25X 826-SPE D1	<2	1	25		04/10/17 15:25
6M146315	L17040368-01 B 826-SPE	<2	1	1		04/10/17 15:56
6M146316	L17040368-02 B 826-SPE	<2	1	1		04/10/17 16:27
6M146317	L17040368-03 B 826-SPE	<2	1	1		04/10/17 16:58
6M146318	L17040368-05 B 826-SPE	<2	1	1		04/10/17 17:28
6M146319	L17040221-02 TB A 826-SPE	<2	1	1		04/10/17 17:59
6M146320	L17040221-01 A 826-SPE	<2	1	1		04/10/17 18:29
6M146321	L17040376-01 B 10X 826-SPE 00	<2	1	10		04/10/17 19:00
6M146322	L17040376-03 B 250X 826-SPE 00	<2	1	250		04/10/17 19:30
6M146323	L17040376-07 B 2500X 826-SPE 00	<2	1	2500		04/10/17 20:01
6M146324	L17040407-05 A 826-SPE	<2	1	1		04/10/17 20:32
6M146325	L17040407-08 A 826-SPE	<2	1	1		04/10/17 21:03
6M146326	L17040407-02 A 2X 826-SPE	<2	1	2		04/10/17 21:34
6M146327	L17040407-03 A 2.5X 826-SPE	<2	1	2.5		04/10/17 22:04
6M146328	L17040407-04 A 2X 826-SPE	<2	1	2		04/10/17 22:35
6M146329	L17040262-01 A 100X 826-SPE	7	1	100		04/10/17 23:05
6M146330	RINSE	NA	1	1		04/10/17 23:36
6M146331	WG609583-02 20ug/L LCS STD 624	NA	2	1	STD81257	04/11/17 00:07
6M146332	WG609583-03 20ug/L LCS2 STD 624	NA	2	1	STD81257	04/11/17 00:38
6M146333	RINSE	NA	2	1		04/11/17 01:09
6M146334	WG609583-01 VBLK0410 BLANK STD 624	NA	2	1		04/11/17 01:40
6M146335	L17040184-05 B 624-SPE	7	2	1		04/11/17 02:11
6M146336	L17040316-01 B 5X 624-SPE D1	<2	2	5		04/11/17 02:41
6M146337	L17040318-01 B 5X 624-SPE D1	<2	2	5		04/11/17 03:11
6M146338	L17040451-16 FB A 624-SPE	4	2	1		04/11/17 03:42

Approved: April 12, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 041017
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54122

Internal Standard: STD81235 Surrogate Standard: STD81235
 CCV: STD81375 LCS: STD81257 MS/MSD: STD81257
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG609502; WG609583

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M146339	L17040451-20 FB A 624-SPE	4	2	1		04/11/17 04:13
6M146340	L17040451-24 FB A 624-SPE	5	2	1		04/11/17 04:43
6M146341	L17040451-25 TB A 624-SPE	5	2	1		04/11/17 05:13
6M146342	L17040272-02 B 624-SPE1	6	2	1		04/11/17 05:44
6M146343	L17040451-15 A 624-SPE	7	2	1		04/11/17 06:14
6M146344	L17040451-17 A 624-SPE	7	2	1		04/11/17 06:44
6M146345	L17040451-18 A 624-SPE	7	2	1		04/11/17 07:14
6M146346	L17040451-19 A 624-SPE	7	2	1		04/11/17 07:45
6M146347	L17040451-21 A 624-SPE	7	2	1		04/11/17 08:15
6M146348	L17040451-22 A 624-SPE	7	2	1		04/11/17 08:46
6M146349	L17040451-23 A 624-SPE	7	2	1		04/11/17 09:17
6M146350	L17040406-01 A 624-SPE	5	2	1		04/11/17 09:48
6M146351	CCV	NA	1	1		04/11/17 10:18
6M146352	RINSE	NA	1	1		04/11/17 10:48

Comments

Seq.	Rerun	Dil.	Reason	Analytes
14				
File ID: 6M146318				
Transferred to a different vial because of sediment.				
17	X	20	Over Calibration Range	NAPH
File ID: 6M146321				
19	X	5000	Over Calibration Range	BEN
File ID: 6M146323				
22	X	1	Analyzed too dilute	
File ID: 6M146326				
43	X	5	Over Calibration Range	CYC
File ID: 6M146347				

Approved: April 12, 2017

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Sarah Vandenberg



Microbac Laboratories Inc.

Data Checklist

Date: 12-JAN-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624
 Instrument: HPMS6
 Curve Workgroup: NA
 Runlog ID: 79799
 Analytical Workgroups: WG598323; WG598431

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	X
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	X
Samples	X
TCL Hits	X
Spectra of TCL Hits	TMB
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	SAV
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
13-JAN-2017

Tiffany Bailey

Secondary Reviewer:
13-JAN-2017

Sarah Vandenberg



Microbac Laboratories Inc.

Data Checklist

Date: 05-APR-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS6
 Curve Workgroup: NA
 Runlog ID: 81399
 Analytical Workgroups: WG608938

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	X
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	NA
Samples	X
TCL Hits	X
Spectra of TCL Hits	TMB
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	FJB
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
06-APR-2017

Tiffany Bailey

Secondary Reviewer:
07-APR-2017

F. J. Bailey



Microbac Laboratories Inc.

Data Checklist

Date: 06-APR-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS6
 Curve Workgroup: NA
 Runlog ID: 81412
 Analytical Workgroups: WG608987

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	X
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	X
Samples	X
TCL Hits	X
Spectra of TCL Hits	TMB
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	X
Reruns	X
Manual Integrations	X
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	SAV
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
07-APR-2017

Tiffany Bailey

Secondary Reviewer:
07-APR-2017

Sarah Vandenberg



Microbac Laboratories Inc.

Data Checklist

Date: 10-APR-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624
 Instrument: HPMS6
 Curve Workgroup: NA
 Runlog ID: 81486
 Analytical Workgroups: WG609502; WG609583

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	NA
Samples	X
TCL Hits	X
Spectra of TCL Hits	TMB
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	X
Reruns	X
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	SAV
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
11-APR-2017

Tiffany Bailey

Secondary Reviewer:
12-APR-2017

Sarah Vandenberg



Analytical Method:8260B
Login Number:L17040221

AAB#:WG609502

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6429	01	04/05/17					04/10/2017	5.1	14		04/10/17	5.1	14	
TRIP BLANK	02	04/05/17					04/10/2017	5.7	14		04/10/17	5.7	14	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17040221
 Instrument Id: HPMS6
 Workgroup (AAB#): WG609502

Method: 8260
 CAL ID: HPMS6-05-APR-17
 Matrix: Water

Sample Number	Dilution	Tag	1	2	3	4
L17040221-01	1.00	01	102	99.7	103	102
L17040221-02	1.00	01	101	102	103	101
WG609502-01	1.00	01	101	103	103	102
WG609502-02	1.00	01	100	105	97.3	100
WG609502-03	1.00	01	100	106	98.7	101

Surrogates	Surrogate Limits		
1 - 1,2-Dichloroethane-d4	70	-	120
2 - Dibromofluoromethane	85	-	115
3 - 4-Bromofluorobenzene	75	-	120
4 - Toluene-d8	85	-	120

Underline = Result out of surrogate limits

DL = surrogate diluted out

ND = surrogate not detected



METHOD BLANK SUMMARY

Login Number: L17040221
 Blank File ID: 6M146309
 Prep Date: 04/10/17 12:52
 Analyzed Date: 04/10/17 12:52
 Analyst: TMB

Work Group: WG609502
 Blank Sample ID: WG609502-01
 Instrument ID: HPMS6
 Method: 8260B

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG609502-02	6M146310	04/10/17 13:23	01
LCS2	WG609502-03	6M146311	04/10/17 13:54	01
TRIP BLANK	L17040221-02	6M146319	04/10/17 17:59	01
LH18/24-SP650-6429	L17040221-01	6M146320	04/10/17 18:29	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5243085
 Report generated 04/12/2017 11:17



Login Number: L17040221 Prep Date: 04/10/17 12:52 Sample ID: WG609502-01
 Instrument ID: HPMS6 Run Date: 04/10/17 12:52 Prep Method: 5030B/5030C/503
 File ID: 6M146309 Analyst: TMB Method: 8260B
 Workgroup (AAB#): WG609502 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS6-05-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
1,1,1-Trichloroethane	0.250	1.00	0.250	1	U
1,1,2-Trichloroethane	0.250	1.00	0.250	1	U
1,1-Dichloroethane	0.125	0.500	0.125	1	U
1,1-Dichloroethene	0.500	2.00	0.500	1	U
1,2-Dichloroethane	0.250	1.00	0.250	1	U
Acetone	2.50	10.0	2.50	1	U
Benzene	0.125	0.500	0.125	1	U
Carbon tetrachloride	0.250	1.00	0.250	1	U
Chloroform	0.125	0.500	0.125	1	U
Ethylbenzene	0.250	1.00	0.250	1	U
Methylene chloride	0.250	1.00	0.250	1	U
m,p-Xylene	0.500	2.00	0.500	1	U
o-Xylene	0.250	1.00	0.250	1	U
Styrene	0.125	0.500	0.125	1	U
Tetrachloroethene	0.250	1.00	0.250	1	U
Trichloroethene	0.250	1.00	0.250	1	U
Toluene	0.250	1.00	0.250	1	U
Vinyl chloride	0.250	1.00	0.250	1	U

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	101	70 - 120	PASS
4-Bromofluorobenzene	103	75 - 120	PASS
Dibromofluoromethane	103	85 - 115	PASS
Toluene-d8	102	85 - 120	PASS

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5241494
 12-APR-2017 11:17



Login Number: L17040221 Analyst: TMB Prep Method: 5030B/5030C/503
 Instrument ID: HPMS6 Matrix: Water Method: 8260B
 Workgroup (AAB#): WG609502 Units: ug/L
 QC Key: DOD4 Lot #: STD81257

Sample ID: WG609502-02 LCS File ID: 6M146310 Run Date: 04/10/2017 13:23
 Sample ID: WG609502-03 LCS2 File ID: 6M146311 Run Date: 04/10/2017 13:54

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
1,1,1-Trichloroethane	20.0	20.4	102	20.0	20.5	102	0.417	65 - 130	30	
1,1,2-Trichloroethane	20.0	18.4	92.1	20.0	18.9	94.3	2.37	75 - 125	30	
1,1-Dichloroethane	20.0	19.9	99.4	20.0	20.2	101	1.63	70 - 135	30	
1,1-Dichloroethene	20.0	20.0	100	20.0	20.3	102	1.61	70 - 130	30	
1,2-Dichloroethane	20.0	19.3	96.3	20.0	19.4	97.0	0.734	70 - 130	30	
Acetone	20.0	19.1	95.5	20.0	19.4	97.1	1.69	40 - 140	30	
Benzene	20.0	18.8	94.0	20.0	19.2	95.8	1.89	80 - 120	30	
Carbon tetrachloride	20.0	21.0	105	20.0	21.3	106	1.32	65 - 140	30	
Chloroform	20.0	18.3	91.7	20.0	18.9	94.5	3.05	65 - 135	30	
Ethylbenzene	20.0	18.3	91.3	20.0	18.6	93.0	1.83	75 - 125	30	
m,p-Xylene	40.0	36.7	91.6	40.0	37.8	94.5	3.06	75 - 130	30	
Methylene chloride	20.0	19.3	96.3	20.0	19.7	98.5	2.22	55 - 140	30	
o-Xylene	20.0	18.8	93.9	20.0	19.3	96.7	3.00	80 - 120	30	
Styrene	20.0	18.8	94.2	20.0	19.4	96.8	2.68	65 - 135	30	
Tetrachloroethene	20.0	19.3	96.6	20.0	20.0	100	3.53	45 - 150	30	
Toluene	20.0	18.3	91.5	20.0	18.7	93.7	2.40	75 - 120	30	
Trichloroethene	20.0	18.9	94.3	20.0	19.1	95.6	1.39	70 - 125	30	
Vinyl chloride	20.0	23.0	115	20.0	22.4	112	2.51	50 - 145	30	

Surogates	LCS	LCS2	Surrogate Limits	Qualifier
	% Recovery	% Recovery		
1,2-Dichloroethane-d4	100	100	70 - 120	PASS
Dibromofluoromethane	105	106	85 - 115	PASS
4-Bromofluorobenzene	97.3	98.7	75 - 120	PASS
Toluene-d8	100	101	85 - 120	PASS

* EXCEEDS %REC LIMIT
 # EXCEEDS RPD LIMIT



BFB

Login Number: L17040221 Tune ID: WG598323-01
 Instrument: HPMS6 Run Date: 01/12/2017
 Analyst: TMB Run Time: 08:36
 Workgroup: WG598323 File ID: 6M144707
 Cal ID: HPMS6-12-JAN-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	19.2	7923	PASS
75.0	95.0	30.0	60.0	54.8	22651	PASS
95.0	95.0	100	100	100	41304	PASS
96.0	95.0	5.00	9.00	7.28	3007	PASS
173	174	0	2.00	0.352	116	PASS
174	95.0	50.0	100	79.8	32963	PASS
175	174	5.00	9.00	8.22	2709	PASS
176	174	95.0	101	97.3	32071	PASS
177	176	5.00	9.00	6.69	2147	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG598323-02	STD	01	01/12/2017 09:02	
WG598323-03	STD	01	01/12/2017 09:37	
WG598323-04	STD	01	01/12/2017 10:10	
WG598323-05	STD-CCV	01	01/12/2017 10:42	
WG598323-06	STD	01	01/12/2017 11:14	
WG598323-07	STD	01	01/12/2017 11:47	
WG598323-08	STD	01	01/12/2017 12:19	
WG598323-09	STD	01	01/12/2017 12:52	
WG598323-10	SSCV	01	01/12/2017 13:56	

* Sample past 12 hour tune limit



BFB

Login Number: L17040221 Tune ID: WG608938-01
 Instrument: HPMS6 Run Date: 04/05/2017
 Analyst: TMB Run Time: 16:29
 Workgroup: WG608938 File ID: 6M146221
 Cal ID: HPMS6-05-APR-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	17.3	4043	PASS
75.0	95.0	30.0	60.0	46.5	10875	PASS
95.0	95.0	100	100	100	23389	PASS
96.0	95.0	5.00	9.00	7.16	1674	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	76.5	17883	PASS
175	174	5.00	9.00	7.58	1356	PASS
176	174	95.0	101	96.1	17186	PASS
177	176	5.00	9.00	7.35	1263	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG608938-02	STD	01	04/05/2017 17:25	
WG608938-03	STD	01	04/05/2017 17:57	
WG608938-04	STD	01	04/05/2017 18:28	
WG608938-05	STD	01	04/05/2017 19:00	
WG608938-06	STD	01	04/05/2017 19:31	
WG608938-07	STD	01	04/05/2017 20:02	
WG608938-08	STD-CCV	01	04/05/2017 20:34	
WG608938-09	STD	01	04/05/2017 21:06	
WG608938-10	STD	01	04/05/2017 21:37	
WG608938-11	STD	01	04/05/2017 22:09	

* Sample past 12 hour tune limit



BFB

Login Number: L17040221 Tune ID: WG609128-01
 Instrument: HPMS6 Run Date: 04/06/2017
 Analyst: TMB Run Time: 13:59
 Workgroup: WG609128 File ID: 6M146236
 Cal ID: HPMS6-05-APR-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	17.6	6056	PASS
75.0	95.0	30.0	60.0	47.8	16465	PASS
95.0	95.0	100	100	100	34464	PASS
96.0	95.0	5.00	9.00	7.14	2460	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	76.9	26498	PASS
175	174	5.00	9.00	7.37	1953	PASS
176	174	95.0	101	98.9	26205	PASS
177	176	5.00	9.00	6.88	1804	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG608938-12	SSCV	01	04/06/2017 15:57	

* Sample past 12 hour tune limit



BFB

Login Number: L17040221 Tune ID: WG609500-01
 Instrument: HPMS6 Run Date: 04/10/2017
 Analyst: TMB Run Time: 11:26
 Workgroup: WG609500 File ID: 6M146306
 Cal ID: HPMS6-05-APR-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	17.4	5116	PASS
75.0	95.0	30.0	60.0	47.1	13850	PASS
95.0	95.0	100	100	100	29426	PASS
96.0	95.0	5.00	9.00	6.49	1909	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	83.2	24480	PASS
175	174	5.00	9.00	7.52	1840	PASS
176	174	95.0	101	99.2	24288	PASS
177	176	5.00	9.00	6.76	1642	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG609500-02	CCV	01	04/10/2017 11:52	
WG609502-01	BLANK	01	04/10/2017 12:52	
WG609502-02	LCS	01	04/10/2017 13:23	
WG609502-03	LCS2	01	04/10/2017 13:54	
L17040221-02	TRIP BLANK	01	04/10/2017 17:59	
L17040221-01	LH18/24-SP650-6429	01	04/10/2017 18:29	

* Sample past 12 hour tune limit



Calibration Table Report
 Method: A9FOOWT.M
 Title: A9-FOO Water - IC: 011217 - HPMS6
 Last Calibration: Thu Jan 12 13:53:06 2017
 Curve: WG598323
 Calibration Files

Compound	5 20 50 100 200 300 400 500									Avg	%RSD
	6M144708.D	6M144709.D	6M144710.D	6M144711.D	6M144712.D	6M144713.D	6M144714.D	6M144715.D			
I Fluorobenzene	ISTD										
T Acetonitrile	0.021	0.019	0.018	0.017	0.018	0.016	0.017	0.017	0.018	8.729	
T 3-Chloro-1-propene	0.301	0.305	0.307	0.308	0.306	0.295	0.287	0.289	0.300	2.763	
T 2-Chloro-1,3-butadiene	0.348	0.368	0.380	0.385	0.382	0.371	0.361	0.364	0.370	3.335	
T Ethyl Acetate	0.144	0.163	0.169	0.166	0.171	0.152	0.159	0.159	0.160	5.700	
T Methacrylonitrile	0.076	0.087	0.089	0.088	0.089	0.080	0.083	0.083	0.084	5.535	
T Isobutyl Alcohol	0.004	0.006	0.006	0.005	0.005	0.004	0.005	0.006	0.005	13.176	
T 1-Butanol									0.000	0.000	
T Methyl methacrylate	0.146	0.173	0.185	0.185	0.188	0.171	0.177	0.178	0.175	7.640	
T 2-Nitropropane		0.063	0.071	0.071	0.076	0.070	0.075	0.074	0.071	6.228	
I Chlorobenzene-d5	ISTD										
I 1,4-Dichlorobenzene-d4	ISTD										
T Cyclohexanone		0.008	0.009	0.008	0.010	0.009	0.011	0.012	0.009	14.808	

Fri Jan 13 10:37:15 2017

Calibration Table Report
 Method: 8260BWT.M
 Title: 8260B/624_WATER SOP:MSV01 04-05-17 - HPMS6
 Last Calibration: Thu Apr 06 09:55:03 2017
 Curve: WG608938
 Calibration Files

		0.3	0.4	1	2	5	20	50	100	200	300					
		6M146223.D	6M146224.D	6M146225.D	6M146226.D	6M146227.D	6M146228.D	6M146229.D	6M146230.D	6M146231.D	6M146232.D					
Compound		Avg										%RSD	Linear	Quad		
I	Fluorobenzene	ISTD														
T	Dichlorodifluoromethane															
P	Chloromethane			0.381	0.345	0.365	0.434	0.430	0.411	0.412			0.397	8.516		
C	Vinyl Chloride	0.564	0.506	0.438	0.420	0.464	0.451	0.364	0.420				0.547	18.885	0.999	
T	1,3-Butadiene					0.220	0.212	0.176	0.135	0.148	0.118	0.168	24.710			0.990
T	Bromomethane			0.176	0.159	0.179	0.196	0.221	0.211	0.228			0.196	13.055		
T	Chloroethane			0.192	0.183	0.199	0.207	0.203	0.189	0.193			0.195	4.273		
T	Trichlorofluoromethane	0.432	0.460	0.431	0.458	0.479	0.482	0.482	0.492				0.465	5.013		
T	Diethyl ether			0.191	0.192	0.193	0.189	0.192	0.197		0.202	0.194	2.274			
T	Isoprene					0.366	0.355	0.386	0.387	0.385		0.414	0.382	5.221		
T	Acrolein				0.021	0.021	0.020	0.021	0.023		0.021	0.021	4.175			
T	1,1,2-Trichloro-1,2,2-Trifluoroet	0.269	0.247	0.261	0.264	0.264	0.265	0.271				0.263	2.932			
T	Acetone					0.057	0.058	0.055	0.053	0.056	0.045	0.054	8.929			
C	1,1-Dichloroethene	0.380	0.369	0.368	0.387	0.390	0.386	0.377	0.392				0.381	2.398		
T	Tert-Butyl Alcohol				0.017	0.018	0.016	0.014	0.018		0.017	0.017	8.130			
T	Dimethyl Sulfide				0.267	0.261	0.276	0.270	0.280	0.281	0.272	2.955				
T	Iodomethane	0.108	0.126	0.150	0.197	0.214	0.251	0.224	0.221	0.186	27.720				0.997	
T	Methyl acetate				0.129	0.125	0.134	0.140	0.141	0.143	0.135	5.216				
T	Methylene Chloride			0.311	0.287	0.287	0.286	0.285	0.274	0.287		0.288	3.813			
T	Carbon Disulfide			0.835	0.817	0.814	0.779	0.841	0.818	0.842	0.816	0.820	2.481			
T	Acrylonitrile			0.058	0.059	0.063	0.063	0.066	0.067		0.060	0.063	5.597			
T	Methyl Tert Butyl Ether			0.650	0.621	0.661	0.659	0.631	0.620	0.582		0.632	4.438			
T	trans-1,2-Dichloroethene	0.269	0.274	0.273	0.272	0.276	0.276	0.271	0.283			0.274	1.519			
T	n-Hexane				0.313	0.290	0.312	0.311	0.316	0.319	0.310	3.309				
T	Diisopropyl ether	0.719	0.724	0.709	0.699	0.699	0.694	0.699			0.699	0.706	1.627			
T	Vinyl Acetate				0.192	0.169	0.166	0.232	0.223	0.194	0.196	13.694				
P	1,1-Dichloroethane	0.460	0.450	0.445	0.457	0.465	0.452	0.444	0.462			0.454	1.740			
T	Ethyl-Tert-Butyl ether		0.716	0.722	0.718	0.705	0.702	0.724			0.720	0.715	1.185			
T	2-Butanone				0.068	0.068	0.066	0.071	0.069	0.067	0.068	2.393				
T	Propionitrile	0.020	0.022	0.023	0.022	0.023	0.023	0.023			0.023	0.022	5.579			
T	2,2-Dichloropropane	0.387	0.403	0.350	0.359	0.297	0.277	0.350	0.342			0.346	12.129			
T	cis-1,2-Dichloroethene	0.303	0.299	0.296	0.301	0.302	0.301	0.298	0.312			0.302	1.628			
C	Chloroform	0.658	0.590	0.542	0.485	0.482	0.482	0.476	0.463	0.481		0.518	12.803			
T	1-Bromopropane			0.041	0.052	0.052	0.056	0.057	0.058	0.053	0.060	0.053	11.075			
T	Bromochloromethane	0.132	0.144	0.150	0.165	0.170	0.168	0.171	0.170			0.159	9.183			
T	Tetrahydrofuran			0.050	0.044	0.045	0.043	0.043	0.045		0.043	0.045	5.367			
S	Dibromofluoromethane			0.245	0.236	0.256	0.262	0.259	0.257	0.262	0.265	0.255	3.868			
T	1,1,1-Trichloroethane	0.405	0.424	0.407	0.410	0.424	0.424	0.425	0.447			0.421	3.239			
T	Cyclohexane			0.387	0.368	0.384	0.366	0.397	0.394	0.411	0.406	0.389	4.204			
T	1,1-Dichloropropene			0.357	0.349	0.355	0.358	0.357	0.352	0.362		0.356	1.233			
T	Tert-Amyl-Methyl ether			0.684	0.674	0.681	0.663	0.669	0.698		0.685	0.679	1.728			
T	Carbon Tetrachloride			0.282	0.274	0.323	0.351	0.366	0.377	0.35		0.33183	12.2386			
S	1,2-Dichloroethane-d4			0.244	0.246	0.257	0.253	0.252	0.254	0.254	0.254	0.25153	1.86029			
T	Heptane											0	0			
T	1,2-Dichloroethane	0.327	0.326	0.306	0.328	0.323	0.321	0.32	0.325			0.32202	2.174			
T	Benzene	1.21	1.101	1.077	1.063	1.054	1.025	1.007	1.019			1.06965	6.04095			
T	Trichloroethene	0.288	0.284	0.274	0.29	0.299	0.302	0.292	0.3			0.29115	3.19828			
T	Methylcyclohexane				0.413	0.393	0.422	0.423	0.432	0.44	0.42065	3.83804				
C	1,2-Dichloropropane	0.232	0.251	0.254	0.257	0.263	0.256	0.249	0.258			0.25244	3.71187			
T	1,4-Dioxane				0.002	0.002	0.002	0.002		0.002	0.00184	6.16966				
T	Bromodichloromethane	0.334	0.34	0.341	0.358	0.37	0.369	0.364	0.376			0.35636	4.47459			
T	Dibromomethane	0.122	0.155	0.145	0.155	0.154	0.153	0.153	0.153			0.14868	7.44253			
T	2-Chloroethyl Vinyl Ether			0.076	0.1	0.106	0.106	0.109	0.088	0.107	0.09902	12.5245				
T	4-Methyl-2-Pentanone				0.063	0.064	0.064	0.068	0.065	0.065	0.06495	2.52742				
T	cis-1,3-Dichloropropene	0.346	0.382	0.37	0.401	0.412	0.407	0.409	0.413			0.39243	6.25845			
T	Dimethyl Disulfide				0.227	0.225	0.247	0.252	0.264	0.27	0.24758	7.53484				
I	Chlorobenzene-d5	ISTD														
S	Toluene-d8			1.282	1.288	1.306	1.276	1.265	1.243	1.262	1.283	1.27569	1.48449			
C	Toluene	1.652	1.626	1.556	1.57	1.551	1.537	1.51	1.503			1.56301	3.34424			
T	Ethyl Methacrylate			0.354	0.349	0.379	0.362	0.386	0.4	0.394	0.402	0.37824	5.56152			
T	Paraldehyde											0	0			
T	trans-1,3-Dichloropropene			0.466	0.427	0.489	0.494	0.497	0.503	0.498		0.48194	5.63896			
T	1,1,2-Trichloroethane	0.273	0.296	0.289	0.303	0.3	0.298	0.298	0.3			0.29455	3.27325			
T	2-Hexanone				0.142	0.14	0.14	0.146	0.139	0.141	0.14144	1.87214				
T	1,3-Dichloropropane	0.484	0.508	0.475	0.504	0.5	0.497	0.495	0.494			0.49443	2.17868			
T	Tetrachloroethene	0.355	0.38	0.375	0.383	0.381	0.385	0.382	0.389			0.37875	2.7685			
T	Dibromochloromethane	0.322	0.345	0.344	0.362	0.378	0.381	0.388	0.394			0.36412	6.97018			
T	1,2-Dibromoethane	0.284	0.282	0.277	0.28	0.281	0.286	0.29	0.283			0.28283	1.39806			
T	1-Chlorohexane	0.501	0.501	0.486	0.499	0.469	0.513	0.509	0.521	0.544	0.50473	4.18396				
P	Chlorobenzene	1.095	1.077	1.019	1.044	1.045	1.064	1.071	1.141			1.06977	3.47515			
T	1,1,1,2-Tetrachloroethane	0.348	0.357	0.345	0.371	0.385	0.4	0.413	0.446			0.3831	9.19348			
C	Ethylbenzene	0.6	0.536	0.538	0.559	0.564	0.581	0.595	0.659			0.57912	6.92495			
T	m-,p-Xylene	0.711	0.677	0.667	0.681	0.673	0.697	0.701	0.731			0.69221	3.13862			
T	o-Xylene			0.671	0.642	0.655	0.669	0.678	0.657	0.704		0.66797	2.95161			
T	Styrene	1.073	1.059	1.076	1.12	1.133	1.168	1.147	1.192			1.12136	4.31921			
P	Bromoform		0.2	0.2	0.214	0.226	0.238	0.239	0.237			0.22189	7.90635			
T	Isopropylbenzene	1.776	1.697	1.623	1.674	1.668	1.699	1.625	1.612			1.67159	3.22323			
I	1,4-Dichlor															

T	1,2,3-Trichloropropane		0.195	0.177	0.197	0.197	0.19	0.193	0.197		0.19228	3.72212	
T	trans-1,4-Dichloro-2-Butene		0.124	0.117	0.135	0.132	0.142	0.151	0.15	0.155	0.13826	10.0162	
T	n-Propylbenzene	4.071	3.929	3.827	3.847	3.789	3.738	3.585	3.496		3.78518	4.83282	
T	Bromobenzene	0.861	0.852	0.867	0.84	0.843	0.856	0.84	0.822	0.872	0.85035	1.84632	
T	1,3,5-Trimethylbenzene		2.773	2.744	2.708	2.654	2.661	2.647	2.591	2.682	2.68251	2.16658	
T	2-Chlorotoluene		2.733	2.689	2.575	2.498	2.579	2.388	2.346	2.355	2.52034	5.92259	
T	4-Chlorotoluene		2.395	2.337	2.248	2.223	2.051	2.189	2.093	2.284	2.22752	5.21159	
T	a-Methylstyrene					1.445	1.366	1.463	1.473	1.542	1.611	1.48341	5.66686
T	tert-Butylbenzene		0.551	0.564	0.544	0.568	0.565	0.555	0.589		0.56208	2.558	
T	1,2,4-Trimethylbenzene		2.798	2.729	2.745	2.76	2.745	2.714	2.793		2.75494	1.13121	
T	sec-Butylbenzene		3.56	3.327	3.322	3.297	3.276	3.197	3.178		3.30805	3.79322	
T	p-Isopropyltoluene			2.879	2.746	2.749	2.779	2.779	2.76	2.787	2.78269	1.6223	
T	1,3-Dichlorobenzene	1.745	1.595	1.607	1.558	1.601	1.574	1.559	1.608		1.60589	3.7263	
T	1,4-Dichlorobenzene	1.858	1.642	1.613	1.574	1.578	1.594	1.578	1.564	1.615	1.62397	5.60487	
T	n-Butylbenzene			2.643	2.479	2.524	2.512	2.536	2.56	2.533	2.54099	2.02916	
T	1,2-Dichlorobenzene	1.566	1.589	1.537	1.453	1.471	1.497	1.472	1.477	1.484	1.50524	3.15458	
T	1,2-Dibromo-3-Chloropropane				0.103	0.12	0.121	0.119	0.128	0.117	0.11794	7.07341	
T	1,2,4-Trichlorobenzene		1.219	1.11	1.06	1.059	1.082	1.083	1.092	1.105	1.10135	4.63701	
T	Hexachlorobutadiene		0.476	0.446	0.394	0.418	0.403	0.409	0.409	0.41	0.42065	6.42356	
T	Naphthalene		2.283	2.179	2.049	2.212	2.236	2.219	2.289	2.175	2.20527	3.4468	
T	1,2,3-Trichlorobenzene	1.267	1.197	1.116	1.005	0.999	0.994	0.992	1.004	0.995	1.06323	9.83782	

Thu Apr 06 14:39:00 2017

Login Number: L17040221 Run Date: 01/12/2017 Sample ID: WG598323-10
Instrument ID: HPMS6 Run Time: 13:56 Method: 8260B
File ID: 6M144717 Analyst: TMB QC Key: DOD4
ICal Workgroup: WG598323 Cal ID: HPMS6 - 12-JAN-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
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* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds



Login Number: L17040221 Run Date: 04/06/2017 Sample ID: WG608938-12
 Instrument ID: HPMS6 Run Time: 15:57 Method: 8260B
 File ID: 6M146240 Analyst: TMB QC Key: DOD4
 ICal Workgroup: WG608938 Cal ID: HPMS6 - 05-APR-17

Analyte		Expected	Found	Units	RF	%D	UCL	Q
1,1-Dichloroethene	CCC	20.0	20.0	ug/L	0.381	0.100	20	
Chloroform	CCC	20.0	18.5	ug/L	0.479	7.50	20	
Ethylbenzene	CCC	20.0	18.6	ug/L	0.538	7.10	20	
Toluene	CCC	20.0	18.5	ug/L	1.45	7.30	20	
Vinyl Chloride	CCC	20.0	22.0	ug/L	0.499	10.0	20	
1,1,2,2-Tetrachloroethane	SPCC	20.0	19.6	ug/L	0.638	2.00	20	
Chloromethane	SPCC	20.0	22.5	ug/L	0.529	12.3	20	
Bromoform	SPCC	20.0	18.7	ug/L	0.208	6.30	20	
Chlorobenzene	SPCC	20.0	18.3	ug/L	0.981	8.30	20	
1,1-Dichloroethane	SPCC	20.0	19.7	ug/L	0.448	1.50	20	
1,1,1-Trichloroethane		20.0	20.1	ug/L	0.423	0.600	20	
1,1,2-Trichloroethane		20.0	18.9	ug/L	0.278	5.50	20	
1,2-Dichloroethane		20.0	19.5	ug/L	0.314	2.60	20	
Acetone		20.0	19.0	ug/L	0.0513	4.90	20	
Benzene		20.0	18.8	ug/L	1.01	5.90	20	
Carbon Tetrachloride		20.0	20.6	ug/L	0.342	3.10	20	
Methylene Chloride		20.0	19.4	ug/L	0.280	3.00	20	
m-,p-Xylene		40.0	37.4	ug/L	0.646	6.60	20	
o-Xylene		20.0	18.9	ug/L	0.631	5.50	20	
Styrene		20.0	19.3	ug/L	1.08	3.50	20	
Tetrachloroethene		20.0	19.4	ug/L	0.367	3.00	20	
Trichloroethene		20.0	18.6	ug/L	0.271	6.80	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17040221 Run Date: 04/10/2017 Sample ID: WG609500-02
 Instrument ID: HPMS6 Run Time: 11:52 Method: 8260B
 File ID: 6M146307 Analyst: TMB QC Key: DOD4
 Workgroup (AAB#): WG609502 Cal ID: HPMS6 - 05-APR-17
 Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
1,2-Dichloropropane	CCC	50.0	51.8	ug/L	0.262	3.69	20	
1,1-Dichloroethene	CCC	50.0	53.7	ug/L	0.409	7.37	20	
Chloroform	CCC	50.0	47.5	ug/L	0.492	4.91	20	
Ethylbenzene	CCC	50.0	49.8	ug/L	0.577	0.437	20	
Toluene	CCC	50.0	48.4	ug/L	1.51	3.14	20	
Vinyl Chloride	CCC	50.0	50.6	ug/L	0.459	1.28	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	47.8	ug/L	0.622	4.46	20	
Bromoform	SPCC	50.0	50.7	ug/L	0.225	1.39	20	
Chlorobenzene	SPCC	50.0	48.8	ug/L	1.04	2.47	20	
Chloromethane	SPCC	50.0	48.4	ug/L	0.448	3.20	20	
1,1-Dichloroethane	SPCC	50.0	52.3	ug/L	0.475	4.54	20	
Xylenes		150	149	ug/L	0.677	0.602	20	
1,1,1-Trichloroethane		50.0	51.9	ug/L	0.437	3.81	20	
1,1,2-Trichloroethane		50.0	48.1	ug/L	0.283	3.83	20	
1,2-Dichloroethane		50.0	50.8	ug/L	0.327	1.55	20	
Acetone		50.0	52.5	ug/L	0.0566	4.97	20	
Benzene		50.0	49.1	ug/L	1.05	1.72	20	
Carbon Tetrachloride		50.0	58.7	ug/L	0.389	17.4	20	
Methylene Chloride		50.0	51.3	ug/L	0.296	2.60	20	
m-,p-Xylene		100	99.2	ug/L	0.687	0.768	20	
o-Xylene		50.0	49.9	ug/L	0.666	0.268	20	
Styrene		50.0	51.0	ug/L	1.14	2.06	20	
Tetrachloroethene		50.0	50.4	ug/L	0.382	0.892	20	
Trichloroethene		50.0	49.6	ug/L	0.289	0.721	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

CCV - Modified 03/05/2008

PDF File ID: 5241498

Report generated 04/12/2017 11:18



Login Number: L17040221
Instrument ID: HPMS6
Workgroup (AAB#): WG609502

ICAL CCV Number: WG608938-08
CAL ID: HPMS6-05-APR-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG608938-08	NA	NA	244954	452398	643185
Upper Limit	NA	NA	489908	904796	1286370
Lower Limit	NA	NA	122477	226199	321593
<u>L17040221-01</u>	1.00	01	212485	410650	579578
<u>L17040221-02</u>	1.00	01	201143	389544	544933
WG609502-01	1.00	01	215511	419688	587679
WG609502-02	1.00	01	233664	429581	590457
WG609502-03	1.00	01	233802	429239	592682

IS-1 - 1,4-Dichlorobenzene-d4
IS-2 - Chlorobenzene-d5
IS-3 - Fluorobenzene

Underline = Response outside limits



Microbac Laboratories Inc.
 INTERNAL STANDARD RETENTION TIME SUMMARY
 (COMPARED TO MIDPOINT OF ICAL)

00853271

Login Number: L17040221
 Instrument ID: HPMS6
 Workgroup (AAB#): WG609502

ICAL CCV Number: WG608938-08
 CAL ID: HPMS6-05-APR-17
 Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG608938-08	NA	NA	18.17	15.14	11.26
Upper Limit	NA	NA	18.67	15.64	11.76
Lower Limit	NA	NA	17.67	14.64	10.76
<u>L17040221-01</u>	1.00	01	18.16	15.13	11.25
<u>L17040221-02</u>	1.00	01	18.17	15.13	11.25
WG609502-01	1.00	01	18.17	15.13	11.25
WG609502-02	1.00	01	18.17	15.13	11.25
WG609502-03	1.00	01	18.16	15.13	11.25

IS-1 - 1,4-Dichlorobenzene-d4
 IS-2 - Chlorobenzene-d5
 IS-3 - Fluorobenzene

Underline = Response outside limits



2.2 General Chemistry Data

2.2.1 Method 9056

2.2.1.1 Summary Data

Lab Report #: L17040221

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040221-01	PrePrep Method: N/A	Instrument: IC2
Client ID: LH18/24-SP650-6429	Prep Method: 9056	Prep Date: 04/06/2017 16:49
Matrix: Water	Analytical Method: 9056	Cal Date: 10/12/2016 15:28
Workgroup #: WG609177	Analyst: CAS	Run Date: 04/06/2017 19:42
Collect Date: 04/05/2017 15:00	Dilution: 10	File ID: I2_040617-12
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	1190	J	4.00	2.00	1.00
Sulfate	14808-79-8	64.7		20.0	10.0	5.00
J	Estimated value ; the analyte concentration was greater than the highest standard					

Lab Report #: L17040221

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040221-01	PrePrep Method: N/A	Instrument: IC2
Client ID: LH18/24-SP650-6429	Prep Method: 9056	Prep Date: 04/06/2017 16:49
Matrix: Water	Analytical Method: 9056	Cal Date: 10/12/2016 15:28
Workgroup #: WG609177	Analyst: CAS	Run Date: 04/06/2017 20:01
Collect Date: 04/05/2017 15:00	Dilution: 100	File ID: I2_040617-13
Sample Tag: DL02	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	1780		40.0	20.0	10.0
J	Estimated value ; the analyte concentration was less than the LOQ.					

2.2.1.2 QC Summary Data

The concentrations (ppm) of the calibration standards and the resulting area counts are used to determine the equation of a linear or quadratic plot.

The slope and y-intercept of that line are used to calculate the quantity of the analyzed unknown samples.

Amount(ppm) = [(slope)(area count of unknown) + y-intercept](dilution)

(The slope is the amt/area also identified as the CF or calibration factor)

Microbac Laboratories Inc.
Instrument Run Log

Instrument: IC2 Dataset: 101216 IC2 ICAL.SEQ
 Analyst1: CAS Analyst2: JWR
 Method: IC01 SOP: 300/9056 Rev: 19

Maintenance Log ID: _____ Syringe Filter Lot#: 160109254
 Eluent ID#: RGT38178

Workgroups: Column 1 ID: AG14A-4MM Column 2 ID: AS14A-4MM
 Analytical WGs 587194 (LOD/LOQ Waters), 587087 (LOD/LOQ Soils)
 Internal STD: NA Surrogate STD: NA Calibration STD STD77046 (10/12/2016)
 CCV STD: STD77046 LCS STD: STD77045 MS/MSD STD: NA

Comments: ICAL WG587294 : Alternate Source STD77045
 Guard Column : Ionpac AG14A (4x50mm)
 Dionex S/N 012640
 Analytical Column : Ionpac AS14A (4x250mm)
 Dionex S/N 010066
 Cond Suppressor : AERS 500 (4mm)
 Dionex S/N 140122040
 System backpressure = 1666psi

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	I2_101216-01	ELUENT	1	1		10/12/16 13:14
2	I2_101216-02	DI WATER	1	1		10/12/16 13:33
3	I2_101216-03	WG587294-01 STD	1	1	STD77046	10/12/16 13:52
4	I2_101216-04	WG587294-02 STD	1	1	STD77046	10/12/16 14:12
5	I2_101216-05	WG587294-03 STD	1	1	STD77046	10/12/16 14:31
6	I2_101216-06	WG587294-04 STD	1	1	STD77046	10/12/16 14:50
7	I2_101216-07	WG587294-05 STD	1	1	STD77046	10/12/16 15:09
8	I2_101216-08	WG587294-06 STD	1	1	STD77046	10/12/16 15:28
9	I2_101216-09	WG587294-07 SSCV	1	1	STD77045	10/12/16 15:48
10	I2_101216-10	LCRV @Level-6	1	1	STD77045	10/12/16 16:14
11	I2_101216-11	LCRV @Level-4	1	1	STD77045	10/12/16 16:34
12	I2_101216-12	LCRV @Level-2	1	1	STD77045	10/12/16 16:53
13	I2_101216-13	LCRV @Level-0	1	1		10/12/16 17:12
14	I2_101216-14	WG587303-01 ANION CCV	1	1	STD77046	10/12/16 17:31
15	I2_101216-15	WG587303-02 ANION CCB	1	1		10/12/16 17:51
16	I2_101216-16	WG587194-01 ANION BLANK	1	1		10/12/16 18:10
17	I2_101216-17	WG587194-02 ANION LCS	1	1	STD77045	10/12/16 18:29
18	I2_101216-18	WG587194-03 ANION LCS2	1	1	STD77045	10/12/16 18:48
19	I2_101216-19	L16100002-01 LOD (F,CL,BR,SO4)	1	1	STD77045	10/12/16 19:07
20	I2_101216-20	L16100002-01 LOD (NO2,NO3)	1	1	STD77045	10/12/16 19:27
21	I2_101216-21	L16100004-01 LOQ (F,CL,BR,SO4)	1	1	STD77045	10/12/16 19:46
22	I2_101216-22	L16100004-01 LOQ (NO2,NO3)	1	1	STD77045	10/12/16 20:05
23	I2_101216-23	L16100004-09 LOQ (F,CL,BR,SO4)	1	1	STD77045	10/12/16 20:24
24	I2_101216-24	L16100004-09 LOQ (NO2,NO3)	1	1	STD77045	10/12/16 20:43
25	I2_101216-25	WG587303-03 ANION CCV	1	1	STD77046	10/12/16 21:03
26	I2_101216-26	WG587303-04 ANION CCB	1	1		10/12/16 21:22
27	I2_101216-27	WG587087-01 ANION BLANK-SOIL	7	1		10/12/16 21:41
28	I2_101216-28	WG587087-02 ANION LCS-SOIL	7	1	STD77045	10/12/16 22:00
29	I2_101216-29	WG587087-03 ANION LCS2-SOIL	7	1	STD77045	10/12/16 22:20
30	I2_101216-30	L16100003-01 LOD (F,CL,BR,SO4)	7	1	STD77045	10/12/16 22:39

Page: 1

Approved: 14-OCT-16




Microbac Laboratories Inc.
Instrument Run Log

Instrument: IC2 Dataset: 101216 IC2 ICAL.SEQ
 Analyst1: CAS Analyst2: JWR
 Method: IC01 SOP: 300/9056 Rev: 19

Maintenance Log ID: _____ Syringe Filter Lot#: 160109254
 Eluent ID#: RGT38178

Workgroups: Column 1 ID: AG14A-4MM Column 2 ID: AS14A-4MM
 Analytical WGs 587194 (LOD/LOQ Waters), 587087 (LOD/LOQ Soils)
 Internal STD: NA Surrogate STD: NA STD77046 (10/12/2016)
 CCV STD: STD77046 LCS STD: STD77045 NA

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
31	I2_101216-31	L16100003-01 LOD (NO2,NO3)	7	1	STD77045	10/12/16 22:58
32	I2_101216-32	L16100005-01 LOQ (F,CL,BR,SO4)	7	1	STD77045	10/12/16 23:17
33	I2_101216-33	L16100005-01 LOQ (NO2,NO3)	7	1	STD77045	10/12/16 23:36
34	I2_101216-34	L16100005-10 LOQ (F,CL,BR,SO4)	7	1	STD77045	10/12/16 23:56
35	I2_101216-35	L16100005-10 LOQ (NO2,NO3)	7	1	STD77045	10/13/16 00:15
36	I2_101216-36	WG587303-05 ANION CCV	1	1	STD77046	10/13/16 00:34
37	I2_101216-37	WG587303-06 ANION CCB	1	1		10/13/16 00:53
38	I2_101216-38	END	1	1		10/13/16 01:12

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Eri C. J. J. J.



Microbac Laboratories Inc.
Instrument Run Log

Instrument: IC2 Dataset: 040617 IC2.SEQ
 Analyst1: CAS Analyst2: NA
 Method: 300/9056 SOP: IC01 Rev: 19

Maintenance Log ID: _____ Syringe Filter Lot#: 160804254
 Eluent ID#: RGT39779

Workgroups: Column 1 ID: AG14A-4MM Column 2 ID: AS14A-4MM
 Analytical WG609177 (Waters)
 Internal STD: NA Surrogate STD: NA Calibration STD STD77046 (10/12/2016)
 CCV STD: STD77046 LCS STD: STD79166 MS/MSD STD: STD79166

Comments: System Backpressure: 1771 psi

Sample L17040213-01 was analyzed at a dilution only due to its pre-run screen result for chloride, which was greater than the calibration maximum.

Sample L17040221-01 was analyzed at dilutions only due to its pre-run screen result for chloride, which was greater than 200 ppm

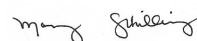
Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	I2_040617-01	ELUENT	1	1		04/06/17 16:10
2	I2_040617-02	DI WATER	1	1		04/06/17 16:30
3	I2_040617-03	WG609181-01 ANION CCV	1	1	STD77046	04/06/17 16:49
4	I2_040617-04	WG609181-02 ANION CCB	1	1		04/06/17 17:08
5	I2_040617-05	WG609177-01 ANION BLANK	1	1		04/06/17 17:27
6	I2_040617-06	WG609177-02 ANION LCS	1	1	STD79166	04/06/17 17:46
7	I2_040617-07	L17040209-03 (F,NO2,NO3) REF	1	1		04/06/17 18:06
8	I2_040617-08	WG609177-04 DUP 0209-03	2	1		04/06/17 18:25
9	I2_040617-09	WG609177-05 MS 0209-03	2	1	STD79166	04/06/17 18:44
10	I2_040617-10	WG609177-06 MSD 0209-03	2	1	STD79166	04/06/17 19:03
11	I2_040617-11	L17040213-01 (CL) 400x	2	400		04/06/17 19:23
12	I2_040617-12	L17040221-01 (CL,SO4) 10x	1	10		04/06/17 19:42
13	I2_040617-13	L17040221-01 RR CL 100x	1	100		04/06/17 20:01
14	I2_040617-14	WG609181-03 ANION CCV	1	1	STD77046	04/06/17 20:20
15	I2_040617-15	WG609181-04 ANION CCB	1	1		04/06/17 20:40
16	I2_040617-16	END	1	1		04/07/17 09:44

Comments

Seq.	Rerun	Dil.	Reason	Analytes

Page: 1

Approved: 07-APR-17




Microbac Laboratories Inc.

Data Checklist


Date: 12-OCT-2016
 Analyst: CAS
 Analyst: JWR
 Method: 300/9056
 Instrument: IC2
 Curve Workgroup: WG587294
 Runlog ID: 78045
 Analytical Workgroups: L16100002, L16100004, L16100003, L16100005

ANALYTICAL	
System Performance Check	X
DFTPP (MS)	NA
Endrin/DDT breakdown (8081/MS)	NA
Pentachlorophenol/benzidine tailing (MS)	NA
Eluent check (IC)/system pressure (HPLC)	1666PSI
Window standard (FID)	NA
Initial Calibration	X
Average RF	NA
Linear regression or higher order curve	X
Alternate source standard (ICV) % Difference	X
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (MS)	NA
Continuing calibration blank (CCB) (IC)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	NA
Recoveries	NA
%RPD	NA
Samples	INTERNAL QC ONLY
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	NA
Surrogate recoveries	NA
Internal standard areas (MS)	NA
Library searches (MS)	NA
Calculations & correct factors	X
Compounds above calibration range	NA
Reruns	0005-01 (SO4) NEEDED
Manual integrations	X
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	NA
Check for completeness	X
Primary Reviewer	CAS
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	ECL

Primary Reviewer:
13-OCT-2016



Secondary Reviewer:
14-OCT-2016




Microbac Laboratories Inc.

Data Checklist

Date: 06-APR-2017
 Analyst: CAS
 Analyst: NA
 Method: 300/9056
 Instrument: IC2
 Curve Workgroup: NA
 Runlog ID: 81413
 Analytical Workgroups: L17040209,0213,0221

ANALYTICAL	
System Performance Check	X
DFTPP (MS)	NA
Endrin/DDT breakdown (8081/MS)	NA
Pentachlorophenol/benzidine tailing (MS)	NA
Eluent check (IC)/system pressure (HPLC)	1771 PSI
Window standard (FID)	NA
Initial Calibration	NA
Average RF	NA
Linear regression or higher order curve	NA
Alternate source standard (ICV) % Difference	NA
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (MS)	NA
Continuing calibration blank (CCB) (IC)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	X
Recoveries	X
%RPD	X
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	NA
Surrogate recoveries	NA
Internal standard areas (MS)	NA
Library searches (MS)	NA
Calculations & correct factors	X
Compounds above calibration range	X
Reruns	X
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	X
Check for completeness	X
Primary Reviewer	CAS
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	MES

Primary Reviewer:
07-APR-2017

CAS

Secondary Reviewer:
07-APR-2017

Mary Schilling

CHECKLIST1 - Modified 03/05/2008

Generated: APR-07-2017 11:06:14



Analytical Method:9056
Login Number:L17040221

AAB#:WG609177

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6429	01	04/05/17					04/06/2017	1.1	2		04/06/17	1.2	2	
LH18/24-SP650-6429	01	04/05/17					04/06/2017	1.1	2		04/06/17	1.2	2	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040221 Work Group: WG609177
 Blank File ID: I2_040617-05 Blank Sample ID: WG609177-01
 Prep Date: 04/06/17 16:49 Instrument ID: IC2
 Analyzed Date: 04/06/17 17:27 Method: 9056
 Analyst: CAS

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG609177-02	I2_040617-06	04/06/17 17:46	01
DUP	WG609177-04	I2_040617-08	04/06/17 18:25	01
LH18/24-SP650-6429	L17040221-01	I2_040617-12	04/06/17 19:42	DL01
LH18/24-SP650-6429	L17040221-01	I2_040617-13	04/06/17 20:01	DL02

Report Name: BLANK_SUMMARY
 PDF File ID: 5234916
 Report generated 04/07/2017 11:19



Login Number: L17040221 Prep Date: 04/06/17 16:49 Sample ID: WG609177-01
 Instrument ID: IC2 Run Date: 04/06/17 17:27 Prep Method: 9056
 File ID: I2_040617-05 Analyst: CAS Method: 9056
 Workgroup (AAB#): WG609177 Matrix: Water Units: mg/L
 Contract #: Cal ID: IC2-12-OCT-16

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Chloride	0.100	0.400	0.100	1	U
Sulfate	0.500	2.00	0.500	1	U

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5234917
 07-APR-2017 11:19



Login Number: L17040221 Run Date: 04/06/2017 Sample ID: WG609177-02
Instrument ID: IC2 Run Time: 17:46 Prep Method: 9056
File ID: I2 040617-06 Analyst: CAS Method: 9056
Workgroup (AAB#): WG609177 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD79166 Cal ID: IC2-12-OCT-16

Analytes	Expected	Found	% Rec	LCS Limits	Q
Chloride	8.00	8.08	101	90 - 110	
Sulfate	40.0	41.0	102	90 - 110	

LCS - Modified 03/06/2008
PDF File ID: 5234918
Report generated: 04/07/2017 11:20



Login Number: L17040221 Instrument ID: IC2
Analytical Method: 9056 Initial Calibration Date: 12-OCT-16 15:28
ICAL Workgroup: WG587294 Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
Chloride	4.561	9.12		0.99600
Sulfate	6.085	13.1		0.99500

R = Correlation coefficient; 0.995 minimum
R² = Coefficient of determination; 0.99 minimum

INT_CAL - Modified 03/06/2008
PDF File ID: 5235254
Report generated 04/07/2017 11:20



Login Number: L17040221
 Analytical Method: 9056

Instrument ID: IC2
 Initial Calibration Date: 12-OCT-16 15:28
 Column ID: F

Analyte	WG587294-01			WG587294-02			WG587294-03		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Chloride	0.200	0.042000000 0	4.762	1.00	0.200000000	5.000	4.00	0.832000000	4.808
Sulfate	1.00	0.141000000	7.092	5.00	0.742000000	6.739	20.0	3.186000000	6.277

INT_CAL - Modified 03/06/2008
 PDF File ID: 5235254
 Report generated 04/07/2017 11:20



Login Number: L17040221
 Analytical Method: 9056

Instrument ID: IC2
 Initial Calibration Date: 12-OCT-16 15:28
 Column ID: F

Analyte	WG587294-04			WG587294-05			WG587294-06		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Chloride	8.00	1.75500000	4.558	12.0	2.77400000	4.326	24.0	6.13200000	3.914
Sulfate	40.0	6.81300000	5.871	60.0	10.84700000	5.531	120	23.99500000	5.001

INT_CAL - Modified 03/06/2008
 PDF File ID: 5235254
 Report generated 04/07/2017 11:20



Login Number: L17040221 Run Date: 10/12/2016 Sample ID: WG587294-07
 Instrument ID: IC2 Run Time: 15:48 Method: 9056
 File ID: I2 101216-09 Analyst: CAS QC Key: DOD4
 ICal Workgroup: WG587294 Cal ID: IC2 - 12-OCT-16

Analyte	Expected	Found	Units	RF	%D	UCL	Q
Chloride	8.00	8.09	mg/L	4.53	1.20	10	
Sulfate	40.0	40.6	mg/L	5.84	1.40	10	

* Exceeds %D Limit



Login Number: L17040221 Run Date: 04/06/2017 Sample ID: WG609181-02
Instrument ID: IC2 Run Time: 17:08 Method: 9056
File ID: I2 040617-04 Analyst: CAS Units: mg/L
Workgroup (AAB#): WG609177 Cal ID: IC2 - 12-OCT-16
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Chloride	0.100	0.400	0.100	U
Sulfate	0.500	2.00	0.500	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 5234920
Report generated 04/07/2017 11:20



Login Number: L17040221 Run Date: 04/06/2017 Sample ID: WG609181-04
 Instrument ID: IC2 Run Time: 20:40 Method: 9056
 File ID: I2 040617-15 Analyst: CAS Units: mg/L
 Workgroup (AAB#): WG609177 Cal ID: IC2 - 12-OCT-16
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Chloride	0.100	0.400	0.100	U
Sulfate	0.500	2.00	0.500	U

U = Result is less than MDL.
 F = Result is between MDL and RL.
 * = Result is above RL.



Login Number: L17040221 Run Date: 04/06/2017 Sample ID: WG609181-01
Instrument ID: IC2 Run Time: 16:49 Method: 9056
File ID: I2 040617-03 Analyst: CAS QC Key: DOD4
Workgroup (AAB#): WG609177 Cal ID: IC2 - 12-OCT-16
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Chloride	8.00	7.96	mg/L	4.61	0.463	10	
Sulfate	40.0	40.3	mg/L	5.88	0.773	10	

* Exceeds %D Criteria



Login Number: L17040221 Run Date: 04/06/2017 Sample ID: WG609181-03
Instrument ID: IC2 Run Time: 20:20 Method: 9056
File ID: I2 040617-14 Analyst: CAS QC Key: DOD4
Workgroup (AAB#): WG609177 Cal ID: IC2 - 12-OCT-16
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Chloride	8.00	7.99	mg/L	4.60	0.150	10	
Sulfate	40.0	40.6	mg/L	5.83	1.60	10	

* Exceeds %D Criteria



3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
April 14, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
PDM - PIERCE D. MORRIS	PIT - MICROBAC WARRENDALE
REK - BOB E. KYER	RLB - BOB BUCHANAN
RNP - RICK N. PETTY	SAV - SARAH A. VANDENBERG
SCB - SARAH C. BOGOLIN	SCJ - SUE ELLEN C. JOHNSON
SDC - SHALYN D. CONLEY	TB - TODD BOYLE
TMB - TIFFANY M. BAILEY	TMM - TAMMY M. MORRIS
VC - VICKI COLLIER	WTD - WADE T. DELONG
XXX - UNAVAILABLE OR SUBCONTRACT	

List of Valid Qualifiers

April 14, 2017

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample receipt exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample receipt exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentatively identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound



List of Valid Qualifiers

April 14, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample receipt exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below



CHAIN OF CUSTODY

Name Of Lab Shipping To: MICROBAC (740) 373-4071 ATTN: STEPHANIE MOSSBURG

Project: AECOM LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS		Project No: 60256135.GWTPT HRUMAR16	Analyses VOC CHLORIDE, SULFATE	No. OF CONTAINERS 3 3 1 1 2 2	MS / MSD	Remarks (Preservatives, etc.) HCL NONE HCL	Lab I.D.#
Job: GROUNDWATER TREATMENT PLANT BI-WEEKLY SAMPLES		P.O Number Scott Beesinger					
Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	MS / MSD	Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650-6429	Water	04/05/17 / 15:00		3 3		HCL	
LH18/24-SP650-6429	Water	04/05/17 / 15:00		1 1		NONE	
Trip Blank	Water	04/05/17		2 2		HCL	

Additional Remarks: **STANDARD TAT ON ALL PARAMETERS.** EMAIL RESULTS TO india.saboo@ecocom.com

Relinquished By:	Date	Time	Received By:	Date	Time
<i>Scott Beesinger</i>	04/05/17	15:30			

9 For Lab Use Only
 Received At Lab By:

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

Microbac OVD
 Received: 04/06/2017 09:58
 By: CARA STRICKLER
 221000099171

Remarks

Cara Strickler

(Word) S:\1-ees\Forms\Chain of Custody - BIWeekly

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17040221

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 17-APR-2017

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17040221-01	890405	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	06-APR-2017 11:54	CLS		
2	ANALYZ	V1	ORG4	06-APR-2017 13:48	HRF	CLS	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	06-APR-2017 11:54	CLS		
2	ANALYZ	V1	ORG4	06-APR-2017 13:49	HRF	CLS	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	06-APR-2017 11:54	CLS		
2	ANALYZ	V1	ORG4	06-APR-2017 13:49	HRF	CLS	

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17040221-01	890406	9056

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	06-APR-2017 11:54	CLS		
2	PREP	W1	SEM	06-APR-2017 13:39	CAS	BRG	

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17040221-02	890407	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	06-APR-2017 11:54	CLS		
2	ANALYZ	V1	ORG4	06-APR-2017 13:49	HRF	CLS	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	06-APR-2017 11:54	CLS		
2	ANALYZ	V1	ORG4	06-APR-2017 13:49	HRF	CLS	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login



NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
 Total Halide by Bomb Combustion (TX)
 Particle Sizing - 200 Mesh (PS200)
 Specific Gravity/Density (SPGRAV)
 Total Residual Chlorine (CL-TRL)
 Total Volatile Solids (all forms) (TVS)
 Total Coliform Bacteria (all methods)
 Fecal Coliform Bacteria (all methods)
 Sulfite (SO₃)
 Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS

Nitrogen, Ammonia by Method 350.1
 Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
 Phenolics, Total by Method 420.1
 ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
 Acetic acid
 Butyric acid
 Lactic acid
 Propionic acid
 Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
 1-Methylnaphthalene
 1,4-Dioxane
 Atrazine
 Benzaldehyde
 Biphenyl
 Caprolactam
 Hexamethylphosphoramide (HMPA)
 Pentachlorobenzene
 Pentachloroethane

NELAP Accreditation by Laboratory SOP**NONPOTABLE WATER**OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALSOVD MSS01/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP**SOLID AND HAZARDOUS CHEMICALS**OVD MSV01/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)



April 06, 2017

Mr. Adriane Steed
Microbac Laboratories, Inc.
158 Starlite Drive
Marietta, Ohio 45750

Re: Perchlorate-Steed
Work Order: 420016

Dear Mr. Steed:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 06, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4778.

Sincerely,

Hope Taylor
Project Manager

Purchase Order: SIGNED QUOTE
Enclosures

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Case Narrative

**Receipt Narrative
for
Microbac Laboratories, Inc Kentucky Division
SDG: 420016**

April 06, 2017

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on April 06, 2017 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

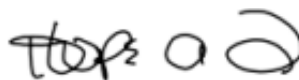
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
420016001	LH18/24-SP650-6429
420016002	LH18/24-SP140-7429

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Perchlorates by LCMSMS.



Hope Taylor
Project Manager

Chain of Custody and Supporting Documentation

SAMPLE RECEIPT & REVIEW FORM

Client: <u>MBAC</u>			SDG/AR/COC/Work Order: <u>420016</u>		
Received By: <u>AG</u>			Date Received: <u>04/06/17</u>		
Carrier and Tracking Number			Circle Applicable: FedEx Express FedEx Ground <u>UPS</u> Field Services Courier Other <u>J461 688 215 8</u>		
Suspected Hazard Information		Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
Shipped as a DOT Hazardous?			<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____	
COC/Samples marked or classified as radioactive?			<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3	
Is package, COC, and/or Samples marked HAZ?			<input checked="" type="checkbox"/>	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____	
Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			
3	Samples requiring cold preservation within (0 ≤ deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: <u>Wet Ice</u> Ice Packs Dry ice None Other: *all temperatures are recorded in Celsius TEMP: <u>1°C</u>
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: <u>IR2-17</u> Secondary Temperature Device Serial # (If Applicable): _____
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>		Sample ID's and Containers Affected: If Preservation added, Lot#: _____
7	Do any samples require Volatile Analysis?			<input checked="" type="checkbox"/>	If Yes, Are Encores or Soil Kits present? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes___ No___ N/A___ (If unknown, select No) VOA vials free of headspace? Yes___ No___ N/A___ Sample ID's and containers affected: _____
8	Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected: _____
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			Sample ID's and containers affected: _____
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Sample ID's affected: _____
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Sample ID's affected: _____
12	Are sample containers identifiable as GEL provided?			<input checked="" type="checkbox"/>	
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			
Comments (Use Continuation Form if needed):					

PM (or PMA) review: Initials MEB Date 4/6/17 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 06 April 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
 Technical Case Narrative
 Microbac Laboratories, Inc Kentucky Division (MBAC)
 SDG #: 420016**

Method/Analysis Information

Procedure: **Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)**

Analytical Method: SW846 6850 Modified

Prep Method: SW846 6850 Modified

Analytical Batch Number: 1654107

Prep Batch Number: 1654106

Sample Analysis

Sample ID	Client ID
420016001	420016001 (LH18/24-SP650-6429)
420016002	420016002 (LH18/24-SP140-7429)
1203763074	Interference Check Sample (ICS)
1203763070	Method Blank (MB)
1203763071	Laboratory Control Sample (LCS)
1203763072	420016001(LH18/24-SP650-6429) Matrix Spike (MS)
1203763073	420016001(LH18/24-SP650-6429) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-067 REV# 14.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG. Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

ICV Requirements

All associated initial calibration verification standard(s) (ICV) met the acceptance criteria.

CCB Requirements

All continuing calibration blanks (CCB) bracketing the analyses associated with this batch were within acceptance criteria.

CCV Requirements

All continuing calibration checks (CCV) requirements were met by all bracketing CCV standards.

Low Level Standard (CRI) Requirements

All low level calibration verification (CRI) requirements were met by all bracketing CRI standards.

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Interference Check Sample (ICS)

The ICS spike recoveries met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 420016001 (LH18/24-SP650-6429) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPDs between the MS and MSD met the acceptance limits.

Internal Standard Area Acceptance

The internal standard areas were within the required acceptance criteria for all samples and QC.

Retention Time

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard. The presence of Perchlorate was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by DOD QSM 5.0, has been used. In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

Technical Information**Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as

days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Manual Integrations

Manual integrations were not required for any data file associated with this SDG.

Method Comments

The samples in this SDG were not originally analyzed using EPA Method 314.0.

Additional Comments

The Perchlorate Isotope Ratio on the Form I may differ slightly from the ratio on the corresponding raw data due to rounding rules and/or significant figures or due to software limitations when there are manual integrations, dilutions or other factors. The ratio value of the Form I is the correct value. The retention time marker, Perchlorate-O (18), is added to all samples, instrument blanks, and standards prior to injection. It is used to verify the retention time of Perchlorate and Perchlorate-101 and to insure an accurate injection occurred. Due to various anions affecting the recovery of Perchlorate-O (18) and not Perchlorate and Perchlorate-101, the calibration curves of Perchlorate and Perchlorate-101 are internally corrected for using Perchlorate-O (18).

Perchlorate Isotope Ratio

The Perchlorate isotope ratio met acceptance criteria for all samples and QC samples. Please see the isotope ratio criteria in the Miscellaneous Section.

System Configuration

The laboratory utilizes a Waters LC 2795 liquid chromatography instrument for Perchlorate analysis. It is coupled with a Micromass Quattro Ultima Mass Spectrometer/Mass Spectrometer. It is designated as LCMSMS #2. It is fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis. The laboratory may also utilize an Agilent 1100 liquid chromatography instrument for Perchlorate analysis. It is coupled with an Applied Biosystems 4000 Mass Spectrometer/Mass Spectrometer, designated as LCMSMS #3 or LCMSMS #4. It is also fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The

signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Chromatographic Columns

The LC-MS/MS Perchlorate analysis was performed on a Quatro Ultima LC/MS/MS.

Chromatographic separation of Perchlorate is accomplished through analysis on the following anion column:

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Qualifier Definition Report
for**

MBAC001 Microbac Laboratories, Inc Kentucky Division

Client SDG: 420016 GEL Work Order: 420016

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: **Name:** Michael Penny**Date:** 07 APR 2017**Title:** Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1654106

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6429

Date Received: 06-APR-17

GEL Job No (SDG): 420016

GEL Sample ID: 420016001

Date Filtered: 06-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.0927	ug/L	J	1	06-APR-17 17:02	per0406016a
	Perchlorate-O(18)			0.509	ug/L		1	06-APR-17 17:02	per0406016a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1654106

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP140-7429

Date Received: 06-APR-17

GEL Job No (SDG): 420016

GEL Sample ID: 420016002

Date Filtered: 06-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	06-APR-17 17:27	per0406019a
	Perchlorate-O(18)			0.490	ug/L		1	06-APR-17 17:27	per0406019a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quality Control Summary

Perchlorate Laboratory Control Sample

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No. (SDG): 420016

Extract Batch Code: 1654106

Date Filtered: 06-APR-17

Matrix: WATER

Sample ID: 1203763071

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.205	ug/L	102		85 - 115
Perchlorate-O(18)		.499	ug/L			-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Interference Check Sample

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No. (SDG): 420016Extract Batch Code: 1654106Date Filtered: 06-APR-17Matrix: WATERSample ID: 1203763074

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.206	ug/L	103		70 - 130
Perchlorate-O(18)		.522	ug/L			

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Spike/Spike Duplicate Summary

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No (SDG): 420016Extract Batch Code: 1654106Date Extracted: 06-APR-17GEL MS/PS ID: 1203763072Client ID: LH18/24-SP650-6429GEL MSD/PSD ID: 1203763073QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	0.0927	ug/L	0.245	76	.249	78	2	30	75 - 125
Perchlorate-O(18)	0	0.509	ug/L	0.487		.478		2		-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate RT And Area Summary

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420016Lab Code: GELHPLC Column: Dionex IonPac AG16Instrument ID: LCMSMS2

Sample ID	Datafile	Run Date	Area	RT	RT CLO4	RRT	Q 0.98-1.02
MidLevel Standard Area	per0406006a	06-APR-17	15578.5				
Lower Area Limit			7789.25				
Upper Area Limit			23367.75				
1203763070	per0406013a	06-APR-17 16:36	16566	3.34	3.34385	1.001	
1203763071	per0406014a	06-APR-17 16:45	16270.8	3.34	3.3715	1.009	
1203763074	per0406015a	06-APR-17 16:53	17002.9	3.32	3.34385	1.007	
420016001	per0406016a	06-APR-17 17:02	16582.3	3.32	3.34385	1.007	
1203763072	per0406017a	06-APR-17 17:10	15877.6	3.32	3.34385	1.007	
1203763073	per0406018a	06-APR-17 17:18	15568.8	3.34	3.3715	1.009	
420016002	per0406019a	06-APR-17 17:27	15980.7	3.34	3.3715	1.009	

Sample Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1654106

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6429

Date Received: 06-APR-17

GEL Job No (SDG): 420016

GEL Sample ID: 420016001

Date Filtered: 06-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.0927	ug/L	J	1	06-APR-17 17:02	per0406016a
	Perchlorate-O(18)			0.509	ug/L		1	06-APR-17 17:02	per0406016a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

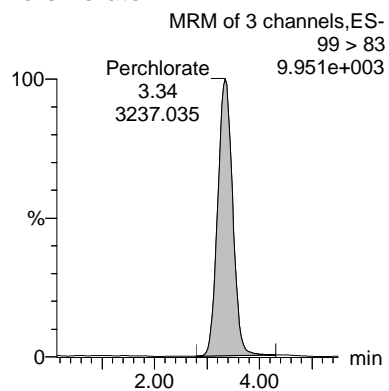
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Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

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 04/07/2017

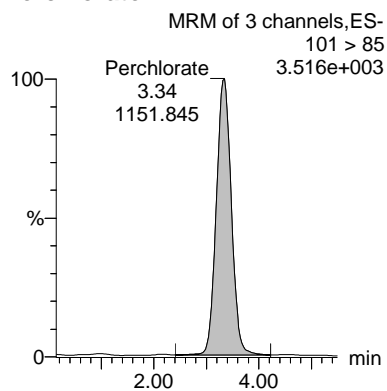
MA
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Name: per0406016a
Date: 06-Apr-2017
Time: 17:02:01
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Vial: 1:3,D

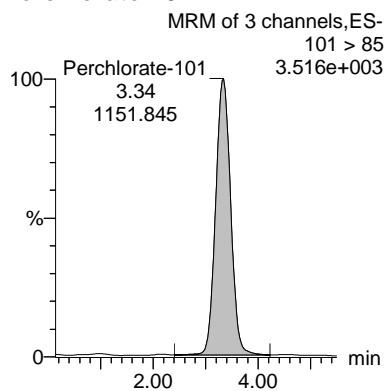
Perchlorate



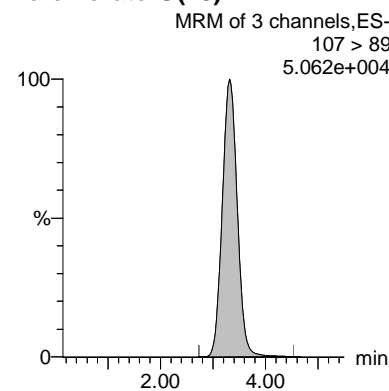
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
420016001	Perchlorate	99 > 83	3.34	3237.035	0.098	bb			0.0927			579.736	2.81
420016001	Perchlorate-101	101 > 85	3.34	1151.845	0.035	bb			0.0992			201.634	
420016001	Perchlorate-O(18)	107 > 89	3.32	16582.287	16582.287	bb			0.5088	101.75	1.75	8991.5...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1654106

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP140-7429

Date Received: 06-APR-17

GEL Job No (SDG): 420016

GEL Sample ID: 420016002

Date Filtered: 06-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	06-APR-17 17:27	per0406019a
	Perchlorate-O(18)			0.490	ug/L		1	06-APR-17 17:27	per0406019a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4

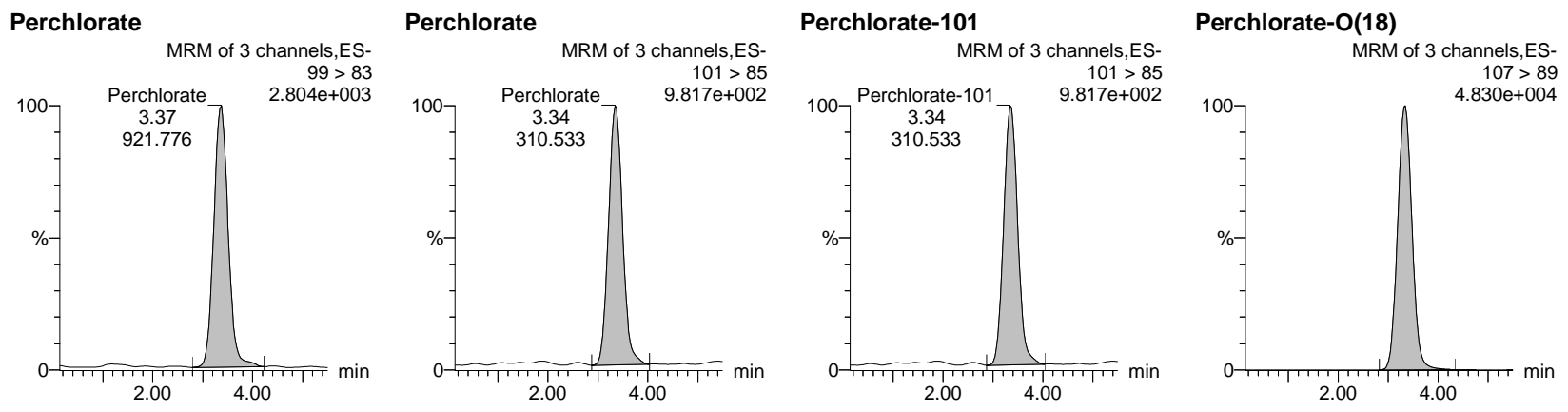
The GEL Group, LLC Analyst: Grace L. Cappelmann

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04/07/2017

Name: per0406019a
 Date: 06-Apr-2017
 Time: 17:27:19
 ID: 420016002
 Vial: 1:4,A



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
420016002	Perchlorate	99 > 83	3.37	921.776	0.029	bb			0.0274			635.925	2.97
420016002	Perchlorate-101	101 > 85	3.34	310.533	0.010	bb			0.0278			208.160	
420016002	Perchlorate-O(18)	107 > 89	3.34	15980.662	15980.662	bb			0.4903	98.06	-1.94	1726.6...	

Standards

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 420016

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 06-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate

Coefficient of Determination: .

Calibration Curve: 1.05333

Response Type: Internal Standard

Curve Type: RF

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 420016

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 06-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate-101

Coefficient of Determination: .

Calibration Curve: .34833

Response Type: Internal Standard

Curve Type: RF

Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per040617a.qld

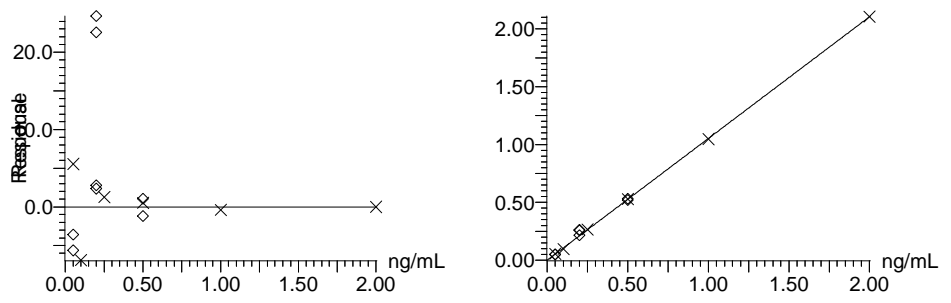
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04/07/2017

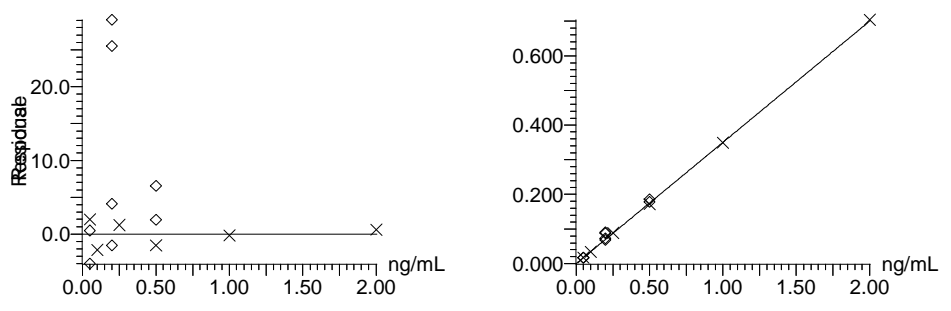
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Calibration: C:\MassLynx\Perchlorate.PRO\CurveDB\per040617a.cdb 07 Apr 2017 09:06:17

Compound name: Perchlorate
Response Factor: 1.05252
RRF SD: 0.0421047, % Relative SD: 4.00035
Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)
Curve type: RF



Compound name: Perchlorate-101
Response Factor: 0.349947
RRF SD: 0.00562584, % Relative SD: 1.60763
Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)
Curve type: RF



Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per040617a.qld

Last Altered: Friday, April 07, 2017 9:06:18 AM Eastern Daylight Time

Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

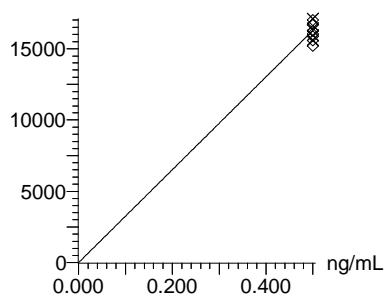
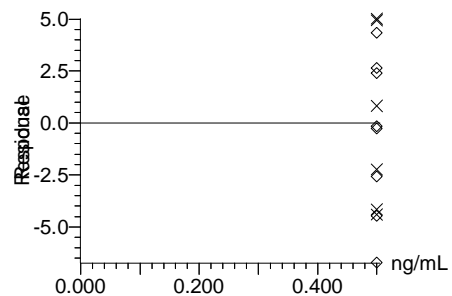
Compound name: Perchlorate-O(18)

Response Factor: 32592.6

RRF SD: 1397.62, % Relative SD: 4.28815

Response type: External Std, Area

Curve type: RF



Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

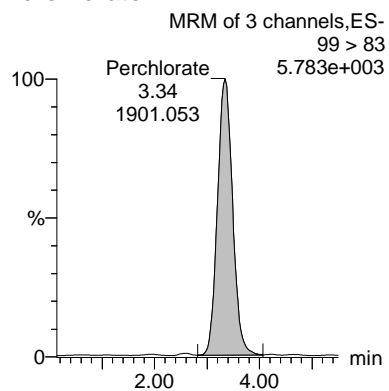
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 04/07/2017

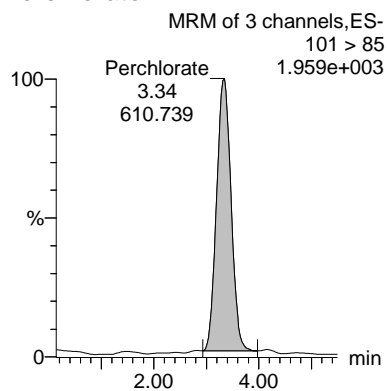
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 04/07/2017

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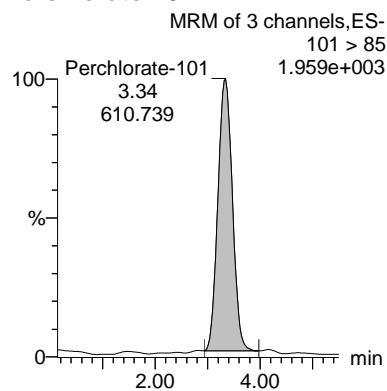
Perchlorate



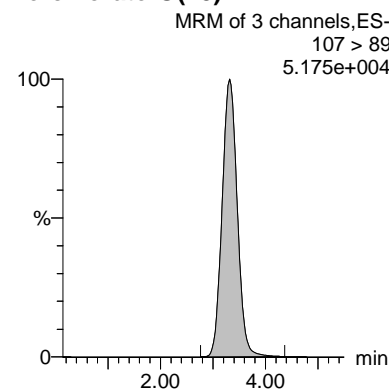
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-01	Perchlorate	99 > 83	3.34	1901.053	0.056	bb			0.0528	105.53	5.53	420.037	3.11
WCL170403-01	Perchlorate-101	101 > 85	3.34	610.739	0.018	bb			0.0510	101.97	1.97	84.257	
WCL170403-01	Perchlorate-O(18)	107 > 89	3.32	17114.885	17114.885	bb			0.5251	105.02	5.02	2244.4...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

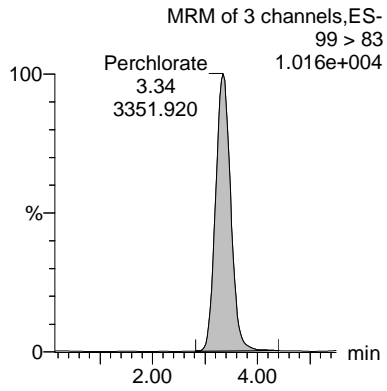
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Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

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 04/07/2017

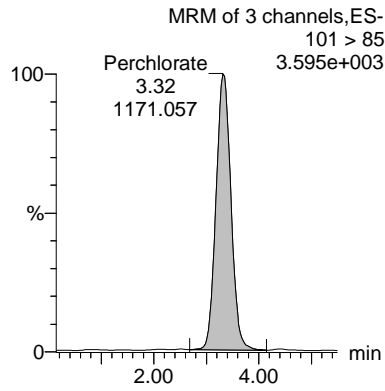
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 04/07/2017

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Time: 15:20:43
ID: WCL170403-02
Vial: 1:1,C

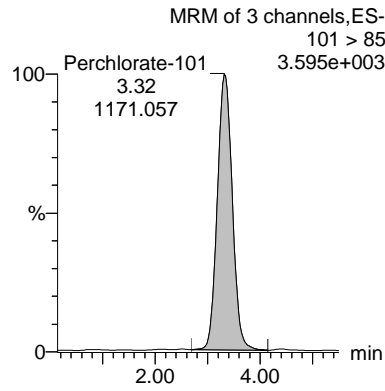
Perchlorate



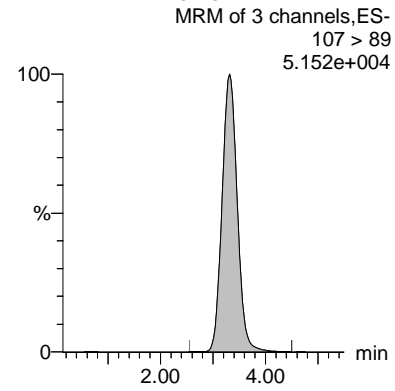
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-02	Perchlorate	99 > 83	3.34	3351.920	0.098	bb			0.0931	93.11	-6.89	2130.6...	2.86
WCL170403-02	Perchlorate-101	101 > 85	3.32	1171.057	0.034	bb			0.0978	97.84	-2.16	360.049	
WCL170403-02	Perchlorate-O(18)	107 > 89	3.32	17101.275	17101.275	bb			0.5247	104.94	4.94	3803.0...	

Quantify Sample Report MassLynx 4.0 SP4

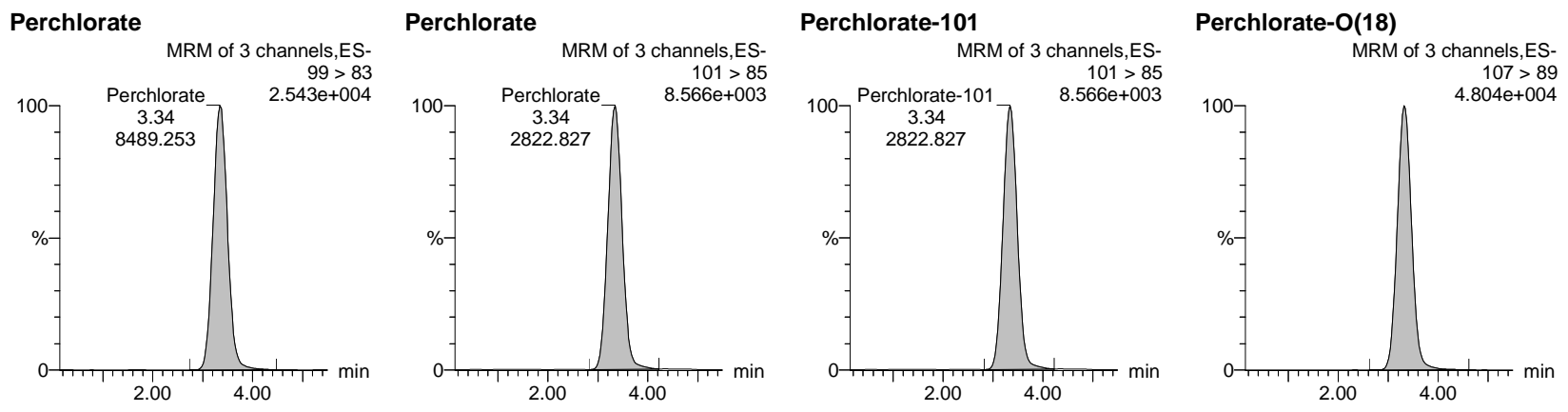
The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per040617a.qld
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 Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

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04/07/2017

MA
04/07/2017

Name: per0406005a
 Date: 06-Apr-2017
 Time: 15:29:08
 ID: WCL170403-03
 Vial: 1:1,D



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-03	Perchlorate	99 > 83	3.34	8489.253	0.266	bb			0.2531	101.25	1.25	2609.4...	3.01
WCL170403-03	Perchlorate-101	101 > 85	3.34	2822.827	0.089	bb			0.2531	101.26	1.26	668.325	
WCL170403-03	Perchlorate-O(18)	107 > 89	3.32	15932.739	15932.739	bb			0.4888	97.77	-2.23	2593.1...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

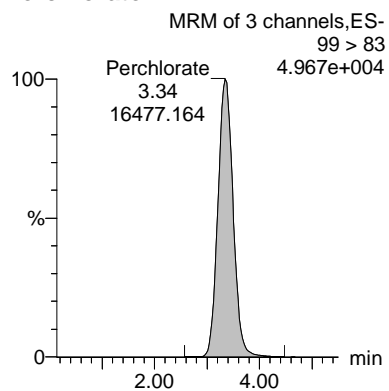
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Last Altered: Friday, April 07, 2017 9:06:18 AM Eastern Daylight Time
Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

GL
 04/07/2017

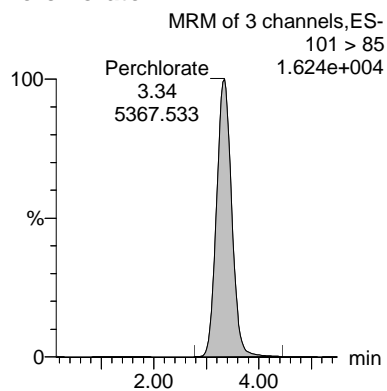
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 04/07/2017

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Date: 06-Apr-2017
Time: 15:37:35
ID: WCL170403-04
Vial: 1:1,E

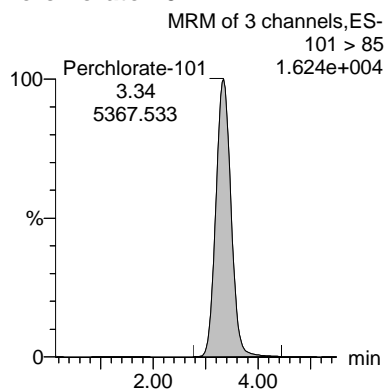
Perchlorate



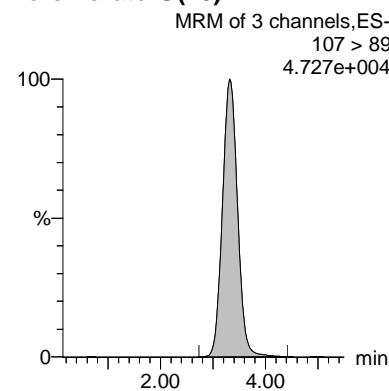
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-04	Perchlorate	99 > 83	3.34	16477.164	0.529	bb			0.5025	100.49	0.49	2381.1...	3.07
WCL170403-04	Perchlorate-101	101 > 85	3.34	5367.533	0.172	bb			0.4923	98.46	-1.54	1045.0...	
WCL170403-04	Perchlorate-O(18)	107 > 89	3.32	15578.509	15578.509	bb			0.4780	95.60	-4.40	9008.4...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

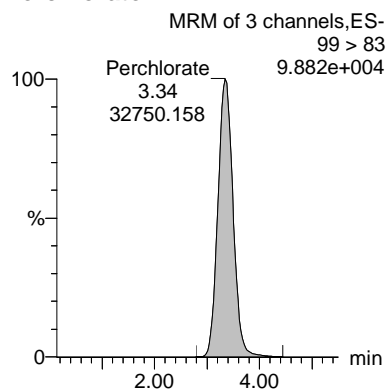
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Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

GL
 04/07/2017

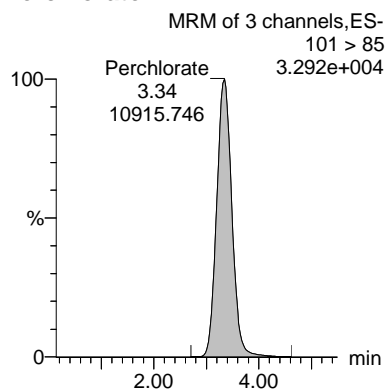
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 04/07/2017

Name: per0406007a
Date: 06-Apr-2017
Time: 15:45:59
ID: WCL170403-05
Vial: 1:1,F

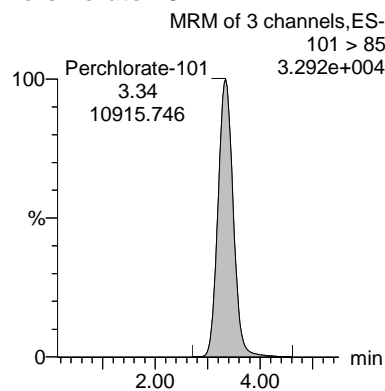
Perchlorate



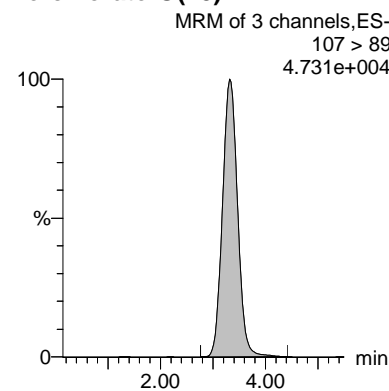
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-05	Perchlorate	99 > 83	3.34	32750.158	1.048	bb			0.9961	99.61	-0.39	2381.5...	3.00
WCL170403-05	Perchlorate-101	101 > 85	3.34	10915.746	0.349	bb			0.9985	99.85	-0.15	8165.6...	
WCL170403-05	Perchlorate-O(18)	107 > 89	3.32	15619.496	15619.496	bb			0.4792	95.85	-4.15	2727.0...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

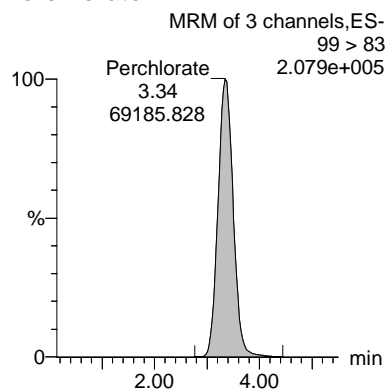
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GL
 04/07/2017

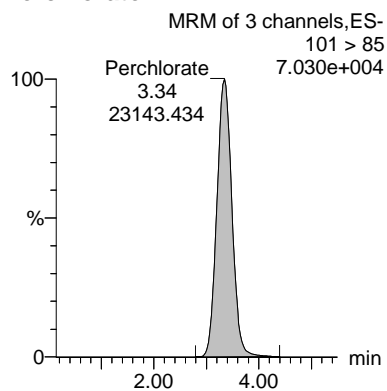
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 04/07/2017

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Date: 06-Apr-2017
Time: 15:54:24
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Vial: 1:2,A

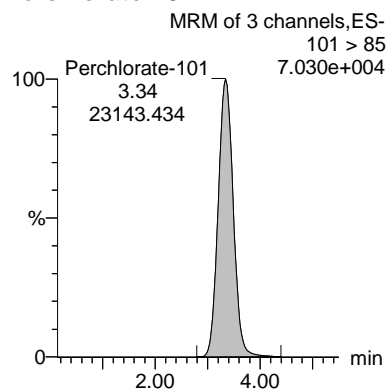
Perchlorate



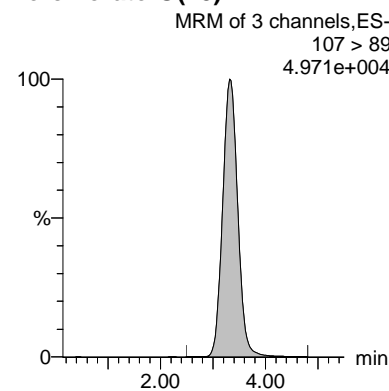
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-06	Perchlorate	99 > 83	3.34	69185.828	2.105	bb			2.0003	100.01	0.01	16055....	2.99
WCL170403-06	Perchlorate-101	101 > 85	3.34	23143.434	0.704	bb			2.0125	100.62	0.62	8453.6...	
WCL170403-06	Perchlorate-O(18)	107 > 89	3.32	16431.020	16431.020	bb			0.5041	100.83	0.83	2078.4...	

Perchlorate Initial Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420016Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.49	98.81	06-APR-17 16:11	per0406010a
Perchlorate Isotope Ratio		2.92		06-APR-17 16:11	per0406010a
Perchlorate-101	.5	.51	101.95	06-APR-17 16:11	per0406010a

Quantify Sample Report MassLynx 4.0 SP4

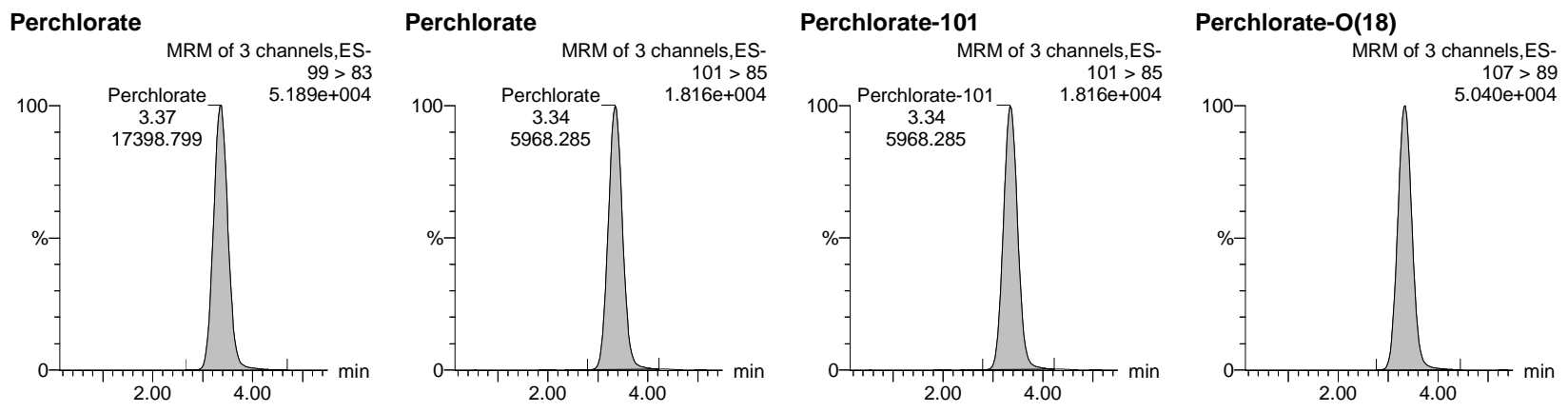
The GEL Group, LLC Analyst: Grace L. Cappelmann

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 Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

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04/07/2017

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04/07/2017

Name: per0406010a
 Date: 06-Apr-2017
 Time: 16:11:18
 ID: WCL170403-07ICV
 Vial: 1:2,B



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-07ICV	Perchlorate	99 > 83	3.37	17398.799	0.520	bb			0.4941	98.81	-1.19	5590.5...	2.92
WCL170403-07ICV	Perchlorate-101	101 > 85	3.34	5968.285	0.178	bb			0.5097	101.95	1.95	1838.5...	
WCL170403-07ICV	Perchlorate-O(18)	107 > 89	3.34	16729.094	16729.094	bb			0.5133	102.66	2.66	3761.2...	

Perchlorate Continuing Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420016Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.51	101.04	06-APR-17 17:35	per0406020a
Perchlorate Isotope Ratio		2.85		06-APR-17 17:35	per0406020a
Perchlorate-101	.5	.53	106.55	06-APR-17 17:35	per0406020a

Quantify Sample Report MassLynx 4.0 SP4

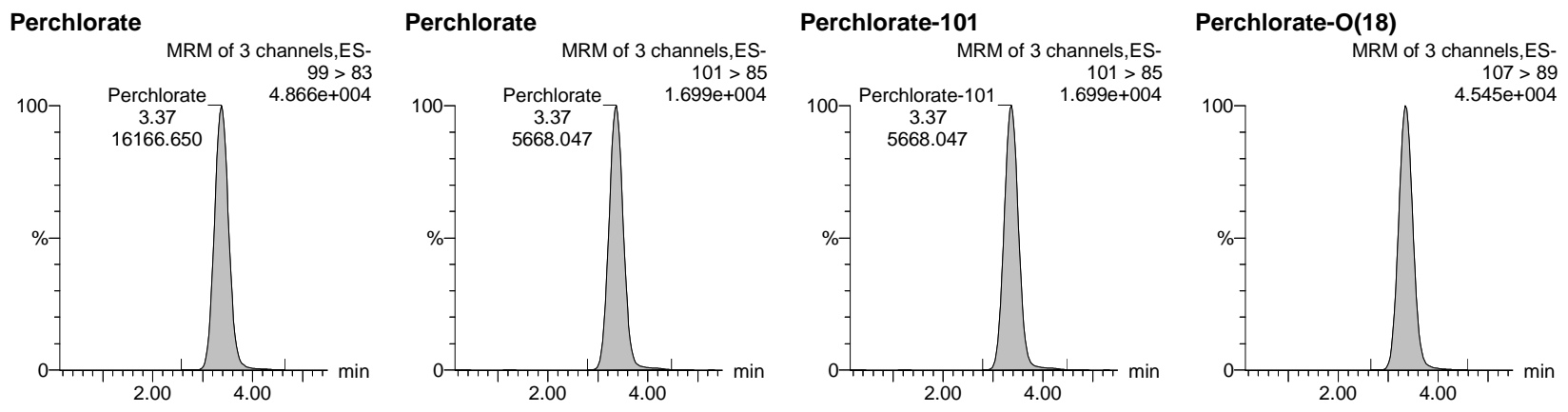
The GEL Group, LLC Analyst: Grace L. Cappelmann

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04/07/2017

MA
04/07/2017

Name: per0406020a
 Date: 06-Apr-2017
 Time: 17:35:46
 ID: WCL170403-07CCV
 Vial: 1:2,B



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-07CCV	Perchlorate	99 > 83	3.37	16166.650	0.532	bb			0.5052	101.04	1.04	3035.8...	2.85
WCL170403-07CCV	Perchlorate-101	101 > 85	3.37	5668.047	0.186	bb			0.5327	106.55	6.55	1067.9...	
WCL170403-07CCV	Perchlorate-O(18)	107 > 89	3.34	15201.779	15201.779	bb			0.4664	93.28	-6.72	2794.1...	

Perchlorate MDL Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420016Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.05	.05	96.43	06-APR-17 16:28	per0406012a
Perchlorate Isotope Ratio		2.89		06-APR-17 16:28	per0406012a
Perchlorate-101	.05	.05	100.48	06-APR-17 16:28	per0406012a
Perchlorate	.05	.05	94.37	06-APR-17 17:52	per0406022a
Perchlorate Isotope Ratio		2.96		06-APR-17 17:52	per0406022a
Perchlorate-101	.05	.05	96	06-APR-17 17:52	per0406022a

Quantify Sample Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

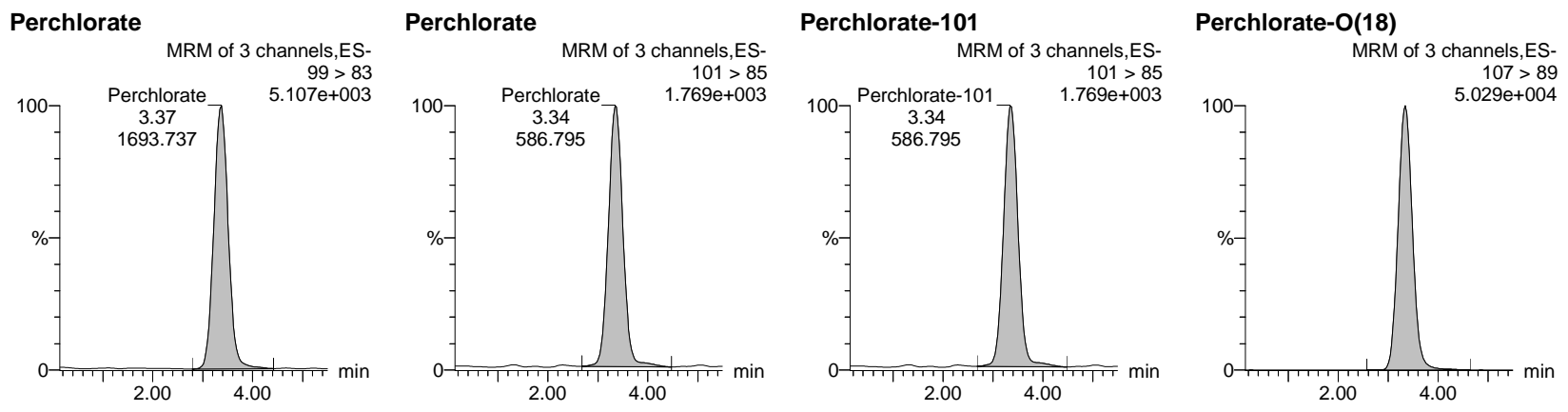
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Last Altered: Friday, April 07, 2017 9:06:18 AM Eastern Daylight Time
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Name: per0406012a
 Date: 06-Apr-2017
 Time: 16:28:12
 ID: WCL170403-08CRI
 Vial: 1:2,C



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-08CRI	Perchlorate	99 > 83	3.37	1693.737	0.051	bb			0.0482	96.43	-3.57	1313.2...	2.89
WCL170403-08CRI	Perchlorate-101	101 > 85	3.34	586.795	0.018	bb			0.0502	100.48	0.48	447.388	
WCL170403-08CRI	Perchlorate-O(18)	107 > 89	3.34	16687.951	16687.951	bb			0.5120	102.40	2.40	3435.6...	

Quantify Sample Report MassLynx 4.0 SP4

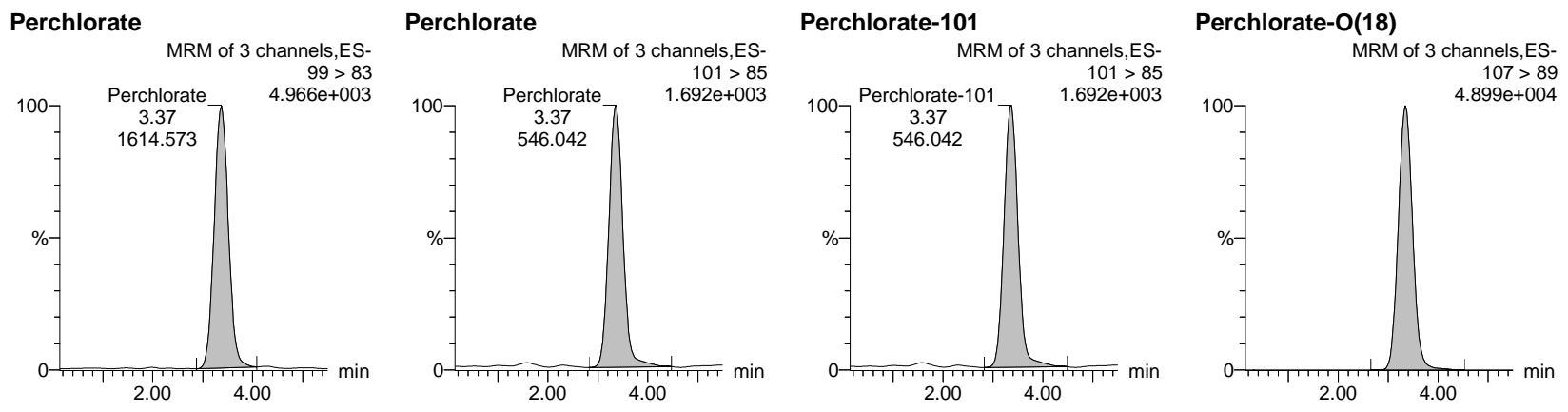
The GEL Group, LLC Analyst: Grace L. Cappelmann

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04/07/2017

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04/07/2017

Name: per0406022a
 Date: 06-Apr-2017
 Time: 17:52:39
 ID: WCL170403-08CRI
 Vial: 1:2,C



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-08CRI	Perchlorate	99 > 83	3.37	1614.573	0.050	bb			0.0472	94.37	-5.63	741.891	2.96
WCL170403-08CRI	Perchlorate-101	101 > 85	3.37	546.042	0.017	bb			0.0480	96.00	-4.00	650.667	
WCL170403-08CRI	Perchlorate-O(18)	107 > 89	3.34	16254.446	16254.446	bb			0.4987	99.74	-0.26	4367.6...	

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1654106

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

MB

Date Received: 06-APR-17

GEL Job No (SDG): 420016

GEL Sample ID: 1203763070

Date Filtered: 06-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	06-APR-17 16:36	per0406013a
	Perchlorate-O(18)			0.508	ug/L		1	06-APR-17 16:36	per0406013a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

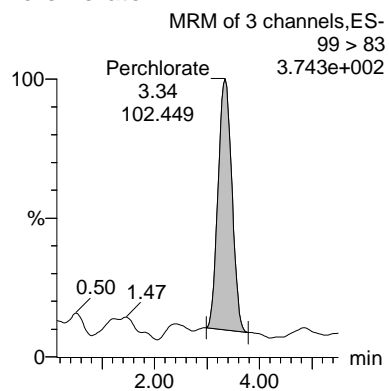
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 04/07/2017

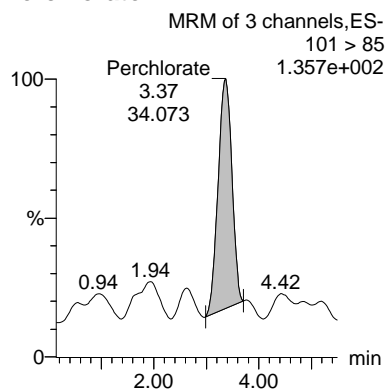
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 04/07/2017

Name: per0406013a
Date: 06-Apr-2017
Time: 16:36:39
ID: 1203763070
Vial: 1:3,A

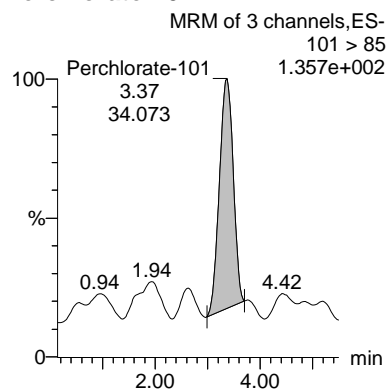
Perchlorate



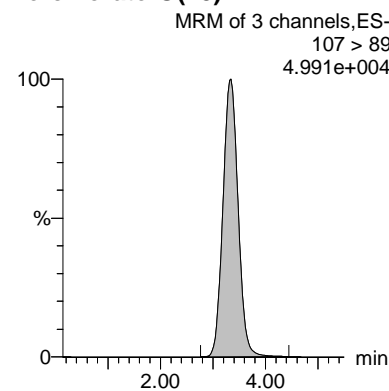
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
1203763070	Perchlorate	99 > 83	3.34	102.449	0.003	bb			0.0029			53.716 3.01
1203763070	Perchlorate-101	101 > 85	3.37	34.073	0.001	bb			0.0029			19.023
1203763070	Perchlorate-O(18)	107 > 89	3.34	16565.992	16565.992	bb			0.5083	101.65	1.65	2602.4...

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1654106

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LCS

Date Received: 06-APR-17

GEL Job No (SDG): 420016

GEL Sample ID: 1203763071

Date Filtered: 06-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.205	ug/L		1	06-APR-17 16:45	per0406014a
	Perchlorate-O(18)			0.499	ug/L		1	06-APR-17 16:45	per0406014a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

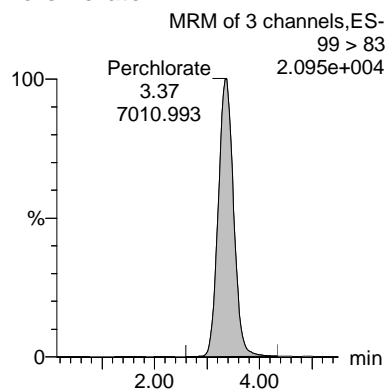
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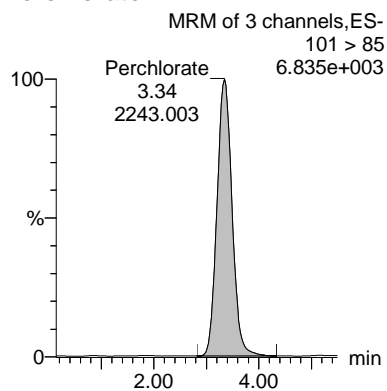
MA
 04/07/2017

Name: per0406014a
Date: 06-Apr-2017
Time: 16:45:07
ID: 1203763071
Vial: 1:3,B

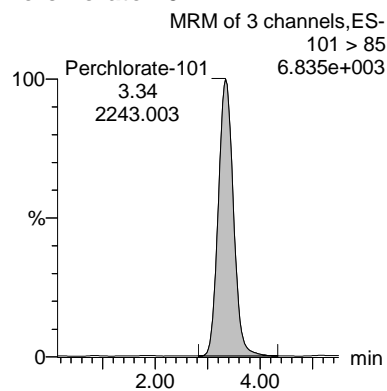
Perchlorate



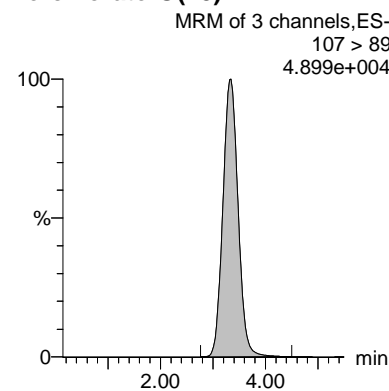
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203763071	Perchlorate	99 > 83	3.37	7010.993	0.215	bb			0.2047	102.35	2.35	1612.6...	3.13
1203763071	Perchlorate-101	101 > 85	3.34	2243.003	0.069	bb			0.1970	98.48	-1.52	2241.5...	
1203763071	Perchlorate-O(18)	107 > 89	3.34	16270.794	16270.794	bb			0.4992	99.84	-0.16	297.857	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1654106

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 420016

GEL Sample ID: 1203763074

Date Filtered: 06-APR-17

Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.206	ug/L		1	06-APR-17 16:53	per0406015a
	Perchlorate-O(18)			0.522	ug/L		1	06-APR-17 16:53	per0406015a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

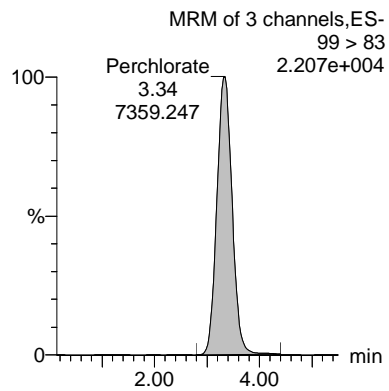
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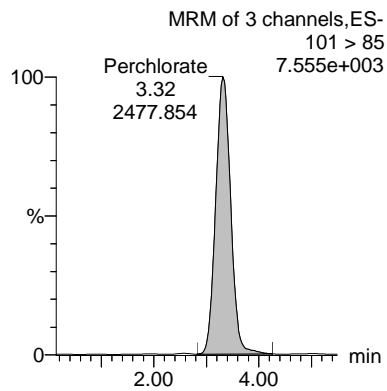
MA
 04/07/2017

Name: per0406015a
Date: 06-Apr-2017
Time: 16:53:34
ID: 1203763074
Vial: 1:3,C

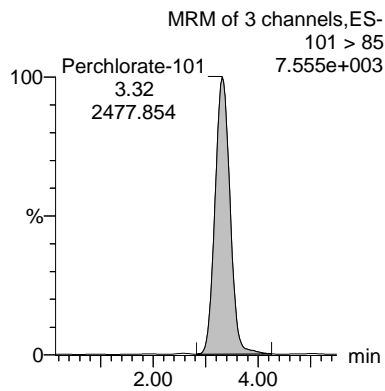
Perchlorate



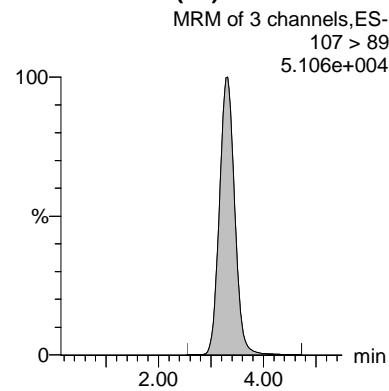
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203763074	Perchlorate	99 > 83	3.34	7359.247	0.216	bb			0.2056	102.81	2.81	2102.9...	2.97
1203763074	Perchlorate-101	101 > 85	3.32	2477.854	0.073	bb			0.2082	104.11	4.11	866.025	
1203763074	Perchlorate-O(18)	107 > 89	3.32	17002.896	17002.896	bb			0.5217	104.34	4.34	2074.0...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1654106Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6429MSDate Received: 06-APR-17GEL Job No (SDG): 420016GEL Sample ID: 1203763072Date Filtered: 06-APR-17Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.245	ug/L		1	06-APR-17 17:10	per0406017a
	Perchlorate-O(18)			0.487	ug/L		1	06-APR-17 17:10	per0406017a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

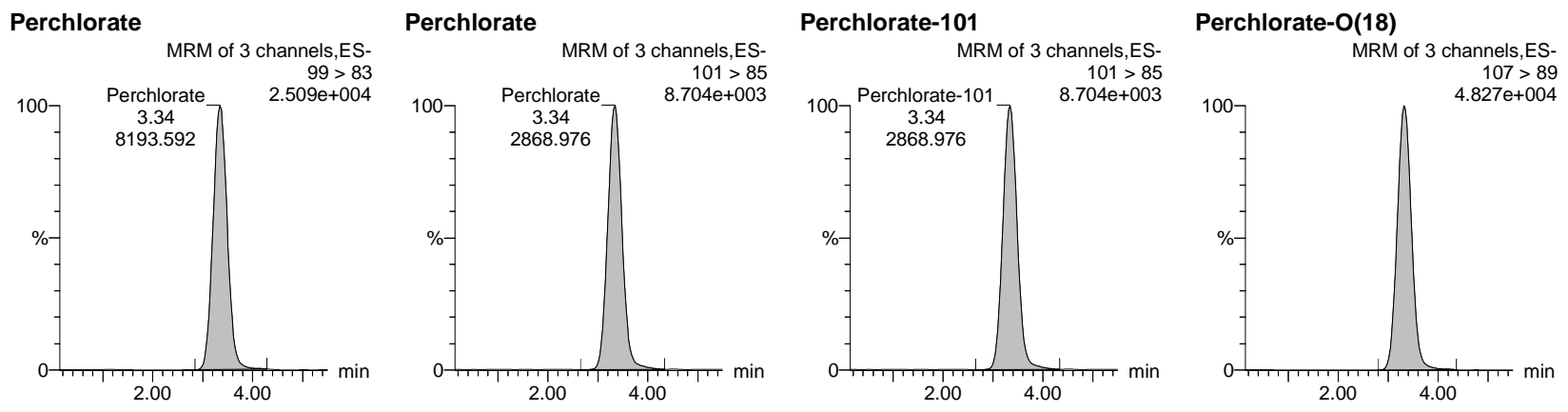
Dataset: C:\MassLynx\Perchlorate.PRO\per040617a.qld

GL
04/07/2017

MA
04/07/2017

Last Altered: Friday, April 07, 2017 9:06:18 AM Eastern Daylight Time
Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

Name: per0406017a
Date: 06-Apr-2017
Time: 17:10:27
ID: 1203763072
Vial: 1:3,E



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203763072	Perchlorate	99 > 83	3.34	8193.592	0.258	bb			0.2451	122.57	22.57	547.734	2.86
1203763072	Perchlorate-101	101 > 85	3.34	2868.976	0.090	bb			0.2582	129.09	29.09	1367.8...	
1203763072	Perchlorate-O(18)	107 > 89	3.32	15877.582	15877.582	bb			0.4872	97.43	-2.57	2223.3...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1654106

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6429MSD

Date Received: 06-APR-17

GEL Job No (SDG): 420016

GEL Sample ID: 1203763073

Date Filtered: 06-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.249	ug/L		1	06-APR-17 17:18	per0406018a
	Perchlorate-O(18)			0.478	ug/L		1	06-APR-17 17:18	per0406018a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

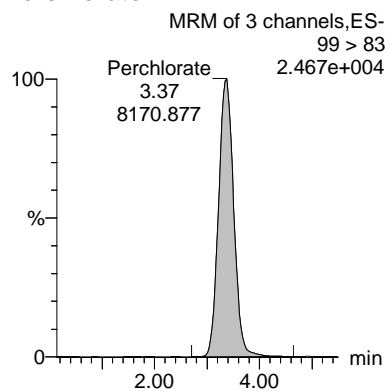
Dataset: C:\MassLynx\Perchlorate.PRO\per040617a.qld
Last Altered: Friday, April 07, 2017 9:06:18 AM Eastern Daylight Time
Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

GL
 04/07/2017

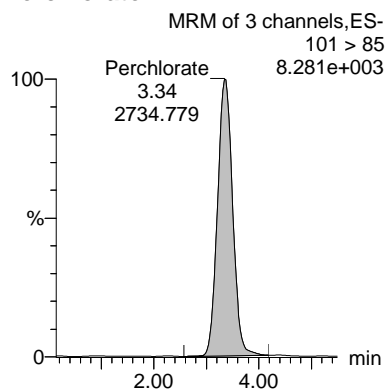
MA
 04/07/2017

Name: per0406018a
Date: 06-Apr-2017
Time: 17:18:53
ID: 1203763073
Vial: 1:3,F

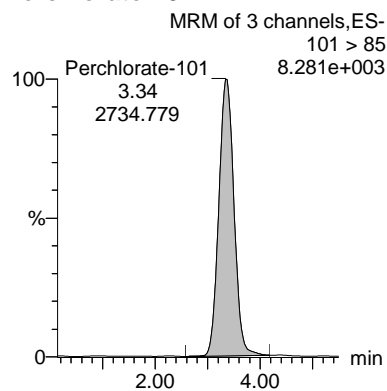
Perchlorate



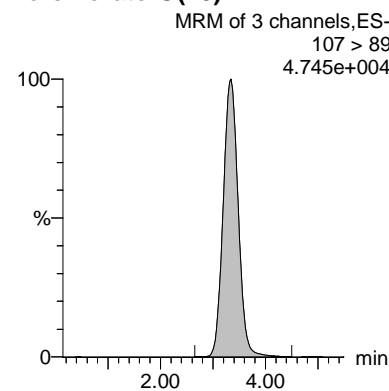
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203763073	Perchlorate	99 > 83	3.37	8170.877	0.262	bb			0.2493	124.66	24.66	3097.8...	2.99
1203763073	Perchlorate-101	101 > 85	3.34	2734.779	0.088	bb			0.2510	125.49	25.49	638.341	
1203763073	Perchlorate-O(18)	107 > 89	3.34	15568.848	15568.848	bb			0.4777	95.54	-4.46	2639.1...	

Perchlorate Initial Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420016Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	06-APR-17	per0406001a	IPB001
Perchlorate-101	0.00	0	NA	06-APR-17	per0406001a	IPB001
Perchlorate	0.00	0	NA	06-APR-17	per0406002a	IPB001
Perchlorate-101	0.00	0	NA	06-APR-17	per0406002a	IPB001

Quantify Sample Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per040617a.qld
 Last Altered: Friday, April 07, 2017 9:06:18 AM Eastern Daylight Time
 Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

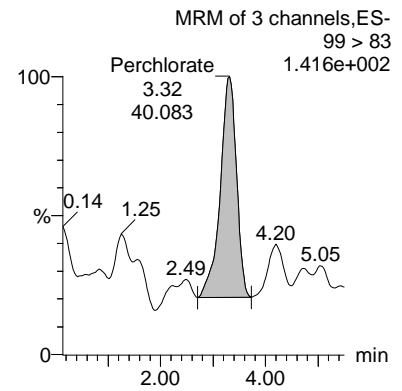
GL
04/07/2017

MA
04/07/2017

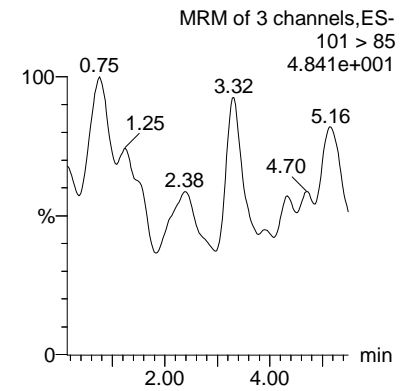
Method: C:\MassLynx\Perchlorate.PRO\MethDB\per040617a.mdb 07 Apr 2017 09:05:43
 Calibration: C:\MassLynx\Perchlorate.PRO\CurveDB\per040617a.cdb 07 Apr 2017 09:06:17

Name: per0406001a
 Date: 06-Apr-2017
 Time: 14:55:20
 ID: IPB001
 Vial: 1:1,A

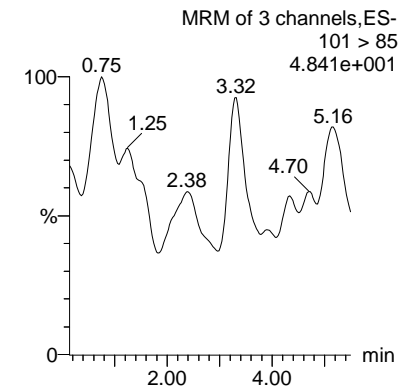
Perchlorate



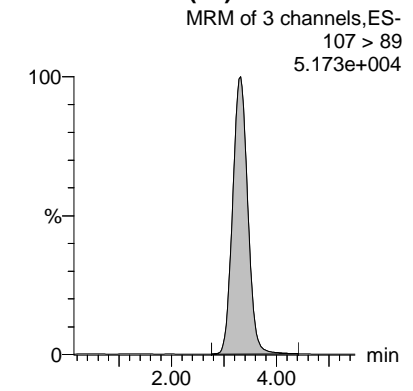
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83	3.32	40.083	0.001	bb			0.0011			11.810 0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	3.32	17095.979	17095.979	bb			0.5245	104.91	4.91	3045.5...

Quantify Sample Report MassLynx 4.0 SP4

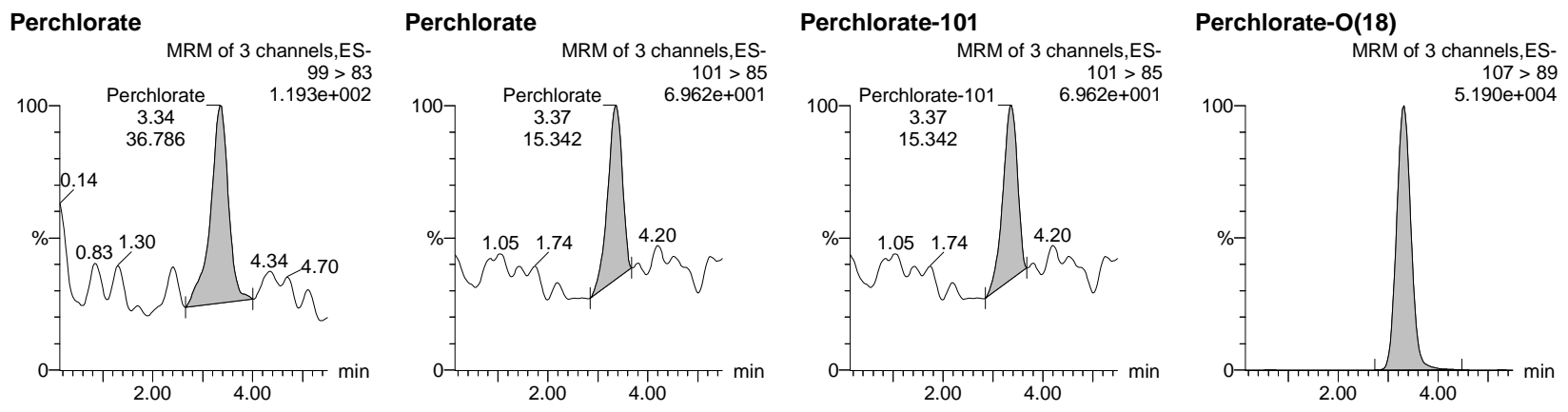
The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per040617a.qld
 Last Altered: Friday, April 07, 2017 9:06:18 AM Eastern Daylight Time
 Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

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04/07/2017

MA
04/07/2017

Name: per0406002a
 Date: 06-Apr-2017
 Time: 15:03:50
 ID: IPB001
 Vial: 1:1,A



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
IPB001	Perchlorate	99 > 83	3.34	36.786	0.001	bb			0.0010			4.744	2.40
IPB001	Perchlorate-101	101 > 85	3.37	15.342	0.000	bb			0.0013			8.938	
IPB001	Perchlorate-O(18)	107 > 89	3.32	17237.574	17237.574	bb			0.5289	105.78	5.78	5499.9...	

Perchlorate Continuing Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420016Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	06-APR-17	per0406009a	IPB002
Perchlorate-101	0.00	0	NA	06-APR-17	per0406009a	IPB002
Perchlorate	0.00	0	NA	06-APR-17	per0406011a	IPB003
Perchlorate-101	0.00	0	NA	06-APR-17	per0406011a	IPB003
Perchlorate	0.00	0	NA	06-APR-17	per0406021a	IPB004
Perchlorate-101	0.00	0	NA	06-APR-17	per0406021a	IPB004

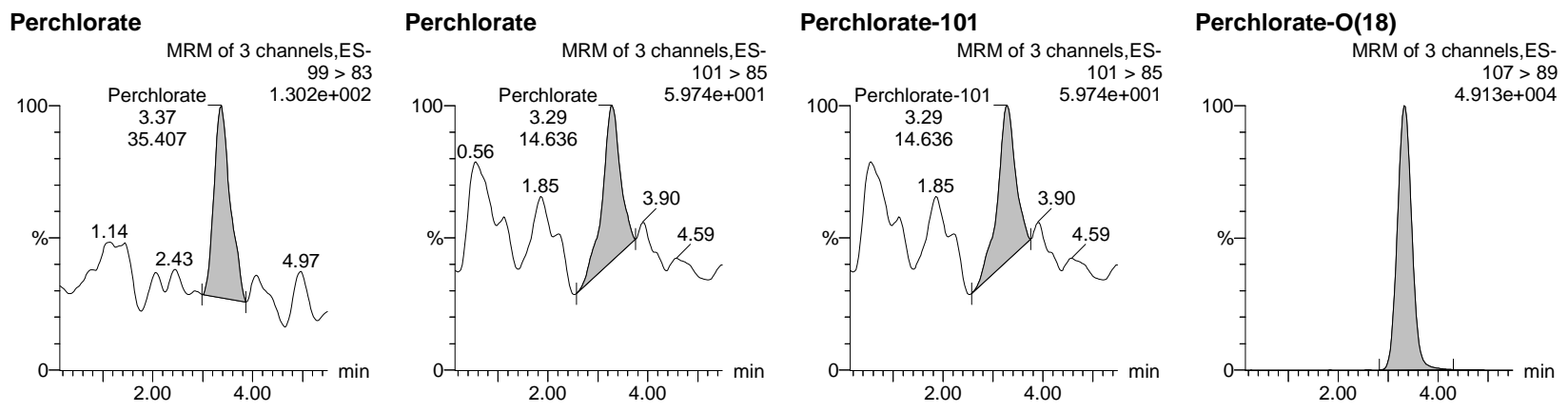
Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per040617a.qld
 Last Altered: Friday, April 07, 2017 9:06:18 AM Eastern Daylight Time
 Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

GL
 04/07/2017

MA
 04/07/2017

Name: per0406009a
 Date: 06-Apr-2017
 Time: 16:02:51
 ID: IPB002
 Vial: 1:1,A



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
IPB002	Perchlorate	99 > 83	3.37	35.407	0.001	bb			0.0010			5.555	2.42
IPB002	Perchlorate-101	101 > 85	3.29	14.636	0.000	bb			0.0013			5.907	
IPB002	Perchlorate-O(18)	107 > 89	3.32	16314.445	16314.445	bb			0.5006	100.11	0.11	2182.1...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

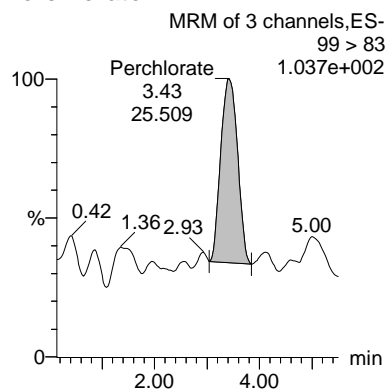
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 Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

GL
 04/07/2017

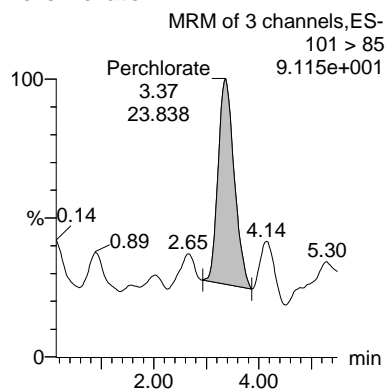
MA
 04/07/2017

Name: per0406011a
 Date: 06-Apr-2017
 Time: 16:19:44
 ID: IPB003
 Vial: 1:1,A

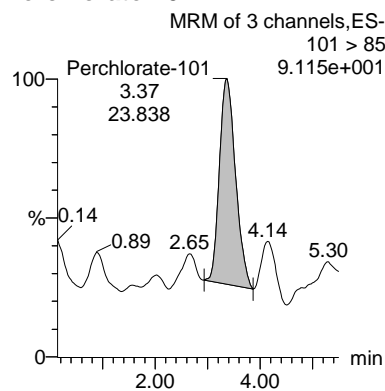
Perchlorate



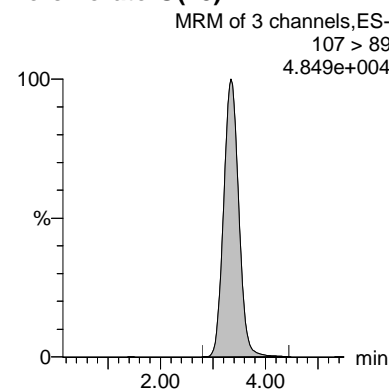
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB003	Perchlorate	99 > 83	3.43	25.509	0.001	bb			0.0008			8.935 1.07
IPB003	Perchlorate-101	101 > 85	3.37	23.838	0.001	bb			0.0021			11.291
IPB003	Perchlorate-O(18)	107 > 89	3.34	16060.114	16060.114	bb			0.4928	98.55	-1.45	612.538

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

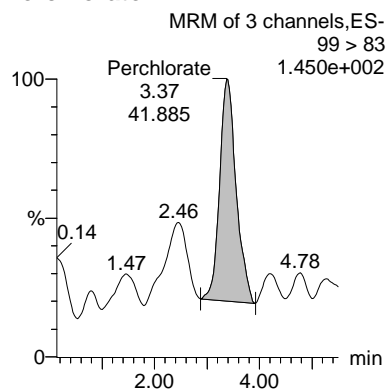
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 Last Altered: Friday, April 07, 2017 9:06:18 AM Eastern Daylight Time
 Printed: Friday, April 07, 2017 9:11:51 AM Eastern Daylight Time

GL
 04/07/2017

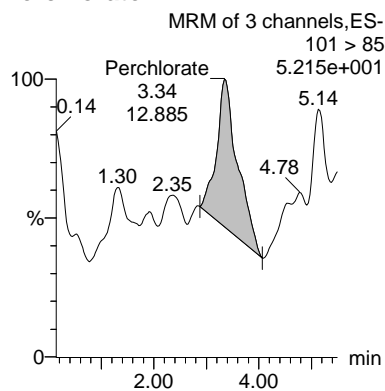
MA
 04/07/2017

Name: per0406021a
Date: 06-Apr-2017
Time: 17:44:13
ID: IPB004
Vial: 1:1,A

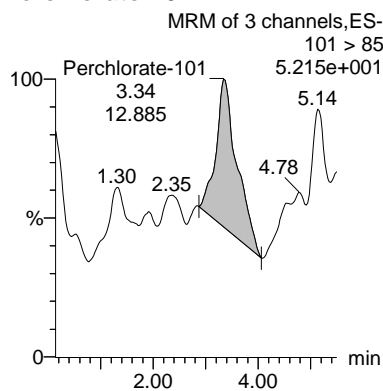
Perchlorate



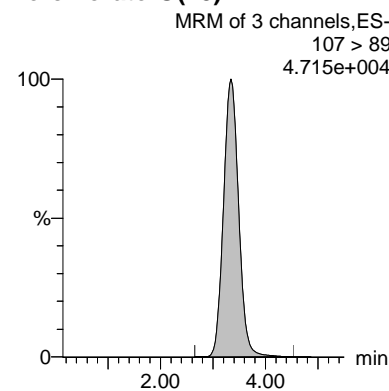
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB004	Perchlorate	99 > 83	3.37	41.885	0.001	bb			0.0013			9.957 3.25
IPB004	Perchlorate-101	101 > 85	3.34	12.885	0.000	bb			0.0012			7.162
IPB004	Perchlorate-O(18)	107 > 89	3.34	15622.898	15622.898	bb			0.4793	95.87	-4.13	2739.7...

Miscellaneous

Prep Logbook

Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)

Batch ID: 1654106 Verified by: _____
 Analyst: Grace Cappelmann
 Method: SW846 6850 Modified

Lab SOP: GL-OA-E-067 REV# 14
 Instrument: LCMSMS Manual Instrument

Sample ID	Prep Date	Initial Volume (mL)	Final Volume (mL)	Prepped Factor (mL/mL)
1203763070 MB	06-APR-2017 12:00:00	10	10	1
1203763071 LCS	06-APR-2017 12:00:00	10	10	1
1203763074 ICS	06-APR-2017 12:00:00	10	10	1
420016001	06-APR-2017 12:00:00	10	10	1
1203763072 MS (420016001)	06-APR-2017 12:00:00	10	10	1
1203763073 MSD (420016001)	06-APR-2017 12:00:00	10	10	1
420016002	06-APR-2017 12:00:00	10	10	1

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
ICS	1203763074	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	De-salting cartridge: 161107-2.5-Ba/Ag/H
LCS	1203763071	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MS	1203763072	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MSD	1203763073	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
RGNT	All	TYPE 1 Water for HPLC	2457559	10	mL	
RGNT	All	500 ppm Carbonate, Bicarbonate, Chloride, Sulfate	2463729	10	mL	

GEL ORGANIC RUN LOG

INSTRUMENT ID: LC-MS/MS#2

Date: 04/06/17

Method: EPA 6850-Modified

Extr. Injection Volume: 20uL

Int. Std.: UCL161103-01

Sequence Number: per040617a

Mobile Phase Lot#: 2523118, 2457559

SOP: GL-OA-E-067

Initial Calibration Date: 04/06/17

Standard-Samp Reagent Lot#.: 2457559

Alt Check Std. ID: WCL170403-07

DataFile	Sample	Analyst	Injection Date	Batch	SDG	Dilution	Client	Comments	QC_Flag
per0406001a	IPB001	GXC1	4/6/2017 14:55			1		USE	B
per0406002a	IPB001	GXC1	4/6/2017 15:03			1		USE	B
per0406003a	WCLICAL-01	GXC1	4/6/2017 15:12			1		USE	I
per0406004a	WCLICAL-02	GXC1	4/6/2017 15:20			1		USE	I
per0406005a	WCLICAL-03	GXC1	4/6/2017 15:29			1		USE	I
per0406006a	WCLICAL-04	GXC1	4/6/2017 15:37			1		USE	I
per0406007a	WCLICAL-05	GXC1	4/6/2017 15:45			1		USE	I
per0406008a	WCLICAL-06	GXC1	4/6/2017 15:54			1		USE	I
per0406009a	IPB002	GXC1	4/6/2017 16:02			1		USE	B
per0406010a	WCLICV	GXC1	4/6/2017 16:11			1		USE	C
per0406011a	IPB003	GXC1	4/6/2017 16:19			1		USE	B
per0406012a	WCLCRI	GXC1	4/6/2017 16:28			1		USE	C
per0406013a	1203763070	GXC1	4/6/2017 16:36	1654107	420016	1	MBAC	USE	S
per0406014a	1203763071	GXC1	4/6/2017 16:45	1654107	420016	1	MBAC	USE	S
per0406015a	1203763074	GXC1	4/6/2017 16:53	1654107	420016	1	MBAC	USE	S
per0406016a	420016001	GXC1	4/6/2017 17:02	1654107	420016	1	MBAC	USE	S
per0406017a	1203763072	GXC1	4/6/2017 17:10	1654107	420016	1	MBAC	USE	S
per0406018a	1203763073	GXC1	4/6/2017 17:18	1654107	420016	1	MBAC	USE	S
per0406019a	420016002	GXC1	4/6/2017 17:27	1654107	420016	1	MBAC	USE	S
per0406020a	WCLCCV	GXC1	4/6/2017 17:35			1		USE	C
per0406021a	IPB004	GXC1	4/6/2017 17:44			1		USE	B
per0406022a	WCLCRI	GXC1	4/6/2017 17:52			1		USE	C

Isotope Ratio Criteria

Isotope Ratio $^{35}\text{Cl}/^{37}\text{Cl}$

2.31-3.85

Tune Criteria

The tuning solution is introduced directly into the mass spectrometer using the ESI interface in the positive ion mode. The mass range scanned is 20 to 1100 amu using at least six scans. The observed mass for the target compound in the daily calibration standards must be within 0.2 amu of the expected value. If it is greater than 0.2 amu, then a mass calibration is performed and the instrument is re-calibrated.

Laboratory Report Number: L17040345

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on April 13 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



Lab Report #: L17040345

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution
-------------	------------

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00114137	H	0.0		J4616882381	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

**Lab Report #:** L17040345**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP650-6430-GRAB	L17040345-01	04/06/2017 15:00	04/07/2017 10:09



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	NH3
Prep Batch Number(s):	WG609737	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-13 17:40:44



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	NH3
Prep Batch Number(s):	WG609737	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	NH3
Prep Batch Number(s):	WG609737	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	NH3
Prep Batch Number(s):	WG609737	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	NH3
Prep Batch Number(s):	WG609737	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	NH3
Prep Batch Number(s):	WG609737	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	PO4
Prep Batch Number(s):	WG609297	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-13 17:40:04



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	PO4
Prep Batch Number(s):	WG609297	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	PO4
Prep Batch Number(s):	WG609297	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	PO4
Prep Batch Number(s):	WG609297	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	PO4
Prep Batch Number(s):	WG609297	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	PO4
Prep Batch Number(s):	WG609297	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	TOC
Prep Batch Number(s):	WG609576	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-13 17:41:16



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	TOC
Prep Batch Number(s):	WG609576	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	TOC
Prep Batch Number(s):	WG609576	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	TOC
Prep Batch Number(s):	WG609576	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	TOC
Prep Batch Number(s):	WG609576	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040345
Project Name:		Method:	TOC
Prep Batch Number(s):	WG609576	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-13 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

Lab Report #: L17040345
 Lab Project #: 2551.096
 Project Name: Longhorn Army Ammunition
 Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040345-01	PrePrep Method: N/A	Instrument: SMARTCHEM
Client ID: LH18/24-SP650-6430-GRAB	Prep Method: 350.1	Prep Date: N/A
Matrix: Water	Analytical Method: 350.1	Cal Date: 04/11/2017 15:05
Workgroup #: WG609737	Analyst: DCM	Run Date: 04/11/2017 15:19
Collect Date: 04/06/2017 15:00	Dilution: 25	File ID: SC170411005.023
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrogen, Ammonia	7664-41-7	26.4		5.00	2.50	1.25

Certificate of Analysis

Sample #: L17040345-01	PrePrep Method: N/A	Instrument: V-1200
Client ID: LH18/24-SP650-6430-GRAB	Prep Method: 365.2	Prep Date: N/A
Matrix: Water	Analytical Method: 365.2	Cal Date: 03/09/2017 11:26
Workgroup #: WG609297	Analyst: DLP	Run Date: 04/07/2017 15:30
Collect Date: 04/06/2017 15:00	Dilution: 10	File ID: 00.1704071530-01
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Orthophosphate	14265-44-2	4.13		1.00	0.500	0.250

Certificate of Analysis

Sample #: L17040345-01	PrePrep Method: N/A	Instrument: TOC-VWP
Client ID: LH18/24-SP650-6430-GRAB	Prep Method: 415.1	Prep Date: N/A
Matrix: Water	Analytical Method: 415.1	Cal Date: 02/10/2017 10:25
Workgroup #: WG609576	Analyst: EPT	Run Date: 04/10/2017 22:37
Collect Date: 04/06/2017 15:00	Dilution: 25	File ID: TC04102017.036
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	264		50.0	25.0	12.5

2.1 General Chemistry Data

2.1.1 Ammonia Data

2.1.1.1 Summary Data

Lab Report #: L17040345

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040345-01	PrePrep Method: N/A	Instrument: SMARTCHEM
Client ID: LH18/24-SP650-6430-GRAB	Prep Method: 350.1	Prep Date: N/A
Matrix: Water	Analytical Method: 350.1	Cal Date: 04/11/2017 15:05
Workgroup #: WG609737	Analyst: DCM	Run Date: 04/11/2017 15:19
Collect Date: 04/06/2017 15:00	Dilution: 25	File ID: SC170411005.023
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrogen, Ammonia	7664-41-7	26.4		5.00	2.50	1.25

2.1.1.2 QC Summary Data

Example Ammonia Calculations

$$(\text{absorbance} - \text{intercept}) / (\text{slope} * \text{dilution}) = \text{mg/L}$$

where:

absorbance = reading from the spectrophotometer

intercept = calculated from calibration standard absorbencies

slope = calculated from calibration standard absorbencies

dilution = dilution of the distillate in decimal form (ex. 1/5 dilution = 0.2)

Microbac Laboratories Inc.

Data Checklist

Date: 11-APR-2017
 Analyst: DCM
 Analyst: NA
 Method: NH3
 Instrument: SC
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG609757 WG609737

Calibration/Linearity	04-11-2017
Second Source Check	X
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	X
QC Violation Sheet	X
Case Narratives	X
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	DCM
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
12-APR-2017



Secondary Reviewer:
13-APR-2017




Analytical Method: 350.1
Login Number: L17040345

AAB#: WG609737

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6430-GRAB	01	04/06/17					04/11/2017	5	28		04/11/17	5	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040345 Work Group: WG609737
 Blank File ID: SC170411005.011 Blank Sample ID: WG609737-01
 Prep Date: 04/11/17 15:08 Instrument ID: SMARTCHEM
 Analyzed Date: 04/11/17 15:08 Method: 350.1
 Analyst: DCM

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG609737-02	SC170411005.012	04/11/17 15:10	01
LH18/24-SP650-6430-GRAB	L17040345-01	SC170411005.023	04/11/17 15:19	DL01
DUP	WG609737-04	SC170411005.025	04/11/17 15:21	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5245287
 Report generated 04/13/2017 10:59



Login Number: L17040345 Prep Date: 04/11/17 15:08 Sample ID: WG609737-01
 Instrument ID: SMARTCHEM Run Date: 04/11/17 15:08 Prep Method: 350.1
 File ID: SC170411005.011 Analyst: DCM Method: 350.1
 Workgroup (AAB#): WG609737 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: SMARTC-11-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Nitrogen, Ammonia	0.0500	0.200	0.0500	1	U

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5245288
 13-APR-2017 10:59



Login Number: L17040345 Run Date: 04/11/2017 Sample ID: WG609737-02
Instrument ID: SMARTCHEM Run Time: 15:10 Prep Method: 350.1
File ID: SC170411005.012 Analyst: DCM Method: 350.1
Workgroup (AAB#): WG609737 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD80299 Cal ID: SMARTC-11-APR-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Nitrogen, Ammonia	2.00	1.95	97.6	90 - 110	

LCS - Modified 03/06/2008
PDF File ID: 5245289
Report generated: 04/13/2017 10:59



2.1 General Chemistry Data

2.1.2 Orthophosphate Data

2.1.2.1 Summary Data

Lab Report #: L17040345

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040345-01	PrePrep Method: N/A	Instrument: V-1200
Client ID: LH18/24-SP650-6430-GRAB	Prep Method: 365.2	Prep Date: N/A
Matrix: Water	Analytical Method: 365.2	Cal Date: 03/09/2017 11:26
Workgroup #: WG609297	Analyst: DLP	Run Date: 04/07/2017 15:30
Collect Date: 04/06/2017 15:00	Dilution: 10	File ID: 00.1704071530-01
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Orthophosphate	14265-44-2	4.13		1.00	0.500	0.250

2.1.2.2 QC Summary Data

Example Calculations for Visible Spectrophotometric Methods

Linear Calibration Model

Step 1 - Retrieve Curve Data from ICAL

m = slope of the linear equation
 b = intercept from the linear equation
 y = instrument response as absorbance or OD
 x = concentration of analyte (mg/L)
 $y = mx + b$

Step 2: Calculate the instrument concentration, x

Where:

$$x = (y - b)/m$$

Step 3: Solve for analyte concentration in sample, Cx

$$Cx = (x) (D)$$

Example Calculation (LCS):

Value of m from plot:	7.809
Value of b from plot:	0.0004135
Absorbance of unknown from quantitation report (y):	0.31
Calculated concentration (x):	0.03964483
Dilution factor (D):	1.00
Concentration of analyte in sample, Cy:	0.0396 mg/L

SmartChem Autoanalyzer - Quadratic Calibration for Chloride and Sulfate

Step 1 - Retrieve Curve Data from Smartchem ICAL

A, B, C = constants from the ICAL quadratic regression

x = instrument response as absorbance or OD

y = concentration of analyte (mg/L)

Step 2: Calculate the instrument concentration, y

Where:

$$y = Ax^2 + Bx + C$$

Step 3: Solve for analyte concentration in sample, Cy

$$Cy = (y) (D)$$

Example Calculation (LCS):

Value of A from plot:	101.2796
Value of B from plot:	318.9056
Value of C from plot:	-2.2712
Absorbance of unknown from quantitation report (x):	0.1583
Calculated concentration (y):	50.7495108
Dilution factor (D):	1.00
Concentration of analyte in sample, Cy:	50.75 mg/L

Microbac Laboratories Inc.

Data Checklist

Date: 07-APR-2017
 Analyst: DLP
 Analyst: NA
 Method: PO4
 Instrument: V-1200
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG609297

Calibration/Linearity	
Second Source Check	03-09-17
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	
QC Violation Sheet	X
Case Narratives	
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	
Primary Reviewer	DLP
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
07-APR-2017

Secondary Reviewer:
12-APR-2017

Dwight Payne

Denna Johnson



Analytical Method: 365.2
Login Number: L17040345

AAB#: WG609297

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6430-GRAB	01	04/06/17					04/07/2017	1	2		04/07/17	1	2	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040345 Work Group: WG609297
 Blank File ID: 00.1704071530-02 Blank Sample ID: WG609297-01
 Prep Date: 04/07/17 15:30 Instrument ID: V-1200
 Analyzed Date: 04/07/17 15:30 Method: 365.2
 Analyst: DLP

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LH18/24-SP650-6430-GRAB	L17040345-01	00.1704071530-01	04/07/17 15:30	
LCS	WG609297-02	00.1704071530-03	04/07/17 15:30	
LCS2	WG609297-03	00.1704071530-04	04/07/17 15:30	
DUP	WG609297-05	00.1704071530-05	04/07/17 15:30	

Report Name: BLANK_SUMMARY
 PDF File ID: 5243865
 Report generated 04/12/2017 15:33



Login Number: L17040345 Prep Date: 04/07/17 15:30 Sample ID: WG609297-01
 Instrument ID: V-1200 Run Date: 04/07/17 15:30 Prep Method: 365.2
 File ID: 00.1704071530-02 Analyst: DLP Method: 365.2
 Workgroup (AAB#): WG609297 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: V-1200-16-MAR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Orthophosphate	0.0250	0.100	0.0250	1	U

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5243866
 12-APR-2017 15:33



Login Number: L17040345 Analyst: DLP Prep Method: 365.2
 Instrument ID: V-1200 Matrix: Water Method: 365.2
 Workgroup (AAB#): WG609297 Units: mg/L
 QC Key: DOD4 Lot #: STD81307
 Sample ID: WG609297-02 LCS File ID: 00.1704071530-03 Run Date: 04/07/2017 15:30
 Sample ID: WG609297-03 LCS2 File ID: 00.1704071530-04 Run Date: 04/07/2017 15:30

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Orthophosphate	1.00	0.968	96.8	1.00	0.992	99.2	2.44	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5243867
 Report generated: 04/12/2017 15:33



2.1.2.3 Raw Data

Std 605653

Curves

Parameter: PO4

Spectrophotometer: V-1200

Calibration (Curve) standard stock: 79640

Concentration: 1000 mg/L

Recipe for preparation of curve standards found in:

SOP: 3653 Revision: 11 Page: 9

Second Source Stock: 58130857 (concentration: 10)

Daily Preparation: 10(10)/100

concentration = 1.0

Calibration Standards (mg/L)	Volume (mL)	Cell Size (cm)	Wavelength (nm)	Absorbance
1.0	50	1cm	9540	0.635
0.7	↓	↓	↓	0.440
0.5	↓	↓	↓	0.318
0.2	↓	↓	↓	0.129
0.1	↓	↓	↓	0.067
0.05	↓	↓	↓	0.038
0	↓	↓	↓	0.007
2nd Source 1.0	↓	↓	↓	0.631

Analyst: April Greene

Date/Time: 3/9/12 @ 0.125

DCN#124439



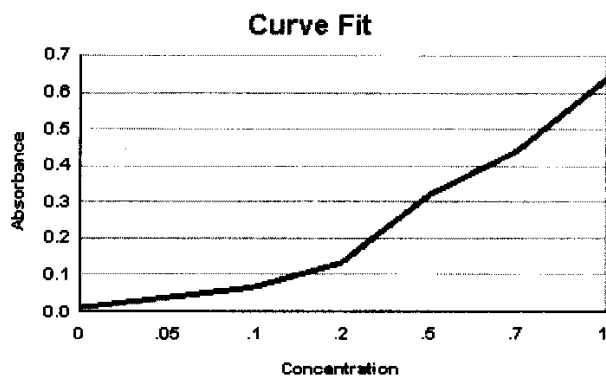
Microbac Laboratories Inc.
INITIAL CALIBRATION

Workgroup: WG605653
Analytical Method: 300
Instrument ID: V-1200

Analyst: ADG
Initial Calibration Date: 03/09/2017

Analyte: **ORTHOPHOSPHATE**
Number of Points: 7
Slope: 0.626650
Y-Intercept: 0.00514888
Coef. Of Correlation (R^2): 0.999901
Coef. Of Correlation (R): 0.999951

Concentration X	Absorbance Y	X ²	X * Y	Y-Fitted (mX ² +B)
0.00	0.00700	0.00	0.00	0.00514888
0.0500	0.0380	0.00250	0.00190	0.0364814
0.100	0.0670	0.0100	0.00670	0.0678139
0.200	0.129	0.0400	0.0258	0.130479
0.500	0.318	0.250	0.159	0.318474
0.700	0.440	0.490	0.308	0.443804
1.00	0.635	1.00	0.635	0.631799



WG_ICAL_CAL_WET - Modified 03/06/2008
Report generated 03/09/2017 12:03



Microbac Laboratories Inc.
ALTERNATE SOURCE REPORT

Workgroup #: WG605653
File ID: 00.1703091126-08
CCV ID: WG605653-08
Units: mg/L
Analyte: ORTHOPHOSPHATE

Instrument ID: V-1200
Run Date: 03/09/2017
Run Time: 11:26
Analyst: ADG
Cal ID: V-1200 - 09-MAR-17 11:26:07

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	1	0.999	0.631	0.1	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_SSCV - Modified 03/06/2008
Report generated 03/09/2017 12:06



Microbac Laboratories Inc.
SAMPLE REPORT

Workgroup: WG609297

Analyst: DLP

Analyte: ORTHOPHOSPHATE

Date: 04/07/2017

Sample ID	I Vol	F Vol	Response	Slope	Y Intercept	Anal. Conc.	Rep. Conc.	Dil	Units
WG609297-01	50	50	0.00600	0.6267	0.005149	0.0013582	0.0013582	1	mg/L
WG609297-02	50	50	0.612	0.6267	0.005149	0.96841	0.96841	1	mg/L
WG609297-03	50	50	0.627	0.6267	0.005149	0.99234	0.99234	1	mg/L
L17040345-01	50	50	0.264	0.6267	0.005149	0.41307	4.1307	10	mg/L
WG609297-04	50	50	0.264	0.6267	0.005149	0.41307	4.1307	10	mg/L
WG609297-05	50	50	0.264	0.6267	0.005149	0.41307	4.1307	10	mg/L
WG609297-06	50	50	0.285	0.6267	0.005149	0.44658	4.4658	10	mg/L

UV_SAMPLE_REPORT - Modified 03/06/2008

Report generated 04/07/2017 17:28

Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00853426

Workgroup #: WG609448 Instrument ID: V-1200
File ID: 00.1704071530-01 Run Date: 04/07/2017
CCV ID: WG609448-01 Run Time: 15:30
Units: mg/L Analyst: DLP
Analyte: ORTHOPHOSPHATE Cal ID: V-1200 - 16-MAR-17

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	.5	0.507	0.646	1.4	

* Exceeds %D Limit
CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/07/2017 17:27



Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00853427

Workgroup #: WG609448
File ID: 00.1704071530-09
CCV ID: WG609448-03
Units: mg/L
Analyte: ORTHOPHOSPHATE

Instrument ID: V-1200
Run Date: 04/07/2017
Run Time: 15:30
Analyst: DLP
Cal ID: V-1200 - 16-MAR-17

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	.5	0.507	0.646	1.4	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/07/2017 17:27



2.1 General Chemistry Data

2.1.3 Total Organic Carbon Data

2.1.3.1 Summary Data

Lab Report #: L17040345

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040345-01	PrePrep Method: N/A	Instrument: TOC-VWP
Client ID: LH18/24-SP650-6430-GRAB	Prep Method: 415.1	Prep Date: N/A
Matrix: Water	Analytical Method: 415.1	Cal Date: 02/10/2017 10:25
Workgroup #: WG609576	Analyst: EPT	Run Date: 04/10/2017 22:37
Collect Date: 04/06/2017 15:00	Dilution: 25	File ID: TC04102017.036
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	264		50.0	25.0	12.5

2.1.3.2 QC Summary Data

**Total Organic Carbon Example Calculations
(Direct Readout Parameter)**

$$(\text{Readout})/(\text{dilution}) = \text{mg/L}$$

where:

Readout = direct readout from the instrument

dilution = dilution in decimal form (ex. 1/5 dilution = 0.2)

Microbac Laboratories Inc.

Data Checklist

Date: 10-APR-2017
 Analyst: EPT
 Analyst: NA
 Method: TOC
 Instrument: TOC-VWP
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG609576 WG609513

Calibration/Linearity	02/10/17
Second Source Check	
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	
QC Violation Sheet	
Case Narratives	X
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	EPT
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
11-APR-2017

Edham Tidd

Secondary Reviewer:
13-APR-2017

Drenna Johnson



Analytical Method: 415.1
Login Number: L17040345

AAB#: WG609576

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6430-GRAB	01	04/06/17					04/10/2017	4.3	28		04/10/17	4.3	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040345
 Blank File ID: TC04102017.033
 Prep Date: 04/10/17 21:37
 Analyzed Date: 04/10/17 21:37
 Analyst: EPT

Work Group: WG609576
 Blank Sample ID: WG609576-01
 Instrument ID: TOC-VWP
 Method: 415.1

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG609576-02	TC04102017.034	04/10/17 21:56	01
LCS2	WG609576-03	TC04102017.035	04/10/17 22:17	01
LH18/24-SP650-6430-GRAB	L17040345-01	TC04102017.036	04/10/17 22:37	DL01
DUP	WG609576-06	TC04102017.044	04/11/17 01:00	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5242647
 Report generated 04/12/2017 09:58



Login Number: L17040345 Prep Date: 04/10/17 21:37 Sample ID: WG609576-01
Instrument ID: TOC-VWP Run Date: 04/10/17 21:37 Prep Method: 415.1
File ID: TC04102017.033 Analyst: EPT Method: 415.1
Workgroup (AAB#): WG609576 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: TOC-VW-10-FEB-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Total Organic Carbon	0.500	2.00	0.500	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5242648
12-APR-2017 09:58



Login Number: L17040345 Analyst: EPT Prep Method: 415.1
 Instrument ID: TOC-VWP Matrix: Water Method: 415.1
 Workgroup (AAB#): WG609576 Units: mg/L
 QC Key: DOD4 Lot #: STD80787
 Sample ID: WG609576-02 LCS File ID: TC04102017.034 Run Date: 04/10/2017 21:56
 Sample ID: WG609576-03 LCS2 File ID: TC04102017.035 Run Date: 04/10/2017 22:17

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Total Organic Carbon	25.0	25.5	102	25.0	25.2	101	1.30	85 - 115	15	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5242649
 Report generated: 04/12/2017 09:58



2.1.3.3 Raw Data

Curve

~~WG 602411~~
~~WG 602476~~ *dm/11/13/17*
 WG 602481

Total Organic Carbon

MAKE DAILY

CCV (TOC): _____ LCS (TOC): _____
 (5/200)(1000) = 25mg/L (5/200)(1000) = 25mg/L

CCV (TIC): _____ MS (TOC): _____
 (5/200)(1000) = 25mg/L _____

Calibration Curve Date: _____ Reagent: RET 35944
RET 37673

SM5310-C : Matrix 2 WG _____
 EPA 415.1/9060A(mod): Matrix 1 WG _____ SOP: K 4151 Rev. 18 *dm/11/13/17*
 Instrument: Shimadza TOC-VWP/ASI

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> drain reservoir filled | <input checked="" type="checkbox"/> DAILY CHECK | <input checked="" type="checkbox"/> sufficient acid waste container |
| <input checked="" type="checkbox"/> ASI water bottle full | <input checked="" type="checkbox"/> 3 rd bottle full | |
| <input checked="" type="checkbox"/> dilution water bottle full | <input checked="" type="checkbox"/> sufficient gas | |
| | <input checked="" type="checkbox"/> sufficient persulfate | |

Position	Sample ID	Dilution	Position	Sample ID	Dilution	Position	Sample ID	Dilution
1	TC Curve		26	TC Curve		51		
2	TC ICV		27	Std 79318		52	See SOP	
3	TIC Curve		28			53	for point	
4	TIC ICV		29	TIC Curve		54	preparation	
5			30	Std 80415		55		
6			31			56		
7			32			57		
8			33	TOC (TC)		58		
9			34	ICV		59		
10			35	Std 77870		60	5/200 (1000) = 25	
11			36			61		
12			37	TIC ICV		62		
13			38	Std 80416		63		
14			39			64		
15			40			65		
16			41			66		
17			42			67		
18			43			68		
19	all points		44	analyzed in duplicate		69		
20			45			70		
21			46			71		
22			47			72		
23			48			73		
24			49			74		
25			50			75		

Analyst: David Merckli Date/Time: 2/10/17

DCN#123915



	Analysis	Sample Name	Result	Status	Date / Time	Vial
1	TC	TCCURVE		Complete	2/10/2017 10:29:51 A	0, 1, 2, 3, 4, 5
2	TC	TOC ICV	TC:23.90mg/L	Complete	2/10/2017 10:47:48 A	6
3	IC	TICCURVE		Complete	2/10/2017 3:55:41 PM	0, 1, 2, 3, 4, 5
4	IC	TIC CURVE	IC:24.27mg/L	Complete	2/10/2017 4:12:07 PM	6
5	TC		TC:0.000mg/L	Complete	2/10/2017 4:31:41 PM	7
6	IC	TOC/TIC	IC:8.571mg/L	Complete	2/10/2017 4:42:05 PM	7
7	TC	TOC/TIC	TC:32.10mg/L	Complete	2/10/2017 5:01:02 PM	7

2/12/2017 11:18:36 AM

CURVES-02-10-2017.i32

Instr. Information

System
DetectorTOCVW ASI
Wet Chemical

Cal. Curve

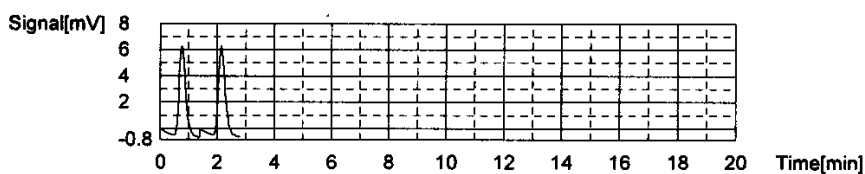
Sample Name: TCCURVE
 Sample ID: Untitled
 Cal. Curve: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
 Status: Completed

Type	Anal.
Standard	TC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.83	500uL	1	*****		2/10/2017 9:36:31 AM
2	10.82	500uL	1	*****		2/10/2017 9:40:05 AM

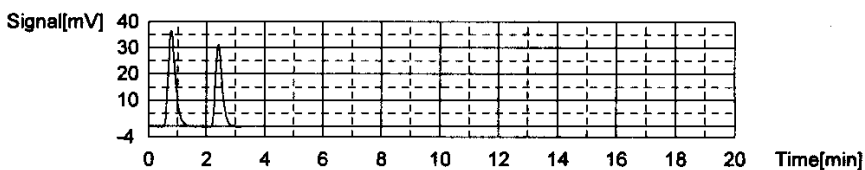
Acid Add. 0.000%
 Mean Area 10.82



Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	64.31	500uL	1	*****		2/10/2017 9:45:28 AM
2	51.52	500uL	1	*****		2/10/2017 9:49:19 AM

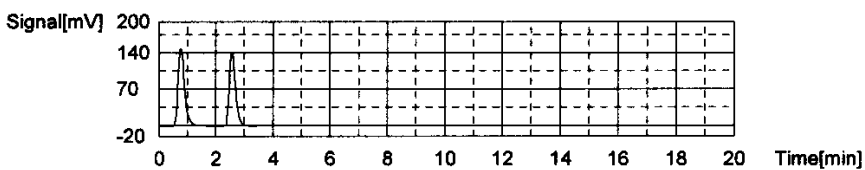
Acid Add. 0.000%
 Mean Area 57.92



Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	238.4	500uL	1	*****		2/10/2017 9:55:04 AM
2	216.3	500uL	1	*****		2/10/2017 9:58:58 AM

Acid Add. 0.000%
 Mean Area 227.4

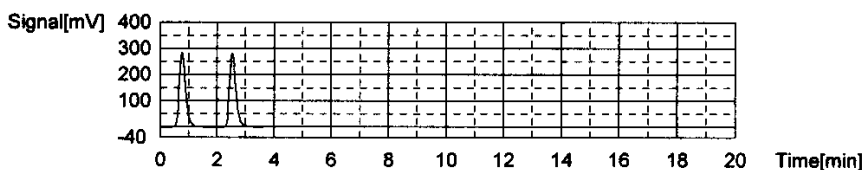


Conc: 10.00mg/L

1/6

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	442.5	500uL	1	*****		2/10/2017 10:04:41 AM
2	437.9	500uL	1	*****		2/10/2017 10:08:48 AM

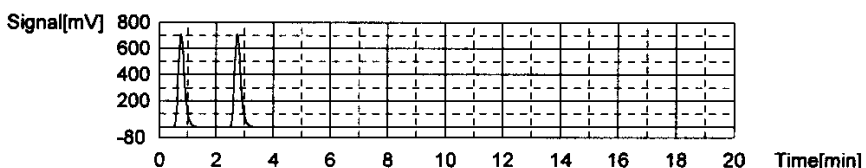
Acid Add. 0.000%
Mean Area 440.2



Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1091	500uL	1	*****		2/10/2017 10:14:47 AM
2	1092	500uL	1	*****		2/10/2017 10:19:05 AM

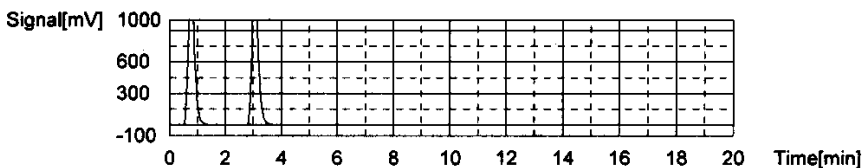
Acid Add. 0.000%
Mean Area 1092



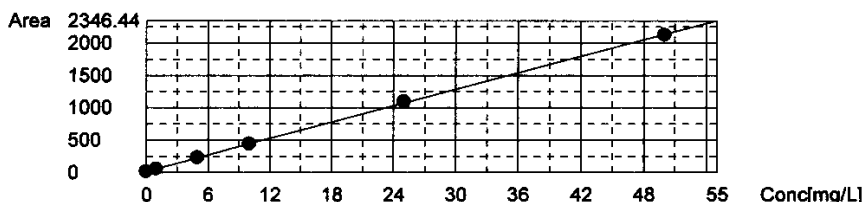
Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	2132	500uL	1	*H*****		2/10/2017 10:25:19 AM
2	2118	500uL	1	*H*****		2/10/2017 10:29:51 AM

Acid Add. 0.000%
Mean Area 2125



Slope: 42.33
Intercept 16.87
r^2 0.999887
Zero Shift No



Sample

Sample Name: TOC ICV
Sample ID: Untitled
Origin: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
Status: Completed
Chk. Result:

Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:23.90mg/L

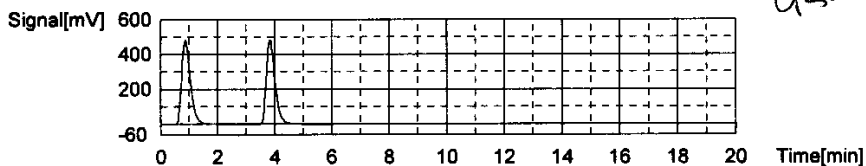
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1029	23.91mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	2/10/2017 10:42:11 AM
2	1028	23.89mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	2/10/2017 10:47:48 AM

95.6%

Mean Area 1029
Mean Conc. 23.90mg/L



Cal. Curve

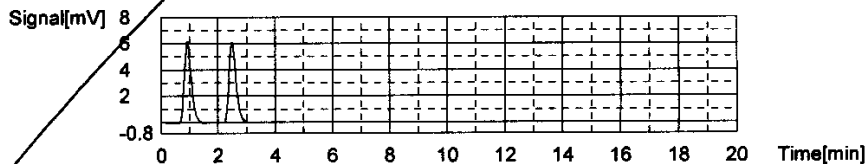
Sample Name: TICCURVE
Sample ID: Untitled
Cal. Curve: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
Status: Completed

Type	Anal.
Standard	TC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.59	500uL	1	*****		2/10/2017 2:49:09 PM
2	10.43	500uL	1	*****		2/10/2017 2:53:06 PM

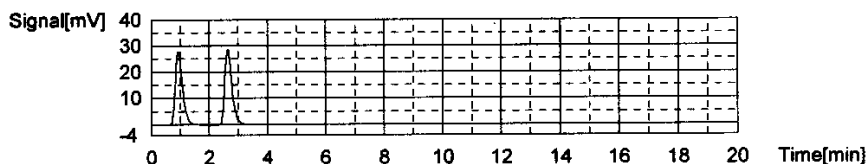
Acid Add. 3.000%
Mean Area 10.51



Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	48.13	500uL	1	*****		2/10/2017 3:00:24 PM
2	49.13	500uL	1	*****		2/10/2017 3:04:41 PM

Acid Add. 3.000%
Mean Area 48.63

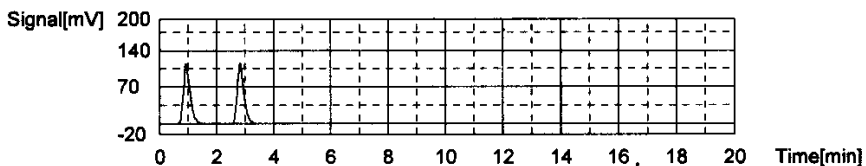


Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	189.0	500uL	1	*****		2/10/2017 3:12:24 PM
2	190.1	500uL	1	*****		2/10/2017 3:16:55 PM

*dem
3/23/17*

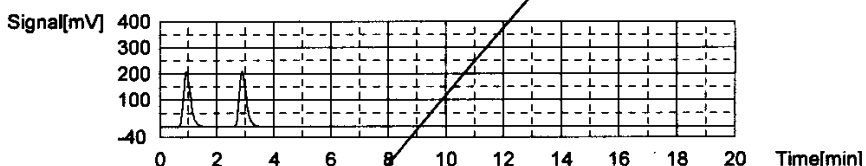
Acid Add. 3.000%
Mean Area 189.6



Conc: 10.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	360.6	500uL	1	*****		2/10/2017 3:24:47 PM
2	362.2	500uL	1	*****		2/10/2017 3:29:24 PM

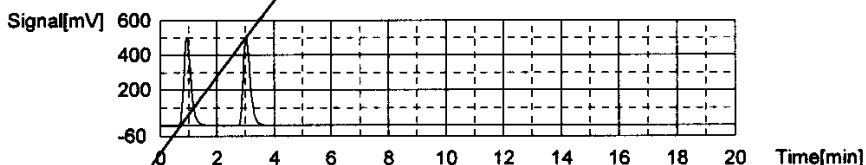
Acid Add. 3.000%
Mean Area 361.4



Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	859.3	500uL	1	*****		2/10/2017 3:37:23 PM
2	856.9	500uL	1	*****		2/10/2017 3:42:16 PM

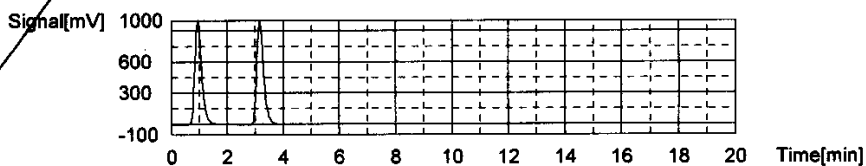
Acid Add. 3.000%
Mean Area 858.1



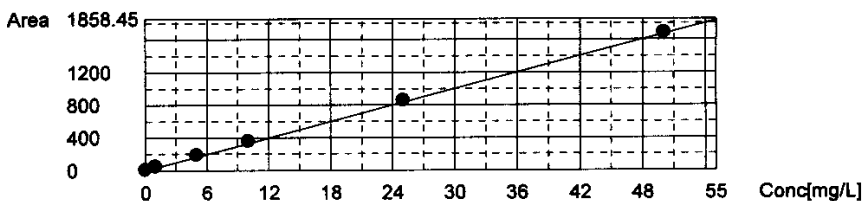
Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1690	500uL	1	*****		2/10/2017 3:50:31 PM
2	1689	500uL	1	*****		2/10/2017 3:55:41 PM

Acid Add. 3.000%
Mean Area 1690



Slope: 33.49
Intercept: 0.000
r^2: 0.999919
Zero Shift: Yes



Sample

dcn

See following pages for curve, slope, intercept
and zero shift unchecked

TOC-V Cal Curve Information
TICCURVE-02-10-2017.2017_02_10_14_45_10.cal

Date of Creation 2:10:17 PM 2/10/2017
User
System TOCVW ASI

Cal. Curve

Sample Name: TICCURVE
Sample ID: Untitled
Cal. Curve: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
Status Completed
Comment:

Type	Anal.
Standard	IC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.59	500uL	1	*****		2/10/2017 2:49:09 PM
2	10.43	500uL	1	*****		2/10/2017 2:53:06 PM

Acid Add. 3.000%
Mean Area 10.51
SD Area 0.1131
CV Area 1.08%
Vial 0

Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	48.13	500uL	1	*****		2/10/2017 3:00:24 PM
2	49.13	500uL	1	*****		2/10/2017 3:04:41 PM

Acid Add. 3.000%
Mean Area 48.63
SD Area 0.7071
CV Area 1.45%
Vial 1

Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	189.0	500uL	1	*****		2/10/2017 3:12:24 PM
2	190.1	500uL	1	*****		2/10/2017 3:16:55 PM

Acid Add. 3.000%
Mean Area 189.6
SD Area 0.7778
CV Area 0.41%
Vial 2

Conc: 10.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	360.6	500uL	1	*****		2/10/2017 3:24:47 PM
2	362.2	500uL	1	*****		2/10/2017 3:29:24 PM

Acid Add. 3.000%
 Mean Area 361.4
 SD Area 1.131
 CV Area 0.31%
 Vial 3

Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	859.3	500uL	1	*****		2/10/2017 3:37:23 PM
2	856.9	500uL	1	*****		2/10/2017 3:42:16 PM

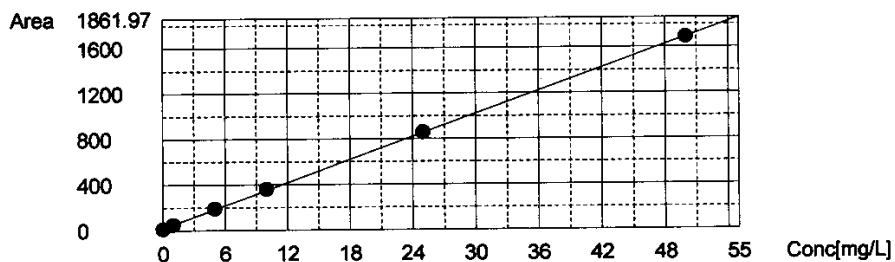
Acid Add. 3.000%
 Mean Area 858.1
 SD Area 1.697
 CV Area 0.20%
 Vial 4

Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1690	500uL	1	*****		2/10/2017 3:50:31 PM
2	1689	500uL	1	*****		2/10/2017 3:55:41 PM

Acid Add. 3.000%
 Mean Area 1690
 SD Area 0.7071
 CV Area 0.04%
 Vial 5

Slope: 33.49
 Intercept 18.41
 r^2 0.999919
 Zero Shift No



Sample Name: TIC CURVE
 Sample ID: Untitled
 Origin: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
 Status: Completed
 Chk. Result:

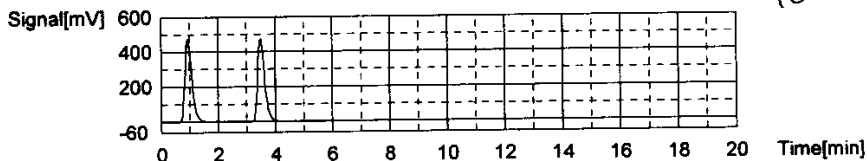
Type	Anal.	Dil.	Result
Unknown	IC	1.000	IC:24.27mg/L

1. Det

Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	810.5	24.20mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	2/10/2017 4:08:15 PM
2	814.6	24.33mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	2/10/2017 4:12:07 PM

Mean Area 812.5
 Mean Conc. 24.27mg/L



Sample

Sample Name: Untitled
 Sample ID: TCCURVE-02-10-2017.2017_02_10_14_14_25.cal
 Origin: Completed
 Status: Completed
 Chk. Result:

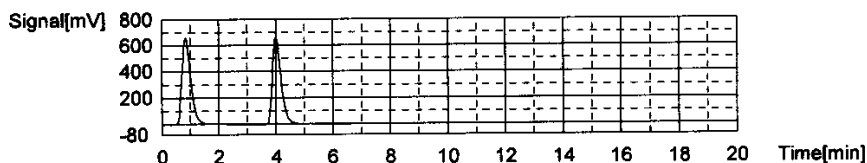
Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:0.000mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1406	0.000mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_14_14	2/10/2017 4:25:42 PM
2	1411	0.000mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_14_14	2/10/2017 4:31:41 PM

Mean Area 1409
 Mean Conc. 0.000mg/L



Sample

Sample Name: TOC/TIC
 Sample ID: Untitled
 Origin: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
 Status: Completed
 Chk. Result:

2/12/2017 11:18:36 AM

CURVES-02-10-2017.132

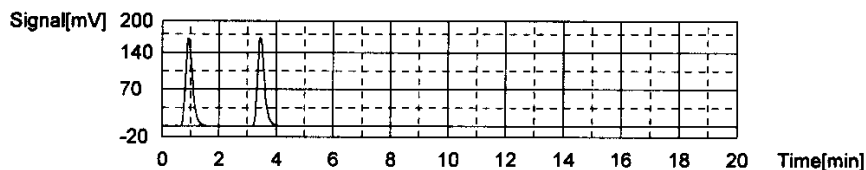
Type	Anal.	Dil.	Result
Unknown	IC	1.000	IC:8.571mg/L

1. Det

Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	286.8	8.565mg/L	500ul	1		TICCURVE-02-10-2017.2017_02_10_14_45	12/10/2017 4:37:09 PM
2	287.2	8.577mg/L	500ul	1		TICCURVE-02-10-2017.2017_02_10_14_45	12/10/2017 4:42:05 PM

Mean Area 287.0
Mean Conc. 8.571mg/L



Sample

Sample Name: TOC/TIC
Sample ID: Untitled
Origin: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
Status: Completed
Chk. Result

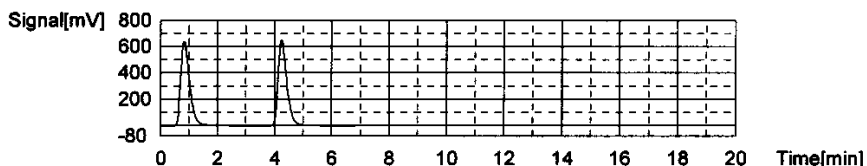
Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:32.10mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1378	32.16mg/L	500ul	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	12/10/2017 4:55:07 PM
2	1373	32.04mg/L	500ul	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	12/10/2017 5:01:02 PM

Mean Area 1376
Mean Conc. 32.10mg/L



WORKGROUP: WG609513
WG609576

Total Organic Carbon

MAKE DAILY

CCV (TOC): Std 79381
 $(5/200)(1000) = 25\text{mg/L}$

LCS (TOC): Std 80787
 $(5/200)(1000) = 25\text{mg/L}$

CCV (TIC): Std 80416
 $(5/200)(1000) = 25\text{mg/L}$

MS (TOC): Std 80787
.4(1000)/40 = 10

Calibration Curve Date: 2/10/17

Reagent: 39685
39266

SM5310-C : Matrix 2 WG 609513

EPA 415.1/9060A(mod): Matrix 1 WG 609576 SOP: K 4151 Rev. 19

WG Instrument: Shimadza TOC-VWP/ASI

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> drain reservoir filled | <input checked="" type="checkbox"/> DAILY CHECK | <input checked="" type="checkbox"/> sufficient acid waste container |
| <input checked="" type="checkbox"/> ASI water bottle full | <input checked="" type="checkbox"/> 3 rd bottle full | |
| <input checked="" type="checkbox"/> dilution water bottle full | <input checked="" type="checkbox"/> sufficient gas | |
| | <input checked="" type="checkbox"/> sufficient persulfate | |

Position	Sample ID	Dilution	Position	Sample ID	Dilution	Position	Sample ID	Dilution
1	TIC		26	CCV		51		
2	TOC/TIC		27	CCB		52		
3	CCV		28	04-0384-08		53		
4	BIX		29	-09		54		
5	LCS		30	-10		55		
6	LCSDVP	ep 4/10/17	31	DVP 246-01		56		
7	04-0246-01		32	MS 246-01		57		
8	04-0311-01	4250/150	33	BIX		58		
9	04-0358-01		34	LCS		59		
10	-03		35	LCSDVP		60		
11	-05	1/15	36	04-0345-01	1/25	61		
* 12	04-0372-01		37	04-0384-11		62		
13	04-0374-01		38	CCV		63		
14	CCV		39	CCB		64		
15	CCB		40	04-0384-12		65		
16	04-0375-01		41	-13		66		
17	04-0382-01		42	-14		67		
18	04-0383-01		43	-15		68		
19	04-0384-01		44	DVP 384-11		69		
20	-02		45	MS 384-12		70		
21	-03		46	CCV		71		
22	-04		47	CCB		72		
23	-05		48			73		
24	-06		49			74		
25	-07		50			75		

Analyst: Edwin Tain Date/Time: 4/10/17 1100

* Diluted 1/30 per client request.

DCN#125090



	Analysis	Sample Name	Result	Status	Date / Time	Vial
1	TOC	TIC	TOC:1.548mg/L TC:25.59mg/L IC:24.04mg/L	Complete	4/10/2017 11:04:46 AM	1
2	TOC	TOC/TIC	TOC:25.97mg/L TC:34.31mg/L IC:8.334mg/L	Complete	4/10/2017 11:17:35 AM	2
3	TOC	CCV	!!Error!! TOC:24.00mg/L TC:23.65mg/L IC:-0.3513mg/L	Complete	4/10/2017 11:34:05 AM	3
4	TOC	WG609513-01 BLK	!!Error!! TOC:0.2132mg/L TC:-0.1152mg/L IC:-0.3284mg/L	Complete	4/10/2017 11:50:29 AM	0
5	TOC	WG609513-02 LCS	!!Error!! TOC:26.03mg/L TC:25.66mg/L IC:-0.3698mg/L	Complete	4/10/2017 12:11:19 PM	5
6	TOC	WG609513-03 LCS DUF	!!Error!! TOC:25.66mg/L TC:25.30mg/L IC:-0.3656mg/L	Complete	4/10/2017 12:32:07 PM	6
7	TOC	L17040246-01	!!Error!! TOC:0.4762mg/L TC:0.08021mg/L IC:-0.3960mg/L	Complete	4/10/2017 12:51:04 PM	7
8	TOC	L17040311-01 (50)	TOC:30.44mg/L TC:30.64mg/L IC:0.1904mg/L	Complete	4/10/2017 1:36:20 PM	8
9	TOC	L17040358-01	TOC:4.261mg/L TC:17.49mg/L IC:13.22mg/L	Complete	4/10/2017 1:58:50 PM	9
10	TOC	L17040358-03	TOC:1.856mg/L TC:6.550mg/L IC:4.694mg/L	Complete	4/10/2017 2:19:39 PM	10
11	TOC	L17040358-05 (5)	TOC:5.255mg/L TC:25.07mg/L IC:19.82mg/L	Complete	4/10/2017 3:03:10 PM	11
12	TOC	L17040372-01	!!Error!! TOC:9.094mg/L TC:8.912mg/L IC:-0.1825mg/L	Complete	4/10/2017 3:25:25 PM	12
13	TOC	L17040374-01	!!Error!! TOC:0.3811mg/L TC:0.03993mg/L IC:-0.3412mg/L	Complete	4/10/2017 3:48:24 PM	13
14	TOC	CCV	!!Error!! TOC:24.69mg/L TC:24.36mg/L IC:-0.3271mg/L	Complete	4/10/2017 4:00:34 PM	14
15	TOC	CCB	!!Error!! TOC:0.1344mg/L TC:-0.2028mg/L IC:-0.3372mg/L	Complete	4/10/2017 4:09:23 PM	0
16	TOC	L17040375-01	!!Error!! TOC:0.3148mg/L TC:-0.03438mg/L IC:-0.3492mg/L	Complete	4/10/2017 4:28:24 PM	16
17	TOC	L17040382-01	!!Error!! TOC:0.3193mg/L TC:-0.01997mg/L IC:-0.3392mg/L	Complete	4/10/2017 4:48:41 PM	17
18	TOC	L17040383-01	!!Error!! TOC:0.5178mg/L TC:0.1837mg/L IC:-0.3341mg/L	Complete	4/10/2017 5:07:53 PM	18
19	TOC	L17040384-01	TOC:2.670mg/L TC:8.128mg/L IC:5.459mg/L	Complete	4/10/2017 5:28:35 PM	19
20	TOC	L17040384-02	TOC:2.441mg/L TC:5.342mg/L IC:3.901mg/L	Complete	4/10/2017 5:49:03 PM	20
21	TOC	L17040384-03	TOC:2.610mg/L TC:6.518mg/L IC:3.909mg/L	Complete	4/10/2017 6:09:19 PM	21
22	TOC	L17040384-04	TOC:2.334mg/L TC:5.248mg/L IC:2.914mg/L	Complete	4/10/2017 6:30:18 PM	22
23	TOC	L17040384-05	TOC:2.431mg/L TC:5.866mg/L IC:3.435mg/L	Complete	4/10/2017 6:50:25 PM	23
24	TOC	L17040384-06	TOC:1.915mg/L TC:5.134mg/L IC:3.219mg/L	Complete	4/10/2017 7:10:35 PM	24
25	TOC	L17040384-07	TOC:2.966mg/L TC:6.640mg/L IC:3.674mg/L	Complete	4/10/2017 7:31:11 PM	25
26	TOC	CCV	!!Error!! TOC:24.80mg/L TC:24.50mg/L IC:-0.2987mg/L	Complete	4/10/2017 7:43:17 PM	26
27	TOC	CCB	!!Error!! TOC:0.1228mg/L TC:-0.2095mg/L IC:-0.3324mg/L	Complete	4/10/2017 7:52:06 PM	0
28	TOC	L17040384-08	TOC:2.421mg/L TC:5.235mg/L IC:2.814mg/L	Complete	4/10/2017 8:12:24 PM	28
29	TOC	L17040384-09	TOC:2.148mg/L TC:4.732mg/L IC:2.584mg/L	Complete	4/10/2017 8:32:47 PM	29
30	TOC	L17040384-10	TOC:2.485mg/L TC:5.129mg/L IC:2.644mg/L	Complete	4/10/2017 8:53:05 PM	30
31	TOC	WG609513-05 DUP	!!Error!! TOC:0.7532mg/L TC:0.4274mg/L IC:-0.3258mg/L	Complete	4/10/2017 9:12:21 PM	31
32	TOC	WG609513-06 MS	!!Error!! TOC:10.08mg/L TC:9.747mg/L IC:-0.3320mg/L	Complete	4/10/2017 9:32:31 PM	32
33	TOC	WG609576-01 BLK	!!Error!! TOC:0.1225mg/L TC:-0.2060mg/L IC:-0.3285mg/L	Complete	4/10/2017 9:48:38 PM	0
34	TOC	WG609576-02 LCS	!!Error!! TOC:25.54mg/L TC:25.22mg/L IC:-0.3124mg/L	Complete	4/10/2017 10:09:31 PM	34
35	TOC	WG609576-03 LCS DUF	!!Error!! TOC:25.21mg/L TC:24.89mg/L IC:-0.3139mg/L	Complete	4/10/2017 10:30:20 PM	35
36	TOC	L17040345-01 (25)	TOC:10.57mg/L TC:10.81mg/L IC:0.2362mg/L	Complete	4/10/2017 10:50:48 PM	36
37	TOC	L17040384-11	TOC:2.753mg/L TC:5.964mg/L IC:3.211mg/L	Complete	4/10/2017 11:11:31 PM	37
38	TOC	CCV	!!Error!! TOC:24.62mg/L TC:24.31mg/L IC:-0.3056mg/L	Complete	4/10/2017 11:23:37 PM	38
39	TOC	CCB	!!Error!! TOC:0.1159mg/L TC:-0.2055mg/L IC:-0.3213mg/L	Complete	4/10/2017 11:32:28 PM	0
40	TOC	L17040384-12	TOC:2.107mg/L TC:4.495mg/L IC:2.388mg/L	Complete	4/10/2017 11:52:31 PM	40
41	TOC	L17040384-13	TOC:2.454mg/L TC:5.519mg/L IC:3.065mg/L	Complete	4/11/2017 12:12:54 AM	41
42	TOC	L17040384-14	TOC:2.194mg/L TC:5.359mg/L IC:3.165mg/L	Complete	4/11/2017 12:33:21 AM	42
43	TOC	L17040384-15	TOC:1.784mg/L TC:3.906mg/L IC:2.122mg/L	Complete	4/11/2017 12:53:34 AM	43
44	TOC	WG609576-06 DUP	TOC:2.620mg/L TC:4.793mg/L IC:2.174mg/L	Complete	4/11/2017 1:13:51 AM	44
45	TOC	WG609576-07 MS	TOC:11.60mg/L TC:13.44mg/L IC:1.841mg/L	Complete	4/11/2017 1:34:27 AM	45
46	TOC	CCV	!!Error!! TOC:24.59mg/L TC:24.29mg/L IC:-0.2950mg/L	Complete	4/11/2017 1:46:33 AM	46
47	TOC	CCB	!!Error!! TOC:0.1109mg/L TC:-0.1979mg/L IC:-0.3087mg/L	Complete	4/11/2017 1:55:28 AM	0

4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.132

Instr. Information

System TOCVW ASI
 Detector Wet Chemical

Sample

Sample Name: TIC
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result: Completed

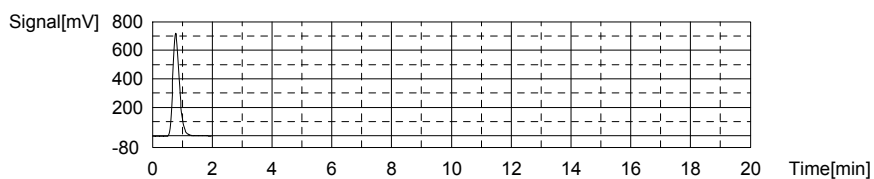
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.548mg/L TC:25.59mg/L IC:24.04mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1100	25.59mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 10:59:45 AM

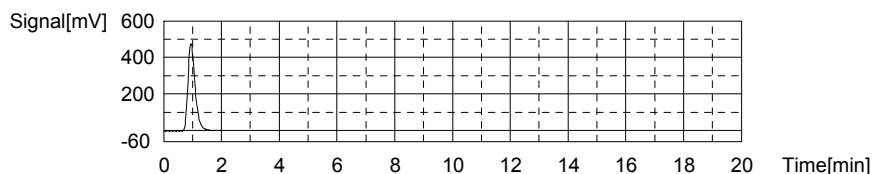
Mean Area 1100
 Mean Conc. 25.59mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	823.5	24.04mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 11:04:46 AM

Mean Area 823.5
 Mean Conc. 24.04mg/L



Sample

Sample Name: TOC/TIC
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result: Completed

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:25.97mg/L TC:34.31mg/L IC:8.334mg/L

1. Det

Anal.: TC

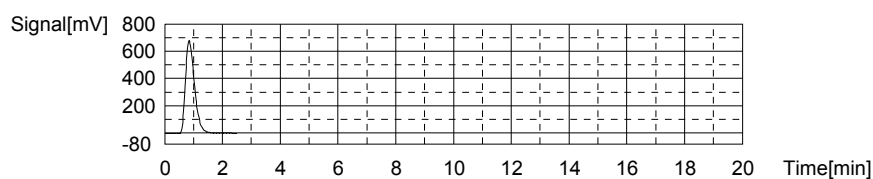
1/33

4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1469	34.31mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 11:12:42 AM

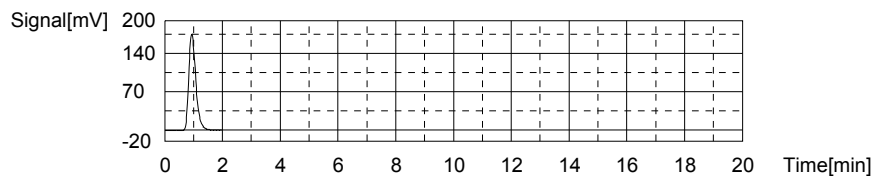
Mean Area 1469
Mean Conc. 34.31mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	297.5	8.334mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 11:17:35 AM

Mean Area 297.5
Mean Conc. 8.334mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

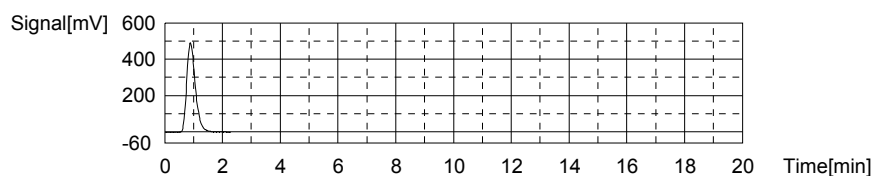
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.00mg/L TC:23.65mg/L IC:-0.3513mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1018	23.65mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 11:29:42 AM

Mean Area 1018
Mean Conc. 23.65mg/L



Anal.: IC

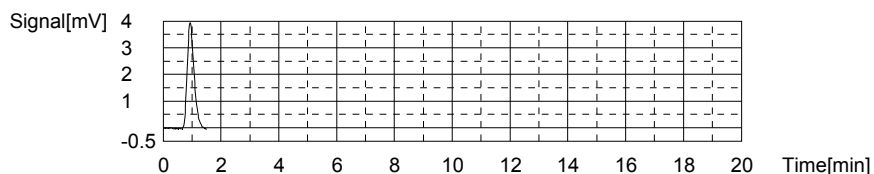
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	6.650	-0.3513mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 11:34:05 AM

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04-10-2017-EPT-TOC.t32

Mean Area 6.650
Mean Conc. -0.3513mg/L



Sample

Sample Name: WG609513-01 BLK
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

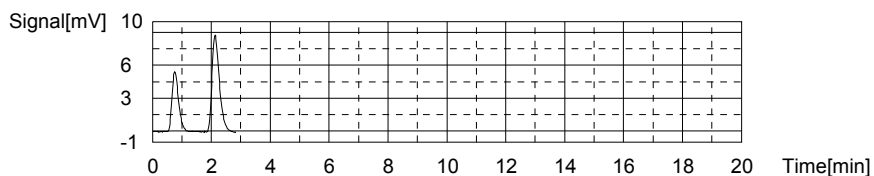
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.2132mg/L TC:-0.1152mg/L IC:-0.3284mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.540	-0.1967mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 11:39:04 AM
2	15.44	-0.03367mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 11:42:43 AM

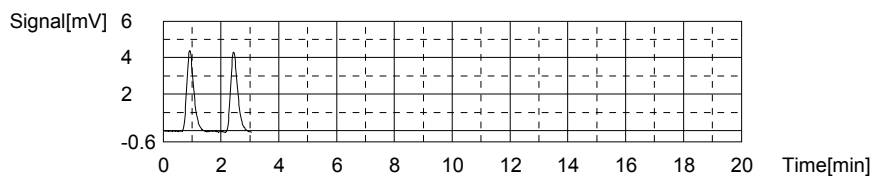
Mean Area 11.99
Mean Conc. -0.1152mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.440	-0.3277mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 11:46:35 AM
2	7.396	-0.3291mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 11:50:29 AM

Mean Area 7.418
Mean Conc. -0.3284mg/L



Sample

Sample Name: WG609513-02 LCS
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

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4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

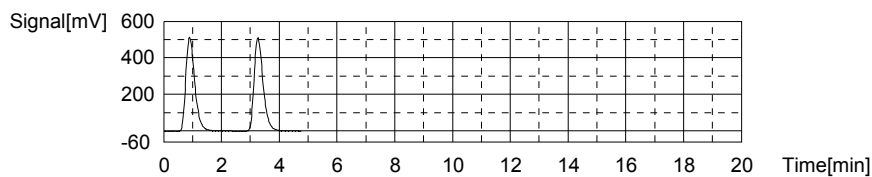
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:26.03mg/L TC:25.66mg/L IC:-0.3698mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1101	25.61mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 11:58:18 AM
2	1105	25.71mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 12:02:57 PM

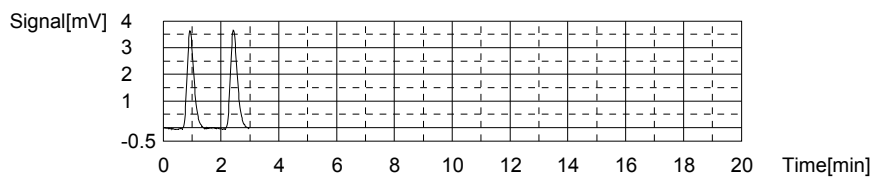
Mean Area 1103
Mean Conc. 25.66mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	5.970	-0.3716mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 12:07:15 PM
2	6.090	-0.3681mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 12:11:19 PM

Mean Area 6.030
Mean Conc. -0.3698mg/L



Sample

Sample Name: WG609513-03 LCSDUP
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

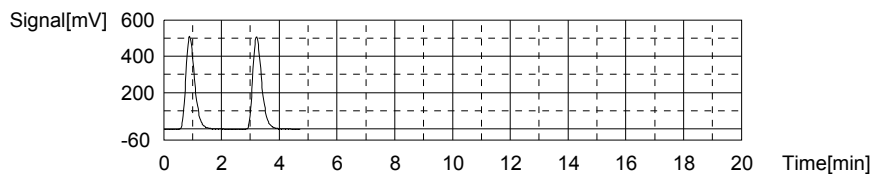
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:25.66mg/L TC:25.30mg/L IC:-0.3656mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1081	25.14mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 12:19:05 PM
2	1094	25.45mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 12:23:45 PM

Mean Area 1088
Mean Conc. 25.30mg/L



Anal.: IC

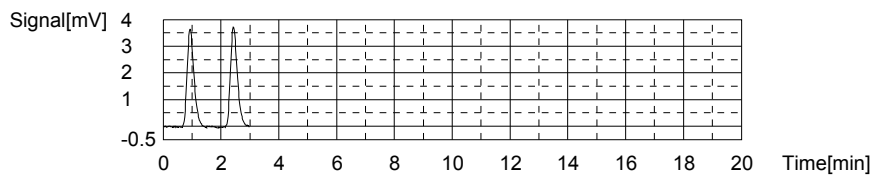
4/33

4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	6.139	-0.3666mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 12:28:03 PM
2	6.202	-0.3647mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 12:32:07 PM

Mean Area 6.171
Mean Conc. -0.3656mg/L



Sample

Sample Name: L17040246-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

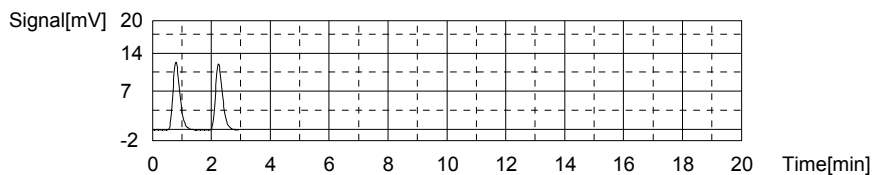
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.4762mg/L TC:0.08021mg/L IC:-0.3960mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	20.56	0.08730mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 12:39:00 PM
2	19.96	0.07312mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 12:42:45 PM

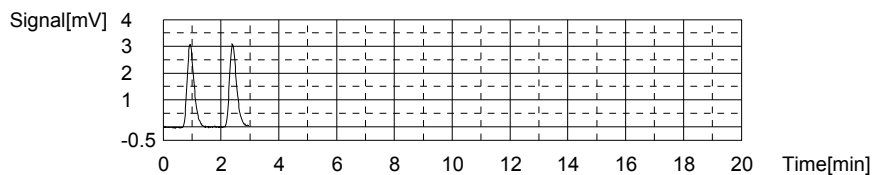
Mean Area 20.26
Mean Conc. 0.08021mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	5.167	-0.3956mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 12:47:02 PM
2	5.143	-0.3963mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 12:51:04 PM

Mean Area 5.155
Mean Conc. -0.3960mg/L



Sample

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4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

Sample Name: L17040311-01 (50)
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

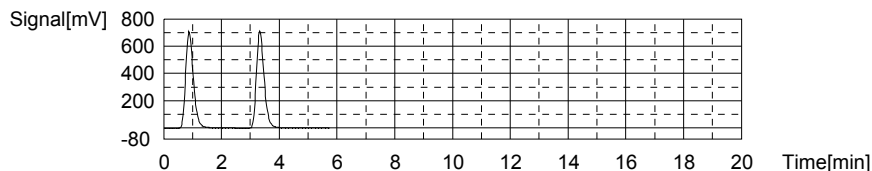
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:30.44mg/L TC:30.64mg/L IC:0.1904mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1309	30.53mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 1:20:46 PM
2	1318	30.74mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 1:27:32 PM

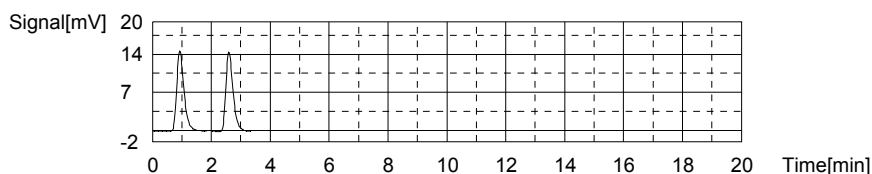
Mean Area 1314
 Mean Conc. 30.64mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	25.00	0.1967mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 1:32:00 PM
2	24.58	0.1841mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 1:36:20 PM

Mean Area 24.79
 Mean Conc. 0.1904mg/L



Sample

Sample Name: L17040358-01
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:4.261mg/L TC:17.49mg/L IC:13.22mg/L

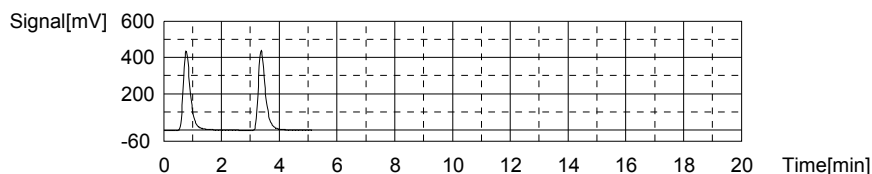
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	753.7	17.41mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 1:44:22 PM
2	760.2	17.56mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 1:49:12 PM

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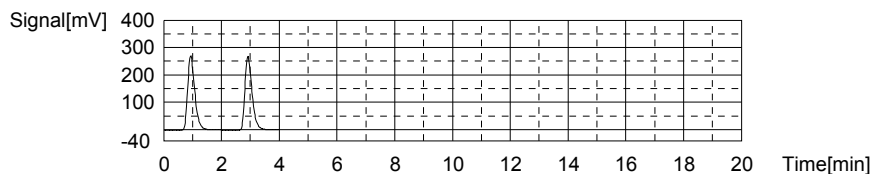
Mean Area 757.0
Mean Conc. 17.49mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	461.4	13.23mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 1:54:07 PM
2	461.1	13.22mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 1:58:50 PM

Mean Area 461.3
Mean Conc. 13.22mg/L



Sample

Sample Name: L17040358-03
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

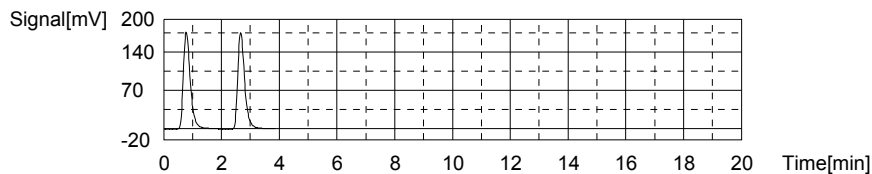
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.856mg/L TC:6.550mg/L IC:4.694mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	295.0	6.571mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 2:06:10 PM
2	293.2	6.529mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 2:10:25 PM

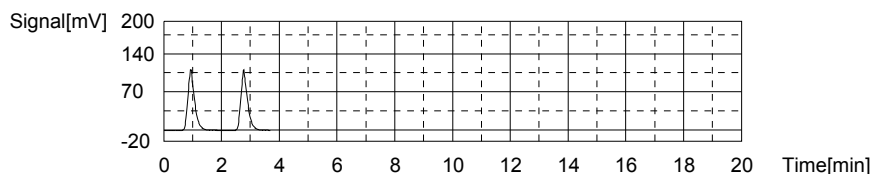
Mean Area 294.1
Mean Conc. 6.550mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	176.3	4.715mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 2:15:09 PM
2	174.9	4.673mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 2:19:39 PM

Mean Area 175.6
Mean Conc. 4.694mg/L



Sample

Sample Name: L17040358-05 (5)
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

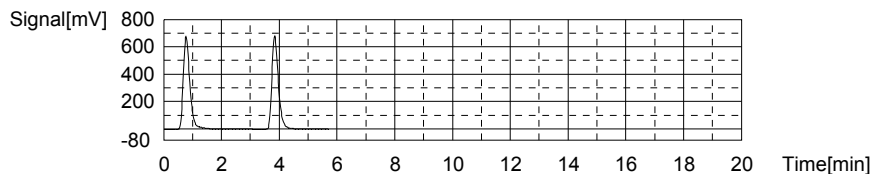
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:5.255mg/L TC:25.07mg/L IC:19.82mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1078	25.07mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 2:48:22 PM
2	1078	25.07mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 2:53:16 PM

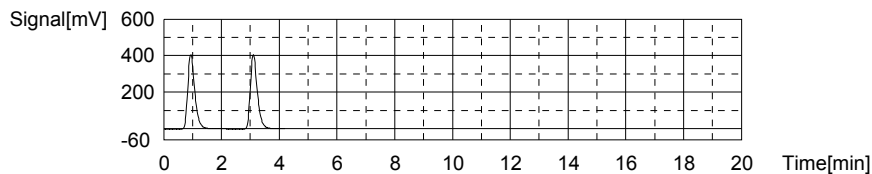
Mean Area 1078
Mean Conc. 25.07mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	683.9	19.87mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 2:58:25 PM
2	680.0	19.76mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 3:03:10 PM

Mean Area 682.0
Mean Conc. 19.82mg/L



Sample

Sample Name: L17040372-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

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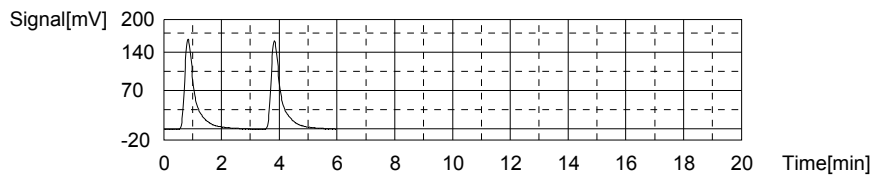
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:9.094mg/L TC:8.912mg/L IC:-0.1825mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	396.8	8.977mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 3:11:36 PM
2	391.3	8.847mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 3:16:50 PM

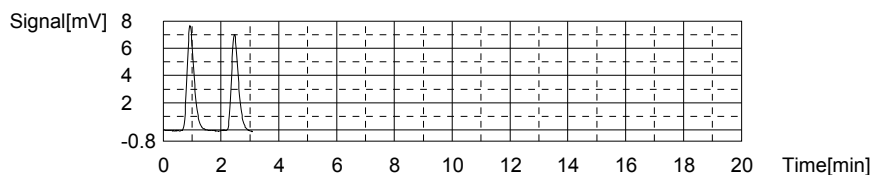
Mean Area 394.1
Mean Conc. 8.912mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	12.87	-0.1656mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 3:21:14 PM
2	11.74	-0.1993mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 3:25:25 PM

Mean Area 12.31
Mean Conc. -0.1825mg/L



Sample

Sample Name: L17040374-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

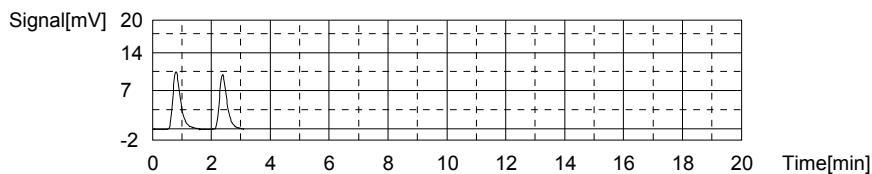
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.3811mg/L TC:0.03993mg/L IC:-0.3412mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	19.31	0.05776mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 3:36:11 PM
2	17.80	0.02209mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 3:39:59 PM

Mean Area 18.56
Mean Conc. 0.03993mg/L



Anal.: IC

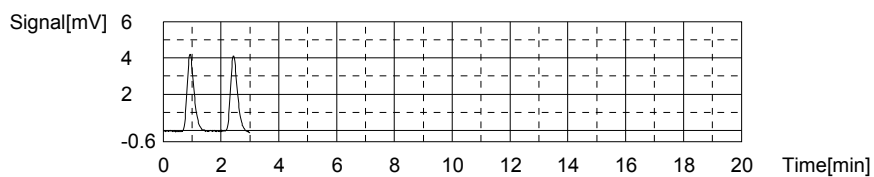
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No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.087	-0.3383mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 3:44:20 PM
2	6.894	-0.3440mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 3:48:24 PM

Mean Area 6.991
Mean Conc. -0.3412mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

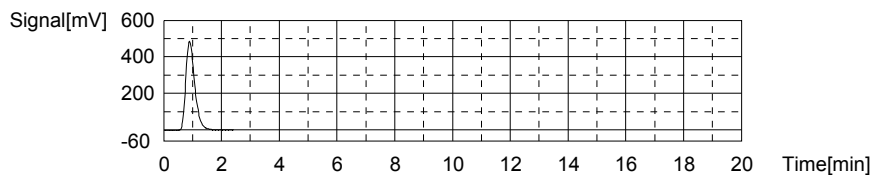
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.69mg/L TC:24.36mg/L IC:-0.3271mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1048	24.36mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_09_32	14/10/2017 3:56:15 PM

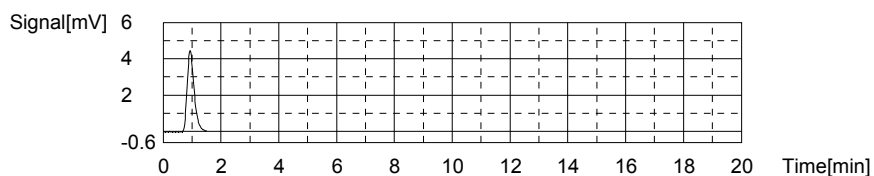
Mean Area 1048
Mean Conc. 24.36mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.460	-0.3271mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 4:00:34 PM

Mean Area 7.460
Mean Conc. -0.3271mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

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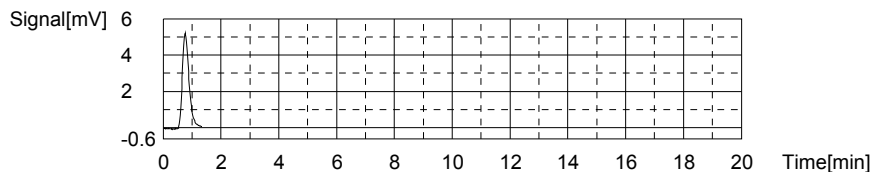
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1344mg/L TC:-0.2028mg/L IC:-0.3372mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.280	-0.2028mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 4:05:32 PM

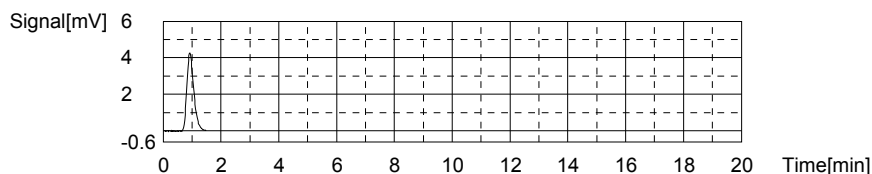
Mean Area 8.280
Mean Conc. -0.2028mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.122	-0.3372mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 4:09:23 PM

Mean Area 7.122
Mean Conc. -0.3372mg/L



Sample

Sample Name: L17040375-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

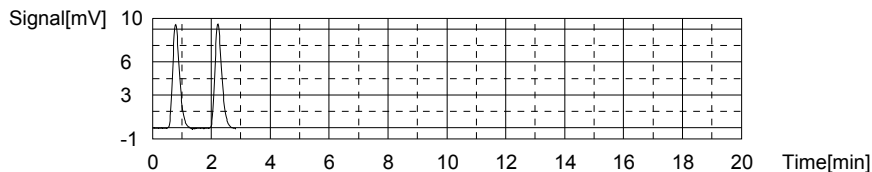
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.3148mg/L TC:-0.03438mg/L IC:-0.3492mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	15.37	-0.03533mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 4:16:16 PM
2	15.45	-0.03344mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 4:19:57 PM

Mean Area 15.41
Mean Conc. -0.03438mg/L



Anal.: IC

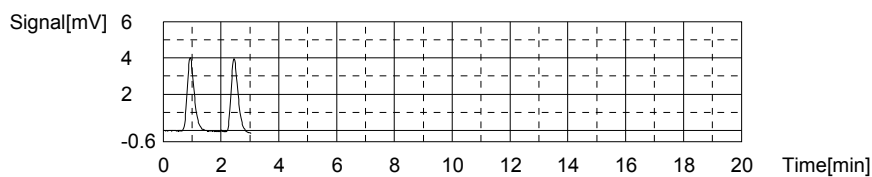
11/33

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No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	6.770	-0.3477mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 4:24:16 PM
2	6.675	-0.3506mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 4:28:24 PM

Mean Area 6.723
Mean Conc. -0.3492mg/L



Sample

Sample Name: L17040382-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

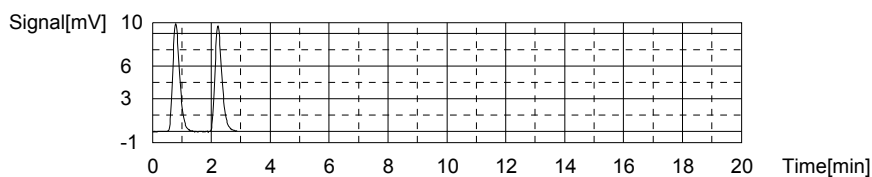
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.3193mg/L TC:-0.01997mg/L IC:-0.3392mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	16.05	-0.01926mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 4:36:35 PM
2	15.99	-0.02068mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 4:40:18 PM

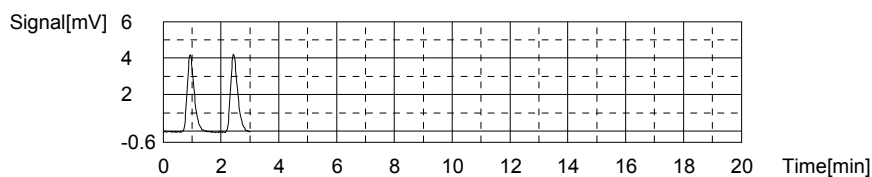
Mean Area 16.02
Mean Conc. -0.01997mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	6.953	-0.3423mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 4:44:35 PM
2	7.158	-0.3362mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 4:48:41 PM

Mean Area 7.056
Mean Conc. -0.3392mg/L



Sample

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Sample Name: L17040383-01
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

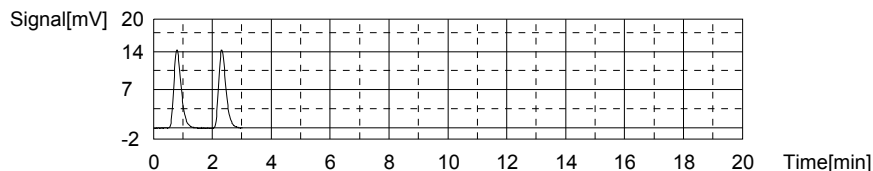
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.5178mg/L TC:0.1837mg/L IC:-0.3341mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	24.67	0.1844mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 4:55:39 PM
2	24.61	0.1830mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 4:59:26 PM

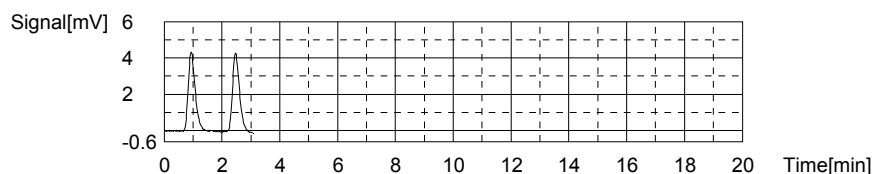
Mean Area 24.64
 Mean Conc. 0.1837mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.285	-0.3324mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 5:03:46 PM
2	7.169	-0.3358mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 5:07:53 PM

Mean Area 7.227
 Mean Conc. -0.3341mg/L



Sample

Sample Name: L17040384-01
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.670mg/L TC:8.128mg/L IC:5.459mg/L

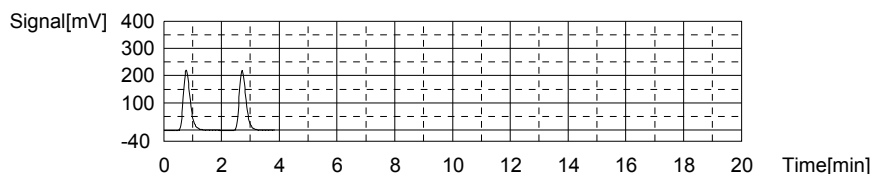
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	362.7	8.171mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 5:15:16 PM
2	359.1	8.086mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 5:19:27 PM

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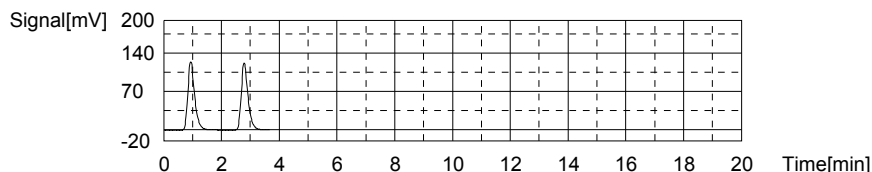
Mean Area 360.9
Mean Conc. 8.128mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	203.3	5.521mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 5:24:08 PM
2	199.1	5.396mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 5:28:35 PM

Mean Area 201.2
Mean Conc. 5.459mg/L



Sample

Sample Name: L17040384-02
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

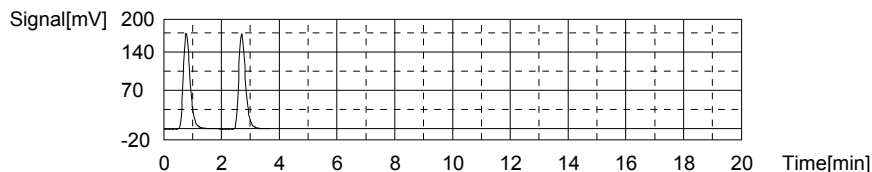
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.441mg/L TC:6.342mg/L IC:3.901mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	285.9	6.356mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 5:35:58 PM
2	284.7	6.328mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 5:40:01 PM

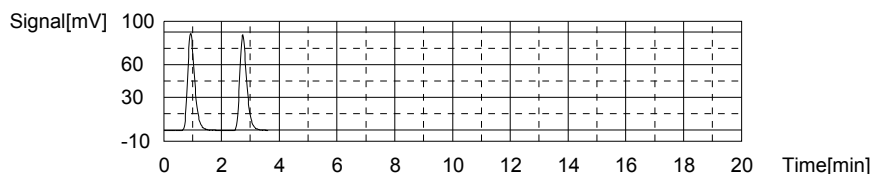
Mean Area 285.3
Mean Conc. 6.342mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	150.1	3.933mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 5:44:39 PM
2	148.0	3.870mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 5:49:03 PM

Mean Area 149.1
Mean Conc. 3.901mg/L



Sample

Sample Name: L17040384-03
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

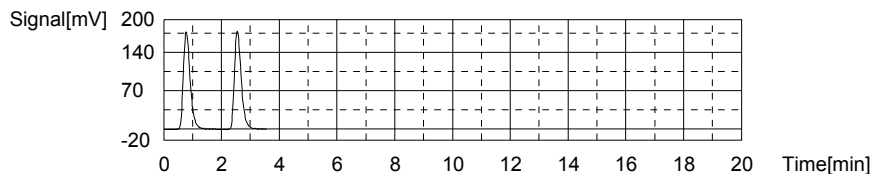
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.610mg/L TC:6.518mg/L IC:3.909mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	291.4	6.486mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 5:56:16 PM
2	294.1	6.550mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 6:00:20 PM

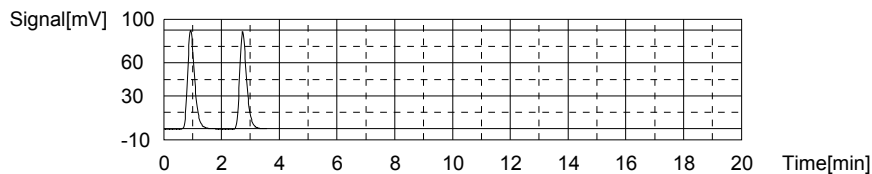
Mean Area 292.8
Mean Conc. 6.518mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	150.5	3.945mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 6:04:56 PM
2	148.1	3.873mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 6:09:19 PM

Mean Area 149.3
Mean Conc. 3.909mg/L



Sample

Sample Name: L17040384-04
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

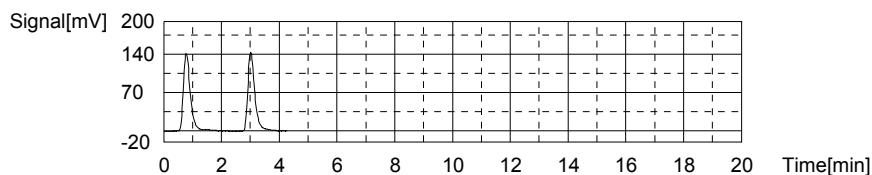
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.334mg/L TC:5.248mg/L IC:2.914mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	238.0	5.225mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 6:17:00 PM
2	240.0	5.272mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 6:21:19 PM

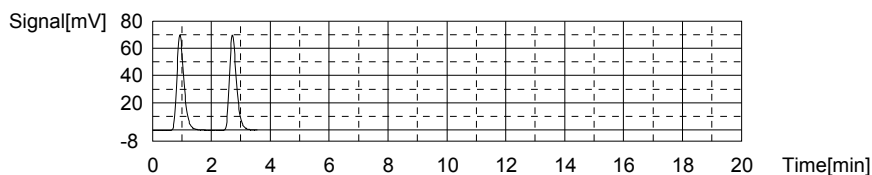
Mean Area 239.0
Mean Conc. 5.248mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	116.4	2.926mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 6:25:56 PM
2	115.6	2.902mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 6:30:18 PM

Mean Area 116.0
Mean Conc. 2.914mg/L



Sample

Sample Name: L17040384-05
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

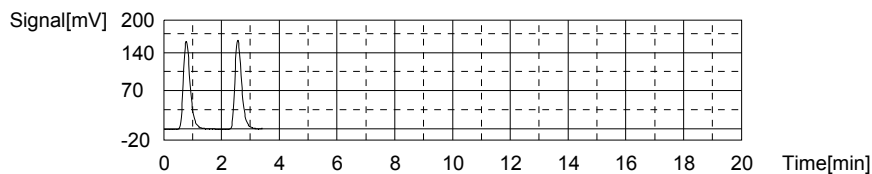
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.431mg/L TC:5.866mg/L IC:3.435mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	266.4	5.896mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 6:37:32 PM
2	263.9	5.837mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 6:41:27 PM

Mean Area 265.2
Mean Conc. 5.866mg/L



Anal.: IC

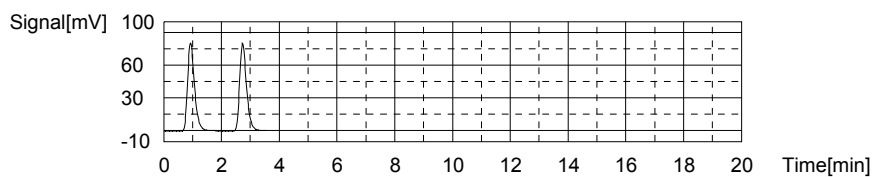
16/33

4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	133.4	3.434mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 6:46:03 PM
2	133.5	3.437mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 6:50:25 PM

Mean Area 133.4
Mean Conc. 3.435mg/L



Sample

Sample Name: L17040384-06
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

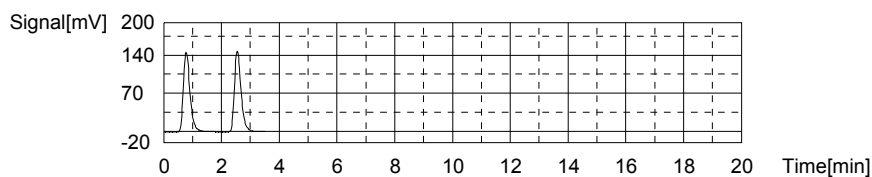
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.915mg/L TC:5.134mg/L IC:3.219mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	231.7	5.076mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 6:57:38 PM
2	236.6	5.192mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 7:01:39 PM

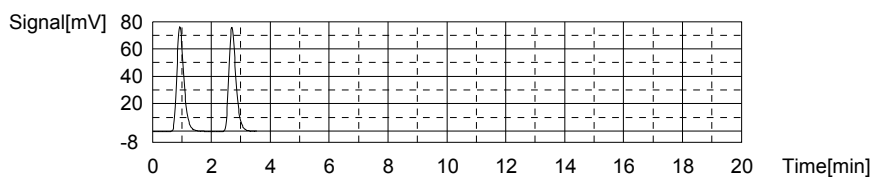
Mean Area 234.2
Mean Conc. 5.134mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	126.0	3.213mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 7:06:13 PM
2	126.4	3.225mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 7:10:35 PM

Mean Area 126.2
Mean Conc. 3.219mg/L



Sample

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4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.i32

Sample Name: L17040384-07
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

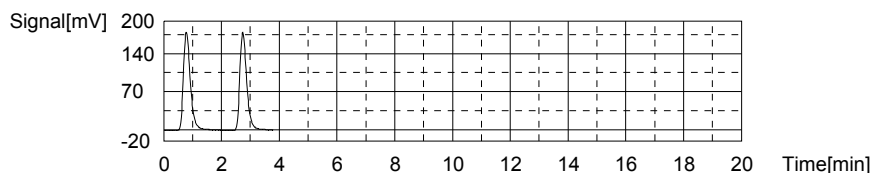
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.966mg/L TC:6.640mg/L IC:3.674mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	300.0	6.689mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 7:18:00 PM
2	295.8	6.590mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 7:22:07 PM

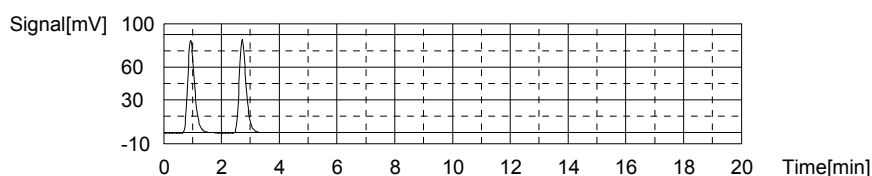
Mean Area 297.9
 Mean Conc. 6.640mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	140.3	3.640mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 7:26:45 PM
2	142.6	3.709mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 7:31:11 PM

Mean Area 141.4
 Mean Conc. 3.674mg/L



Sample

Sample Name: CCV
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.80mg/L TC:24.50mg/L IC:-0.2987mg/L

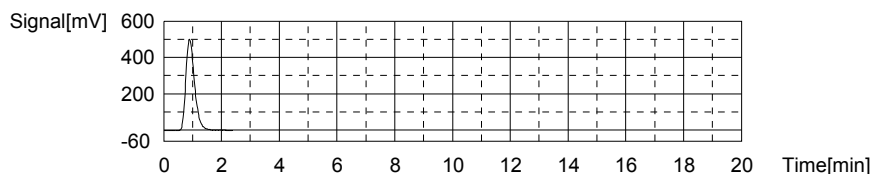
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1054	24.50mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 7:38:59 PM

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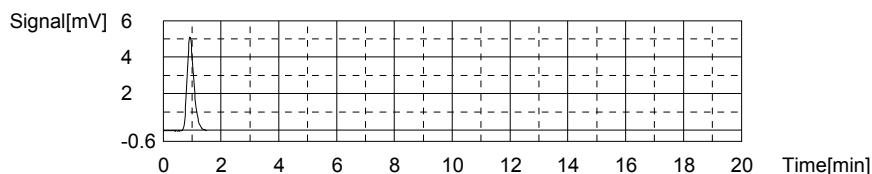
Mean Area 1054
Mean Conc. 24.50mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.413	-0.2987mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 7:43:17 PM

Mean Area 8.413
Mean Conc. -0.2987mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

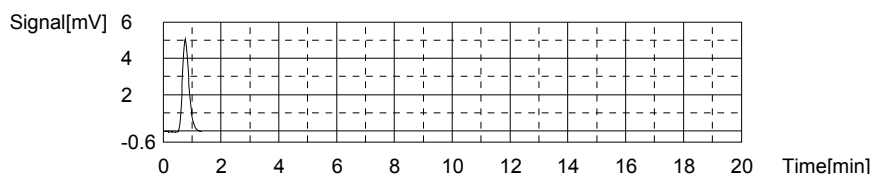
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1228mg/L TC:-0.2095mg/L IC:-0.3324mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.996	-0.2095mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_09_32	5/4/10/2017 7:48:15 PM

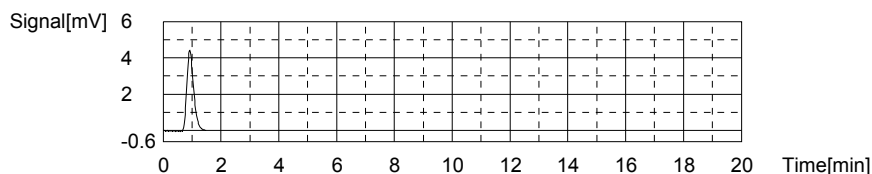
Mean Area 7.996
Mean Conc. -0.2095mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.284	-0.3324mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 7:52:06 PM

Mean Area 7.284
Mean Conc. -0.3324mg/L



4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

Sample

Sample Name: L17040384-08
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

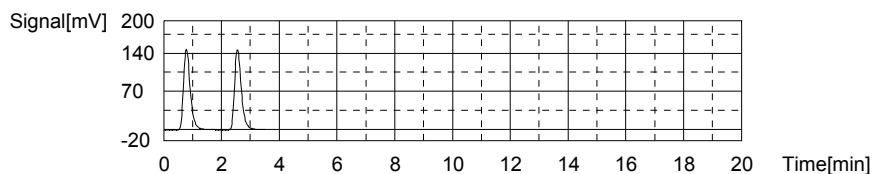
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.421mg/L TC:5.235mg/L IC:2.814mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	238.2	5.229mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 7:59:19 PM
2	238.7	5.241mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 8:03:21 PM

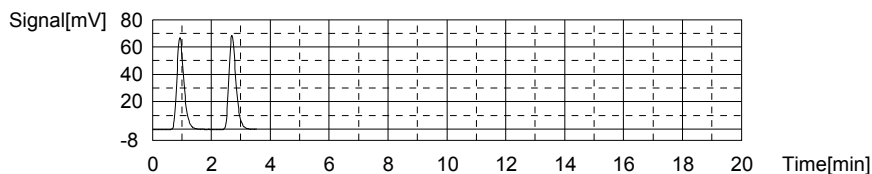
Mean Area 238.5
 Mean Conc. 5.235mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	111.3	2.774mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 8:07:58 PM
2	114.0	2.855mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 8:12:24 PM

Mean Area 112.7
 Mean Conc. 2.814mg/L



Sample

Sample Name: L17040384-09
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.148mg/L TC:4.732mg/L IC:2.584mg/L

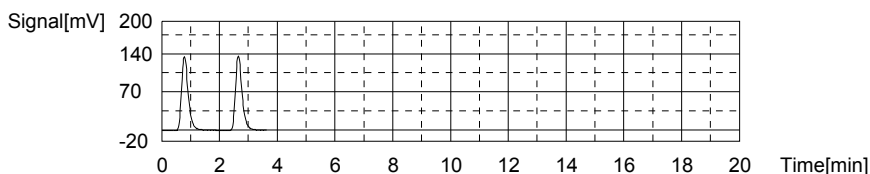
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	216.4	4.714mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 8:19:43 PM
2	217.9	4.750mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 8:23:45 PM

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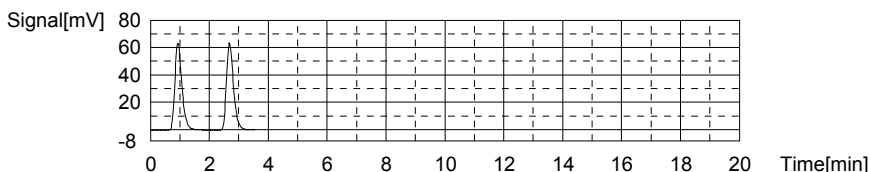
Mean Area 217.2
Mean Conc. 4.732mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	104.8	2.580mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 8:28:22 PM
2	105.1	2.589mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 8:32:47 PM

Mean Area 105.0
Mean Conc. 2.584mg/L



Sample

Sample Name: L17040384-10
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

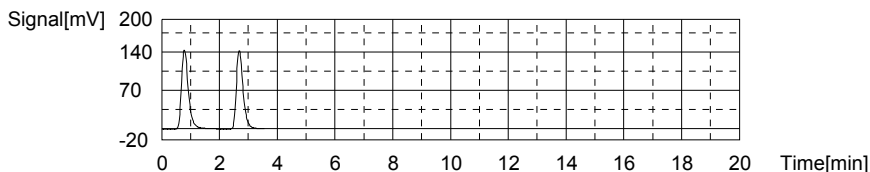
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.485mg/L TC:5.129mg/L IC:2.644mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	237.0	5.201mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 8:40:08 PM
2	230.9	5.057mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 8:44:04 PM

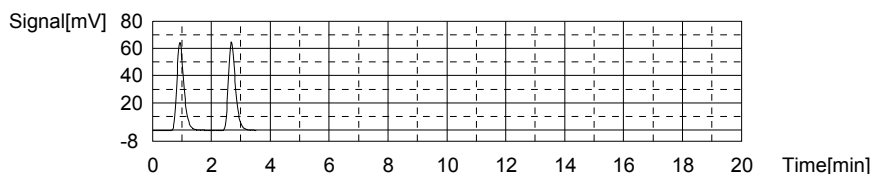
Mean Area 233.9
Mean Conc. 5.129mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	106.3	2.625mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 8:48:39 PM
2	107.6	2.663mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 8:53:05 PM

Mean Area 107.0
Mean Conc. 2.644mg/L



Sample

Sample Name: WG609513-05 DUP
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

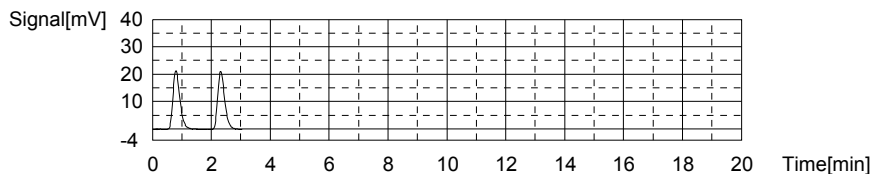
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.7532mg/L TC:0.4274mg/L IC:-0.3258mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	34.98	0.4280mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 9:00:05 PM
2	34.93	0.4268mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 9:03:53 PM

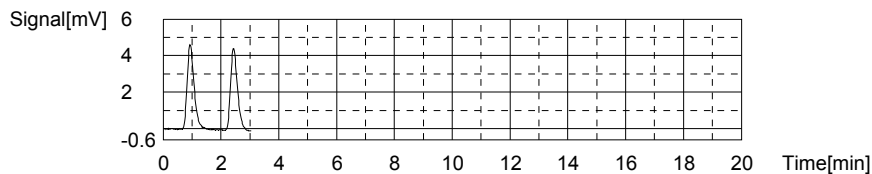
Mean Area 34.95
Mean Conc. 0.4274mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.589	-0.3233mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 9:08:14 PM
2	7.420	-0.3283mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 9:12:21 PM

Mean Area 7.505
Mean Conc. -0.3258mg/L



Sample

Sample Name: WG609513-06 MS
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

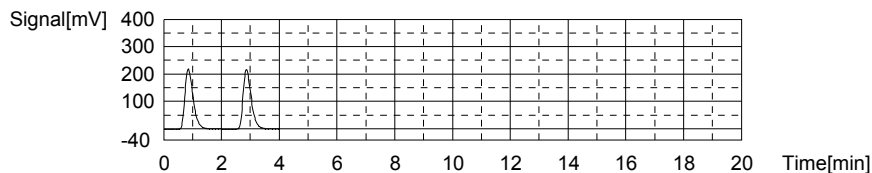
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:10.08mg/L TC:9.747mg/L IC:-0.3320mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	434.4	9.865mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 9:19:50 PM
2	424.4	9.629mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 9:24:07 PM

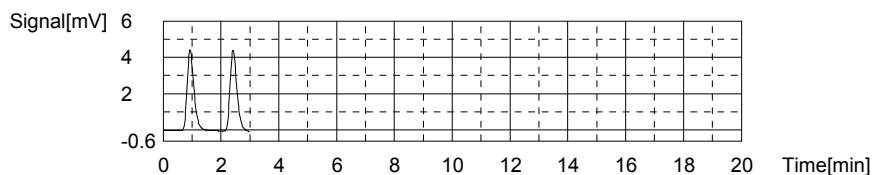
Mean Area 429.4
Mean Conc. 9.747mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.224	-0.3342mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 9:28:26 PM
2	7.368	-0.3299mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 9:32:31 PM

Mean Area 7.296
Mean Conc. -0.3320mg/L



Sample

Sample Name: WG609576-01 BLK
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

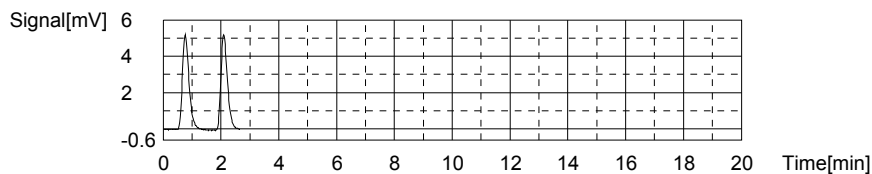
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1225mg/L TC:-0.2060mg/L IC:-0.3285mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.166	-0.2055mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 9:37:29 PM
2	8.124	-0.2065mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 9:40:57 PM

Mean Area 8.145
Mean Conc. -0.2060mg/L



Anal.: IC

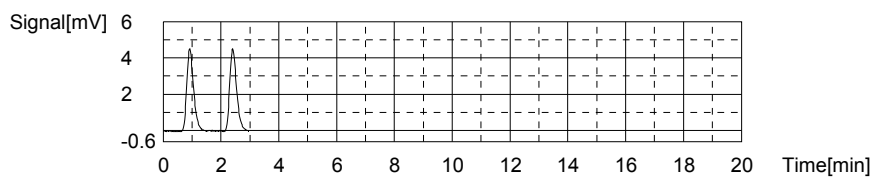
23/33

4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.371	-0.3298mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 9:44:47 PM
2	7.455	-0.3273mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 9:48:38 PM

Mean Area 7.413
Mean Conc. -0.3285mg/L



Sample

Sample Name: WG609576-02 LCS
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

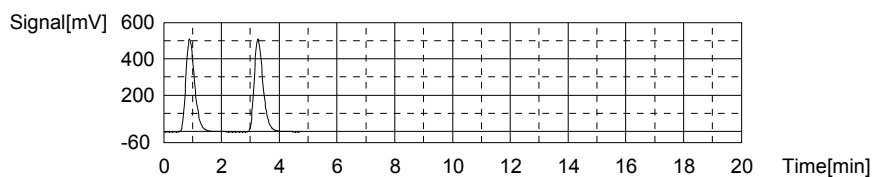
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:25.54mg/L TC:25.22mg/L IC:-0.3124mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1083	25.19mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 9:56:28 PM
2	1086	25.26mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 10:01:06 PM

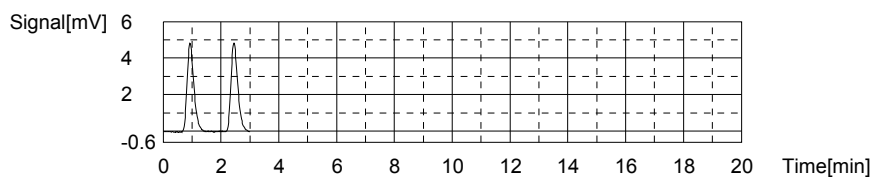
Mean Area 1085
Mean Conc. 25.22mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.960	-0.3122mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 10:05:28 PM
2	7.944	-0.3127mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 10:09:31 PM

Mean Area 7.952
Mean Conc. -0.3124mg/L



Sample

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4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.i32

Sample Name: WG609576-03 LCS DUP
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

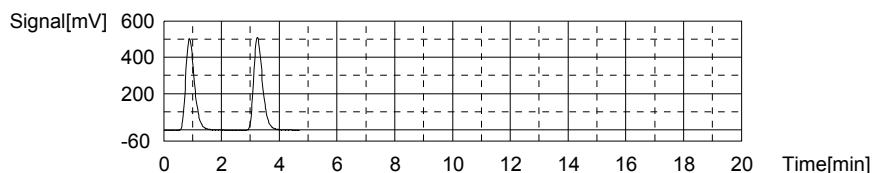
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:25.21mg/L TC:24.89mg/L IC:-0.3139mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1058	24.60mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 10:17:20 PM
2	1083	25.19mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 10:21:58 PM

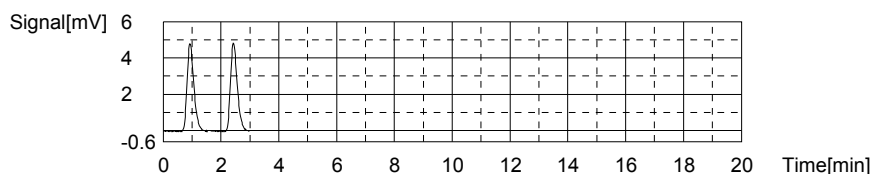
Mean Area 1071
 Mean Conc. 24.89mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.916	-0.3135mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 10:26:15 PM
2	7.894	-0.3142mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/10/2017 10:30:20 PM

Mean Area 7.905
 Mean Conc. -0.3139mg/L



Sample

Sample Name: L17040345-01 (25)
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:10.57mg/L TC:10.81mg/L IC:0.2362mg/L

1. Det

Anal.: TC

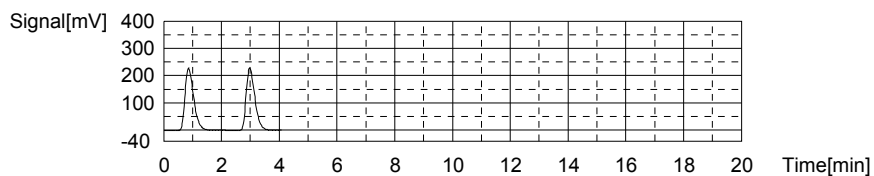
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	473.8	10.80mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 10:37:56 PM
2	474.7	10.82mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/10/2017 10:42:10 PM

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4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

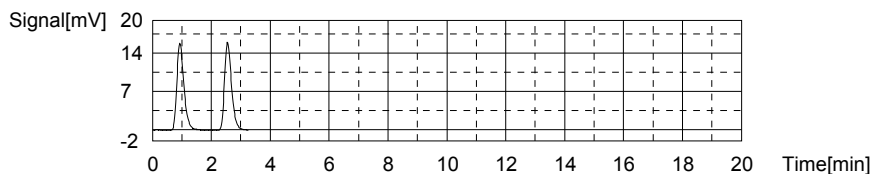
Mean Area 474.3
Mean Conc. 10.81mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	26.10	0.2295mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 10:46:35 PM
2	26.55	0.2430mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 10:50:48 PM

Mean Area 26.33
Mean Conc. 0.2362mg/L



Sample

Sample Name: L17040384-11
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

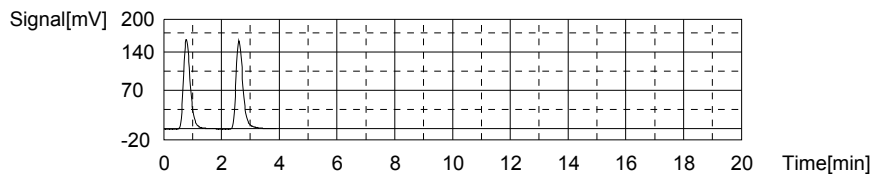
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.753mg/L TC:5.964mg/L IC:3.211mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	267.7	5.926mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 10:58:05 PM
2	270.9	6.002mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 11:02:27 PM

Mean Area 269.3
Mean Conc. 5.964mg/L

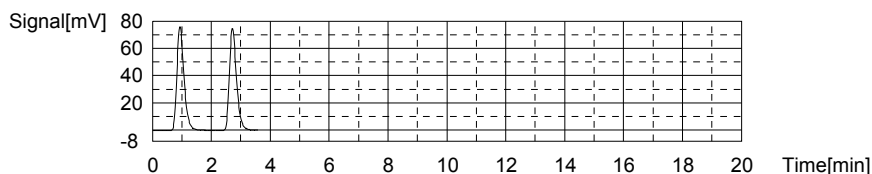


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	126.9	3.240mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 11:07:06 PM
2	125.0	3.183mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/10/2017 11:11:31 PM

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Mean Area 126.0
Mean Conc. 3.211mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

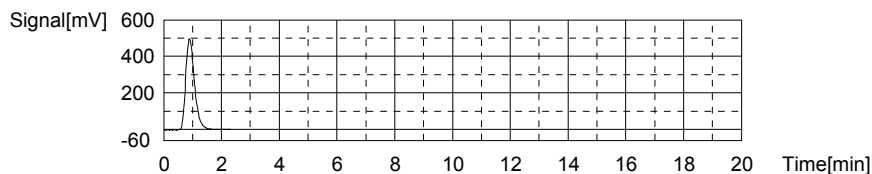
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.62mg/L TC:24.31mg/L IC:-0.3056mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1046	24.31mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 11:19:18 PM

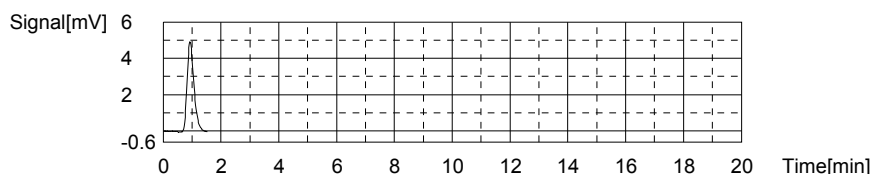
Mean Area 1046
Mean Conc. 24.31mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.180	-0.3056mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45	14/10/2017 11:23:37 PM

Mean Area 8.180
Mean Conc. -0.3056mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1159mg/L TC:-0.2055mg/L IC:-0.3213mg/L

4/11/2017 8:08:49 AM

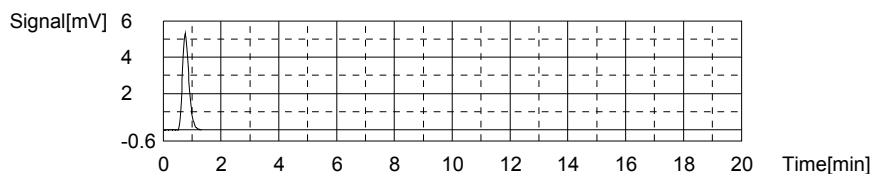
04-10-2017-EPT-TOC.t32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.168	-0.2055mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 11:28:35 PM

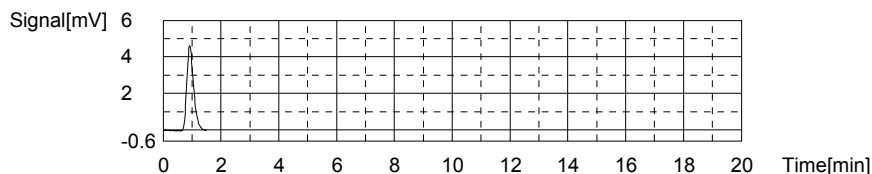
Mean Area 8.168
Mean Conc. -0.2055mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.654	-0.3213mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 11:32:28 PM

Mean Area 7.654
Mean Conc. -0.3213mg/L



Sample

Sample Name: L17040384-12
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

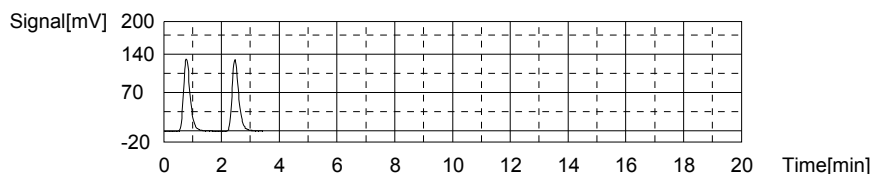
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.107mg/L TC:4.495mg/L IC:2.388mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	207.1	4.495mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 11:39:37 PM
2	207.1	4.495mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 11:43:39 PM

Mean Area 207.1
Mean Conc. 4.495mg/L

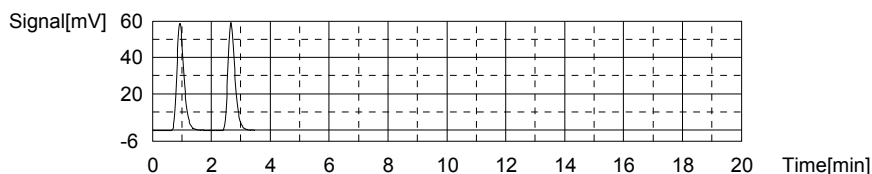


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	98.15	2.381mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 11:48:12 PM
2	98.58	2.394mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/10/2017 11:52:31 PM

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Mean Area 98.37
 Mean Conc. 2.388mg/L



Sample

Sample Name: L17040384-13
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

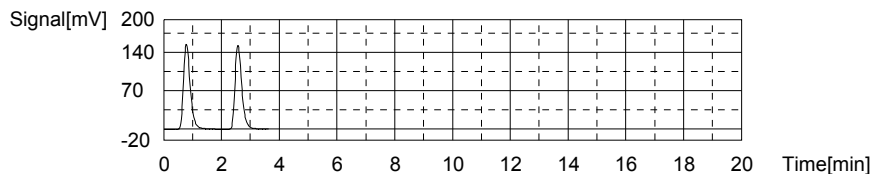
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.454mg/L TC:5.519mg/L IC:3.065mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	251.1	5.534mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/10/2017 11:59:46 PM
2	249.8	5.503mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/11/2017 12:03:53 AM

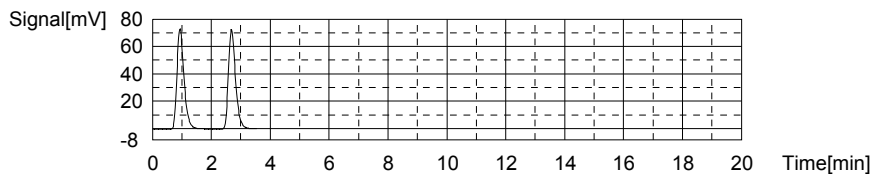
Mean Area 250.5
 Mean Conc. 5.519mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	120.8	3.058mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/11/2017 12:08:29 AM
2	121.3	3.073mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/11/2017 12:12:54 AM

Mean Area 121.1
 Mean Conc. 3.065mg/L



Sample

Sample Name: L17040384-14
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

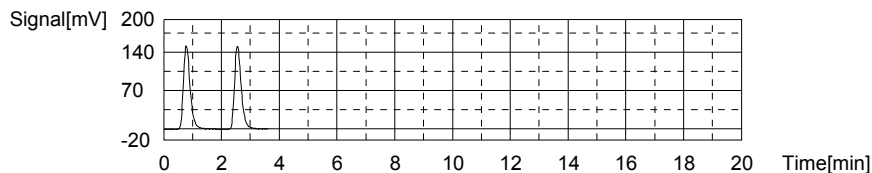
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.194mg/L TC:5.359mg/L IC:3.165mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	243.5	5.355mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/11/2017 12:20:08 AM
2	243.9	5.364mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/11/2017 12:24:16 AM

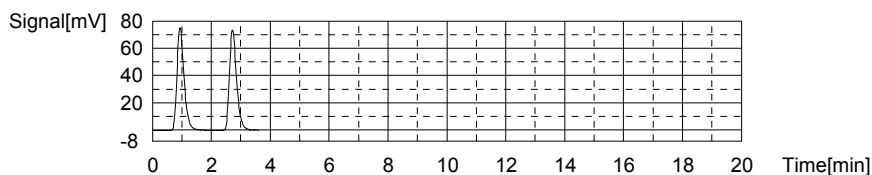
Mean Area 243.7
Mean Conc. 5.359mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	125.2	3.189mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/11/2017 12:28:56 AM
2	123.6	3.141mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/11/2017 12:33:21 AM

Mean Area 124.4
Mean Conc. 3.165mg/L



Sample

Sample Name: L17040384-15
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status Completed
Chk. Result

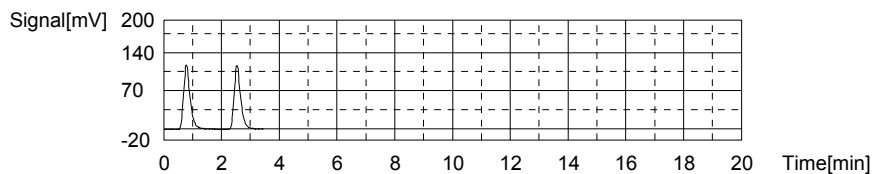
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.784mg/L TC:3.906mg/L IC:2.122mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	182.6	3.916mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/11/2017 12:40:34 AM
2	181.8	3.897mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/11/2017 12:44:33 AM

Mean Area 182.2
Mean Conc. 3.906mg/L



Anal.: IC

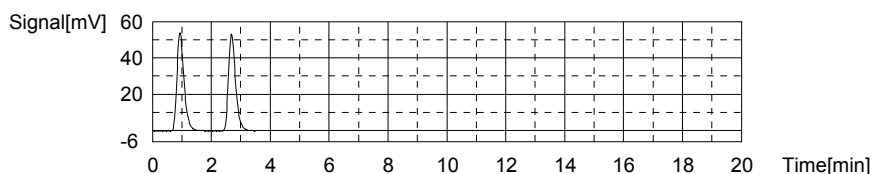
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4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	89.74	2.130mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/11/2017 12:49:12 AM
2	89.23	2.115mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/11/2017 12:53:34 AM

Mean Area 89.49
Mean Conc. 2.122mg/L



Sample

Sample Name: WG609576-06 DUP
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

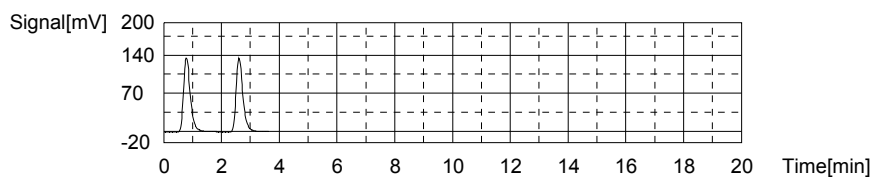
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.620mg/L TC:4.793mg/L IC:2.174mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	219.4	4.785mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/11/2017 1:00:51 AM
2	220.1	4.802mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/11/2017 1:04:57 AM

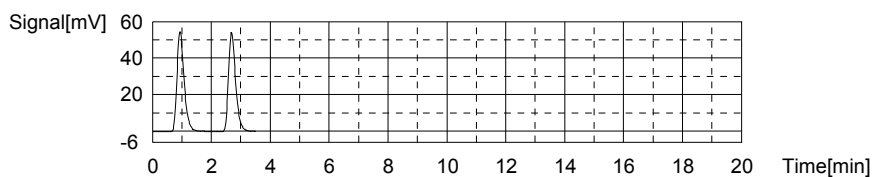
Mean Area 219.8
Mean Conc. 4.793mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	91.53	2.183mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/11/2017 1:09:31 AM
2	90.89	2.164mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/11/2017 1:13:51 AM

Mean Area 91.21
Mean Conc. 2.174mg/L



Sample

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4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

Sample Name: WG609576-07 MS
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

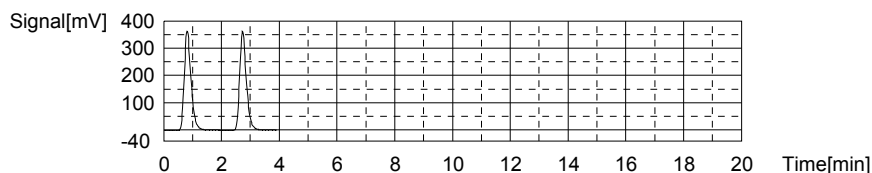
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:11.60mg/L TC:13.44mg/L IC:1.841mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	585.5	13.43mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/11/2017 1:21:15 AM
2	585.8	13.44mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/11/2017 1:25:31 AM

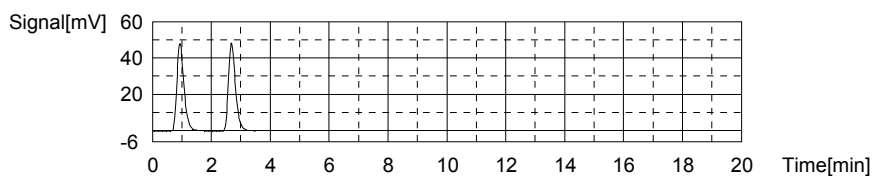
Mean Area 585.7
 Mean Conc. 13.44mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	80.11	1.842mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/11/2017 1:30:05 AM
2	80.01	1.839mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/11/2017 1:34:27 AM

Mean Area 80.06
 Mean Conc. 1.841mg/L



Sample

Sample Name: CCV
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.59mg/L TC:24.29mg/L IC:-0.2950mg/L

1. Det

Anal.: TC

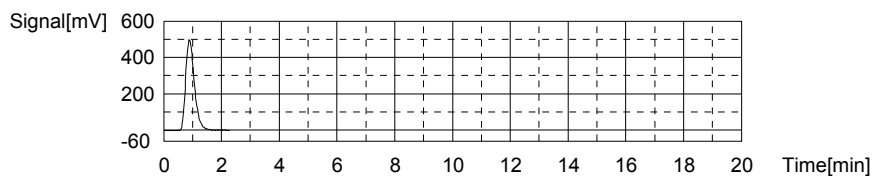
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1045	24.29mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/11/2017 1:42:12 AM

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4/11/2017 8:08:49 AM

04-10-2017-EPT-TOC.t32

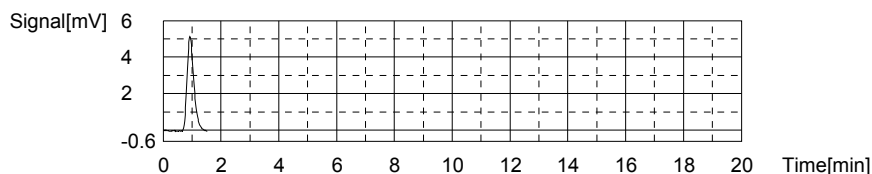
Mean Area 1045
Mean Conc. 24.29mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.535	-0.2950mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/11/2017 1:46:33 AM

Mean Area 8.535
Mean Conc. -0.2950mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

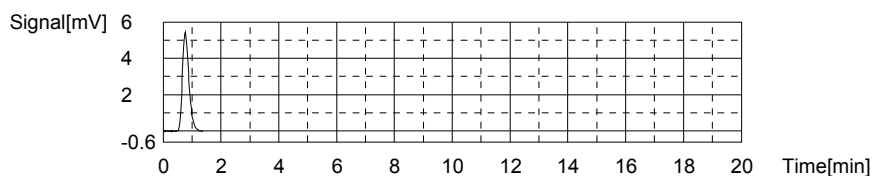
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1109mg/L TC:-0.1979mg/L IC:-0.3087mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.491	-0.1979mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32	14/11/2017 1:51:34 AM

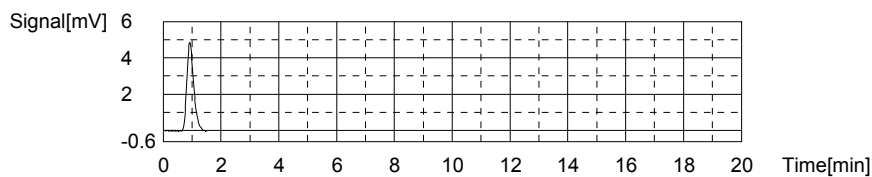
Mean Area 8.491
Mean Conc. -0.1979mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.076	-0.3087mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/11/2017 1:55:28 AM

Mean Area 8.076
Mean Conc. -0.3087mg/L



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3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
April 13, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
PDM - PIERCE D. MORRIS	PIT - MICROBAC WARRENDALE
REK - BOB E. KYER	RLB - BOB BUCHANAN
RNP - RICK N. PETTY	SAV - SARAH A. VANDENBERG
SCB - SARAH C. BOGOLIN	SCJ - SUE ELLEN C. JOHNSON
SDC - SHALYN D. CONLEY	TB - TODD BOYLE
TMB - TIFFANY M. BAILEY	TMM - TAMMY M. MORRIS
VC - VICKI COLLIER	WTD - WADE T. DELONG
XXX - UNAVAILABLE OR SUBCONTRACT	

List of Valid Qualifiers

April 13, 2017

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample receipt exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample receipt exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentatively identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound



List of Valid Qualifiers

April 13, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample receipt exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below



CHAIN OF CUSTODY

Name Of Lab Shipping To: MICROBAC (740) 373-4071 ATTN: STEPHANIE MOSSBURG

Project: AECOM
 LONGHORN ARMY AMMN. PLANT (LHAAP)
 GROUNDWATER TREATMENT PLANT (GWTP)
 KARNACK, TEXAS
 Project No.
 60256135.GWTPT
 HRUMAR16

Job:
**GROUNDWATER TREATMENT PLANT
 WEEKLY SAMPLES**

Prepared By:
Scott Beesinger
 P.O. Number

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	NO. OF CONTAINERS	Analyses			Remarks (Preservatives, etc.)	Lab I.D.#
					AMMONIA-N	ORTHO-PHOSPHATE	TOTAL ORGANIC CARBON		
LH18/24-SP650-6430-Grab	Water	04/06/17 / 15:00		2	X			H2SO4	
LH18/24-SP650-6430-Grab	Water	04/06/17 / 15:00		1	X			NONE	

Additional Remarks: **Standard TAT on all parameters** Send results to Linda Raabe at linda.raabe@aecom.com or call at 210-253-7518

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
<i>Scott Beesinger</i>	04/06/17	15:30									

Received At Lab By:

Date: _____ Time: _____

Airbill No. _____

Date: _____ Time: _____

Temp of Container: _____

Seal No. _____

Condition: _____

For Lab Use Only

Opened By: _____

Date: _____ Time: _____

Microbac OVD
 Received: 04/07/2017 10:09
 By: BRENDA GREGORY

221000099255

Brenda Gregory

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17040345

Account: 2551

Project: 2551.096

Samples: 1

Due Date: 18-APR-2017

Samplenum **Container ID** **Products**
L17040345-01 891246 PO4

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	WET	07-APR-2017 11:09	BRG		
2	STORE	WET	A1	11-APR-2017 08:15	CLS	DLP	

Samplenum **Container ID** **Products**
L17040345-01 891247 TOC

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	07-APR-2017 11:09	BRG		<2
2	ANALYZ	W1	WET	10-APR-2017 10:15	EPT	CLS	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	07-APR-2017 11:09	BRG		<2

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login



NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
 Total Halide by Bomb Combustion (TX)
 Particle Sizing - 200 Mesh (PS200)
 Specific Gravity/Density (SPGRAV)
 Total Residual Chlorine (CL-TRL)
 Total Volatile Solids (all forms) (TVS)
 Total Coliform Bacteria (all methods)
 Fecal Coliform Bacteria (all methods)
 Sulfite (SO₃)
 Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS

Nitrogen, Ammonia by Method 350.1
 Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
 Phenolics, Total by Method 420.1
 ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
 Acetic acid
 Butyric acid
 Lactic acid
 Propionic acid
 Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
 1-Methylnaphthalene
 1,4-Dioxane
 Atrazine
 Benzaldehyde
 Biphenyl
 Caprolactam
 Hexamethylphosphoramide (HMPA)
 Pentachlorobenzene
 Pentachloroethane

NELAP Accreditation by Laboratory SOP**NONPOTABLE WATER**OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALSOVD MSS01/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP**SOLID AND HAZARDOUS CHEMICALS**OVD MSV01/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)

Laboratory Report Number: L17040618

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on April 24 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



Lab Report #: L17040618

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution
-------------	------------

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00112195	I	5.0		J4616882327	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	Yes

**Lab Report #:** L17040618**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP650-6431-GRAB	L17040618-01	04/12/2017 15:00	04/13/2017 09:33
TRIP BLANK	L17040618-02	04/12/2017 00:01	04/13/2017 09:33



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	8260
Prep Batch Number(s):	609950	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-14 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Sarah Vandenberg	<i>Sarah Vandenberg</i>		2017-04-14 17:49:53



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	8260
Prep Batch Number(s):	609950	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-14 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?	X				
Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	8260
Prep Batch Number(s):	609950	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-14 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	8260
Prep Batch Number(s):	609950	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-14 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	8260
Prep Batch Number(s):	609950	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-14 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	8260
Prep Batch Number(s):	609950	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-04-14 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG610353	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-20 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2017-04-20 14:52:13



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG610353	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-20 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?	X				
Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG610353	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-20 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG610353	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-20 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG610353	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-20 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

- Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
- O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
- NA = Not applicable;
- NR = Not reviewed;
- ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG610353	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-20 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Kerri Buck	<i>Kerri Buck</i>		2017-04-24 19:26:18



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports	X				
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?					
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?	X				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Kerri Buck	<i>Kerri Buck</i>		2017-04-24 19:25:00



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports	X				
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?					
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?	X				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-14 14:29:12



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040618
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

Lab Report #: L17040618
 Lab Project #: 2551.096
 Project Name: Longhorn Army Ammunition
 Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040618-01	PrePrep Method: N/A	Instrument: HPMS8
Client ID: LH18/24-SP650-6431-GRAB	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 03/21/2017 20:43
Workgroup #: WG609950	Analyst: TMB	Run Date: 04/13/2017 21:39
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: 8M418947
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	5.89	J	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.701	J	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	4.18		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,2-Dichloroethane-d4	92.6	70	120			
4-Bromofluorobenzene	99.8	75	120			
Dibromofluoromethane	94.2	85	115			
Toluene-d8	97.5	85	120			
J	Estimated value ; the analyte concentration was less than the LOQ.					
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17040618
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040618-01	PrePrep Method: N/A	Instrument: HPMS15
Client ID: LH18/24-SP650-6431-GRAB	Prep Method: 3520C	Prep Date: 04/17/2017 13:45
Matrix: Water	Analytical Method: 8270D	Cal Date: 03/21/2017 13:29
Workgroup #: WG610568	Analyst: LJH	Run Date: 04/18/2017 13:21
Collect Date: 04/12/2017 15:00	Dilution: 5	File ID: 15M21018
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,4-Dioxane	123-91-1	15.8		10.0	5.00	2.50
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,4-Dioxane-d8	59.9	20	129			

Certificate of Analysis

Sample #: L17040618-01	PrePrep Method: N/A	Instrument: ICP-THERMO4
Client ID: LH18/24-SP650-6431-GRAB	Prep Method: 3015A	Prep Date: 04/13/2017 12:38
Matrix: Water	Analytical Method: 6010C	Cal Date: 04/21/2017 12:12
Workgroup #: WG610749	Analyst: KKB	Run Date: 04/21/2017 15:48
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: T4.042117.154820
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Selenium, Total	7782-49-2	0.0200	U	0.0200	0.0200	0.0100
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17040618
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040618-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP650-6431-GRAB	Prep Method: 3015	Prep Date: 04/14/2017 08:52
Matrix: Water	Analytical Method: 6020A	Cal Date: 04/14/2017 10:09
Workgroup #: WG610246	Analyst: JYH	Run Date: 04/14/2017 12:56
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: NI.041417.125654
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Barium, Total	7440-39-3	0.219		0.00600	0.00300	0.00150
Lead, Total	7439-92-1	0.00100	U	0.00200	0.00100	0.000500
Silver, Total	7440-22-4	0.00100	U	0.00200	0.00100	0.000500

U	Analyte was not detected. The concentration is below the reported LOD.
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Lab Report #: L17040618
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040618-01	PrePrep Method: N/A	Instrument: UV-2600
Client ID: LH18/24-SP650-6431-GRAB	Prep Method: 7196A	Prep Date: N/A
Matrix: Water	Analytical Method: 7196A	Cal Date: 03/10/2017 13:59
Workgroup #: WG610118	Analyst: DLP	Run Date: 04/13/2017 14:00
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: 00.1704131400-06
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chromium, Hexavalent	18540-29-9	0.0100	U	0.0200	0.0100	0.00500
U	Analyte was not detected. The concentration is below the reported LOD.					

Certificate of Analysis

Sample #: L17040618-02	PrePrep Method: N/A	Instrument: HPMS8
Client ID: TRIP BLANK	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 03/21/2017 20:43
Workgroup #: WG609950	Analyst: TMB	Run Date: 04/13/2017 21:09
Collect Date: 04/12/2017 00:01	Dilution: 1	File ID: 8M418946
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	89.4	70	120	
4-Bromofluorobenzene	101	75	120	
Dibromofluoromethane	92.0	85	115	
Toluene-d8	97.8	85	120	

U Analyte was not detected. The concentration is below the reported LOD.

Certificate of Analysis

2.1 Volatiles Data

2.1.1 Volatiles GCMS Data (8260)

2.1.1.1 Summary Data

Certificate of Analysis

Sample #: L17040618-01	PrePrep Method: N/A	Instrument: HPMS8
Client ID: LH18/24-SP650-6431-GRAB	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 03/21/2017 20:43
Workgroup #: WG609950	Analyst: TMB	Run Date: 04/13/2017 21:39
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: 8M418947
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	5.89	J	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.701	J	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	4.18		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	92.6	70	120	
4-Bromofluorobenzene	99.8	75	120	
Dibromofluoromethane	94.2	85	115	
Toluene-d8	97.5	85	120	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Certificate of Analysis

Sample #: L17040618-02

PrePrep Method: N/A

Instrument: HPMS8

Client ID: TRIP BLANK

Prep Method: 5030B/5030C/5035A

Prep Date: N/A

Matrix: Water

Analytical Method: 8260B

Cal Date: 03/21/2017 20:43

Workgroup #: WG609950

Analyst: TMB

Run Date: 04/13/2017 21:09

Collect Date: 04/12/2017 00:01

Dilution: 1

File ID: 8M418946

Sample Tag: 01

Units: ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,2-Dichloroethane-d4	89.4	70	120			
4-Bromofluorobenzene	101	75	120			
Dibromofluoromethane	92.0	85	115			
Toluene-d8	97.8	85	120			
U	Analyte was not detected. The concentration is below the reported LOD.					

Certificate of Analysis

2.1.1.2 QC Summary Data

Example 8260 Calculations

1.0 Calculating the Response Factor (RF) from the initial calibration (ICAL) data:

$$RF = [(Ax) (Cis)] / [(Ais) (Cx)]$$

Example

where:

Ax = Area of the characteristic ion for the compound being measured:	3399156
Cis = Concentration of the specific internal standard (ug/mL)	25
Ais = Area of the characteristic ion of the specific internal standard	846471
Cx = Concentration of the compound in the standard being measured (ug/mL)	100
RF = Calculated Response Factor	1.0039

2.0 Calculating the concentration (C) of a compound in water using the average RF: *

$$Cx = [(Ax) (Cis) (Vn)(D)] / [(Ais) (RF) (Vs)]$$

Example

where:

Ax = Area of the characteristic ion for the compound being measured	3122498
Cis = Concentration of the specific internal standard (ug/L)	25
D = Dilution factor for sample as a multiplier (10x = 10)	1
Ais = Area of the characteristic ion of the specific internal standard	611048
RF = Average RF from the ICAL	1.004
Vs = Purge volume of sample (mL)	10
Vn = Nominal purge volume of sample (mL) (10.0 mL)	10
Cx = Concentration of the compound in the sample being measured (ug/L)	127.2428

3.0 Calculating the concentration (C) of a compound in soil using the average RF: *

$$Cx = [(Ax) (Cis) (Wn)(D)] / [(Ais) (RF) (Ws)]$$

Example

where:

Ax = Area of the characteristic ion for the compound being measured	3122498
Cis = Concentration of the specific internal standard (ug/L)	25
D = Dilution factor for sample as a multiplier (10x = 10)	1
Ais = Area of the characteristic ion of the specific internal standard	611048
RF = Average RF from the ICAL	1.004
Ws = Weight of sample purged (g)	5
Wn = Nominal purge weight (g) (5.0 g)	5
Cx = Concentration of the compound in the sample being measured (ug/L)	127.2428

Dry weight correction:

Percent solids (PCT_S)	50
Cd = (Cx) (100)/PCT_S	254.4856

* Concentrations appearing on the instrument quantitation reports are on-column results and do not take into account initial volume, final volume, and the dilution factor.

4.0 Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, $y = mx + b$

y = response ratio = response of analyte / response of IS = Ax/Ais

x = amount ratio = concentration analyte/concentration internal standard = Cx / Cis

m = slope from curve = 0.213

b = intercept from curve = - 0.00642

Step 2: Calculate y from Quantitation Report

$$y = 86550/593147 = 0.1459$$

Step 3: Solve for x

$$x = (y - b)/m = [(0.1459 - (-0.00642))/0.213] = 0.7152$$

Step 4: Solve for analyte concentration Cx

$$Cx = Cis (x) = (25.0)(0.7152) = 17.88$$

Example Spreadsheet Calculation:

Slope from curve, m:	0.213
Intercept from curve, b:	-0.00642
Area of analyte, Ax:	86550
Area of Internal Standard, Ais:	593147
Concentration of IS, Cis	25.00
Response Ratio:	0.145917
Amount Ratio:	0.715195
Concentration:	17.87988
Units of Internal Standard:	ug/L

5.0 Concentration from Quadratic Regression**Step 1 - Retrieve Curve Data from Plot, $y = Ax^2 + Bx + C$**

Where:

$$Ax^2 + Bx + (C - y) = 0$$

A, B, C = constants from the ICAL quadratic regression

y = Response ratio = Area of analyte/Area of internal standard (IS)

x = Amount ratio = Concentration of analyte/concentration of IS

Step 2: Calculate y from Quantitation Report

$$y = Ax/Ais$$

Step 3: Solve for x using the quadratic formula

$$Ax^2 + Bx + C - y = 0$$

$$x = \frac{b \pm \sqrt{(b^2 - 4a(c - y))}}{2a} \quad (\text{Two possible solutions})$$

Step 4: Solve for analyte concentration Cx

$$Cx = (Cis)(\text{Amount ratio})$$

Example Spreadsheet Calculation:

Value of A from plot:	-0.00629
Value of B from plot:	0.511
Value of C from plot:	-0.0276
Area of unknown from quantitation report:	293821
Area of IS from quantitation report:	784848
Response ratio, y:	0.374367
C - y:	-0.40197
Root 1 - Computed amount ratio, X1:	80.44567
Root 2 - Computed amount ratio, X2:	0.794396 use this solution
Concentration of IS, Cis:	25.00
Concentration of analyte, Cx:	19.86 ug/L

Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 120816
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01 Rev: 24
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01 Rev: 18
 Maintenance Log ID: 53988

Internal Standard: STD78987 Surrogate Standard: STD78987
 CCV: STD79185; STD79330 LCS: STD79186; STD78319 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG594051; WG594142

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M416518	WG594051-01 50ng BFB STD A9/FOO	NA	1	1	STD78995	12/08/16 08:55
8M416519	WG594051-02 5ug/L STD A9/FOO	NA	1	1	STD79185	12/08/16 09:19
8M416520	WG594051-03 20ug/L STD A9/FOO	NA	1	1	STD79185	12/08/16 09:48
8M416521	WG594051-04 50ug/L STD A9/FOO	NA	1	1	STD79185	12/08/16 10:17
8M416522	WG594051-05 100ug/L STD A9/FOO	NA	1	1	STD79185	12/08/16 10:47
8M416523	WG594051-06 200ug/L STD A9/FOO	NA	1	1	STD79185	12/08/16 11:16
8M416524	WG594051-07 300ug/L STD A9/FOO	NA	1	1	STD79185	12/08/16 11:46
8M416525	WG594051-08 400ug/L STD A9/FOO	NA	1	1	STD79185	12/08/16 12:16
8M416526	WG594051-09 500ug/L STD A9/FOO	NA	1	1	STD79185	12/08/16 12:45
8M416527	RINSE	NA	1	1		12/08/16 13:14
8M416528	RINSE	NA	1	1		12/08/16 13:43
8M416529	WG594051-10 100ug/L STD A9/FOO	NA	1	1	STD79186	12/08/16 14:12
8M416530	WG594141-01 50ng BFB STD 8260	NA	1	1	STD78995	12/08/16 14:40
8M416531	WG594141-01 50ng BFB STD 8260	NA	1	1	STD78995	12/08/16 14:54
8M416532	WG594141-01 50ng BFB STD 8260	NA	1	1	STD78995	12/08/16 15:17
8M416533	WG594141-02 50ug/L CCV STD 8260	NA	1	1	STD79330	12/08/16 15:44
8M416534	WG594141-02 50ug/L CCV STD 8260	NA	1	1	STD79330	12/08/16 16:15
8M416535	WG000000-01 100ug/L A9 CCV STD 8260	NA	1	1	STD78971	12/08/16 16:45
8M416536	WG594142-01 VBLK1208 BLANK STD 826	NA	1	1		12/08/16 17:16
8M416537	WG594142-02 20ug/L LCS STD 8260	NA	1	1	STD79319	12/08/16 17:45
8M416538	L16120424-04 A MS 826-SPE	<2	1	1	STD79319	12/08/16 18:14
8M416539	L16120424-05 A MSD 826-SPE	<2	1	1	STD79319	12/08/16 18:43
8M416540	L16120315-05 B TB 826-SPE	<2	1	1		12/08/16 19:12
8M416541	L16120315-03 B EB 826-SPE	<2	1	1		12/08/16 19:41
8M416542	L16120424-01 A TB 826-SPE	<2	1	1		12/08/16 20:10
8M416543	L16120424-03 A RS 826-SPE	<2	1	1		12/08/16 20:39
8M416544	L16120424-06 A 826-SPE	<2	1	1		12/08/16 21:09
8M416545	L16120424-02 A 826-SPE	<2	1	1		12/08/16 21:40
8M416546	L16120315-01 B 826-SPE	<2	1	1		12/08/16 22:08
8M416547	L16120315-02 B 826-SPE	<2	1	1		12/08/16 22:37
8M416548	L16120315-04 B 826-SPE	<2	1	1		12/08/16 23:06
8M416549	L16120424-07 A 826-SPE	<2	1	1		12/08/16 23:35
8M416550	WG594142-06 20ug/L LCS2 STD 8260	NA	1	1	STD79319	12/09/16 00:04
8M416551	CCV	NA	1	1		12/09/16 00:33

Approved: December 09, 2016

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Wade D. [Signature]



Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 120816
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01 Rev: 24
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01 Rev: 18
 Maintenance Log ID: 53988

Internal Standard: STD78987 Surrogate Standard: STD78987
 CCV: STD79185; STD79330 LCS: STD79186; STD78319 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG594051; WG594142

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M416552	RINSE	NA	1	1		12/09/16 01:01

Comments

Seq.	Rerun	Dil.	Reason	Analytes
13	X			
File ID: 8M416530				
Tune failed, DNR.				
15	X			
File ID: 8M416531				
Tune failed, DNR.				
16				
File ID: 8M416532				
Purged BFB.				
17	X			
File ID: 8M416533				
DNR. Bromomethane was low.				
19				
File ID: 8M416535				
Not needed, DNR.				
27	X	10	Over Calibration Range	PCE
File ID: 8M416543				

Approved: December 09, 2016

Page: 2

Wade D. [Signature]



Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 032117
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01 Rev: 24
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01 Rev: 18
 Maintenance Log ID: 54101

Internal Standard: STD80702 Surrogate Standard: STD80702
 CCV: STD81040 LCS: STD81038 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG607066

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M418406	WG607066-01 50ng BFB STD 8260	NA	1	1	STD80989	03/21/17 15:10
8M418407	RINSE	NA	1	1		03/21/17 15:39
8M418408	WG607066-02 0.3ug/L STD 8260	NA	1	1	STD810	03/21/17 16:09
8M418409	WG607066-03 0.4ug/L STD 8260	NA	1	1	STD81040	03/21/17 16:39
8M418410	WG607066-04 1ug/L STD 8260	NA	1	1	STD81040	03/21/17 17:09
8M418411	WG607066-05 2ug/L STD 8260	NA	1	1	STD81040	03/21/17 17:40
8M418412	WG607066-06 5ug/L STD 8260	NA	1	1	STD81040	03/21/17 18:10
8M418413	WG607066-07 20ug/L STD 8260	NA	1	1	STD81040	03/21/17 18:41
8M418414	WG607066-08 50ug/L STD 8260	NA	1	1	STD81040	03/21/17 19:11
8M418415	WG607066-09 100ug/L STD 8260	NA	1	1	STD81040	03/21/17 19:42
8M418416	WG607066-10 200ug/L STD 8260	NA	1	1	STD81040	03/21/17 20:12
8M418417	WG607066-11 300ug/L STD 8260	NA	1	1	STD81040	03/21/17 20:43
8M418418	RINSE	NA	1	1		03/21/17 21:13
8M418419	RINSE	NA	1	1		03/21/17 21:44
8M418420	WG607066-12 50ug/L ALT SRC STD 8260	NA	1	1	STD81038	03/21/17 22:14
8M418421	RINSE	NA	1	1		03/21/17 22:45
8M418422	RINSE	NA	1	1		03/21/17 23:15
8M418423	RINSE	NA	1	1		03/21/17 23:45

Approved: March 24, 2017

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[Signature]



Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 041317
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54127

Internal Standard: STD81235 Surrogate Standard: STD81235
 CCV: STD81377 LCS: STD81409 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG609950

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M418929	WG609948-02 50ng BFB STD 8260	NA	1	1	STD80989	04/13/17 11:57
8M418930	WG609948-02 50ng BFB STD 8260	NA	1	1	STD80989	04/13/17 12:23
8M418931	WG609948-02 50ng BFB STD 8260	NA	1	1	STD80989	04/13/17 12:37
8M418932	WG609948-02 50ng BFB STD 8260	NA	1	1	STD80989	04/13/17 13:00
8M418933	WG609948-02 50ng BFB STD 8260	NA	1	1	STD80989	04/13/17 14:40
8M418934	WG609948-01 50ug/L CCV STD 8260	NA	1	1	STD81377	04/13/17 15:09
8M418935	WG000000-01 100ug/L A9 CCV STD 8260	NA	1	1	STD81397	04/13/17 15:44
8M418936	WG609950-01 VBLK0413 BLANK STD 826	NA	1	1		04/13/17 16:13
8M418937	WG609950-02 20ug/L LCS STD 8260	NA	1	1	STD81409	04/13/17 16:42
8M418938	WG609950-03 20ug/L LCS2 STD 8260	NA	1	1	STD81409	04/13/17 17:11
8M418939	L17040443-01 B 10X 826-TC	NA	17	10		04/13/17 17:42
8M418940	L17040483-02 B 10X 826-TC	NA	17	10		04/13/17 18:12
8M418941	L17040483-04 B 10X 826-TC	NA	17	10		04/13/17 18:42
8M418942	L17040583-03 A 10X 826-TC	NA	17	10		04/13/17 19:11
8M418943	L17040443-03 B 10X 826-TC	NA	17	10		04/13/17 19:41
8M418944	RINSE	NA	1	1		04/13/17 20:10
8M418945	L17040601-01 A 826-SPE CT1	7	1	1		04/13/17 20:39
8M418946	L17040618-02 A TB 826-SPE	<2	1	1		04/13/17 21:09
8M418947	L17040618-01 A 826-SPE	<2	1	1		04/13/17 21:39
8M418948	WG609950-04 VBLK0413 BLANK STD 624	NA	2	1		04/13/17 22:10
8M418949	L17040661-02 A TB 624-SPE	5	2	1		04/13/17 22:40
8M418950	L17040659-04 A TB 624-SPE	5	2	1		04/13/17 23:09
8M418951	L17040659-03 A EB 624-SPE	5	2	1		04/13/17 23:38
8M418952	L17040659-02 A 624-SPE	8	2	1		04/14/17 00:09
8M418953	L17040659-01 A 624-SPE	7	2	1		04/14/17 00:38
8M418954	L17040661-01 A 100X 624-SPE	7	2	100		04/14/17 01:08
8M418955	L17040634-01 A 624-SPE	7	2	1		04/14/17 01:38
8M418956	L17040634-02 A 624-SPE	7	2	1		04/14/17 02:07
8M418957	L17040634-03 A 624-SPE	5	2	1		04/14/17 02:37
8M418958	CCV	NA	1	1		04/14/17 03:07
8M418959	RINSE	NA	1	1		04/14/17 03:37
8M418960	RINSE	NA	1	1		04/14/17 04:06
8M418961	WG609942-01 A FBLK 10X 826-TC	NA	17	10		04/14/17 04:36

Approved: April 14, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 041317
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54127

Internal Standard: STD81235 Surrogate Standard: STD81235
 CCV: STD81377 LCS: STD81409 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG609950

Comments:

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1	X			
File ID: 8M418929				
Tune failed, DNR.				
2	X			
File ID: 8M418930				
Tune failed, DNR. Changed the septa.				
3	X			
File ID: 8M418931				
Purger BFB. Tune failed, DNR.				
4	X			
File ID: 8M418932				
Tune failed, DNR. Retuned the MS.				
7				
File ID: 8M418935				
Not needed, DNR.				
29	X	1	Carry-over contamination	
File ID: 8M418957				
Possible benzene carry over.				

Approved: April 14, 2017

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Sarah Vandenberg



Microbac Laboratories Inc.

Data Checklist

Date: 08-DEC-2016
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 79117
 Analytical Workgroups: WG594051; WG594142

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	X
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	NA
Samples	X
TCL Hits	X
Spectra of TCL Hits	TMB
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	WTD
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
08-DEC-2016

Tiffany Bailey

Secondary Reviewer:
09-DEC-2016

Wade D. ...



Microbac Laboratories Inc.

Data Checklist

Date: 21-MAR-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 81123
 Analytical Workgroups: WG607066

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	X
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	NA
Samples	X
TCL Hits	X
Spectra of TCL Hits	ADC
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	FJB
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
23-MAR-2017

Tiffany Bailey

Secondary Reviewer:
24-MAR-2017

F. J. Bailey



Microbac Laboratories Inc.

Data Checklist

Date: 13-APR-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 81550
 Analytical Workgroups: WG609950

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	NA
Samples	X
TCL Hits	X
Spectra of TCL Hits	TMB
Surrogates	X
Internal Standards Criteria	X
Library Searches	X
Calculations & Correct Factors	X
Dilutions Run	X
Reruns	X
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	SAV
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
14-APR-2017

Tiffany Bailey

Secondary Reviewer:
14-APR-2017

Sarah Vandenberg



Analytical Method:8260B
Login Number:L17040618

AAB#:WG609950

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6431-GRAB	01	04/12/17					04/13/2017	1.3	14		04/13/17	1.3	14	
TRIP BLANK	02	04/12/17					04/13/2017	1.9	14		04/13/17	1.9	14	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17040618
 Instrument Id: HPMS8
 Workgroup (AAB#): WG609950

Method: 8260
 CAL ID: HPMS8 - 21-MAR-17
 Matrix: Water

Sample Number	Dilution	Tag	1	2	3	4
L17040618-01	1.00	01	92.6	94.2	99.8	97.5
L17040618-02	1.00	01	89.4	92.0	101	97.8
WG609950-01	1.00	01	91.6	92.1	97.8	97.6
WG609950-02	1.00	01	88.8	93.8	93.5	96.1
WG609950-03	1.00	01	91.4	94.6	92.8	96.2
WG609950-04	1.00	01	91.8	93.0	100	98.1

Surrogates	Surrogate Limits		
1 - 1,2-Dichloroethane-d4	70	-	120
2 - Dibromofluoromethane	85	-	115
3 - 4-Bromofluorobenzene	75	-	120
4 - Toluene-d8	85	-	120

Underline = Result out of surrogate limits

DL = surrogate diluted out

ND = surrogate not detected



METHOD BLANK SUMMARY

Login Number: L17040618
 Blank File ID: 8M418936
 Prep Date: 04/13/17 16:13
 Analyzed Date: 04/13/17 16:13
 Analyst: TMB

Work Group: WG609950
 Blank Sample ID: WG609950-01
 Instrument ID: HPMS8
 Method: 8260B

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG609950-02	8M418937	04/13/17 16:42	01
LCS2	WG609950-03	8M418938	04/13/17 17:11	01
TRIP BLANK	L17040618-02	8M418946	04/13/17 21:09	01
LH18/24-SP650-6431-GRAB	L17040618-01	8M418947	04/13/17 21:39	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5248190
 Report generated 04/14/2017 13:19



METHOD BLANK SUMMARY

Login Number: L17040618
 Blank File ID: 8M418948
 Prep Date: 04/13/17 22:10
 Analyzed Date: 04/13/17 22:10
 Analyst: TMB

Work Group: WG609950
 Blank Sample ID: WG609950-04
 Instrument ID: HPMS8
 Method: 8260B

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG609950-02	8M418937	04/13/17 16:42	01
LCS2	WG609950-03	8M418938	04/13/17 17:11	01
TRIP BLANK	L17040618-02	8M418946	04/13/17 21:09	01
LH18/24-SP650-6431-GRAB	L17040618-01	8M418947	04/13/17 21:39	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5248190
 Report generated 04/14/2017 13:19



Login Number: L17040618 Prep Date: 04/13/17 16:13 Sample ID: WG609950-01
 Instrument ID: HPMS8 Run Date: 04/13/17 16:13 Prep Method: 5030B/5030C/503
 File ID: 8M418936 Analyst: TMB Method: 8260B
 Workgroup (AAB#): WG609950 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS8-21-MAR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
1,1,1-Trichloroethane	0.250	1.00	0.250	1	U
1,1,2-Trichloroethane	0.250	1.00	0.250	1	U
1,1-Dichloroethane	0.125	0.500	0.125	1	U
1,1-Dichloroethene	0.500	2.00	0.500	1	U
1,2-Dichloroethane	0.250	1.00	0.250	1	U
Acetone	2.50	10.0	2.50	1	U
Benzene	0.125	0.500	0.125	1	U
Carbon tetrachloride	0.250	1.00	0.250	1	U
Chloroform	0.125	0.500	0.125	1	U
Ethylbenzene	0.250	1.00	0.250	1	U
Methylene chloride	0.250	1.00	0.250	1	U
m,p-Xylene	0.500	2.00	0.500	1	U
o-Xylene	0.250	1.00	0.250	1	U
Styrene	0.125	0.500	0.125	1	U
Tetrachloroethene	0.250	1.00	0.250	1	U
Trichloroethene	0.250	1.00	0.250	1	U
Toluene	0.250	1.00	0.250	1	U
Vinyl chloride	0.250	1.00	0.250	1	U

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	91.6	70 - 120	PASS
4-Bromofluorobenzene	97.8	75 - 120	PASS
Dibromofluoromethane	92.1	85 - 115	PASS
Toluene-d8	97.6	85 - 120	PASS

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5247998
 14-APR-2017 13:19



Login Number: L17040618 Prep Date: 04/13/17 22:10 Sample ID: WG609950-04
 Instrument ID: HPMS8 Run Date: 04/13/17 22:10 Prep Method: 5030B/5030C/503
 File ID: 8M418948 Analyst: TMB Method: 8260B
 Workgroup (AAB#): WG609950 Matrix: Water 2 Units: ug/L
 Contract #: _____ Cal ID: HPMS8-21-MAR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
1,1,1-Trichloroethane	0.250	1.00	0.250	1	U
1,1,2-Trichloroethane	0.250	1.00	0.250	1	U
1,1-Dichloroethane	0.125	0.500	0.125	1	U
1,1-Dichloroethene	0.500	2.00	0.500	1	U
1,2-Dichloroethane	0.250	1.00	0.250	1	U
Acetone	2.50	10.0	2.50	1	U
Benzene	0.125	0.500	0.125	1	U
Carbon tetrachloride	0.250	1.00	0.250	1	U
Chloroform	0.125	0.500	0.125	1	U
Ethylbenzene	0.250	1.00	0.250	1	U
Methylene chloride	0.250	1.00	0.250	1	U
m,p-Xylene	0.500	2.00	0.500	1	U
o-Xylene	0.250	1.00	0.250	1	U
Styrene	0.125	0.500	0.125	1	U
Tetrachloroethene	0.250	1.00	0.250	1	U
Trichloroethene	0.250	1.00	0.250	1	U
Toluene	0.250	1.00	0.250	1	U
Vinyl chloride	0.250	1.00	0.250	1	U

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	91.8	70 - 120	PASS
4-Bromofluorobenzene	100	75 - 120	PASS
Dibromofluoromethane	93.0	85 - 115	PASS
Toluene-d8	98.1	85 - 120	PASS

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5247998
 14-APR-2017 13:19



Login Number: L17040618 Analyst: TMB Prep Method: 5030B/5030C/503
 Instrument ID: HPMS8 Matrix: Water Method: 8260B
 Workgroup (AAB#): WG609950 Units: ug/L
 QC Key: DOD4 Lot #: STD81409

Sample ID: WG609950-02 LCS File ID: 8M418937 Run Date: 04/13/2017 16:42
 Sample ID: WG609950-03 LCS2 File ID: 8M418938 Run Date: 04/13/2017 17:11

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
1,1,1-Trichloroethane	20.0	19.8	99.0	20.0	19.4	96.9	2.15	65 - 130	30	
1,1,2-Trichloroethane	20.0	17.7	88.3	20.0	18.2	91.1	3.07	75 - 125	30	
1,1-Dichloroethane	20.0	20.9	105	20.0	20.9	104	0.287	70 - 135	30	
1,1-Dichloroethene	20.0	20.9	105	20.0	20.6	103	1.58	70 - 130	30	
1,2-Dichloroethane	20.0	18.3	91.6	20.0	18.8	93.9	2.42	70 - 130	30	
Acetone	20.0	20.7	104	20.0	22.0	110	5.87	40 - 140	30	
Benzene	20.0	20.3	102	20.0	19.8	99.1	2.41	80 - 120	30	
Carbon tetrachloride	20.0	20.0	99.9	20.0	19.9	99.3	0.596	65 - 140	30	
Chloroform	20.0	18.0	90.2	20.0	17.9	89.5	0.778	65 - 135	30	
Ethylbenzene	20.0	18.8	93.8	20.0	18.3	91.7	2.30	75 - 125	30	
m,p-Xylene	40.0	38.6	96.5	40.0	37.6	94.1	2.54	75 - 130	30	
Methylene chloride	20.0	19.2	95.8	20.0	19.2	96.0	0.262	55 - 140	30	
o-Xylene	20.0	18.4	91.8	20.0	18.2	91.2	0.668	80 - 120	30	
Styrene	20.0	19.1	95.6	20.0	19.0	95.2	0.410	65 - 135	30	
Tetrachloroethene	20.0	19.1	95.6	20.0	18.8	93.9	1.79	45 - 150	30	
Toluene	20.0	19.2	96.1	20.0	18.7	93.6	2.56	75 - 120	30	
Trichloroethene	20.0	21.0	105	20.0	20.3	102	3.08	70 - 125	30	
Vinyl chloride	20.0	19.8	98.8	20.0	18.6	93.2	5.89	50 - 145	30	

Surogates	LCS	LCS2	Surrogate Limits	Qualifier
	% Recovery	% Recovery		
1,2-Dichloroethane-d4	88.8	91.4	70 - 120	PASS
Dibromofluoromethane	93.8	94.6	85 - 115	PASS
4-Bromofluorobenzene	93.5	92.8	75 - 120	PASS
Toluene-d8	96.1	96.2	85 - 120	PASS

* EXCEEDS %REC LIMIT
 # EXCEEDS RPD LIMIT



BFB

Login Number: L17040618 Tune ID: WG594051-01
 Instrument: HPMS8 Run Date: 12/08/2016
 Analyst: TMB Run Time: 08:55
 Workgroup: WG594051 File ID: 8M416518
 Cal ID: HPMS8-08-DEC-16

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	15.9	3959	PASS
75.0	95.0	30.0	60.0	50.2	12523	PASS
95.0	95.0	100	100	100	24967	PASS
96.0	95.0	5.00	9.00	6.61	1651	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	74.9	18700	PASS
175	174	5.00	9.00	7.25	1355	PASS
176	174	95.0	101	96.0	17959	PASS
177	176	5.00	9.00	6.08	1092	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG594051-02	STD	01	12/08/2016 09:19	
WG594051-03	STD	01	12/08/2016 09:48	
WG594051-04	STD	01	12/08/2016 10:17	
WG594051-05	STD-CCV	01	12/08/2016 10:47	
WG594051-06	STD	01	12/08/2016 11:16	
WG594051-07	STD	01	12/08/2016 11:46	
WG594051-08	STD	01	12/08/2016 12:16	
WG594051-09	STD	01	12/08/2016 12:45	
WG594051-10	SSCV	01	12/08/2016 14:12	

* Sample past 12 hour tune limit



BFB

Login Number: L17040618 Tune ID: WG607066-01
 Instrument: HPMS8 Run Date: 03/21/2017
 Analyst: TMB Run Time: 15:10
 Workgroup: WG607066 File ID: 8M418406
 Cal ID: HPMS8-

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	17.8	6993	PASS
75.0	95.0	30.0	60.0	52.2	20477	PASS
95.0	95.0	100	100	100	39240	PASS
96.0	95.0	5.00	9.00	6.89	2704	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	80.6	31623	PASS
175	174	5.00	9.00	6.77	2141	PASS
176	174	95.0	101	98.6	31189	PASS
177	176	5.00	9.00	6.60	2060	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG607066-02	STD	01	03/21/2017 16:09	
WG607066-03	STD	01	03/21/2017 16:39	
WG607066-04	STD	01	03/21/2017 17:09	
WG607066-05	STD	01	03/21/2017 17:40	
WG607066-06	STD	01	03/21/2017 18:10	
WG607066-07	STD	01	03/21/2017 18:41	
WG607066-08	STD-CCV	01	03/21/2017 19:11	
WG607066-09	STD	01	03/21/2017 19:42	
WG607066-10	STD	01	03/21/2017 20:12	
WG607066-11	STD	01	03/21/2017 20:43	
WG607066-12	SSCV	01	03/21/2017 22:14	

* Sample past 12 hour tune limit



BFB

Login Number: L17040618 Tune ID: WG609948-02
 Instrument: HPMS8 Run Date: 04/13/2017
 Analyst: TMB Run Time: 14:40
 Workgroup: WG609948 File ID: 8M418933
 Cal ID: HPMS8-21-MAR-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	17.6	4582	PASS
75.0	95.0	30.0	60.0	46.8	12168	PASS
95.0	95.0	100	100	100	26008	PASS
96.0	95.0	5.00	9.00	6.70	1743	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	92.2	23984	PASS
175	174	5.00	9.00	7.27	1743	PASS
176	174	95.0	101	98.4	23608	PASS
177	176	5.00	9.00	6.54	1544	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG609948-01	CCV	01	04/13/2017 15:09	
WG609950-01	BLANK	01	04/13/2017 16:13	
WG609950-02	LCS	01	04/13/2017 16:42	
WG609950-03	LCS2	01	04/13/2017 17:11	
L17040618-02	TRIP BLANK	01	04/13/2017 21:09	
L17040618-01	LH18/24-SP650-6431-GRAB	01	04/13/2017 21:39	
WG609950-04	BLANK2	01	04/13/2017 22:10	
WG609942-01	FBLK1	DL01	04/14/2017 04:36	*

* Sample past 12 hour tune limit



Calibration Table Report
 Method: A9FOOWTR.M
 Title: A9-FOO Water SOP:MSV01 12-08-16 HPMS8
 Last Calibration: Thu Dec 08 13:41:47 2016
 Curve: WG594051
 Calibration Files

Compound											Avg	%RSD
	5	20	50	100	200	300	400	500				
	8M116519.D	8M116520.D	8M116521.D	8M116522.D	8M116523.D	8M116524.D	8M116525.D	8M116526.D				
I Fluorobenzene	ISTD											
T Acetonitrile		0.007	0.007	0.008	0.007	0.007	0.007	0.007	0.007	0.007	2.734	
T 3-Chloro-1-propene	0.285	0.281	0.282	0.286	0.290	0.298	0.298	0.306	0.291	3.019		
T 2-Chloro-1,3-butadiene	0.282	0.298	0.305	0.315	0.325	0.335	0.338	0.343	0.318	6.789		
T Ethyl Acetate		0.065	0.063	0.064	0.066	0.064	0.067	0.066	0.065	2.080		
T Methacrylonitrile	0.032	0.041	0.043	0.043	0.044	0.044	0.046	0.045	0.042	10.556		
T Isobutyl Alcohol			0.002	0.002	0.002	0.002	0.002	0.002	0.002	6.131		
T 1-Butanol										0.000	0.000	
T Methyl methacrylate	0.055	0.067	0.068	0.069	0.071	0.070	0.074	0.074	0.068	8.866		
T 2-Nitropropane		0.020	0.020	0.021	0.023	0.023	0.024	0.024	0.022	7.043		
I Chlorobenzene-d5	ISTD											
I 1,4-Dichlorobenzene-d4	ISTD											
T Cyclohexanone			0.007	0.008	0.008	0.008	0.008	0.008	0.008	7.809		

Thu Dec 08 15:05:15 2016

Calibration Table Report

Method: 8260WTR.M

Title: Method 8260B/624 WTR-SOP:OVLMSV01 03-21-17 HPMS8

Last Calibration: Thu Mar 23 09:07:42 2017

Curve: WG607066

Calibration Files

Compound	0.3 0.4 1 2 5 20 50 100 200 300										Avg	%RSD	Linear	Quad
	8M118408.D	8M118409.D	8M118410.D	8M118411.D	8M118412.D	8M118413.D	8M118414.D	8M118415.D	8M118416.D	8M118417.D				
I Fluorobenzene	ISTD													
T Dichlorodifluoromethane			0.365	0.339	0.354	0.406	0.433	0.432	0.413		0.392	9.845		
P Chloromethane			0.561	0.481	0.480	0.467	0.465	0.449	0.420		0.475	9.181		
C Vinyl Chloride		0.522	0.492	0.462	0.450	0.440	0.425	0.399	0.360		0.444	11.541		
T 1,3-Butadiene			0.256	0.253	0.235	0.174	0.111	0.091	0.088	0.173		44.128	0.994	
T Bromomethane			0.220	0.210	0.215	0.212	0.225	0.237	0.254		0.225	6.976		
T Chloroethane		0.164	0.177	0.169	0.176	0.181	0.186	0.192	0.194		0.180	5.764		
T Trichlorofluoromethane		0.491	0.482	0.451	0.464	0.469	0.491	0.497	0.497		0.480	3.565		
T Diethyl ether			0.156	0.146	0.151	0.153	0.159	0.155		0.167	0.155	4.339		
T Isoprene					0.354	0.350	0.368	0.382	0.374	0.398	0.371	4.814		
T Acrolein				0.021	0.019	0.020	0.020	0.020		0.020	0.020	3.525		
T 1,1,2-Trichloro-1,2,2-Trifluoroethane			0.254	0.238	0.260	0.252	0.269	0.272	0.264		0.258	4.444		
T Acetone					0.028	0.031	0.031	0.028	0.032	0.029	0.030	5.215		
C 1,1-Dichloroethene		0.377	0.363	0.325	0.352	0.349	0.366	0.375	0.375		0.360	4.930		
T Tert-Butyl Alcohol				0.009	0.009	0.010	0.010	0.009		0.010	0.010	5.290		
T Dimethyl Sulfide					0.242	0.246	0.255	0.258	0.268	0.268	0.256	4.156		
T Iodomethane			0.227	0.204	0.235	0.261	0.298	0.318	0.317	0.290	0.269	16.181	0.997	
T Methyl acetate					0.083	0.082	0.084	0.084	0.090	0.089	0.085	4.049		
T Methylene Chloride			0.290	0.251	0.262	0.267	0.276	0.281	0.294		0.274	5.692		
T Carbon Disulfide			0.876	0.782	0.819	0.813	0.836	0.848	0.830	0.764	0.821	4.336		
T Acrylonitrile			0.040	0.040	0.040	0.042	0.046	0.045		0.041	0.042	5.937		
T Methyl Tert Butyl Ether			0.519	0.484	0.503	0.533	0.556	0.536	0.567		0.528	5.471		
T trans-1,2-Dichloroethene		0.369	0.352	0.326	0.338	0.338	0.348	0.360	0.365		0.349	4.283		
T n-Hexane					0.312	0.279	0.293	0.297	0.289	0.307	0.296	4.010		
T Diisopropyl ether			0.683	0.641	0.674	0.668	0.683	0.670		0.654	0.668	2.316		
T Vinyl Acetate					0.283	0.262	0.254	0.246	0.280	0.252	0.263	5.853		
P 1,1-Dichloroethane		0.457	0.446	0.429	0.451	0.446	0.464	0.476	0.477		0.456	3.523		
T Ethyl-Tert-Butyl ether			0.634	0.600	0.636	0.649	0.667	0.645		0.643	0.639	3.163		
T 2-Butanone					0.047	0.048	0.048	0.047	0.050	0.048	0.048	2.346		
T Propionitrile			0.012	0.015	0.014	0.015	0.015	0.014		0.015	0.014	7.137		
T 2,2-Dichloropropane		0.445	0.414	0.394	0.409	0.385	0.398	0.406	0.403		0.407	4.403		
T cis-1,2-Dichloroethene		0.294	0.289	0.270	0.290	0.293	0.302	0.314	0.321		0.297	5.370		
C Chloroform	0.670	0.608	0.515	0.477	0.491	0.484	0.500	0.506	0.504		0.528	12.418		
T 1-Bromopropane			0.050	0.050	0.056	0.056	0.057	0.060	0.061	0.064	0.057	8.723		
T Bromochloromethane		0.151	0.160	0.150	0.153	0.157	0.166	0.166	0.171		0.159	4.835		
T Tetrahydrofuran			0.036	0.029	0.029	0.030	0.032	0.029		0.030	0.031	8.295		
S Dibromofluoromethane				0.277	0.275	0.278	0.277	0.289	0.294	0.295	0.284	3.074		
T 1,1,1-Trichloroethane		0.405	0.426	0.387	0.429	0.422	0.450	0.469	0.488		0.435	7.610		
T Cyclohexane			0.377	0.348	0.367	0.359	0.378	0.387	0.392	0.396	0.376	4.441		
T 1,1-Dichloropropene			0.377	0.349	0.366	0.363	0.376	0.389	0.392		0.373	4.028		
T Tert-Amyl-Methyl ether			0.580	0.564	0.592	0.603	0.628	0.607		0.602	0.596	3.411		
T Carbon Tetrachloride		0.375	0.364	0.334	0.379	0.381	0.41	0.437	0.431		0.3888	9.01028		
S 1,2-Dichloroethane-d4				0.251	0.234	0.245	0.242	0.246	0.252	0.249	0.2457	2.56178		
T Heptane											0	0		
T 1,2-Dichloroethane		0.299	0.294	0.276	0.286	0.294	0.305	0.308	0.324		0.2982	4.87776		
T Benzene		1.144	1.082	1.017	1.09	1.066	1.09	1.099	1.022		1.0761	3.85617		
T Trichloroethene		0.282	0.267	0.261	0.279	0.282	0.297	0.31	0.324		0.2877	7.45091		
T Methylcyclohexane					0.428	0.409	0.425	0.438	0.433	0.462	0.4323	4.01264		
C 1,2-Dichloropropane		0.227	0.243	0.232	0.245	0.248	0.253	0.261	0.27		0.2474	5.70702		
T Bromodichloromethane		0.332	0.33	0.314	0.328	0.348	0.371	0.38	0.395		0.3498	8.26577		
T 1,4-Dioxane					0.001	0.001	0.001	0.001		0.001	0.0012	10.0042		
T Dibromomethane		0.093	0.132	0.126	0.131	0.137	0.144	0.143	0.155		0.1326	13.823		
T 2-Chloroethyl Vinyl Ether				0.101	0.107	0.108	0.112	0.114	0.123	0.122	0.1125	7.11154		
T 4-Methyl-2-Pentanone					0.042	0.046	0.049	0.047	0.053	0.052	0.0481	8.06815		
T cis-1,3-Dichloropropene		0.393	0.387	0.371	0.388	0.405	0.425	0.432	0.448		0.406	6.45571		

T	Dimethyl Disulfide				0.159	0.196	0.22	0.231	0.257	0.257	0.2197	17.2311	0.998
I	Chlorobenzene-d5	ISTD											
S	Toluene-d8			1.195	1.269	1.261	1.225	1.302	1.283	1.269	1.2576	2.85929	
C	Toluene	1.544	1.543	1.406	1.506	1.485	1.517	1.549	1.346		1.4869	4.94343	
T	Ethyl Methacrylate		0.249	0.239	0.265	0.298	0.304	0.302	0.323	0.32	0.2875	11.2531	
T	Paraldehyde										0	0	
T	trans-1,3-Dichloropropene		0.416	0.378	0.415	0.44	0.463	0.469	0.489		0.4386	8.75675	
T	1,1,2-Trichloroethane	0.223	0.226	0.208	0.232	0.237	0.243	0.244	0.261		0.2342	6.81927	
T	2-Hexanone				0.045	0.055	0.058	0.056	0.062	0.06	0.0562	10.7796	
T	1,3-Dichloropropane	0.421	0.417	0.393	0.405	0.421	0.427	0.427	0.443		0.4194	3.60274	
T	Tetrachloroethene	0.305	0.327	0.287	0.315	0.303	0.321	0.347	0.372		0.3222	8.35255	
T	Dibromochloromethane	0.203	0.251	0.243	0.271	0.296	0.323	0.336	0.366		0.2861	18.8764	1.000
T	1,2-Dibromoethane	0.228	0.236	0.217	0.232	0.244	0.251	0.249	0.267		0.2403	6.53165	
T	1-Chlorohexane	0.543	0.505	0.46	0.498	0.479	0.489	0.52	0.528	0.54	0.5067	5.53864	
P	Chlorobenzene	1.019	1.011	0.957	0.997	0.997	1.074	1.173	1.145		1.0465	7.3529	
T	1,1,1,2-Tetrachloroethane	0.31	0.305	0.304	0.326	0.363	0.413	0.48	0.542		0.3805	23.6944	1.001
C	Ethylbenzene	0.541	0.546	0.515	0.556	0.559	0.628	0.722			0.5808	12.244	
T	m-p-Xylene	0.677	0.666	0.631	0.672	0.683	0.74	0.8	0.704		0.6966	7.49879	
T	o-Xylene		0.635	0.63	0.648	0.659	0.698	0.763	0.802		0.6907	9.76299	
T	Styrene	1.018	1.033	0.999	1.083	1.118	1.195	1.273	1.201		1.1151	8.93255	
P	Bromoform		0.129	0.136	0.14	0.173	0.197	0.207	0.236		0.1739	23.4918	1.000
T	Isopropylbenzene	1.697	1.683	1.58	1.688	1.672	1.757	1.776	1.517		1.6711	5.13622	
I	1,4-Dichlorobenzene-d4	ISTD											
P	1,1,2,2-Tetrachloroethane	0.449	0.51	0.451	0.492	0.495	0.505	0.483	0.514		0.4873	5.14107	
S	p-Bromofluorobenzene			0.947	0.928	0.921	0.899	0.942	0.956	1.03	0.946	4.39688	
T	1,2,3-Trichloropropane		0.131	0.131	0.135	0.138	0.146	0.14	0.149		0.1387	5.09526	
T	trans-1,4-Dichloro-2-Butene		0.098	0.097	0.117	0.116	0.125	0.125	0.119	0.117	0.1143	9.45734	
T	n-Propylbenzene		4.01	3.885	3.661	3.908	3.753	3.8	3.622	2.819	3.6822	10.0999	
T	Bromobenzene	0.851	0.768	0.757	0.755	0.783	0.79	0.837	0.875	0.919	0.815	7.14151	
T	1,3,5-Trimethylbenzene		2.725	2.624	2.532	2.686	2.662	2.801	2.829	2.417	2.6595	5.12759	
T	2-Chlorotoluene		2.64	2.51	2.341	2.519	2.505	2.539	2.593	2.155	2.4751	6.29617	
T	4-Chlorotoluene		2.183	2.216	2.162	2.151	2.107	2.241	2.221	2.018	2.1623	3.34861	
T	a-Methylstyrene				1.37	1.407	1.493	1.584	1.552	1.514	1.4867	5.5986	
T	tert-Butylbenzene		0.531	0.54	0.556	0.549	0.595	0.646	0.694		0.5873	10.4863	
T	1,2,4-Trimethylbenzene	2.785	2.797	2.613	2.808	2.805	2.92	2.929	2.463		2.7649	5.63985	
T	sec-Butylbenzene		3.451	3.251	3.466	3.33	3.466	3.399	2.744		3.3012	7.81848	
T	p-Isopropyltoluene		2.668	2.562	2.751	2.717	2.871	2.905	2.455		2.7041	5.93081	
T	1,3-Dichlorobenzene		1.611	1.613	1.52	1.6	1.577	1.671	1.734	1.67	1.6245	4.04016	
T	1,4-Dichlorobenzene	1.768	1.634	1.651	1.54	1.572	1.56	1.651	1.703	1.647	1.6362	4.40361	
T	n-Butylbenzene			2.731	2.594	2.706	2.618	2.734	2.719	2.264	2.6236	6.41729	
T	1,2-Dichlorobenzene	1.417	1.362	1.414	1.333	1.376	1.38	1.468	1.496	1.494	1.4155	4.16177	
T	1,2-Dibromo-3-Chloropropane				0.068	0.066	0.077	0.082	0.079	0.085	0.0765	9.84774	
T	1,2,4-Trichlorobenzene		1.096	1.056	0.929	0.997	1.007	1.067	1.129	1.19	1.0587	7.74032	
T	Hexachlorobutadiene		0.539	0.533	0.478	0.493	0.469	0.503	0.544	0.582	0.5176	7.43716	
T	Naphthalene		1.385	1.388	1.295	1.341	1.404	1.5	1.427	1.446	1.3983	4.5068	
T	1,2,3-Trichlorobenzene	0.853	0.929	0.879	0.798	0.801	0.839	0.89	0.91	0.981	0.8755	6.84769	

Thu Mar 23 12:32:39 2017

Login Number: L17040618 Run Date: 12/08/2016 Sample ID: WG594051-10
Instrument ID: HPMS8 Run Time: 14:12 Method: 8260B
File ID: 8M416529 Analyst: TMB QC Key: DOD4
ICal Workgroup: WG594051 Cal ID: HPMS8 - 08-DEC-16

Analyte	Expected	Found	Units	RF	%D	UCL	Q
---------	----------	-------	-------	----	----	-----	---

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds



Login Number: L17040618 Run Date: 03/21/2017 Sample ID: WG607066-12
 Instrument ID: HPMS8 Run Time: 22:14 Method: 8260B
 File ID: 8M418420 Analyst: TMB QC Key: DOD4
 ICal Workgroup: WG607066 Cal ID: HPMS8 - 21-MAR-17

Analyte		Expected	Found	Units	RF	%D	UCL	Q
1,1-Dichloroethene	CCC	50.0	48.5	ug/L	0.349	3.10	20	
Chloroform	CCC	50.0	46.3	ug/L	0.489	7.40	20	
Ethylbenzene	CCC	50.0	51.7	ug/L	0.601	3.50	20	
Toluene	CCC	50.0	48.4	ug/L	1.44	3.10	20	
Vinyl Chloride	CCC	50.0	42.7	ug/L	0.379	14.7	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	47.5	ug/L	0.462	5.10	20	
Chloromethane	SPCC	50.0	46.2	ug/L	0.439	7.60	20	
Bromoform	SPCC	50.0	48.4	ug/L	0.185	3.10	20	
Chlorobenzene	SPCC	50.0	48.7	ug/L	1.02	2.60	20	
1,1-Dichloroethane	SPCC	50.0	48.4	ug/L	0.441	3.20	20	
1,1,1-Trichloroethane		50.0	51.7	ug/L	0.449	3.30	20	
1,1,2-Trichloroethane		50.0	48.4	ug/L	0.227	3.30	20	
1,2-Dichloroethane		50.0	48.5	ug/L	0.290	2.90	20	
Acetone		50.0	47.4	ug/L	0.0284	5.20	20	
Benzene		50.0	48.8	ug/L	1.05	2.30	20	
Carbon Tetrachloride		50.0	52.7	ug/L	0.409	5.30	20	
Methylene Chloride		50.0	48.9	ug/L	0.269	2.20	20	
m-,p-Xylene		100	103	ug/L	0.716	2.80	20	
o-Xylene		50.0	48.9	ug/L	0.675	2.30	20	
Styrene		50.0	52.3	ug/L	1.17	4.70	20	
Tetrachloroethene		50.0	49.0	ug/L	0.316	2.00	20	
Trichloroethene		50.0	49.8	ug/L	0.286	0.500	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17040618 Run Date: 04/13/2017 Sample ID: WG609948-01
 Instrument ID: HPMS8 Run Time: 15:09 Method: 8260B
 File ID: 8M418934 Analyst: TMB QC Key: DOD4
 Workgroup (AAB#): WG609950 Cal ID: HPMS8 - 21-MAR-17
 Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
1,2-Dichloropropane	CCC	50.0	53.4	ug/L	0.264	6.73	20	
1,1-Dichloroethene	CCC	50.0	52.1	ug/L	0.376	4.23	20	
Chloroform	CCC	50.0	44.3	ug/L	0.468	11.3	20	
Ethylbenzene	CCC	50.0	51.1	ug/L	0.594	2.20	20	
Toluene	CCC	50.0	49.1	ug/L	1.46	1.88	20	
Vinyl Chloride	CCC	50.0	47.3	ug/L	0.420	5.35	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	41.1	ug/L	0.401	17.7	20	
Bromoform	SPCC	50.0	45.6	ug/L	0.173	8.72	20	
Chlorobenzene	SPCC	50.0	48.2	ug/L	1.01	3.62	20	
Chloromethane	SPCC	50.0	57.0	ug/L	0.541	13.9	20	
1,1-Dichloroethane	SPCC	50.0	53.0	ug/L	0.483	6.02	20	
Xylenes		150	149	ug/L	0.684	0.583	20	
1,1,1-Trichloroethane		50.0	48.3	ug/L	0.420	3.44	20	
1,1,2-Trichloroethane		50.0	44.1	ug/L	0.207	11.7	20	
1,2-Dichloroethane		50.0	45.1	ug/L	0.269	9.71	20	
Acetone		50.0	51.8	ug/L	0.0310	3.55	20	
Benzene		50.0	50.4	ug/L	1.08	0.827	20	
Carbon Tetrachloride		50.0	50.0	ug/L	0.389	0.0130	20	
Methylene Chloride		50.0	47.1	ug/L	0.259	5.83	20	
m-,p-Xylene		100	101	ug/L	0.704	1.11	20	
o-Xylene		50.0	48.0	ug/L	0.663	3.97	20	
Styrene		50.0	50.1	ug/L	1.12	0.143	20	
Tetrachloroethene		50.0	48.4	ug/L	0.312	3.22	20	
Trichloroethene		50.0	52.4	ug/L	0.301	4.73	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

CCV - Modified 03/05/2008

PDF File ID: 5248002

Report generated 04/14/2017 13:19



Login Number: L17040618
Instrument ID: HPMS8
Workgroup (AAB#): WG609950

ICAL CCV Number: WG607066-08
CAL ID: HPMS8-21-MAR-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG607066-08	NA	NA	345493	635449	821515
Upper Limit	NA	NA	690986	1270898	1643030
Lower Limit	NA	NA	172747	317725	410758
<u>L17040618-01</u>	1.00	01	<u>237387</u>	<u>471432</u>	<u>581421</u>
L17040618-02	1.00	01	234790	472980	591449
WG609950-01	1.00	01	263533	495632	611263
WG609950-02	1.00	01	289042	522973	636877
WG609950-03	1.00	01	299263	536607	652123

IS-1 - 1,4-Dichlorobenzene-d4
IS-2 - Chlorobenzene-d5
IS-3 - Fluorobenzene

Underline = Response outside limits



Microbac Laboratories Inc.
INTERNAL STANDARD RETENTION TIME SUMMARY
(COMPARED TO MIDPOINT OF ICAL)

00853571

Login Number: L17040618
Instrument ID: HPMS8
Workgroup (AAB#): WG609950

ICAL CCV Number: WG607066-08
CAL ID: HPMS8-21-MAR-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG607066-08	NA	NA	17.83	14.81	10.94
Upper Limit	NA	NA	18.33	15.31	11.44
Lower Limit	NA	NA	17.33	14.31	10.44
<u>L17040618-01</u>	1.00	01	17.82	14.8	10.94
<u>L17040618-02</u>	1.00	01	17.82	14.8	10.94
WG609950-01	1.00	01	17.82	14.8	10.94
WG609950-02	1.00	01	17.82	14.8	10.94
WG609950-03	1.00	01	17.82	14.8	10.94

IS-1 - 1,4-Dichlorobenzene-d4
IS-2 - Chlorobenzene-d5
IS-3 - Fluorobenzene

Underline = Response outside limits



2.2 Semivolatiles Data

2.2.1 GC/MS Semivolatiles Data (827 Dioxane)

2.2.1.1 Summary Data

Lab Report #: L17040618

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040618-01	PrePrep Method: N/A	Instrument: HPMS15
Client ID: LH18/24-SP650-6431-GRAB	Prep Method: 3520C	Prep Date: 04/17/2017 13:45
Matrix: Water	Analytical Method: 8270D	Cal Date: 03/21/2017 13:29
Workgroup #: WG610568	Analyst: LJH	Run Date: 04/18/2017 13:21
Collect Date: 04/12/2017 15:00	Dilution: 5	File ID: 15M21018
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,4-Dioxane	123-91-1	15.8		10.0	5.00	2.50
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,4-Dioxane-d8	59.9	20	129			

2.2.1.2 QC Summary Data

Example 8270 Calculations

1.0 Calculating the Response Factor (RF) from the initial calibration (ICAL) data:

$$RF = [(Ax) (Cis)] / [(Ais) (Cx)]$$

where:

Ax = Area of the characteristic ion for the compound being measured:	1261197
Cis = Concentration of the specific internal standard (ug/mL)	40
Ais = Area of the characteristic ion of the specific internal standard	608044
Cx = Concentration of the compound in the standard being measured (ug/mL)	50
RF = Calculated Response Factor	1.65935

Example

2.0 Calculating the concentration (C) of a compound in water using the data from the prep log and quantitation report: *

$$Cx = [(Ax) (Cis) (Vf) (D)] / [(Ais) (RF) (Vi)]$$

where:

Ax = Area of the characteristic ion for the compound being measured	367250
Cis = Concentration of the specific internal standard (ug/mL)	40
Vf = Final volume of sample extract from prep log (mL)	1
D = Dilution factor for sample as a multiplier (10x = 10)	1
Ais = Area of the characteristic ion of the specific internal standard	511641
RF = Average RF from the ICAL	1.65935
Vi = Initial volume of sample extracted from prep log (mL)	1021
Cx = Concentration of the compound in the sample being measured (ug/mL)	0.016947
Cx = Concentration of the compound in the sample being measured (ug/L)	16.947

Example

3.0 Calculating the concentration (C) of a compound in soil using the data from the prep log and quantitation report: *

$$Cx = [(Ax) (Cis) (Vf) (D)] / [(Ais) (RF) (Wi)]$$

where:

Ax = Area of the characteristic ion for the compound being measured	367250
Cis = Concentration of the specific internal standard (ug/mL)	40
Vf = Final volume of sample extract from prep log (mL)	1
D = Dilution factor for sample as a multiplier (10x = 10)	1
Ais = Area of the characteristic ion of the specific internal standard	511641
RF = Average RF from the ICAL	1.65935
Wi = Initial weight of sample extracted (g) from prep log	30
Cx = Concentration of the compound in the sample being measured (ug/g)	0.576763
Cx = Concentration of the compound in the sample being measured (ug/kg)	576.7627

Example

Dry weight correction:

Percent solids (PCT_S)	50
Cd = (Cx) (100)/PCT_S	1153.525 ug/kg

* Concentrations appearing on the instrument quantitation reports are on-column results and do not take into account initial volume, final volume, and the dilution factor.

4.0 Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, $y = mx + b$

y = response ratio = response of analyte / response of IS = Ax/Ais

x = amount ratio = concentration analyte/concentration internal standard = Cx / Cis

m = slope from curve plot

b = intercept from curve plot

Step 2: Calculate y from Quantitation Report

y = 16790/784838 = 0.02139

Step 3: Solve for x

$$x = (y - b)/m = [(0.02139 - (-0.0435))/0.0783] = 0.829$$

Step 4: Solve for analyte concentration Cx

$$Cx = Cis (x) = (25.0)(0.829) = 20.72 \text{ ug/L}$$

Example Spreadsheet Calculation:

Slope from curve, m:	0.0783
Intercept from curve, b:	-0.0435
Area of analyte, Ax:	16790
Area of Internal Standard, Ais:	784484
Concentration of IS, Cis	25.00 ug/L
Response Ratio (y) :	0.021403
Amount Ratio:	0.828897
Concentration (Cx):	20.72241 ug/L

5.0 Concentration from Quadratic Regression**Step 1 - Retrieve Curve Data from Plot, $y = Ax^2 + Bx + C$**

Where:

$$Ax^2 + Bx + (C - y) = 0$$

A, B, C = constants from the ICAL quadratic regression

y = Response ratio = Area of analyte/Area of internal standard (IS)

x = Amount ratio = Concentration of analyte/concentration of IS

Step 2: Calculate y from Quantitation Report

$$y = Ax/Ais$$

Step 3: Solve for x using the quadratic formula

$$Ax^2 + Bx + C - y = 0$$

$$x = \frac{b \pm \sqrt{(b^2 - 4a(c - y))}}{2a} \quad (\text{Two possible solutions})$$

Step 4: Solve for analyte concentration Cx

$$Cx = (Cis)(\text{Amount ratio})$$

Example Spreadsheet Calculation:

Value of A from plot:	0.0259
Value of B from plot:	0.0596
Value of C from plot:	-0.0165
Area of analyte from quantitation report:	203233
Area of IS from quantitation report:	1425653
Response ratio, y:	0.142554
C - y:	-0.15905
Root 1 - Computed amount ratio, X1:	-3.88278
Root 2 - Computed amount ratio, X2:	1.581623 use this solution
Concentration of IS, Cis:	40.00
Concentration of analyte, Cx:	63.26 ug/L

Workgroup: WG610353
 Analyst: JDH
 Spike Analyst: JDH
 Method: 3520C
 Run Date: 04/17/2017 13:45
 SOP: EXB01 Revision 20
 Spike Witness: JLD
 Surr Solution: STD80323

Methylene Chloride Lot #: COA19595
 Sodium Sulfate , Anhydrous , Granul Lot # COA19381
 1:1 H2SO4 Lot #: RGT39543

	SAMPLE #	Type	Reference	pH	Prod	Init Amnt	Surr Amnt	Spike Amnt	Spike Sol	Final Vol	Color
1	L17040618-01	SAMP			827-DIOXANE	1000 mL	.05 mL			1 mL	Transparent
2	WG610353-01	BLANK			827-DIOXANE	1000 mL	.05 mL			1 mL	Transparent
3	WG610353-02	LCS			827-DIOXANE	1000 mL	.05 mL	.05 mL	STD79978	1 mL	Transparent
4	WG610353-03	LCS2			827-DIOXANE	1000 mL	.05 mL	.05 mL	STD79978	1 mL	Transparent

Due to insufficient sample volume, this preparation batch failed to include the method prescribed MS and MSD.

pH lot # 230515

Analyst: _____

Justin Henson

Reviewer: _____

Jessica DeLong



Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 032117
 Analyst1: SCB Analyst2: NA
 Method: 8270C/D SOP: MSS01 Rev: 28

Maintenance Log ID: _____ Syringe Filter Lot#: _____
 Eluent ID#: _____

Workgroups: _____ Column 1 ID: RXI-5MS Column 2 ID: NA
WG606959, WG606673
 Internal STD: STD81022 Surrogate STD: NA Calibration STD: _____
 CCV STD: STD80097 LCS STD: _____ MS/MSD STD: _____

Comments: File 15M20885 does not exist

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	15M20882	BAKE OUT	1	1		03/21/17 08:57
2	15M20883	WG606959-01 5PPM LL DFTPP	1	1	STD80383	03/21/17 09:16
3	15M20884	WG606959-01 5PPM LL DFTPP	1	1	STD80383	03/21/17 09:33
4	15M20886	WG606959-01 5PPM LL DFTPP	1	1	STD80383	03/21/17 10:43
5	15M20887	WG606959-01 5PPM LL DFTPP	1	1	STD80383	03/21/17 11:00
6	15M20888	WG606959-01 5PPM LL DFTPP	1	1	STD80383	03/21/17 11:17
7	15M20889	WG606959-02 5PPM 1,4-DIOXSTD	1	1	STD80097	03/21/17 11:36
8	15M20890	WG606959-03 10PPM 1,4-DIOX STD	1	1	STD80097	03/21/17 11:59
9	15M20891	WG606959-04 7.5PPM 1,4-DIOX STD	1	1	STD80097	03/21/17 12:22
10	15M20892	WG606959-05 2.5PPM 1,4-DIOX STD	1	1	STD80097	03/21/17 12:44
11	15M20893	WG606959-06 1PPM 1,4-DIOX STD	1	1	STD80097	03/21/17 13:07
12	15M20894	WG606959-07 0.4PPM 1,4-DIOX STD	1	1	STD80097	03/21/17 13:29
13	15M20895	WG606959-08 5PPM 1,4-DIOX ALT SRC	1	1	STD80098	03/21/17 13:51
14	15M20896	WG606465-01 BLANK 3/16	1	1		03/21/17 14:14
15	15M20897	WG606465-02 LCS 3/16	1	1		03/21/17 14:37
16	15M20898	WG606465-03 LCS2 3/16	1	1		03/21/17 15:00
17	15M20899	L17030724-01	1	1		03/21/17 15:22
18	15M20900	L17030724-01 10X	1	10		03/21/17 15:45
19	15M20901	BAKE OUT	1	1		03/21/17 16:07
20	15M20902	BAKE OUT	1	1		03/21/17 16:30
21	15M20903	BAKE OUT	1	1		03/21/17 16:53
22	15M20904	CH2CL2 CHECK	1	1		03/21/17 17:15

Comments

Seq.	Rerun	Dil.	Reason	Analytes
2			WG606959-01 5PPM LL DFTPP has an ion failure, DNR	
3			WG606959-01 5PPM LL DFTPP has an ion failure, changed liner, DNR	
4			WG606959-01 5PPM LL DFTPP benzidine tailing is >2, DNR	
5			WG606959-01 5PPM LL DFTPP has two ion failures, tightened nuts, DNR	

Page: 1

Approved: 22-MAR-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 032117
 Analyst1: SCB Analyst2: NA
 Method: 8270C/D SOP: MSS01 Rev: 28

Maintenance Log ID: _____ Syringe Filter Lot#: _____
 Eluent ID#: _____

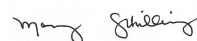
Workgroups: Column 1 ID: RXI-5MS Column 2 ID: NA
 WG606959, WG606673
 Internal STD: STD81022 Surrogate STD: NA
 CCV STD: STD80097 LCS STD: _____

Comments

Seq.	Rerun	Dil.	Reason	Analytes
15				
			WG606465-02 LCS 3/16 has high %REC and high surrogate recovery	
16				
			WG606465-03 LCS2 3/16 has high %REC and high surrogate recovery	
17	X	10	Over Calibration Range	2
			L17030724-01 the surrogate recovery is high, needs re-extracted	
18				
			L17030724-01 10X the surrogate recovery is high	

Page: 2

Approved: 22-MAR-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 041817
 Analyst1: LJH Analyst2: NA
 Method: 8270C/D SOP: MSS01 Rev: 28

Maintenance Log ID: _____ Syringe Filter Lot#: _____
 Eluent ID#: _____

Workgroups: _____
 Column 1 ID: RXI-5MS Column 2 ID: NA
WG610568
 Internal STD: STD81022 Surrogate STD: NA Calibration STD: _____
 CCV STD: STD80097 LCS STD: _____ MS/MSD STD: _____

Comments: _____

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	15M21010	BAKE OUT	1	1		04/18/17 10:33
2	15M21011	WG610552-01 5PPM LL DFTPP	1	1	STD80383	04/18/17 10:53
3	15M21012	WG610552-01 5PPM LL DFTPP	1	1	STD80383	04/18/17 11:10
4	15M21013	WG610552-02 5PPM 1,4-DIOX STD	1	1	STD80097	04/18/17 11:28
5	15M21014	WG610353-01 BLANK 827-DIOXANE	1	1		04/18/17 11:51
6	15M21015	WG610353-02 LCS 827-DIOXANE	1	1		04/18/17 12:13
7	15M21016	WG610353-03 LCS2 827-DIOXANE	1	1		04/18/17 12:36
8	15M21017	L17040618-01 827-DIOXANE	1	1		04/18/17 12:59
9	15M21018	L17040618-01 5X 827-DIOXANE	1	5		04/18/17 13:21

Comments

Seq.	Rerun	Dil.	Reason	Analytes
2	X			
			WG610552-01 5PPM LL DFTPP had ion failures, RR, NR.	
8	X	5	Over Calibration Range	1,4-Dioxane
			L17040618-01 827-DIOXANE	

Page: 1

Approved: 18-APR-17

Eri C. Zimm



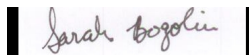
Microbac Laboratories Inc.

Data Checklist


Date: 21-MAR-2017
 Analyst: SCB
 Analyst: NA
 Method: 827-DIOX
 Instrument: HPMS15
 Curve Workgroup: NA
 Runlog ID: 81082
 Analytical Workgroups: WG606959, L17030724

ANALYTICAL	
System Performance Check	X
DFTPP (MS)	X
Endrin/DDT breakdown (8081/MS)	X
Pentachlorophenol/benzidine tailing (MS)	X
Eluent check (IC)/system pressure (HPLC)	NA
Window standard (FID)	NA
Initial Calibration	X
Average RF	X
Linear regression or higher order curve	X
Alternate source standard (ICV) % Difference	X
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (MS)	X
Continuing calibration blank (CCB) (IC)	NA
Special standards	NA
Blanks	X
TCL hits	X
Surrogate recoveries	X
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	X
MS/MSD/Sample duplicates	NA
Recoveries	NA
%RPD	NA
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	X
Surrogate recoveries	X
Internal standard areas (MS)	X
Library searches (MS)	NA
Calculations & correct factors	X
Compounds above calibration range	X
Reruns	X
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	NA
Check for completeness	X
Primary Reviewer	SCB
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	MES

Primary Reviewer:
22-MAR-2017



Secondary Reviewer:
22-MAR-2017





Microbac Laboratories Inc.

Data Checklist

Date: 18-APR-2017
 Analyst: LJH
 Analyst: NA
 Method: 827-DIOX
 Instrument: HPMS15
 Curve Workgroup: NA
 Runlog ID: 81595
 Analytical Workgroups: L17040618

ANALYTICAL	
System Performance Check	X
DFTPP (MS)	X
Endrin/DDT breakdown (8081/MS)	X
Pentachlorophenol/benzidine tailing (MS)	X
Eluent check (IC)/system pressure (HPLC)	NA
Window standard (FID)	NA
Initial Calibration	NA
Average RF	NA
Linear regression or higher order curve	NA
Alternate source standard (ICV) % Difference	NA
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (MS)	X
Continuing calibration blank (CCB) (IC)	NA
Special standards	NA
Blanks	X
TCL hits	X
Surrogate recoveries	X
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	X
MS/MSD/Sample duplicates	NA
Recoveries	NA
%RPD	NA
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	X
Surrogate recoveries	X
Internal standard areas (MS)	X
Library searches (MS)	NA
Calculations & correct factors	X
Compounds above calibration range	X
Reruns	X
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	
Check for completeness	X
Primary Reviewer	LJH
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	ECL

Primary Reviewer:
18-APR-2017

Randy J. Bendorshot

Secondary Reviewer:
18-APR-2017

Eric C. Zimm



Analytical Method: 8270D
Login Number: L17040618

AAB#: WG610568

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6431-GRAB	01	04/12/17					04/17/2017	4.9	7		04/18/17	1	40	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040618 Work Group: WG610568
 Blank File ID: 15M21014 Blank Sample ID: WG610353-01
 Prep Date: 04/17/17 13:45 Instrument ID: HPMS15
 Analyzed Date: 04/18/17 11:51 Method: 8270D
 Analyst: LJH

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG610353-02	15M21015	04/18/17 12:13	01
LCS2	WG610353-03	15M21016	04/18/17 12:36	01
LH18/24-SP650-6431-GRAB	L17040618-01	15M21018	04/18/17 13:21	DL01

Report Name: BLANK_SUMMARY
 PDF File ID: 5251605
 Report generated 04/20/2017 10:44



Login Number: L17040618 Prep Date: 04/17/17 13:45 Sample ID: WG610353-01
 Instrument ID: HPMS15 Run Date: 04/18/17 11:51 Prep Method: 3520C
 File ID: 15M21014 Analyst: LJH Method: 8270D
 Workgroup (AAB#): WG610568 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS15-21-MAR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
1,4-Dioxane	0.500	2.00	0.500	1	U

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,4-Dioxane-d8	76.5	20 - 129	PASS

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5251606
 20-APR-2017 10:44



Login Number: L17040618 Analyst: LJH Prep Method: 3520C
 Instrument ID: HPMS15 Matrix: Water Method: 8270D
 Workgroup (AAB#): WG610568 Units: ug/L
 QC Key: DOD4 Lot #: STD79978
 Sample ID: WG610353-02 LCS File ID: 15M21015 Run Date: 04/18/2017 12:13
 Sample ID: WG610353-03 LCS2 File ID: 15M21016 Run Date: 04/18/2017 12:36

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
1,4-Dioxane	5.00	2.90	58.0	5.00	3.16	63.2	8.51	30 - 104	30	

Surogates	LCS	LCS2	Surrogate Limits		Qualifier
	% Recovery	% Recovery			
1,4-Dioxane-d8	76.8	74.7	20	- 129	PASS

* EXCEEDS %REC LIMIT
EXCEEDS RPD LIMIT



DFTPP

Login Number: L17040618 Tune ID: WG606959-01
 Instrument: HPMS15 Run Date: 03/21/2017
 Analyst: SCB Run Time: 11:17
 Workgroup: WG606959 File ID: 15M20888
 Cal ID: HPMS15-21-MAR-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51.0	198	30.0	60.0	37.4	124900	PASS
68.0	69.0	0	2.00	1.56	2066	PASS
69.0	198	0	100	39.8	132696	PASS
70.0	69.0	0	2.00	0.730	969	PASS
127	198	40.0	60.0	55.0	183360	PASS
197	198	0	1.00	0.456	1521	PASS
198	198	100	100	100	333568	PASS
199	198	5.00	9.00	6.67	22252	PASS
275	198	10.0	30.0	26.9	89573	PASS
365	198	1.00	100	3.82	12731	PASS
441	443	0.0100	100	76.8	35691	PASS
442	198	40.0	100	72.5	241941	PASS
443	442	17.0	23.0	19.2	46461	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG606959-02	STD-CCV	01	03/21/2017 11:36	
WG606959-03	STD	01	03/21/2017 11:59	
WG606959-04	STD	01	03/21/2017 12:22	
WG606959-05	STD	01	03/21/2017 12:44	
WG606959-06	STD	01	03/21/2017 13:07	
WG606959-07	STD	01	03/21/2017 13:29	
WG606959-08	SSCV	01	03/21/2017 13:51	

* Sample past 12 hour tune limit



DFTPP

Login Number: L17040618 Tune ID: WG610552-01
 Instrument: HPMS15 Run Date: 04/18/2017
 Analyst: LJH Run Time: 11:10
 Workgroup: WG610552 File ID: 15M21012
 Cal ID: HPMS15-21-MAR-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51.0	198	30.0	60.0	39.9	84827	PASS
68.0	69.0	0	2.00	0.713	614	PASS
69.0	198	0	100	40.5	86075	PASS
70.0	69.0	0	2.00	0	0	PASS
127	198	40.0	60.0	56.8	120738	PASS
197	198	0	1.00	0.443	942	PASS
198	198	100	100	100	212608	PASS
199	198	5.00	9.00	7.20	15314	PASS
275	198	10.0	30.0	26.0	55229	PASS
365	198	1.00	100	4.06	8631	PASS
441	443	0.0100	100	80.0	22090	PASS
442	198	40.0	100	67.2	142864	PASS
443	442	17.0	23.0	19.3	27621	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG610552-02	CCV	01	04/18/2017 11:28	
WG610353-01	BLANK	01	04/18/2017 11:51	
WG610353-02	LCS	01	04/18/2017 12:13	
WG610353-03	LCS2	01	04/18/2017 12:36	
L17040618-01	LH18/24-SP650-6431-GRAB	DL01	04/18/2017 13:21	

* Sample past 12 hour tune limit



Login Number: L17040618
Analytical Method: 8270D
ICAL Workgroup: WG606959

Instrument ID: HPMS15
Initial Calibration Date: 21-MAR-17 13:29
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
1,4-Dioxane	0.3028	1.79		

R = Correlation coefficient; 0.995 minimum
R² = Coefficient of determination; 0.99 minimum



Login Number: L17040618
Analytical Method: 8270D

Instrument ID: HPMS15
Initial Calibration Date: 21-MAR-17 13:29
Column ID: F

Analyte	WG606959-02			WG606959-03			WG606959-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
1,4-Dioxane	5.00	212168.000	0.3040	10.0	413045.000	0.3069	7.50	289607.000	0.3055

INT_CAL - Modified 03/06/2008
PDF File ID: 5251608
Report generated 04/20/2017 10:44



Login Number: L17040618
Analytical Method: 8270D

Instrument ID: HPMS15
Initial Calibration Date: 21-MAR-17 13:29
Column ID: F

Analyte	WG606959-05			WG606959-06			WG606959-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
1,4-Dioxane	2.50	79286.0000	0.3015	1.00	32819.0000	0.3066	0.400	15800.0000	0.2925

INT_CAL - Modified 03/06/2008
PDF File ID: 5251608
Report generated 04/20/2017 10:44



Login Number: L17040618 Run Date: 03/21/2017 Sample ID: WG606959-08
 Instrument ID: HPMS15 Run Time: 13:51 Method: 8270D
 File ID: 15M20895 Analyst: SCB QC Key: DOD4
 ICal Workgroup: WG606959 Cal ID: HPMS15 - 21-MAR-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
1,4-Dioxane	5000	4630	ug/L	0.280	7.40	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17040618 Run Date: 04/18/2017 Sample ID: WG610552-02
 Instrument ID: HPMS15 Run Time: 11:28 Method: 8270D
 File ID: 15M21013 Analyst: LJH QC Key: DOD4
 Workgroup (AAB#): WG610568 Cal ID: HPMS15 - 21-MAR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
1,4-Dioxane	5000	5210	ug/L	0.316	4.29	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds

CCV - Modified 03/05/2008
 PDF File ID: 5251611
 Report generated 04/20/2017 10:44



Login Number: L17040618
Instrument ID: HPMS15
Workgroup (AAB#): WG610568

ICAL CCV Number: WG606959-02
CAL ID: HPMS15-21-MAR-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG606959-02	NA	NA	139587
Upper Limit	NA	NA	279174
Lower Limit	NA	NA	69794
<u>L17040618-01</u>	5.00	DL01	107244
WG610353-01	1.00	01	76357
WG610353-02	1.00	01	73645
WG610353-03	1.00	01	87471

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



Microbac Laboratories Inc.
INTERNAL STANDARD RETENTION TIME SUMMARY
(COMPARED TO MIDPOINT OF ICAL)

00853598

Login Number: L17040618
Instrument ID: HPMS15
Workgroup (AAB#): WG610568

ICAL CCV Number: WG606959-02
CAL ID: HPMS15-21-MAR-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG606959-02	NA	NA	7.05
Upper Limit	NA	NA	7.55
Lower Limit	NA	NA	6.55
<u>L17040618-01</u>	5.00	DL01	<u>7.043</u>
WG610353-01	1.00	01	7.04
WG610353-02	1.00	01	7.04
WG610353-03	1.00	01	7.04

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits

INTERNAL_STD_RT_ICAL - Modified 03/06/2008
PDF File ID: 5251614
Report generated: 04/20/2017 10:45



2.3 Metals Data

2.3.1 Metals I C P Data

2.3.1.1 Summary Data

Lab Report #: L17040618

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040618-01	PrePrep Method: N/A	Instrument: ICP-THERMO4
Client ID: LH18/24-SP650-6431-GRAB	Prep Method: 3015A	Prep Date: 04/13/2017 12:38
Matrix: Water	Analytical Method: 6010C	Cal Date: 04/21/2017 12:12
Workgroup #: WG610749	Analyst: KKB	Run Date: 04/21/2017 15:48
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: T4.042117.154820
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Selenium, Total	7782-49-2	0.0200	U	0.0200	0.0200	0.0100
U	Analyte was not detected. The concentration is below the reported LOD.					

2.3.1.2 QC Summary Data

Example 6010 Calculations

Thermo Scientific iCAP

1.0 Initial Calibration (ICAL) Parameters

For a multi-point calibration, the system performs linear regression from data consisting of a blank and four standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system in ug/mL (ppm)

Vf = Final volume (mL)

Vi = Initial volume (mL)

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in ug/mL (mg/L)

Example:

0.1

50

50

1

0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system (mg/L) (ppm)

Vf = Final volume (mL)

Vi = Initial weight (g)

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in ug/g (mg/kg)

Example:

0.1

50

1

1

5

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:

Cx = Concentration calculated as received (wet basis)

Px = Percent solids of sample (%wt)

$Cdry$ = Concentration calculated as dry weight (mg/kg)

Example:

5

80

6.25

Example 6010 Calculations

Thermo Scientific iCAP

1.0 Initial Calibration (ICAL) Parameters

For a multi-point calibration, the system performs linear regression from data consisting of a blank and four standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system in ug/mL (ppm)

Vf = Final volume (mL)

Vi = Initial volume (mL)

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in ug/mL (mg/L)

Example:

0.1

50

50

1

0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system (mg/L) (ppm)

Vf = Final volume (mL)

Vi = Initial weight (g)

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in ug/g (mg/kg)

Example:

0.1

50

1

1

5

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:

Cx = Concentration calculated as received (wet basis)

Px = Percent solids of sample (%wt)

$Cdry$ = Concentration calculated as dry weight (mg/kg)

Example:

5

80

6.25

Workgroup: WG610076
 Analyst: AC
 Spike Analyst: AC
 Run Date: 04/13/2017 12:38
 Method: 3015A
 Balance: BAL019
 Instrument: MW-4
 Instrument Start: 04/13/2017 12:38

SOP: ME407 Revision 19
 Spike Solution: STD81198
 Spike Witness: VC
 HNO3 Lot #: COA19650
 HCL Lot #: COA19441
 ICP FILTERS LOT# R6EA4780RGT38286
 40 & 50 ML. DIGESTION TU COA19487

SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG610076-02	BLANK	1	40 mL	50 mL	207.852 g	207.83 g	
2	WG610076-03	LCS	1	40 mL	50 mL	209.52 g	209.511 g	5 mL
3	L17040610-02	SAMP	1	40 mL	50 mL	207.322 g	207.316 g	
4	L17040610-04	SAMP	1	40 mL	50 mL	209.293 g	209.28 g	04/26/17
5	L17040610-06	SAMP	1	40 mL	50 mL	205.107 g	205.094 g	04/26/17
6	L17040610-08	SAMP	1	40 mL	50 mL	203.347 g	203.338 g	04/26/17
7	L17040610-10	SAMP	1	40 mL	50 mL	206.686 g	206.678 g	04/26/17
8	L17040610-12	SAMP	1	40 mL	50 mL	207.221 g	207.209 g	04/26/17
9	L17040610-14	SAMP	1	40 mL	50 mL	207.72 g	207.707 g	04/26/17
10	L17040610-16	SAMP	1	40 mL	50 mL	205.418 g	205.409 g	04/26/17
11	L17040610-18	SAMP	1	40 mL	50 mL	205.655 g	205.645 g	04/26/17
12	L17040610-20	SAMP	1	40 mL	50 mL	204.846 g	204.832 g	04/26/17
13	L17040610-22	SAMP	1	40 mL	50 mL	204.339 g	204.33 g	04/26/17
14	WG610076-01	REF	1	40 mL	50 mL	205.946 g	205.94 g	
15	L17040610-24	RS02	1	40 mL	50 mL	205.946 g	205.94 g	04/26/17
16	WG610076-04	MS	1	40 mL	50 mL	211.035 g	211.024 g	5 mL
17	L17040610-26	MS02	1	40 mL	50 mL	211.035 g	211.024 g	5 mL
18	WG610076-05	MSD	1	40 mL	50 mL	213.22 g	213.206 g	5 mL
19	L17040610-28	SD02	1	40 mL	50 mL	213.22 g	213.206 g	5 mL
20	L17040610-30	SAMP	1	40 mL	50 mL	207.209 g	207.194 g	04/26/17
21	L17040610-32	SAMP	1	40 mL	50 mL	205.66 g	205.645 g	04/26/17
22	L17040610-34	SAMP	1	40 mL	50 mL	204.95 g	204.936 g	04/26/17
23	L17040610-36	SAMP	1	40 mL	50 mL	206.205 g	206.186 g	04/26/17
24	L17040610-38	SAMP	1	40 mL	50 mL	207.193 g	207.176 g	04/26/17
25	L17040618-01	SAMP	1	40 mL	50 mL	206.508 g	206.482 g	04/24/17
26	L17040620-01	SAMP	1	40 mL	50 mL	207.028 g	207.01 g	04/24/17

L17040618-01 Filtered Digestate

Analyst: Amber R Gehring

Reviewer: Erin Patten



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 042117T4.1R.TXT

Analyst1: KKB Analyst2: N/A

Method: 200.7/6010B/6010C SOP: ME600G Rev: 8

Maintenance Log ID: _____

Calibration Std: STD81302 ICV Std: STD81301 Post Spike: STD81198

ICSA: STD81187 IC SAB: STD81114 Int. Std: RGT39282

CCV: STD81303 LLCCV: COA19158 Tuning Sol: _____

Stannous : _____ Hydroxylamine : _____

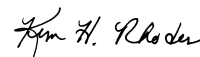
Workgroups: 610746,610749

Comments:

--

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	T4.042117.115827	WG611302-01	Calibration Point		1		04/21/17 11:58
2	T4.042117.120203	WG611302-02	Calibration Point		1		04/21/17 12:02
3	T4.042117.120539	WG611302-03	Calibration Point		1		04/21/17 12:05
4	T4.042117.120915	WG611302-04	Calibration Point		1		04/21/17 12:09
5	T4.042117.121240	WG611302-05	Calibration Point		1		04/21/17 12:12
6	T4.042117.121605	WG611302-06	Initial Calibration Verification		1		04/21/17 12:16
7	T4.042117.121930	WG611302-07	Initial Calib Blank		1		04/21/17 12:19
8	T4.042117.122307	WG611302-08	Low Level Initial Calibration V		1		04/21/17 12:23
9	T4.042117.122639	WG611302-09	LLICV		1		04/21/17 12:26
10	T4.042117.123011	WG611302-10	LLICV		1		04/21/17 12:30
11	T4.042117.123344	WG611302-11	Interference Check		1		04/21/17 12:33
12	T4.042117.123723	WG611302-12	Interference Check		1		04/21/17 12:37
13	T4.042117.124057	WG611302-13	CCV		1		04/21/17 12:40
14	T4.042117.124421	WG611302-14	CCB		1		04/21/17 12:44
15	T4.042117.134045	WG610545-02	Method/Prep Blank	40/50	1		04/21/17 13:40
16	T4.042117.134423	WG610545-03	Laboratory Control S	40/50	1		04/21/17 13:44
17	T4.042117.134751	WG610545-01	Reference Sample		1	L17040785-01	04/21/17 13:47
18	T4.042117.135125	WG610746-03	Post Digestion Spike		1	L17040785-01	04/21/17 13:51
19	T4.042117.135453	WG610746-04	Serial Dilution		5	L17040785-01	04/21/17 13:54
20	T4.042117.135829	WG610545-04	Matrix Spike	40/50	1	L17040785-01	04/21/17 13:58
21	T4.042117.140156	WG610545-05	Matrix Spike Duplica	40/50	1	L17040785-01	04/21/17 14:01
22	T4.042117.140525	WG611302-15	CCV		1		04/21/17 14:05
23	T4.042117.140850	WG611302-16	CCB		1		04/21/17 14:08
24	T4.042117.141228	WG610076-02	Method/Prep Blank	40/50	1		04/21/17 14:12
25	T4.042117.141604	WG610076-03	Laboratory Control S	40/50	1		04/21/17 14:16
26	T4.042117.141932	L17040610-02	8910 PR	40/50	1		04/21/17 14:19
27	T4.042117.142305	L17040610-04	8906 L	40/50	1		04/21/17 14:23
28	T4.042117.142639	L17040610-06	8716 P	40/50	1		04/21/17 14:26
29	T4.042117.143012	L17040610-08	8908 L	40/50	1		04/21/17 14:30
30	T4.042117.143346	L17040610-10	8002	40/50	1		04/21/17 14:33
31	T4.042117.143721	WG610749-01	Post Digestion Spike		1	L17040610-10	04/21/17 14:37
32	T4.042117.144049	WG610749-02	Serial Dilution		5	L17040610-10	04/21/17 14:40
33	T4.042117.144424	L17040610-12	8905 L	40/50	1		04/21/17 14:44
34	T4.042117.144758	WG611302-17	CCV		1		04/21/17 14:47

Page: 1 Approved: April 24, 2017




Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 042117T4.1R.TXT

Analyst1: KKB Analyst2: N/A

Method: 200.7/6010B/6010C SOP: ME600G Rev: 8

Maintenance Log ID: _____

Calibration Std: STD81302 ICV Std: STD81301 Post Spike: STD81198

ICSA: STD81187 IC SAB: STD81114 Int. Std: RGT39282

CCV: STD81303 LLCCV: COA19158 Tuning Sol: _____

Stannous: _____ Hydroxylamine: _____

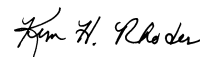
Workgroups: 610746,610749

Comments:

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Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	T4.042117.145124	WG611302-18	CCB		1		04/21/17 14:51
36	T4.042117.145502	L17040610-14	8905 L DUP	40/50	1		04/21/17 14:55
37	T4.042117.145836	L17040610-16	8905 U	40/50	1		04/21/17 14:58
38	T4.042117.150209	L17040610-18	8912 L	40/50	1		04/21/17 15:02
39	T4.042117.150543	L17040610-20	8912 U	40/50	1		04/21/17 15:05
40	T4.042117.150916	L17040610-22	8004	40/50	1		04/21/17 15:09
41	T4.042117.151255	WG610076-01	Reference Sample		1	L17040610-24	04/21/17 15:12
42	T4.042117.151628	WG610076-04	Matrix Spike	40/50	1	L17040610-24	04/21/17 15:16
43	T4.042117.151955	WG610076-05	Matrix Spike Duplica	40/50	1	L17040610-24	04/21/17 15:19
44	T4.042117.152323	L17040610-30	8911 U	40/50	1		04/21/17 15:23
45	T4.042117.152656	L17040610-32	8911 U DUP	40/50	1		04/21/17 15:26
46	T4.042117.153032	WG611302-19	CCV		1		04/21/17 15:30
47	T4.042117.153358	WG611302-20	CCB		1		04/21/17 15:33
48	T4.042117.153739	L17040610-34	8902 L	40/50	1		04/21/17 15:37
49	T4.042117.154113	L17040610-36	8902 U	40/50	1		04/21/17 15:41
50	T4.042117.154446	L17040610-38	8907 U	40/50	1		04/21/17 15:44
51	T4.042117.154820	L17040618-01	LH18/24-SP650-6431-GRAB	40/50	1		04/21/17 15:48
52	T4.042117.155203	L17040620-01	LH18/24-SP140-7431-GRAB	40/50	1		04/21/17 15:52
53	T4.042117.155536	WG611302-21	CCV		1		04/21/17 15:55
54	T4.042117.155904	WG611302-22	CCB		1		04/21/17 15:59
55	T4.042117.160242	WG611302-23	Low Level Continuing Calibra		1		04/21/17 16:02
56	T4.042117.160614	WG611302-24	LLCCV		1		04/21/17 16:06
57	T4.042117.160947	WG611302-25	LLCCV		1		04/21/17 16:09
58	T4.042117.161321	WG610076-02	Method/Prep Blank	40/50	1		04/21/17 16:13
59	T4.042117.161657	WG610076-03	Laboratory Control S	40/50	1		04/21/17 16:16
60	T4.042117.162026	L17040610-02	8910 PR	40/50	5		04/21/17 16:20
61	T4.042117.162400	L17040610-04	8906 L	40/50	1		04/21/17 16:24
62	T4.042117.162734	L17040610-06	8716 P	40/50	5		04/21/17 16:27
63	T4.042117.163109	L17040610-08	8908 L	40/50	5		04/21/17 16:31
64	T4.042117.163443	L17040610-10	8002	40/50	5		04/21/17 16:34
65	T4.042117.163817	WG610749-01	Post Digestion Spike		5	L17040610-10	04/21/17 16:38
66	T4.042117.164145	WG610749-02	Serial Dilution		25	L17040610-10	04/21/17 16:41
67	T4.042117.164523	L17040610-12	8905 L	40/50	5		04/21/17 16:45
68	T4.042117.164900	WG611302-26	CCV		1		04/21/17 16:49

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 042117T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 8
 Maintenance Log ID: _____
 Calibration Std: STD81302 ICV Std: STD81301 Post Spike: STD81198
 ICSA: STD81187 ICSAB: STD81114 Int. Std: RGT39282
 CCV: STD81303 LLCCV: COA19158 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 610746,610749

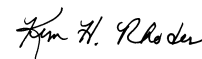
Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
69	T4.042117.165226	WG611302-27	CCB		1		04/21/17 16:52
70	T4.042117.165604	L17040610-14	8905 L DUP	40/50	5		04/21/17 16:56
71	T4.042117.165939	L17040610-16	8905 U	40/50	1		04/21/17 16:59
72	T4.042117.170312	L17040610-18	8912 L	40/50	5		04/21/17 17:03
73	T4.042117.170648	L17040610-20	8912 U	40/50	1		04/21/17 17:06
74	T4.042117.171020	L17040610-22	8004	40/50	1		04/21/17 17:10
75	T4.042117.171355	L17040610-24	8714 P		5	WG610076-01	04/21/17 17:13
76	T4.042117.171728	L17040610-26	8714 P MS	40/50	5	WG610076-04	04/21/17 17:17
77	T4.042117.172056	L17040610-28	8714 P MSD	40/50	5	WG610076-05	04/21/17 17:20
78	T4.042117.172425	L17040610-30	8911 U	40/50	1		04/21/17 17:24
79	T4.042117.172759	L17040610-32	8911 U DUP	40/50	1		04/21/17 17:27
80	T4.042117.173135	WG611302-28	CCV		1		04/21/17 17:31
81	T4.042117.173458	WG611302-29	CCB		1		04/21/17 17:34
82	T4.042117.173836	L17040610-34	8902 L	40/50	1		04/21/17 17:38
83	T4.042117.174210	L17040610-36	8902 U	40/50	1		04/21/17 17:42
84	T4.042117.174544	L17040610-38	8907 U	40/50	1		04/21/17 17:45
85	T4.042117.174921	WG611302-30	CCV		1		04/21/17 17:49
86	T4.042117.175247	WG611302-31	CCB		1		04/21/17 17:52

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Approved:

April 24, 2017




Microbac Laboratories Inc.

Data Checklist

Date: 21-APR-2017
 Analyst: KKB
 Analyst: NA
 Method: 6010B/6010C/200.7
 Instrument: ICP-THERMO4
 Curve Workgroup: 611302
 Runlog ID: 81688
 Analytical Workgroups: 610746,610749

	3015 STDS W/ ZR
STD ID#s on Runlog	X
Calibration/Linearity	X
ICV/CCV	X
ICV RSD < 3% (EPA 200.7 only)	
ICB/CCB	X
ICSA/ICSAB	X
CRI	X
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	X
Client Forms	X
Level X	
Level 3	785
Level 4	618,620
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	KKB
Secondary Reviewer	KHR
Comments	

Primary Reviewer:
24-APR-2017

Secondary Reviewer:
24-APR-2017

Ki K Buck

Lyn H. Rhodes



Analytical Method:6010C
Login Number:L17040618

AAB#:WG610749

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6431-GRAB	01	04/12/17					04/13/2017	.9	180		04/21/17	9	180	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040618 Work Group: WG610749
 Blank File ID: T4.042117.141228 Blank Sample ID: WG610076-02
 Prep Date: 04/13/17 12:38 Instrument ID: ICP-THERMO4
 Analyzed Date: 04/21/17 14:12 Method: 6010C
 Analyst: KKB

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG610076-03	T4.042117.141604	04/21/17 14:16	01
LH18/24-SP650-6431-GRAB	L17040618-01	T4.042117.154820	04/21/17 15:48	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5259222
 Report generated 04/24/2017 11:41



Login Number: L17040618 Prep Date: 04/13/17 12:38 Sample ID: WG610076-02
Instrument ID: ICP-THERMO4 Run Date: 04/21/17 14:12 Prep Method: 3015A
File ID: T4.042117.141228 Analyst: KKB Method: 6010C
Workgroup (AAB#): WG610749 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: ICP-TH-21-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Selenium, Total	0.0100	0.0200	0.0100	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5259223
24-APR-2017 11:40



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG610076-03
Instrument ID: ICP-THERMO4 Run Time: 14:16 Prep Method: 3015A
File ID: T4.042117.141604 Analyst: KKB Method: 6010C
Workgroup (AAB#): WG610749 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD81198 Cal ID: ICP-TH-21-APR-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Selenium, Total	0.250	0.240	96.0	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 5259224
Report generated: 04/24/2017 11:40



Loginnum: L17040618 Cal ID: ICP-THERMO4- Worknum: WG610749
 Instrument ID: ICP-THERMO4 Contract #: _____ Method: 6010C
 Parent ID: WG610076-01 File ID: T4.042117.151255 Dil: 1 Matrix: WATER
 Sample ID: WG610076-04 MS File ID: T4.042117.151628 Dil: 1 Units: mg/L
 Sample ID: WG610076-05 MSD File ID: T4.042117.151955 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Selenium, Dissolved	0.0132	0.250	0.256	97.2	0.250	0.254	96.3	0.892	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17040618 **Worknum:** WG610749
Instrument: ICP-THERMO4 **Method:** 6010C
Serial Dil: WG610749-02 **File ID:** T4.042117.144049 **Dil:** 5 **Units:** ug/L
Sample: L17040610-10 **File ID:** T4.042117.143346 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Selenium	ND	U	3.15		229.00	

U = Result is below MDL.

F = Result is greater than or equal to MDL and less than the RL.

X = Result is greater than or equal to RL and less than 25 times the MDL.

E = %D exceeds control limit of 10% and initial sample result is greater than or equal to 25 times the MDL.

SERIAL_DIL - Modified 09/22/2008

PDF File ID: 5259219

04/24/2017 11:40



Sample Login ID: L17040618 Worknum: WG610749
 Instrument ID: ICP-THERMO4 Method: 6010C
 Post Spike ID: WG610749-01 File ID: T4.042117.143721 Dil: 1 Units: ug/L
 Sample ID: L17040610-10 File ID: T4.042117.143346 Dil: 1 Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
SELENIUM	197		0	U	200	98.3	75 - 125	

N = % Recovery exceeds control limits

F = Result is between MDL and RL

U = Sample result is below MDL. A value of zero is used in the calculation



Login: L17040618 Workgroup (AAB#): WG610749
 Analytical Method: 6010C Instrument ID: ICP-THERMO4
 ICAL Worknum: WG611302 Initial Calibration Date: 21-APR-2017 12:12

	WG611302-01		WG611302-02		WG611302-03		WG611302-04		WG611302-05		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
SELENIUM	0	0.0000500	NA	NA	.008	0.000160	.4	0.00642	.8	0.0129	.999971	

INT = Instrument intensity
 R = Coefficient of correlation
 Q = Data Qualifier
 * = Out of Compliance; R < 0.995



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-07
Instrument ID: ICP-THERMO4 Run Time: 12:19 Method: 6010C
File ID: T4.042117.121930 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-THERI - 21-APR-17
Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
SELENIUM	.008	.016	.008	U

U = Result is less than 2 x MDL
F = Result is between MDL and 2 x MDL
* = Result is above 2 x MDL



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-14
Instrument ID: ICP-THERMO4 Run Time: 12:44 Method: 6010C
File ID: T4.042117.124421 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00800	0.0160	0.00800	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-16
Instrument ID: ICP-THERMO4 Run Time: 14:08 Method: 6010C
File ID: T4.042117.140850 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00800	0.0160	0.00800	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-18
Instrument ID: ICP-THERMO4 Run Time: 14:51 Method: 6010C
File ID: T4.042117.145124 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00800	0.0160	0.00800	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-20
 Instrument ID: ICP-THERMO4 Run Time: 15:33 Method: 6010C
 File ID: T4.042117.153358 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00800	0.0160	0.00800	U

U = Result is less than MDL.
 F = Result is between MDL and RL.
 * = Result is above RL.

CCB - Modified 03/05/2008
 PDF File ID: 5259233
 Report generated 04/24/2017 11:40



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-22
Instrument ID: ICP-THERMO4 Run Time: 15:59 Method: 6010C
File ID: T4.042117.155904 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00800	0.0160	0.00800	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-06
Instrument ID: ICP-THERMO4 Run Time: 12:16 Method: 6010C
File ID: T4.042117.121605 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Selenium	.4	0.411	103	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-13
 Instrument ID: ICP-THERMO4 Run Time: 12:40 Method: 6010C
 File ID: T4.042117.124057 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.407	mg/L	102	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-15
 Instrument ID: ICP-THERMO4 Run Time: 14:05 Method: 6010C
 File ID: T4.042117.140525 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.405	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-17
 Instrument ID: ICP-THERMO4 Run Time: 14:47 Method: 6010C
 File ID: T4.042117.144758 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.406	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-19
 Instrument ID: ICP-THERMO4 Run Time: 15:30 Method: 6010C
 File ID: T4.042117.153032 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.405	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-21
Instrument ID: ICP-THERMO4 Run Time: 15:55 Method: 6010C
File ID: T4.042117.155536 Analyst: KKB QC Key: DOD4
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.404	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-08
 Instrument ID: ICP-THERMO4 Run Time: 12:23 Method: 6010C
 File ID: T4.042117.122307 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0200	mg/L	125	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/21/2017 Sample ID: WG611302-23
Instrument ID: ICP-THERMO4 Run Time: 16:02 Method: 6010C
File ID: T4.042117.160242 Analyst: KKB QC Key: DOD4
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0178	mg/L	111	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17040618
 Instrument ID: ICP-THERMO4
 Sol. A : WG611302-11
 Sol. AB : WG611302-12

File ID: T4.042117.123344
 File ID: T4.042117.123723

Workgroup (AAB#): WG610749
 Method: 6010C
 Units: mg/L
 Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Selenium	NS	-0.00275	NS	0.250	0.239	95.6	

NS = Not spiked

* = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.

= Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

+ = Result for unspiked element is outside the acceptance limits of (+/-) 2 times the project method detection limit (MDL). This criteria is only applicable to specific QAPPs.



Login Number: L17040618
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 Method: 6010C

Analyte	Wave Length	AG	AL	AS	B	BA
ALUMINUM	308.20	0	0	0	0	0
ANTIMONY	206.80	0	0.0000410	0	0	0
ARSENIC	189.00	0	0	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	0	0	0	0
CADMIUM	228.80	0	0	0.0145	0	-0.0000800
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0	0	0	0	0
COBALT	228.60	0	0	0	0	0
COPPER	224.70	0	0	0	0	0
IRON	261.10	0	0	0	0	0
LEAD	220.30	0	0.000378	0	0	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	0	0	0	0	0
MANGANESE	257.60	0	0	0	0	0
MOLYBDENUM	202.00	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
PHOSPHORUS	214.90	0	-0.000289	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0	0.0000140	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.10	0	0	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0	0	0	0
THALLIUM	190.80	0	-0.0000120	0	0	0
TIN	189.90	0	0	0	0	0
TITANIUM	337.20	0	0	0	0	0
VANADIUM	292.40	0	0	0	0	0
ZINC	206.20	0	0.0000320	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5259227
 Report generated: 04/24/2017 11:40



Login Number: L17040618
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 Method: 6010C

Analyte	Wave Length	BE	CA	CD	CO	CR
ALUMINUM	308.20	0	0	0	-0.000820	0
ANTIMONY	206.80	0	0	0	0	0.0260
ARSENIC	189.00	0	0	0	0	-0.00730
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	0	0	0.00343	0
CADMIUM	228.80	0	0	0	-0.00390	0
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0	0	0	0	0
COBALT	228.60	0	0	0	0	-0.000200
COPPER	224.70	0	0	0	0.0000770	-0.00100
IRON	261.10	0	0	0	0	-0.00100
LEAD	220.30	0	0	0	-0.0000130	-0.000132
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	0	0	0	0	0
MANGANESE	257.60	0	0	0	0	0.0000500
MOLYBDENUM	202.00	0	0	0	0	0
NICKEL	231.60	0	0	0	-0.000860	0
PHOSPHORUS	214.90	0	0	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.10	0	0	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0.00000500	0	0	0
THALLIUM	190.80	0	0	0	0.00240	0.000276
TIN	189.90	0	0	0	0	0
TITANIUM	337.20	0	0	0	0	0
VANADIUM	292.40	0	0	0	0	-0.00350
ZINC	206.20	0	0	0	0	-0.00180
ZIRCONIUM	339.10	0	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5259227
 Report generated: 04/24/2017 11:40



Login Number: L17040618

Date: 01/04/2017

Instrument ID: ICP-THERMO4

Method: 6010C

Analyte	Wave Length	CU	FE	K	LI	MG
ALUMINUM	308.20	0	0	0	0	0
ANTIMONY	206.80	0	0.0000560	0	0	0
ARSENIC	189.00	0	-0.0000490	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	0.000648	0	0	0
CADMIUM	228.80	0	-0.00000500	0	0	0
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0	0.0000400	0	0	0
COBALT	228.60	0	0	0	0	0
COPPER	224.70	0	0.00139	0	0	0
IRON	261.10	0	0	0	0	0
LEAD	220.30	0.000609	0	0	0	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	0	0	0	0	0
MANGANESE	257.60	0	0	0	0	0.0000220
MOLYBDENUM	202.00	0	0	0	0	0
NICKEL	231.60	0	0.0000420	0	0	0
PHOSPHORUS	214.90	0.0390	0.000900	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.10	0	-0.000118	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.90	0	0	0	0	0
TITANIUM	337.20	0	-0.000200	0	0	0
VANADIUM	292.40	0	0.0000700	0	0	0
ZINC	206.20	0	0	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5259227
 Report generated: 04/24/2017 11:40



Login Number: L17040618
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 Method: 6010C

Analyte	Wave Length	MN	MO	NA	NI	P
ALUMINUM	308.20	0	0.0163	0	0	0
ANTIMONY	206.80	0	0.000910	0	-0.00190	0
ARSENIC	189.00	0	0.000139	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	-0.00190	0	0	0
CADMIUM	228.80	0	0.0000320	0	-0.000770	0
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0.000360	0	0	0	0
COBALT	228.60	0	-0.00200	0	0.000100	0
COPPER	224.70	0	0.00160	0	-0.0123	0
IRON	261.10	0	0	0	0	0
LEAD	220.30	0	-0.000610	0	0.000110	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	-0.00290	-0.0230	0	0	0
MANGANESE	257.60	0	0	0	0	0
MOLYBDENUM	202.00	0	0.0000300	0	0	0
NICKEL	231.60	0	0	0	0	0
PHOSPHORUS	214.90	0	0.00710	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0.000600	0.000580	0	0	0
SILICON	212.40	0	-0.354	0	0	0
SILVER	328.10	0	-0.0000100	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0	0	0	0
THALLIUM	190.80	0.00100	0	0	0	0
TIN	189.90	0	0	0	0	0
TITANIUM	337.20	0	-0.000153	0	0	0
VANADIUM	292.40	-0.000200	-0.00160	0	0	0
ZINC	206.20	0	0	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5259227
 Report generated: 04/24/2017 11:40



Login Number: L17040618

Date: 01/04/2017

Instrument ID: ICP-THERMO4

Method: 6010C

Analyte	Wave Length	PB	SB	SE	SI	SN
ALUMINUM	308.20	0	0	0	0	0
ANTIMONY	206.80	0	0	0	0	-0.0320
ARSENIC	189.00	0	0	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	0	0	0	0
CADMIUM	228.80	0	0	0	0	0
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0	0	0	0	0
COBALT	228.60	0	0	0	0	0
COPPER	224.70	0.00440	0	0	0	0
IRON	261.10	0	0	0	0	0
LEAD	220.30	0	0	0	0	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	0	0	0	0	0
MANGANESE	257.60	0	0	0	0	0
MOLYBDENUM	202.00	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
PHOSPHORUS	214.90	0	0	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.10	0	0	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.90	0	0	0	0	0
TITANIUM	337.20	0	0	0	0	0
VANADIUM	292.40	0	0	0	0	0
ZINC	206.20	0	0	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5259227
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Login Number: L17040618
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 Method: 6010C

Analyte	Wave Length	SR	TI	TL	V	ZN
ALUMINUM	308.20	0	0	0	0.0720	0
ANTIMONY	206.80	0	0.000500	0	-0.00360	0
ARSENIC	189.00	0	0	0	0.000107	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	-0.00000700	0	0.000990	0
BORON	249.60	0	0	0	0	0
CADMIUM	228.80	0	0	0	0.000102	0
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0	0.0000550	0	0	0
COBALT	228.60	0	0.00170	0	0.0000200	0
COPPER	224.70	0	0.000269	0	0	0
IRON	261.10	0	0	0	0	0
LEAD	220.30	0	0	0	-0.000126	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	0	-0.00290	0	0	0
MANGANESE	257.60	0	0	0	0	0
MOLYBDENUM	202.00	0	0	0	-0.000110	0
NICKEL	231.60	0	0	0	0	0
PHOSPHORUS	214.90	0	0	0	-0.00100	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.10	0	-0.000720	0	-0.000260	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0	0	0	0
THALLIUM	190.80	0	-0.00100	0	-0.0420	0
TIN	189.90	0	-0.00190	0	0	0
TITANIUM	337.20	0	0	0	0	0
VANADIUM	292.40	0	0.000820	0	0	0
ZINC	206.20	0	0	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5259227
 Report generated: 04/24/2017 11:40



Login Number: L17040618

Date: 01/04/2017

Instrument ID: ICP-THERMO4

Method: 6010C

Analyte	Wave Length	ZR
ALUMINUM	308.20	0
ANTIMONY	206.80	0
ARSENIC	189.00	0
BARIUM	455.40	0
BERYLLIUM	313.10	0
BORON	249.60	0
CADMIUM	228.80	0
CALCIUM	422.60	0
CHROMIUM	267.70	0
COBALT	228.60	0
COPPER	224.70	0
IRON	261.10	0
LEAD	220.30	0
LITHIUM	670.70	0
MAGNESIUM	279.10	0
MANGANESE	257.60	0
MOLYBDENUM	202.00	0
NICKEL	231.60	0
PHOSPHORUS	214.90	0
POTASSIUM	766.40	0
SELENIUM	196.10	0
SILICON	212.40	0
SILVER	328.10	0
SODIUM	589.50	0
STRONTIUM	407.70	0
THALLIUM	190.80	0
TIN	189.90	0
TITANIUM	337.20	0
VANADIUM	292.40	0
ZINC	206.20	0
ZIRCONIUM	339.10	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5259227
 Report generated: 04/24/2017 11:40



Login Number: L17040618 Date: 04/05/2017
 Instrument ID: ICP-THERMO4 Method: 6010C

Analyte	Integration Time (Sec.)	Concentration (ug/L)
Aluminum	10.00	900.0
Antimony	20.00	45.0
Arsenic	10.00	45.0
Barium	10.00	45.0
Beryllium	10.00	1.8
Boron	20.00	45.0
Cadmium	20.00	4.5
Calcium	8.00	270.0
Chromium	20.00	36.0
Cobalt	20.00	45.0
Copper	20.00	180.0
Iron	8.00	720.0
Lead	20.00	225.0
Lithium	8.00	36.0
Magnesium	8.00	900.0
Manganese	10.00	36.0
Molybdenum	20.00	18.0
Nickel	20.00	90.0
Phosphorus	20.00	180.0
Potassium	8.00	360.0
Selenium	20.00	90.0
Silicon	20.00	36.0
Silver	10.00	4.5
Sodium	8.00	270.0
Strontium	8.00	9.0
Thallium	20.00	18.0
Tin	20.00	45.0
Titanium	8.00	45.0
Vanadium	20.00	27.0
Zinc	20.00	45.0
Zirconium	10.00	45.0

Comments:

All analytes passed acceptance criteria at the specified concentration.



2.3 Metals Data

2.3.2 Metals ICP-MS Data

2.3.2.1 Summary Data

Lab Report #: L17040618

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040618-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP650-6431-GRAB	Prep Method: 3015	Prep Date: 04/14/2017 08:52
Matrix: Water	Analytical Method: 6020A	Cal Date: 04/14/2017 10:09
Workgroup #: WG610246	Analyst: JYH	Run Date: 04/14/2017 12:56
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: NI.041417.125654
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Barium, Total	7440-39-3	0.219		0.00600	0.00300	0.00150
Lead, Total	7439-92-1	0.00100	U	0.00200	0.00100	0.000500
Silver, Total	7440-22-4	0.00100	U	0.00200	0.00100	0.000500
U	Analyte was not detected. The concentration is below the reported LOD.					

2.3.2.2 QC Summary Data

Example 6020 Calculations
Perkin Elmer ELAN 6100

1.0 Initial Calibration (ICAL) Parameters

The system performs linear regression from data consisting of a blank and three standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system (ug/L)

Vf = Final volume

Vi = Initial volume

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in (ug/L)

Example:

0.1

100

40

1

0.25

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system (ug/L)

Vf = Final volume

Vi = Initial volume

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in (ug/kg)

Example:

0.1

200

0.5

1

40

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:

Cx = Concentration calculated as received (wet basis)

Px = Percent solids of sample (%wt)

$Cdry$ = Concentration calculated as dry weight (ug/kg)

Example:

40

80

50

50 ug/kg = 0.050 mg/kg

Perkin Elmer ELAN ICP/MS

STANDARDS KEY

QC Std 1 - ICV

QC Std 2 - ICB

QC Std 3 - LLICV

QC Std 4 - ICSA

QC Std 5 - ICSAB

QC Std 6 - CCV

QC Std 7 - CCB

QC Std 8 - LLCCV

Calibration Solutions

Analyte	Stock Conc. (mg/L)	S1 (mg/L)	S2 (mg/L)	S3 (mg/L)	S4 (mg/L)
Al	10	0	0.0004	0.05	0.1
Sb	10	0	0.0004	0.05	0.1
As	10	0	0.0004	0.05	0.1
Ba	10	0	0.0004	0.05	0.1
Be	10	0	0.0004	0.05	0.1
Ca	1000	0	0.04	5	10
Cd	10	0	0.0004	0.05	0.1
Cr	10	0	0.0004	0.05	0.1
Co	10	0	0.0004	0.05	0.1
Cu	10	0	0.0004	0.05	0.1
Fe	1000	0	0.04	5	10
Pb	10	0	0.0004	0.05	0.1
Mg	1000	0	0.04	5	10
Mn	10	0	0.0004	0.05	0.1
Ni	10	0	0.0004	0.05	0.1
K	1000	0	0.04	5	10
Se	10	0	0.0004	0.05	0.1
Ag	10	0	0.0004	0.05	0.1
Na	1000	0	0.04	5	10
Tl	10	0	0.0004	0.05	0.1
V	10	0	0.0004	0.05	0.1
U	1000	0	0.0004	0.05	0.1
Zn	10	0	0.0004	0.05	0.1

Workgroup: WG610193
 Analyst: VC
 Spike Analyst: VC
 Run Date: 04/14/2017 08:52
 Method: 3015
 Balance: BAL016
 Instrument: MW-3
 Instrument Start: 04/14/2017 08:56

SOP: ME407 Revision 19
 Spike Solution: STD80296
 Spike Witness: ERP
 40 & 50 ML. DIGESTION TU_{COA}19487
 HNO₃ Lot #: COA19650
 MS Filters- fisher-Lot#RRGT38288

SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG610193-02	BLANK	1	20 mL	50 mL	184.771 g	184.771 g	
2	WG610193-03	LCS	1	20 mL	50 mL	184.968 g	184.957 g	.25 mL
3	L17040610-02	SAMP	1	20 mL	50 mL	185.764 g	185.765 g	
4	L17040610-04	SAMP	1	20 mL	50 mL	183.639 g	183.635 g	
5	L17040610-06	SAMP	1	20 mL	50 mL	182.041 g	182.037 g	
6	L17040610-08	SAMP	1	20 mL	50 mL	182.545 g	182.538 g	
7	L17040610-10	SAMP	1	20 mL	50 mL	183.26 g	183.249 g	
8	L17040610-12	SAMP	1	20 mL	50 mL	185.232 g	185.221 g	
9	L17040610-14	SAMP	1	20 mL	50 mL	184.721 g	184.705 g	
10	L17040610-16	SAMP	1	20 mL	50 mL	182.556 g	182.544 g	
11	L17040610-18	SAMP	1	20 mL	50 mL	184.577 g	184.566 g	
12	L17040610-20	SAMP	1	20 mL	50 mL	185.218 g	185.208 g	
13	L17040610-22	SAMP	1	20 mL	50 mL	184.301 g	184.291 g	
14	WG610193-01	REF	1	20 mL	50 mL	182.918 g	182.906 g	
15	L17040610-24	RS02	1	20 mL	50 mL	182.918 g	182.906 g	
16	WG610193-04	MS	1	20 mL	50 mL	185.479 g	185.469 g	.25 mL
17	L17040610-26	MS02	1	20 mL	50 mL	185.479 g	185.469 g	.25 mL
18	WG610193-05	MSD	1	20 mL	50 mL	182.162 g	182.15 g	.25 mL
19	L17040610-28	SD02	1	20 mL	50 mL	182.162 g	182.15 g	.25 mL
20	L17040610-30	SAMP	1	20 mL	50 mL	182.097 g	182.09 g	
21	L17040610-32	SAMP	1	20 mL	50 mL	183.241 g	183.23 g	
22	L17040610-34	SAMP	1	20 mL	50 mL	184.344 g	184.33 g	
23	L17040610-36	SAMP	1	20 mL	50 mL	182.646 g	182.634 g	
24	L17040610-38	SAMP	1	20 mL	50 mL	184.618 g	184.611 g	
25	L17040618-01	SAMP	1	20 mL	50 mL	182.375 g	182.356 g	
26	L17040620-01	SAMP	1	20 mL	50 mL	183.395 g	183.382 g	

Analyst: Vicki Collier

Reviewer: Erin Patten



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 041417A.REP

Analyst1: JYH Analyst2: N/A

Method: 6020/6020A/200.8 SOP: ME700A Rev: 3

Maintenance Log ID: _____

Calibration Std: STD81368 ICV Std: STD81367 Post Spike: STD79415

ICSA: STD81369 ICSAB: STD81136 Int. Std: RGT39300

CCV: STD81129 LLCCV: STD81372 Tuning Sol : STD81373

Stannous : _____ Hydroxylamine : _____

Workgroups: 610269,609798,609914,608658,610246

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	NI.041417.095651	Blank	Blank		1		04/14/17 09:56
2	NI.041417.095956	WG610270-01	Calibration Point		1		04/14/17 09:59
3	NI.041417.100301	WG610270-02	Calibration Point		1		04/14/17 10:03
4	NI.041417.100607	WG610270-03	Calibration Point		1		04/14/17 10:06
5	NI.041417.100912	WG610270-04	Calibration Point		1		04/14/17 10:09
6	NI.041417.101219	WG610270-05	Initial Calibration Verification		1		04/14/17 10:12
7	NI.041417.101526	WG610270-06	Initial Calib Blank		1		04/14/17 10:15
8	NI.041417.101833	WG610270-07	Low Level Initial Calibration V		1		04/14/17 10:18
9	NI.041417.102139	WG610270-08	Interference Check		1		04/14/17 10:21
10	NI.041417.102444	WG610270-09	Interference Check		1		04/14/17 10:24
11	NI.041417.102751	WG610270-10	CCV		1		04/14/17 10:27
12	NI.041417.103056	WG610270-11	CCB		1		04/14/17 10:30
13	NI.041417.103533	L17040009-36	IDL15-ICP-ELAN	20/50	1		04/14/17 10:35
14	NI.041417.103845	L17040009-37	IDL16-ICP-ELAN	20/50	1		04/14/17 10:38
15	NI.041417.104151	L17040009-38	IDL17-ICP-ELAN	20/50	1		04/14/17 10:41
16	NI.041417.104456	L17040009-39	IDL18-ICP-ELAN	20/50	1		04/14/17 10:44
17	NI.041417.104801	L17040009-40	IDL19-ICP-ELAN	20/50	1		04/14/17 10:48
18	NI.041417.105107	L17040009-41	IDL20-ICP-ELAN	20/50	1		04/14/17 10:51
19	NI.041417.105413	L17040009-42	IDL21-ICP-ELAN	20/50	1		04/14/17 10:54
20	NI.041417.105721	WG610270-12	CCV		1		04/14/17 10:57
21	NI.041417.110026	WG610270-13	CCB		1		04/14/17 11:00
22	NI.041417.110334	L17040003-01	MDL-1	.25/100	1		04/14/17 11:03
23	NI.041417.110639	L17040005-01	LOQ-1	.25/100	1		04/14/17 11:06
24	NI.041417.110945	L17040002-01	MDL-1	20/50	1		04/14/17 11:09
25	NI.041417.111250	L17040004-01	LOQ-1	20/50	1		04/14/17 11:12
26	NI.041417.111555	L17031685-01	LF 6-7 SW11	20/50	1		04/14/17 11:15
27	NI.041417.111903	WG610270-14	CCV		1		04/14/17 11:19
28	NI.041417.112208	WG610270-15	CCB		1		04/14/17 11:22
29	NI.041417.113001	WG610193-02	Method/Prep Blank	20/50	1		04/14/17 11:30
30	NI.041417.113306	WG610193-03	Laboratory Control S	20/50	1		04/14/17 11:33
31	NI.041417.113611	L17040610-24	8714 P		1	WG610193-01	04/14/17 11:36
32	NI.041417.113917	L17040610-26	8714 P MS	20/50	1	WG610193-04	04/14/17 11:39
33	NI.041417.114222	L17040610-28	8714 P MSD	20/50	1	WG610193-05	04/14/17 11:42
34	NI.041417.114528	L17040610-02	8910 PR	20/50	1		04/14/17 11:45

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K: K Buck



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 041417A.REP
 Analyst1: JYH Analyst2: N/A
 Method: 6020/6020A/200.8 SOP: ME700A Rev: 3
 Maintenance Log ID: _____
 Calibration Std: STD81368 ICV Std: STD81367 Post Spike: STD79415
 ICSA: STD81369 ICSAB: STD81136 Int. Std: RGT39300
 CCV: STD81129 LLCCV: STD81372 Tuning Sol : STD81373
 Stannous : _____ Hydroxylamine : _____

Workgroups: 610269,609798,609914,608658,610246

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	NI.041417.114833	L17040610-04	8906 L	20/50	1		04/14/17 11:48
36	NI.041417.115138	WG610246-01	Post Digestion Spike		1	L17040610-04	04/14/17 11:51
37	NI.041417.115444	WG610246-02	Serial Dilution		5	L17040610-04	04/14/17 11:54
38	NI.041417.115749	WG610246-02	Serial Dilution		25	L17040610-04	04/14/17 11:57
39	NI.041417.120056	WG610270-16	CCV		1		04/14/17 12:00
40	NI.041417.120402	WG610270-17	CCB		1		04/14/17 12:04
41	NI.041417.120728	L17040610-06	8716 P	20/50	1		04/14/17 12:07
42	NI.041417.121033	L17040610-08	8908 L	20/50	1		04/14/17 12:10
43	NI.041417.121339	L17040610-10	8002	20/50	1		04/14/17 12:13
44	NI.041417.121644	L17040610-12	8905 L	20/50	1		04/14/17 12:16
45	NI.041417.121950	L17040610-14	8905 L DUP	20/50	1		04/14/17 12:19
46	NI.041417.122256	L17040610-16	8905 U	20/50	1		04/14/17 12:22
47	NI.041417.122601	L17040610-18	8912 L	20/50	1		04/14/17 12:26
48	NI.041417.122905	L17040610-20	8912 U	20/50	1		04/14/17 12:29
49	NI.041417.123210	L17040610-22	8004	20/50	1		04/14/17 12:32
50	NI.041417.123515	L17040610-30	8911 U	20/50	1		04/14/17 12:35
51	NI.041417.123822	WG610270-18	CCV		1		04/14/17 12:38
52	NI.041417.124127	WG610270-19	CCB		1		04/14/17 12:41
53	NI.041417.124434	L17040610-32	8911 U DUP	20/50	1		04/14/17 12:44
54	NI.041417.124739	L17040610-34	8902 L	20/50	1		04/14/17 12:47
55	NI.041417.125044	L17040610-36	8902 U	20/50	1		04/14/17 12:50
56	NI.041417.125349	L17040610-38	8907 U	20/50	1		04/14/17 12:53
57	NI.041417.125654	L17040618-01	LH18/24-SP650-6431-GRAB	20/50	1		04/14/17 12:56
58	NI.041417.130000	L17040620-01	LH18/24-SP140-7431-GRAB	20/50	1		04/14/17 13:00
59	NI.041417.130646	L17040610-06	8716 P	20/50	50		04/14/17 13:06
60	NI.041417.130951	L17040610-08	8908 L	20/50	50		04/14/17 13:09
61	NI.041417.131256	L17040610-12	8905 L	20/50	50		04/14/17 13:12
62	NI.041417.131602	L17040610-14	8905 L DUP	20/50	50		04/14/17 13:16
63	NI.041417.131909	WG610270-20	CCV		1		04/14/17 13:19
64	NI.041417.132215	WG610270-21	CCB		1		04/14/17 13:22
65	NI.041417.132521	L17040610-36	8902 U	20/50	50		04/14/17 13:25
66	NI.041417.132829	WG610270-22	CCV		1		04/14/17 13:28
67	NI.041417.133134	WG610270-23	CCB		1		04/14/17 13:31
68	NI.041417.133441	WG610270-24	Low Level Continuing Calibra		1		04/14/17 13:34

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K: K Buck

Microbac Laboratories Inc.

Data Checklist

Date: 14-APR-2017
 Analyst: JYH
 Analyst: NA
 Method: 6020/6020A/200.8
 Instrument: ICP-MS2
 Curve Workgroup: 610270
 Runlog ID: 81553
 Analytical Workgroups: 610269,609798,609914,608658,610246

STD ID#s on Runlog	X
Calibration/Linearity	X
ICV/CCV	X
ICV RSD < 3% (EPA 200.7 only)	
ICB/CCB	X
ICSA/ICSAB	X
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	610,618,620
Client Forms	X
Level X	
Level 3	
Level 4	1685,002,003,004,005,618,620
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	JYH
Secondary Reviewer	KKB
Comments	

Primary Reviewer:
14-APR-2017

Secondary Reviewer:
14-APR-2017



Analytical Method:6020A
Login Number:L17040618

AAB#:WG610246

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6431-GRAB	01	04/12/17					04/14/2017	1.7	180		04/14/17	1.9	180	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040618 Work Group: WG610246
 Blank File ID: NI.041417.113001 Blank Sample ID: WG610193-02
 Prep Date: 04/14/17 08:52 Instrument ID: ICP-MS2
 Analyzed Date: 04/14/17 11:30 Method: 6020A
 Analyst: JYH

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG610193-03	NI.041417.113306	04/14/17 11:33	01
LH18/24-SP650-6431-GRAB	L17040618-01	NI.041417.125654	04/14/17 12:56	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5248414
 Report generated 04/14/2017 13:49



Login Number: L17040618 Prep Date: 04/14/17 08:52 Sample ID: WG610193-02
 Instrument ID: ICP-MS2 Run Date: 04/14/17 11:30 Prep Method: 3015
 File ID: NI.041417.113001 Analyst: JYH Method: 6020A
 Workgroup (AAB#): WG610246 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: ICP-MS - 14-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Barium, Total	0.00150	0.00600	0.00150	1	U
Lead, Total	0.000500	0.00200	0.000500	1	U
Silver, Total	0.000500	0.00200	0.000500	1	U

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5248415
 14-APR-2017 13:49



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610193-03
Instrument ID: ICP-MS2 Run Time: 11:33 Prep Method: 3015
File ID: NI.041417.113306 Analyst: JYH Method: 6020A
Workgroup (AAB#): WG610246 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD80296 Cal ID: ICP-MS - 14-APR-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Barium, Total	0.125	0.123	98.0	80 - 120	
Lead, Total	0.125	0.126	101	80 - 120	
Silver, Total	0.125	0.125	100	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 5248416
Report generated: 04/14/2017 13:50



Loginum:L17040618 Cal ID: ICP-MS2- Worknum:WG610246
 Instrument ID:ICP-MS2 Contract #: Method:6020A
 Parent ID:WG610193-01 File ID:NI.041417.113611 Dil:1 Matrix:WATER
 Sample ID:WG610193-04 MS File ID:NI.041417.113917 Dil:1 Units:mg/L
 Sample ID:WG610193-05 MSD File ID:NI.041417.114222 Dil:1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Barium	0.0987	0.125	0.220	97.1	0.125	0.219	96.4	0.352	80 - 120	20	
Lead	ND	0.125	0.126	101	0.125	0.127	101	0.331	80 - 120	20	
Silver	ND	0.125	0.123	98.3	0.125	0.123	98.2	0.0598	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17040618 **Worknum:** WG610246
Instrument: ICP-MS2 **Method:** 6020A
Serial Dil: WG610246-02 **File ID:** NI.041417.115444 **Dil:** 5 **Units:** ug/L
Sample: L17040610-04 **File ID:** NI.041417.114833 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Barium	27.6	X	29.4	X	6.49	
Lead	ND	U	ND	U		
Silver	ND	U	ND	U		

U = Result is below MDL.

F = Result is greater than or equal to MDL and less than the RL.

X = Result is greater than or equal to RL and less than 100 times the MDL.

E = %D exceeds control limit of 10% and initial sample result is greater than or equal to 100 times the MDL.

SERIAL_DIL - Modified 09/22/2008

PDF File ID: 5248412

04/14/2017 13:48



Sample Login ID: L17040618

Worknum: WG610246

Instrument ID: ICP-MS2

Method: 6020A

Post Spike ID: WG610246-01

File ID: NI.041417.115138

Dil: 1

Units: ug/L

Sample ID: L17040610-04

File ID: NI.041417.114833

Dil: 1

Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
BARIUM	78.5		27.6		50	101.8	75 - 125	
LEAD	51.7		0	U	50	103.4	75 - 125	
SILVER	50.6		0	U	50	101.3	75 - 125	

N = % Recovery exceeds control limits

F = Result is between MDL and RL

U = Sample result is below MDL. A value of zero is used in the calculation



Microbac Laboratories Inc.
Initial Calibration Summary

00853662

Login: L17040618 Workgroup (AAB#): WG610246
 Analytical Method: 6020A Instrument ID: ICP-MS2
 ICAL Worknum: WG610270 Initial Calibration Date: 14-APR-2017 10:09

	WG610270-01		WG610270-02		WG610270-03		WG610270-04		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
BARIUM	0	30.0	.4	100	50	67200	100	131000	.999946	
LEAD	0	438	.4	714	50	271000	100	530000	.999985	
SILVER	0	99.0	.4	390	50	264000	100	505000	.999999	

INT = Instrument intensity
 R = Coefficient of correlation
 Q = Data Qualifier
 * = Out of Compliance; R < 0.995



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-06
Instrument ID: ICP-MS2 Run Time: 10:15 Method: 6020A
File ID: NI.041417.101526 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG610246 Cal ID: ICP-MS2 - 14-APR-17
Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
SILVER	.2	.8	.2	U
BARIIUM	.6	2.4	.6	U
LEAD	.2	.8	.2	U

U = Result is less than 2 x MDL
F = Result is between MDL and 2 x MDL
* = Result is above 2 x MDL



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-11
Instrument ID: ICP-MS2 Run Time: 10:30 Method: 6020A
File ID: NI.041417.103056 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Barium	0.600	2.40	0.600	U
Lead	0.200	0.800	0.200	U
Silver	0.200	0.800	0.200	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-15
 Instrument ID: ICP-MS2 Run Time: 11:22 Method: 6020A
 File ID: NI.041417.112208 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Barium	0.600	2.40	0.600	U
Lead	0.200	0.800	0.200	U
Silver	0.200	0.800	0.200	U

U = Result is less than MDL.
 F = Result is between MDL and RL.
 * = Result is above RL.

CCB - Modified 03/05/2008
 PDF File ID: 5248329
 Report generated 04/14/2017 13:51



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-17
 Instrument ID: ICP-MS2 Run Time: 12:04 Method: 6020A
 File ID: NI.041417.120402 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Barium	0.600	2.40	0.600	U
Lead	0.200	0.800	0.200	U
Silver	0.200	0.800	0.200	U

U = Result is less than MDL.
 F = Result is between MDL and RL.
 * = Result is above RL.

CCB - Modified 03/05/2008
 PDF File ID: 5248329
 Report generated 04/14/2017 13:51



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-19
 Instrument ID: ICP-MS2 Run Time: 12:41 Method: 6020A
 File ID: NI.041417.124127 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Barium	0.600	2.40	0.600	U
Lead	0.200	0.800	0.200	U
Silver	0.200	0.800	0.200	U

U = Result is less than MDL.
 F = Result is between MDL and RL.
 * = Result is above RL.

CCB - Modified 03/05/2008
 PDF File ID: 5248329
 Report generated 04/14/2017 13:51



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-21
 Instrument ID: ICP-MS2 Run Time: 13:22 Method: 6020A
 File ID: NI.041417.132215 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Barium	0.600	2.40	0.600	U
Lead	0.200	0.800	0.200	U
Silver	0.200	0.800	0.200	U

U = Result is less than MDL.
 F = Result is between MDL and RL.
 * = Result is above RL.

CCB - Modified 03/05/2008
 PDF File ID: 5248329
 Report generated 04/14/2017 13:51



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-05
 Instrument ID: ICP-MS2 Run Time: 10:12 Method: 6020A
 File ID: NI.041417.101219 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Barium	50	49.1	98.2	90 - 110	
Lead	50	49.7	99.4	90 - 110	
Silver	50	49.2	98.4	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-10
 Instrument ID: ICP-MS2 Run Time: 10:27 Method: 6020A
 File ID: NI.041417.102751 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.0500	0.0490	mg/L	97.9	90 - 110	
Lead	0.0500	0.0498	mg/L	99.7	90 - 110	
Silver	0.0500	0.0497	mg/L	99.3	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
 PDF File ID: 5248328
 Report generated 04/14/2017 13:51



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-14
 Instrument ID: ICP-MS2 Run Time: 11:19 Method: 6020A
 File ID: NI.041417.111903 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.0500	0.0493	mg/L	98.7	90 - 110	
Lead	0.0500	0.0497	mg/L	99.4	90 - 110	
Silver	0.0500	0.0496	mg/L	99.1	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-16
 Instrument ID: ICP-MS2 Run Time: 12:00 Method: 6020A
 File ID: NI.041417.120056 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.0500	0.0492	mg/L	98.4	90 - 110	
Lead	0.0500	0.0499	mg/L	99.8	90 - 110	
Silver	0.0500	0.0494	mg/L	98.7	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-18
 Instrument ID: ICP-MS2 Run Time: 12:38 Method: 6020A
 File ID: NI.041417.123822 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.0500	0.0498	mg/L	99.6	90 - 110	
Lead	0.0500	0.0504	mg/L	101	90 - 110	
Silver	0.0500	0.0490	mg/L	98.0	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-20
 Instrument ID: ICP-MS2 Run Time: 13:19 Method: 6020A
 File ID: NI.041417.131909 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.0500	0.0504	mg/L	101	90 - 110	
Lead	0.0500	0.0513	mg/L	103	90 - 110	
Silver	0.0500	0.0496	mg/L	99.2	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-07
 Instrument ID: ICP-MS2 Run Time: 10:18 Method: 6020A
 File ID: NI.041417.101833 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.750	0.709	ug/L	94.5	70 - 130	
Lead	0.200	0.196	ug/L	98.1	70 - 130	
Silver	0.400	0.396	ug/L	99.1	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17040618 Run Date: 04/14/2017 Sample ID: WG610270-24
 Instrument ID: ICP-MS2 Run Time: 13:34 Method: 6020A
 File ID: NI.041417.133441 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.750	0.693	ug/L	92.4	70 - 130	
Lead	0.200	0.189	ug/L	94.4	70 - 130	
Silver	0.400	0.348	ug/L	86.9	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17040618
 Instrument ID: ICP-MS2
 Sol. A : WG610270-08
 Sol. AB : WG610270-09

File ID: NI.041417.102139
 File ID: NI.041417.102444

Workgroup (AAB#): WG610246
 Method: 6020A
 Units: ug/L
 Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Barium	NS	0.00630	NS	100	100	100	
Lead	NS	0.0137	NS	100	101	101	
Silver	NS	-0.00370	NS	100	91.5	91.5	

NS = Not spiked

* = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.

= Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

+ = Result for unspiked element is outside the acceptance limits of (+/-) 2 times the project method detection limit (MDL). This criteria is only applicable to specific QAPPs.



INTERNAL STANDARD REPORT

Login: L17040618 Analytical Method: 6020
 Analytical Workgroup: WG610246 Matrix: 1
 Instrument: ICP-MS2 Analyst: JYH
 ICAL Date: 14-APR-2017 09:59

Sample	Type	Run Date	BISMUTH	GERMANIUM	INDIUM
			% Rec	% Rec	% Rec
L17040610-04	SAMP	14-APR-2017 11:48	100.097	96.512	98.072
L17040618-01	SAMP	14-APR-2017 12:56	91.378	93.464	93.374
WG610193-02	BLANK	14-APR-2017 11:30	99.032	95.569	96.671
WG610193-03	LCS	14-APR-2017 11:33	101.092	97.609	99.415
WG610246-01	PSPK	14-APR-2017 11:51	99.834	96.575	97.47
WG610246-02	SERIAL	14-APR-2017 11:54	94.181	88.193	90.519
WG610270-05	ICV	14-APR-2017 10:12	97.123	93.429	95.384
WG610270-06	ICB	14-APR-2017 10:15	98.641	93.446	95.824
WG610270-07	LLICV	14-APR-2017 10:18	97.252	92.492	94.272
WG610270-08	ICS	14-APR-2017 10:21	96.452	93.059	95.078
WG610270-09	ICS	14-APR-2017 10:24	98.984	95.221	95.251
WG610270-10	CCV	14-APR-2017 10:27	99.611	94.717	96.697
WG610270-11	CCB	14-APR-2017 10:30	101.325	95.176	97.053
WG610270-14	CCV	14-APR-2017 11:19	99.92	95.576	97.313
WG610270-15	CCB	14-APR-2017 11:22	99.953	96.356	96.931
WG610270-16	CCV	14-APR-2017 12:00	100.777	97.991	98.585
WG610270-17	CCB	14-APR-2017 12:04	101.521	97.022	97.622
WG610270-18	CCV	14-APR-2017 12:38	101.642	95.443	97.35
WG610270-19	CCB	14-APR-2017 12:41	102.456	95.839	97.906
WG610270-20	CCV	14-APR-2017 13:19	100.656	98.67	99.829
WG610270-21	CCB	14-APR-2017 13:22	100.826	96.134	99.095
WG610270-24	LLCCV	14-APR-2017 13:34	99.525	94.356	96.975

Acceptance criteria: 30% - 120% Underlined recoveries are out of range
 Acceptance criteria for CCVs and CCBs for method SW846-6020: 80% - 120%

INT_STD_ICPMS - Modified 07/28/2010
 PDF File ID: 5248422
 Report generated: 04/14/2017 13:50



Login Number: L17040618 Date: 04/12/2017
Instrument ID: ICP-MS2 Method: 6020A

Analyte	Integration Time (Sec.)	Concentration (ug/L)
Antimony	1.00	100.0
Arsenic	1.00	100.0
Barium	1.00	100.0
Cadmium	1.00	100.0
Chromium	1.00	100.0
Cobalt	1.00	100.0
Copper	1.00	100.0
Lead	1.00	100.0
Manganese	1.00	100.0
Nickel	1.00	100.0
Selenium	1.00	100.0
Silver	1.00	100.0
Thallium	1.00	100.0
Uranium	1.00	100.0
Vanadium	1.00	100.0
Zinc	1.00	100.0

Comments:

All analytes passed acceptance criteria at the specified concentration.



2.4 General Chemistry Data

2.4.1 Hexavalent Chromium Data

2.4.1.1 Summary Data

Lab Report #: L17040618

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040618-01	PrePrep Method: N/A	Instrument: UV-2600
Client ID: LH18/24-SP650-6431-GRAB	Prep Method: 7196A	Prep Date: N/A
Matrix: Water	Analytical Method: 7196A	Cal Date: 03/10/2017 13:59
Workgroup #: WG610118	Analyst: DLP	Run Date: 04/13/2017 14:00
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: 00.1704131400-06
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chromium, Hexavalent	18540-29-9	0.0100	U	0.0200	0.0100	0.00500
U	Analyte was not detected. The concentration is below the reported LOD.					

2.4.1.2 QC Summary Data

Example Calculations for Visible Spectrophotometric Methods

Linear Calibration Model

Step 1 - Retrieve Curve Data from ICAL

m = slope of the linear equation
 b = intercept from the linear equation
 y = instrument response as absorbance or OD
 x = concentration of analyte (mg/L)
 $y = mx + b$

Step 2: Calculate the instrument concentration, x

Where:

$$x = (y - b)/m$$

Step 3: Solve for analyte concentration in sample, Cx

$$Cx = (x) (D)$$

Example Calculation (LCS):

Value of m from plot:	7.809
Value of b from plot:	0.0004135
Absorbance of unknown from quantitation report (y):	0.31
Calculated concentration (x):	0.03964483
Dilution factor (D):	1.00
Concentration of analyte in sample, Cy:	0.0396 mg/L

SmartChem Autoanalyzer - Quadratic Calibration for Chloride and Sulfate

Step 1 - Retrieve Curve Data from Smartchem ICAL

A, B, C = constants from the ICAL quadratic regression

x = instrument response as absorbance or OD

y = concentration of analyte (mg/L)

Step 2: Calculate the instrument concentration, y

Where:

$$y = Ax^2 + Bx + C$$

Step 3: Solve for analyte concentration in sample, Cy

$$Cy = (y) (D)$$

Example Calculation (LCS):

Value of A from plot:	101.2796
Value of B from plot:	318.9056
Value of C from plot:	-2.2712
Absorbance of unknown from quantitation report (x):	0.1583
Calculated concentration (y):	50.7495108
Dilution factor (D):	1.00
Concentration of analyte in sample, Cy:	50.75 mg/L

Microbac Laboratories Inc.

Data Checklist

Date: 13-APR-2017
 Analyst: DLP
 Analyst: NA
 Method: CR-6
 Instrument: UV-2600
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG610118

Calibration/Linearity	
Second Source Check	03-10-17
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	
QC Violation Sheet	
Case Narratives	
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	
Primary Reviewer	DLP
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
14-APR-2017

Secondary Reviewer:
14-APR-2017

Dwight Payne

Denna Johnson



Analytical Method: 7196A
Login Number: L17040618

AAB#: WG610118

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6431-GRAB	01	04/12/17					04/13/2017	1	1		04/13/17	1	1	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040618 Work Group: WG610118
 Blank File ID: 00.1704131400-03 Blank Sample ID: WG610118-01
 Prep Date: 04/13/17 14:00 Instrument ID: UV-2600
 Analyzed Date: 04/13/17 14:00 Method: 7196A
 Analyst: DLP

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG610118-02	00.1704131400-04	04/13/17 14:00	
LCS2	WG610118-03	00.1704131400-05	04/13/17 14:00	
LH18/24-SP650-6431-GRAB	L17040618-01	00.1704131400-06	04/13/17 14:00	
DUP	WG610118-05	00.1704131400-08	04/13/17 14:00	

Report Name: BLANK_SUMMARY
 PDF File ID: 5246744
 Report generated 04/14/2017 09:23



Login Number: L17040618 Prep Date: 04/13/17 14:00 Sample ID: WG610118-01
Instrument ID: UV-2600 Run Date: 04/13/17 14:00 Prep Method: 7196A
File ID: 00.1704131400-03 Analyst: DLP Method: 7196A
Workgroup (AAB#): WG610118 Matrix: Water Units: mg/L
Contract #: Cal ID: UV-260-12-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Chromium, Hexavalent	0.00500	0.0200	0.00500	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5246745
14-APR-2017 09:23



Login Number: L17040618 Analyst: DLP Prep Method: 7196A
 Instrument ID: UV-2600 Matrix: Water Method: 7196A
 Workgroup (AAB#): WG610118 Units: mg/L
 QC Key: DOD4 Lot #: STD80875
 Sample ID: WG610118-02 LCS File ID: 00.1704131400-04 Run Date: 04/13/2017 14:00
 Sample ID: WG610118-03 LCS2 File ID: 00.1704131400-05 Run Date: 04/13/2017 14:00

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Chromium, Hexavalent	0.100	0.102	102	0.100	0.102	102	0.733	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5246746
 Report generated: 04/14/2017 09:23



2.4.1.3 Raw Data

Curves

Parameter: Cole - Low

Spectrophotometer: UV-2200

Calibration (Curve) standard stock: SP 80872, 80873

Concentration: 50mg/L, 5mg/L

Recipe for preparation of curve standards found in:

SOP: K2180 Revision: 22 Page: 12

Second Source Stock: 80875 (concentration: 2mg/L)

Daily Preparation: 10L 2) 100

concentration = 201

Calibration Standards (mg/L)	Volume (mL)	Cell Size (cm)	Wavelength (nm)	Absorbance
0.2	100	5cm	540	0.808
0.1	100	5cm	540	0.408
0.05	100	5cm	540	0.206
0.02	100	5cm	540	0.084
0.01	100	5cm	540	0.052
0.00	100	5cm	540	0.003
<u>2nd source 0.1</u>	<u>100</u>	<u>5cm</u>	<u>540</u>	<u>0.418</u>

Analyst: April Greene

Date/Time: 3/10/17 1358

DCN#124473



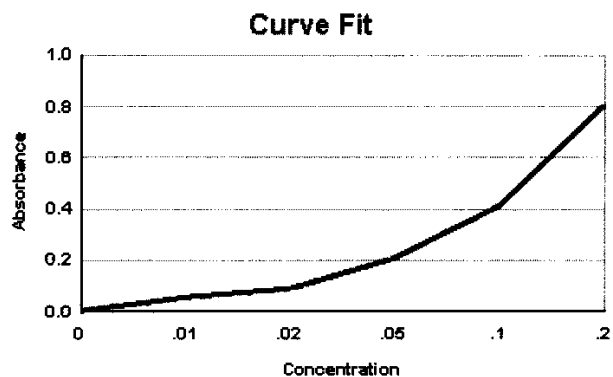
Microbac Laboratories Inc.
INITIAL CALIBRATION

Workgroup: WG605850
Analytical Method: 3500CR
Instrument ID: UV-2600

Analyst: ADG
Initial Calibration Date: 03/10/2017

Analyte: **CHROMIUM, HEXAVALENT**
Number of Points: 6
Slope: 4.01048
Y-Intercept: 0.00616935
Coef. Of Correlation (R^2): 0.999893
Coef. Of Correlation (R): 0.999947

Concentration X	Absorbance Y	X^2	$X * Y$	Y-Fitted (mX^2+B)
0.00	0.00300	0.00	0.00	0.00616935
0.0100	0.0520	0.000100	0.000520	0.0462742
0.0200	0.0840	0.000400	0.00168	0.0863790
0.0500	0.206	0.00250	0.0103	0.206694
0.100	0.408	0.0100	0.0408	0.407218
0.200	0.808	0.0400	0.162	0.808266



WG_ICAL_CAL_WET - Modified 03/06/2008
Report generated 03/10/2017 15:28



Microbac Laboratories Inc.
ALTERNATE SOURCE REPORT

Workgroup #: WG605850Instrument ID: UV-2600File ID: 00.1703101359-07Run Date: 03/10/2017CCV ID: WG605850-07Run Time: 13:59Units: mg/LAnalyst: ADGAnalyte: CHROMIUM, HEXAVALENT Cal ID: UV-260 - 10-MAR-17 13:59:06

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.1	0.103	4.18	3.0	

* Exceeds %D Limit

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

WET_WG_SSCV - Modified 03/06/2008
Report generated 03/10/2017 15:29



CHROMIUM (6)

(Cr6)

Standard Methods 3500 Cr-D (18th, 19th), 3500Cr-B(20th)

SPEC: UV 2600

SOP K2186 Rev. # 22

SW846 7196A

Curve ID: 605850 3-10-17

SOP OVAP K3500-Cr Rev. # _____

CCV: 81080873

LCS: 81080875

Spike: 81080874

RGT: 39797

Matrix: Liquid (mg/L)

Daily dilution: 1.5/100 =

Daily dilution: 10.2/100 =

Daily dilution: 0.2/50

RGT: 18997

Soil (mg/Kg)

Daily dilution: 0.05

Daily dilution: 0.10

Daily dilution: 0.10

Sample	Volume (mL)	pH adj. to 2 ± 0.5	Dilution	Cell size (cm)	Absorbance @ 540 nm
CCV: mg/L(1 cm)	100				
CCV: <u>0.05</u> mg/L(5 cm)	100	✓		<u>5 cm</u>	<u>0.215</u>
Blank/CCB:	100	✓		<u>5 cm</u>	<u>0.001</u>
LCS: ppm	100	✓		<u>5 cm</u>	<u>0.414</u>
LCSDUP: ppm	100	✓		<u>5 cm</u>	<u>0.417</u>
<u>04-618-01</u>	100	✓		<u>5 cm</u>	<u>0.005</u>
<u>04-620-01</u>	100	✓		<u>5 cm</u>	<u>0.004</u>
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
CCV: (1 cm)	100				
CCV: (5 cm)	100				
CCB:	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
DUP <u>04-620-01</u>	100	✓		<u>5 cm</u>	<u>0.004</u>
MS: (<u>04-618-01</u>)	100	✓		<u>5 cm</u>	<u>0.381</u>
MSD: ()	100				
CCV: (1 cm)	100				
CCV: <u>0.05</u> (5 cm)	100	✓		<u>5</u>	<u>0.214</u>
CCB:	100			<u>5 cm</u>	<u>0.001</u>

Analyst: Quinty Poyner

Date / Time: 04-13-17 11400

SW846 7196 (Dup and/or MS every 10 samples)

SM3500 Cr (Dup and MS/MSD every 20 samples)

DCN#125185



Microbac Laboratories Inc.
SAMPLE REPORT

Workgroup: WG610118Analyst: DLPAnalyte: CHROMIUM, HEXAVALENTDate: 04/13/2017

Sample ID	I Vol	F Vol	Response	Slope	Y Intercept	Anal. Conc.	Rep. Conc.	Dil	Units
WG610118-01	100	100	0.00100	4.010	0.006169	-0.0012890	-0.0012890	1	mg/L
WG610118-02	100	100	0.414	4.010	0.006169	0.10169	0.10169	1	mg/L
WG610118-03	100	100	0.417	4.010	0.006169	0.10244	0.10244	1	mg/L
L17040618-01	100	100	0.00500	4.010	0.006169	-0.00029157	ND	1	mg/L
WG610118-06	100	100	0.00500	4.010	0.006169	-0.00029157	-0.00029157	1	mg/L
WG610118-04	100	100	0.00400	4.010	0.006169	-0.00054092	-0.00054092	1	mg/L
L17040620-01	100	100	0.00400	4.010	0.006169	-0.00054092	ND	1	mg/L
WG610118-05	100	100	0.00400	4.010	0.006169	-0.00054092	-0.00054092	1	mg/L
WG610118-07	100	100	0.381	4.010	0.006169	0.093463	0.093463	1	mg/L

UV SAMPLE REPORT - Modified 03/06/2008

Report generated 04/14/2017 08:14

Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00853698

Workgroup #: WG610180 Instrument ID: UV-2600
File ID: 00.1704131400-01 Run Date: 04/13/2017
CCV ID: WG610180-01 Run Time: 14:00
Units: mg/L Analyst: DLP
Analyte: CHROMIUM, HEXAVALENT Cal ID: UV-260 - 12-APR-17

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.05	0.0521	4.30	4.2	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/14/2017 08:10



Workgroup #: WG610180
File ID: 00.1704131400-10
CCV ID: WG610180-03
Units: mg/L
Analyte: CHROMIUM, HEXAVALENT

Instrument ID: UV-2600
Run Date: 04/13/2017
Run Time: 14:00
Analyst: DLP
Cal ID: UV-260 - 12-APR-17

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.05	0.0518	4.28	3.6	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/14/2017 08:10



3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
April 24, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
OJE - OMOYEMWEN J. ENGLISH	PDM - PIERCE D. MORRIS
PIT - MICROBAC WARRENDALE	REK - BOB E. KYER
RLB - BOB BUCHANAN	RNP - RICK N. PETTY
SAV - SARAH A. VANDENBERG	SCB - SARAH C. BOGOLIN
SCJ - SUE ELLEN C. JOHNSON	SDC - SHALYN D. CONLEY
TB - TODD BOYLE	TMB - TIFFANY M. BAILEY
TMM - TAMMY M. MORRIS	VC - VICKI COLLIER
WTD - WADE T. DELONG	XXX - UNAVAILABLE OR SUBCONTRACT

List of Valid Qualifiers

April 24, 2017

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample receipt exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample receipt exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentatively identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound



List of Valid Qualifiers

April 24, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample receipt exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below



CHAIN OF CUSTODY

Name of Lab Shipping To: MICROBAC (740) 373-4071 ATTN: STEPHANIE MOSSBURG

Project: AECOM
 LONGHORN ARMY AMMN. PLANT (LHAAP)
 GROUNDWATER TREATMENT PLANT (GWTP)
 KARNACK, TEXAS
 Project No.: 60256135.GWTP
 HRUMAR16

Job: GROUNDWATER TREATMENT PLANT
 MONTHLY EFFLUENT SAMPLES

Prepared By: P.O. Number

Scott Beesinger

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. of Containers	Analyses						Remarks (Preservatives, etc.)	Lab I.D.#	
					VOLATILES	SILVER, SELENIUM, LEAD, BARIUM	HEXAVALENT CHROMIUM	1, 4 - DIOXANE					
LH18/24-SP650-6431-Grab	Water	04/12/17 / 15:00		3	X							HCL	
LH18/24-SP650-6431-Grab	Water	04/12/17 / 15:00		3		X	X	X				NONE	
LH18/24-SP650-6431-Grab	Water	04/12/17 / 15:00		1		X						HNO3	
Trip Blank	Water	04/12/17		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>	04/12/17	15:30									

For Lab Use Only

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

Microbac OVD
 Received: 04/13/2017 09:33
 By: CARA STRICKLER
 221000059496

Cara Strickler

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17040618

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 24-APR-2017

Samplenum Container ID Products

L17040618-01 893427

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	13-APR-2017 10:48	CLS		
2	ANALYZ	V1	ORG4	13-APR-2017 11:43	TMB	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	13-APR-2017 10:48	CLS		
2	ANALYZ	V1	ORG4	13-APR-2017 11:43	TMB	BRG	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	13-APR-2017 10:48	CLS		
2	ANALYZ	V1	ORG4	13-APR-2017 11:43	TMB	BRG	

Samplenum Container ID Products

L17040618-01 893428

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	13-APR-2017 10:48	CLS		
2	PREP	W1	EXT	17-APR-2017 09:49	JDH	CLS	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER		13-APR-2017 10:48	CLS		

Samplenum Container ID Products

L17040618-01 893429 AG-MS BA-MS PB-MS SE-AX

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	13-APR-2017 10:48	CLS		
2	PREP	W1	DIG	13-APR-2017 10:56	ERP	BRG	
3	ANALYZ*	DIG	METALS	14-APR-2017 10:55	JYH	ERP	
4	STORE	DIG	A1	14-APR-2017 13:58	BRG	ERP	

***Sample extract/digestate/leachate**

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login



Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17040618

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 24-APR-2017

Samplenum **Container ID** **Products**
L17040618-01 893430 826-SPE 827-DIOXANE CR-6

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	13-APR-2017 10:48	CLS		
2	ANALYZ	W1	WET	13-APR-2017 10:58	DLP	BRG	

Samplenum **Container ID** **Products**
L17040618-02 893431 826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	13-APR-2017 10:48	CLS		
2	ANALYZ	V1	ORG4	13-APR-2017 11:43	TMB	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	13-APR-2017 10:48	CLS		
2	ANALYZ	V1	ORG4	13-APR-2017 11:43	TMB	BRG	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login



NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
 Total Halide by Bomb Combustion (TX)
 Particle Sizing - 200 Mesh (PS200)
 Specific Gravity/Density (SPGRAV)
 Total Residual Chlorine (CL-TRL)
 Total Volatile Solids (all forms) (TVS)
 Total Coliform Bacteria (all methods)
 Fecal Coliform Bacteria (all methods)
 Sulfite (SO₃)
 Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS

Nitrogen, Ammonia by Method 350.1
 Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
 Phenolics, Total by Method 420.1
 ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
 Acetic acid
 Butyric acid
 Lactic acid
 Propionic acid
 Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
 1-Methylnaphthalene
 1,4-Dioxane
 Atrazine
 Benzaldehyde
 Biphenyl
 Caprolactam
 Hexamethylphosphoramide (HMPA)
 Pentachlorobenzene
 Pentachloroethane

NELAP Accreditation by Laboratory SOP**NONPOTABLE WATER**OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALSOVD MSS01/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP**SOLID AND HAZARDOUS CHEMICALS**OVD MSV01/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)



Laboratory Report Number: L17040620

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on April 24 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com

Lab Report #: L17040620

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00112195	I	5.0		J4616882327	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

**Lab Report #:** L17040620**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP140-7431-GRAB	L17040620-01	04/12/2017 15:00	04/13/2017 09:33



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Kerri Buck			2017-04-24 19:35:31



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports	X				
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?					
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?	X				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6010
Prep Batch Number(s):	610076	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Kerri Buck	<i>Kerri Buck</i>		2017-04-24 19:38:06



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports	X				
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?					
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?	X				
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?	X				
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	6020
Prep Batch Number(s):	610193	Reviewer Name:	Kerri Buck
LRC Date:	2017-04-24 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-14 14:29:50



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

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2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

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Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040620
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG610118	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-14 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

Lab Report #: L17040620
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040620-01	PrePrep Method: N/A	Instrument: ICP-THERMO4
Client ID: LH18/24-SP140-7431-GRAB	Prep Method: 3015A	Prep Date: 04/13/2017 12:38
Matrix: Water	Analytical Method: 6010C	Cal Date: 04/21/2017 12:12
Workgroup #: WG610749	Analyst: KKB	Run Date: 04/21/2017 15:52
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: T4.042117.155203
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Selenium, Total	7782-49-2	0.0800	U	0.0800	0.0800	0.0400
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17040620
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040620-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP140-7431-GRAB	Prep Method: 3015	Prep Date: 04/14/2017 08:52
Matrix: Water	Analytical Method: 6020A	Cal Date: 04/14/2017 10:09
Workgroup #: WG610246	Analyst: JYH	Run Date: 04/14/2017 13:00
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: NI.041417.130000
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Silver, Total	7440-22-4	0.00100	U	0.00200	0.00100	0.000500
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17040620
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040620-01	PrePrep Method: N/A	Instrument: UV-2600
Client ID: LH18/24-SP140-7431-GRAB	Prep Method: 7196A	Prep Date: N/A
Matrix: Water	Analytical Method: 7196A	Cal Date: 03/10/2017 13:59
Workgroup #: WG610118	Analyst: DLP	Run Date: 04/13/2017 14:00
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: 00.1704131400-07
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chromium, Hexavalent	18540-29-9	0.0100	U	0.0200	0.0100	0.00500
U	Analyte was not detected. The concentration is below the reported LOD.					

2.1 Metals Data

2.1.1 Metals I C P Data

2.1.1.1 Summary Data

Lab Report #: L17040620

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040620-01	PrePrep Method: N/A	Instrument: ICP-THERMO4
Client ID: LH18/24-SP140-7431-GRAB	Prep Method: 3015A	Prep Date: 04/13/2017 12:38
Matrix: Water	Analytical Method: 6010C	Cal Date: 04/21/2017 12:12
Workgroup #: WG610749	Analyst: KKB	Run Date: 04/21/2017 15:52
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: T4.042117.155203
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Selenium, Total	7782-49-2	0.0800	U	0.0800	0.0800	0.0400
U	Analyte was not detected. The concentration is below the reported LOD.					

2.1.1.2 QC Summary Data

Example 6010 Calculations

Thermo Scientific iCAP

1.0 Initial Calibration (ICAL) Parameters

For a multi-point calibration, the system performs linear regression from data consisting of a blank and four standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system in ug/mL (ppm)

Vf = Final volume (mL)

Vi = Initial volume (mL)

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in ug/mL (mg/L)

Example:

0.1

50

50

1

0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system (mg/L) (ppm)

Vf = Final volume (mL)

Vi = Initial weight (g)

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in ug/g (mg/kg)

Example:

0.1

50

1

1

5

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:

Cx = Concentration calculated as received (wet basis)

Px = Percent solids of sample (%wt)

$Cdry$ = Concentration calculated as dry weight (mg/kg)

Example:

5

80

6.25

Example 6010 Calculations

Thermo Scientific iCAP

1.0 Initial Calibration (ICAL) Parameters

For a multi-point calibration, the system performs linear regression from data consisting of a blank and four standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system in ug/mL (ppm)

Vf = Final volume (mL)

Vi = Initial volume (mL)

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in ug/mL (mg/L)

Example:

0.1

50

50

1

0.1

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system (mg/L) (ppm)

Vf = Final volume (mL)

Vi = Initial weight (g)

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in ug/g (mg/kg)

Example:

0.1

50

1

1

5

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:

Cx = Concentration calculated as received (wet basis)

Px = Percent solids of sample (%wt)

$Cdry$ = Concentration calculated as dry weight (mg/kg)

Example:

5

80

6.25

Workgroup: WG610076
 Analyst: AC
 Spike Analyst: AC
 Run Date: 04/13/2017 12:38
 Method: 3015A
 Balance: BAL019
 Instrument: MW-4
 Instrument Start: 04/13/2017 12:38

SOP: ME407 Revision 19
 Spike Solution: STD81198
 Spike Witness: VC
 HNO3 Lot #: COA19650
 HCL Lot #: COA19441
 ICP FILTERS LOT# R6EA4780RGT38286
 40 & 50 ML. DIGESTION TU COA19487

SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG610076-02	BLANK	1	40 mL	50 mL	207.852 g	207.83 g	
2	WG610076-03	LCS	1	40 mL	50 mL	209.52 g	209.511 g	5 mL
3	L17040610-02	SAMP	1	40 mL	50 mL	207.322 g	207.316 g	
4	L17040610-04	SAMP	1	40 mL	50 mL	209.293 g	209.28 g	04/26/17
5	L17040610-06	SAMP	1	40 mL	50 mL	205.107 g	205.094 g	04/26/17
6	L17040610-08	SAMP	1	40 mL	50 mL	203.347 g	203.338 g	04/26/17
7	L17040610-10	SAMP	1	40 mL	50 mL	206.686 g	206.678 g	04/26/17
8	L17040610-12	SAMP	1	40 mL	50 mL	207.221 g	207.209 g	04/26/17
9	L17040610-14	SAMP	1	40 mL	50 mL	207.72 g	207.707 g	04/26/17
10	L17040610-16	SAMP	1	40 mL	50 mL	205.418 g	205.409 g	04/26/17
11	L17040610-18	SAMP	1	40 mL	50 mL	205.655 g	205.645 g	04/26/17
12	L17040610-20	SAMP	1	40 mL	50 mL	204.846 g	204.832 g	04/26/17
13	L17040610-22	SAMP	1	40 mL	50 mL	204.339 g	204.33 g	04/26/17
14	WG610076-01	REF	1	40 mL	50 mL	205.946 g	205.94 g	
15	L17040610-24	RS02	1	40 mL	50 mL	205.946 g	205.94 g	04/26/17
16	WG610076-04	MS	1	40 mL	50 mL	211.035 g	211.024 g	5 mL
17	L17040610-26	MS02	1	40 mL	50 mL	211.035 g	211.024 g	5 mL
18	WG610076-05	MSD	1	40 mL	50 mL	213.22 g	213.206 g	5 mL
19	L17040610-28	SD02	1	40 mL	50 mL	213.22 g	213.206 g	5 mL
20	L17040610-30	SAMP	1	40 mL	50 mL	207.209 g	207.194 g	04/26/17
21	L17040610-32	SAMP	1	40 mL	50 mL	205.66 g	205.645 g	04/26/17
22	L17040610-34	SAMP	1	40 mL	50 mL	204.95 g	204.936 g	04/26/17
23	L17040610-36	SAMP	1	40 mL	50 mL	206.205 g	206.186 g	04/26/17
24	L17040610-38	SAMP	1	40 mL	50 mL	207.193 g	207.176 g	04/26/17
25	L17040618-01	SAMP	1	40 mL	50 mL	206.508 g	206.482 g	04/24/17
26	L17040620-01	SAMP	1	40 mL	50 mL	207.028 g	207.01 g	04/24/17

L17040618-01 Filtered Digestate

Analyst: Amber R Gehring

Reviewer: Erin Patten



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 042117T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 8
 Maintenance Log ID: _____
 Calibration Std: STD81302 ICV Std: STD81301 Post Spike: STD81198
 ICSA: STD81187 ICSAB: STD81114 Int. Std: RGT39282
 CCV: STD81303 LLCCV: COA19158 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 610746,610749

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	T4.042117.115827	WG611302-01	Calibration Point		1		04/21/17 11:58
2	T4.042117.120203	WG611302-02	Calibration Point		1		04/21/17 12:02
3	T4.042117.120539	WG611302-03	Calibration Point		1		04/21/17 12:05
4	T4.042117.120915	WG611302-04	Calibration Point		1		04/21/17 12:09
5	T4.042117.121240	WG611302-05	Calibration Point		1		04/21/17 12:12
6	T4.042117.121605	WG611302-06	Initial Calibration Verification		1		04/21/17 12:16
7	T4.042117.121930	WG611302-07	Initial Calib Blank		1		04/21/17 12:19
8	T4.042117.122307	WG611302-08	Low Level Initial Calibration V		1		04/21/17 12:23
9	T4.042117.122639	WG611302-09	LLICV		1		04/21/17 12:26
10	T4.042117.123011	WG611302-10	LLICV		1		04/21/17 12:30
11	T4.042117.123344	WG611302-11	Interference Check		1		04/21/17 12:33
12	T4.042117.123723	WG611302-12	Interference Check		1		04/21/17 12:37
13	T4.042117.124057	WG611302-13	CCV		1		04/21/17 12:40
14	T4.042117.124421	WG611302-14	CCB		1		04/21/17 12:44
15	T4.042117.134045	WG610545-02	Method/Prep Blank	40/50	1		04/21/17 13:40
16	T4.042117.134423	WG610545-03	Laboratory Control S	40/50	1		04/21/17 13:44
17	T4.042117.134751	WG610545-01	Reference Sample		1	L17040785-01	04/21/17 13:47
18	T4.042117.135125	WG610746-03	Post Digestion Spike		1	L17040785-01	04/21/17 13:51
19	T4.042117.135453	WG610746-04	Serial Dilution		5	L17040785-01	04/21/17 13:54
20	T4.042117.135829	WG610545-04	Matrix Spike	40/50	1	L17040785-01	04/21/17 13:58
21	T4.042117.140156	WG610545-05	Matrix Spike Duplica	40/50	1	L17040785-01	04/21/17 14:01
22	T4.042117.140525	WG611302-15	CCV		1		04/21/17 14:05
23	T4.042117.140850	WG611302-16	CCB		1		04/21/17 14:08
24	T4.042117.141228	WG610076-02	Method/Prep Blank	40/50	1		04/21/17 14:12
25	T4.042117.141604	WG610076-03	Laboratory Control S	40/50	1		04/21/17 14:16
26	T4.042117.141932	L17040610-02	8910 PR	40/50	1		04/21/17 14:19
27	T4.042117.142305	L17040610-04	8906 L	40/50	1		04/21/17 14:23
28	T4.042117.142639	L17040610-06	8716 P	40/50	1		04/21/17 14:26
29	T4.042117.143012	L17040610-08	8908 L	40/50	1		04/21/17 14:30
30	T4.042117.143346	L17040610-10	8002	40/50	1		04/21/17 14:33
31	T4.042117.143721	WG610749-01	Post Digestion Spike		1	L17040610-10	04/21/17 14:37
32	T4.042117.144049	WG610749-02	Serial Dilution		5	L17040610-10	04/21/17 14:40
33	T4.042117.144424	L17040610-12	8905 L	40/50	1		04/21/17 14:44
34	T4.042117.144758	WG611302-17	CCV		1		04/21/17 14:47

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Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 042117T4.1R.TXT

Analyst1: KKB Analyst2: N/A

Method: 200.7/6010B/6010C SOP: ME600G Rev: 8

Maintenance Log ID: _____

Calibration Std: STD81302 ICV Std: STD81301 Post Spike: STD81198

ICSA: STD81187 IC SAB: STD81114 Int. Std: RGT39282

CCV: STD81303 LLCCV: COA19158 Tuning Sol: _____

Stannous: _____ Hydroxylamine: _____

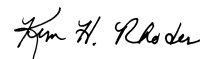
Workgroups: 610746,610749

Comments:

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Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	T4.042117.145124	WG611302-18	CCB		1		04/21/17 14:51
36	T4.042117.145502	L17040610-14	8905 L DUP	40/50	1		04/21/17 14:55
37	T4.042117.145836	L17040610-16	8905 U	40/50	1		04/21/17 14:58
38	T4.042117.150209	L17040610-18	8912 L	40/50	1		04/21/17 15:02
39	T4.042117.150543	L17040610-20	8912 U	40/50	1		04/21/17 15:05
40	T4.042117.150916	L17040610-22	8004	40/50	1		04/21/17 15:09
41	T4.042117.151255	WG610076-01	Reference Sample		1	L17040610-24	04/21/17 15:12
42	T4.042117.151628	WG610076-04	Matrix Spike	40/50	1	L17040610-24	04/21/17 15:16
43	T4.042117.151955	WG610076-05	Matrix Spike Duplica	40/50	1	L17040610-24	04/21/17 15:19
44	T4.042117.152323	L17040610-30	8911 U	40/50	1		04/21/17 15:23
45	T4.042117.152656	L17040610-32	8911 U DUP	40/50	1		04/21/17 15:26
46	T4.042117.153032	WG611302-19	CCV		1		04/21/17 15:30
47	T4.042117.153358	WG611302-20	CCB		1		04/21/17 15:33
48	T4.042117.153739	L17040610-34	8902 L	40/50	1		04/21/17 15:37
49	T4.042117.154113	L17040610-36	8902 U	40/50	1		04/21/17 15:41
50	T4.042117.154446	L17040610-38	8907 U	40/50	1		04/21/17 15:44
51	T4.042117.154820	L17040618-01	LH18/24-SP650-6431-GRAB	40/50	1		04/21/17 15:48
52	T4.042117.155203	L17040620-01	LH18/24-SP140-7431-GRAB	40/50	1		04/21/17 15:52
53	T4.042117.155536	WG611302-21	CCV		1		04/21/17 15:55
54	T4.042117.155904	WG611302-22	CCB		1		04/21/17 15:59
55	T4.042117.160242	WG611302-23	Low Level Continuing Calibra		1		04/21/17 16:02
56	T4.042117.160614	WG611302-24	LLCCV		1		04/21/17 16:06
57	T4.042117.160947	WG611302-25	LLCCV		1		04/21/17 16:09
58	T4.042117.161321	WG610076-02	Method/Prep Blank	40/50	1		04/21/17 16:13
59	T4.042117.161657	WG610076-03	Laboratory Control S	40/50	1		04/21/17 16:16
60	T4.042117.162026	L17040610-02	8910 PR	40/50	5		04/21/17 16:20
61	T4.042117.162400	L17040610-04	8906 L	40/50	1		04/21/17 16:24
62	T4.042117.162734	L17040610-06	8716 P	40/50	5		04/21/17 16:27
63	T4.042117.163109	L17040610-08	8908 L	40/50	5		04/21/17 16:31
64	T4.042117.163443	L17040610-10	8002	40/50	5		04/21/17 16:34
65	T4.042117.163817	WG610749-01	Post Digestion Spike		5	L17040610-10	04/21/17 16:38
66	T4.042117.164145	WG610749-02	Serial Dilution		25	L17040610-10	04/21/17 16:41
67	T4.042117.164523	L17040610-12	8905 L	40/50	5		04/21/17 16:45
68	T4.042117.164900	WG611302-26	CCV		1		04/21/17 16:49

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Microbac Laboratories Inc.

Instrument Run Log

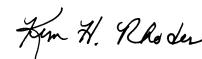
Instrument: ICP-THERMO4 Dataset: 042117T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 8
 Maintenance Log ID: _____
 Calibration Std: STD81302 ICV Std: STD81301 Post Spike: STD81198
 ICSA: STD81187 ICSAB: STD81114 Int. Std: RGT39282
 CCV: STD81303 LLCCV: COA19158 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 610746,610749

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
69	T4.042117.165226	WG611302-27	CCB		1		04/21/17 16:52
70	T4.042117.165604	L17040610-14	8905 L DUP	40/50	5		04/21/17 16:56
71	T4.042117.165939	L17040610-16	8905 U	40/50	1		04/21/17 16:59
72	T4.042117.170312	L17040610-18	8912 L	40/50	5		04/21/17 17:03
73	T4.042117.170648	L17040610-20	8912 U	40/50	1		04/21/17 17:06
74	T4.042117.171020	L17040610-22	8004	40/50	1		04/21/17 17:10
75	T4.042117.171355	L17040610-24	8714 P		5	WG610076-01	04/21/17 17:13
76	T4.042117.171728	L17040610-26	8714 P MS	40/50	5	WG610076-04	04/21/17 17:17
77	T4.042117.172056	L17040610-28	8714 P MSD	40/50	5	WG610076-05	04/21/17 17:20
78	T4.042117.172425	L17040610-30	8911 U	40/50	1		04/21/17 17:24
79	T4.042117.172759	L17040610-32	8911 U DUP	40/50	1		04/21/17 17:27
80	T4.042117.173135	WG611302-28	CCV		1		04/21/17 17:31
81	T4.042117.173458	WG611302-29	CCB		1		04/21/17 17:34
82	T4.042117.173836	L17040610-34	8902 L	40/50	1		04/21/17 17:38
83	T4.042117.174210	L17040610-36	8902 U	40/50	1		04/21/17 17:42
84	T4.042117.174544	L17040610-38	8907 U	40/50	1		04/21/17 17:45
85	T4.042117.174921	WG611302-30	CCV		1		04/21/17 17:49
86	T4.042117.175247	WG611302-31	CCB		1		04/21/17 17:52

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Microbac Laboratories Inc.

Data Checklist

Date: 21-APR-2017
 Analyst: KKB
 Analyst: NA
 Method: 6010B/6010C/200.7
 Instrument: ICP-THERMO4
 Curve Workgroup: 611302
 Runlog ID: 81688
 Analytical Workgroups: 610746,610749

	3015 STDS W/ ZR
STD ID#s on Runlog	X
Calibration/Linearity	X
ICV/CCV	X
ICV RSD < 3% (EPA 200.7 only)	
ICB/CCB	X
ICSA/ICSAB	X
CRI	X
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	X
Client Forms	X
Level X	
Level 3	785
Level 4	618,620
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	KKB
Secondary Reviewer	KHR
Comments	

Primary Reviewer:
24-APR-2017

Secondary Reviewer:
24-APR-2017

Ki K Beck

Lyn H. Rhodes



Analytical Method:6010C
Login Number:L17040620

AAB#:WG610749

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP140-7431-GRAB	01	04/12/17					04/13/2017	.9	180		04/21/17	9	180	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17040620 Prep Date: 04/13/17 12:38 Sample ID: WG610076-02
 Instrument ID: ICP-THERMO4 Run Date: 04/21/17 14:12 Prep Method: 3015A
 File ID: T4.042117.141228 Analyst: KKB Method: 6010C
 Workgroup (AAB#): WG610749 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: ICP-TH-21-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Selenium, Total	0.0400	0.0800	0.0400	1	U

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5259254
 24-APR-2017 11:40



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG610076-03
Instrument ID: ICP-THERMO4 Run Time: 14:16 Prep Method: 3015A
File ID: T4.042117.141604 Analyst: KKB Method: 6010C
Workgroup (AAB#): WG610749 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD81198 Cal ID: ICP-TH-21-APR-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Selenium, Total	0.250	0.240	96.0	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 5259255
Report generated: 04/24/2017 11:40



Loginnum: L17040620 Cal ID: ICP-THERMO4- Worknum: WG610749
 Instrument ID: ICP-THERMO4 Contract #: _____ Method: 6010C
 Parent ID: WG610076-01 File ID: T4.042117.151255 Dil: 1 Matrix: WATER
 Sample ID: WG610076-04 MS File ID: T4.042117.151628 Dil: 1 Units: mg/L
 Sample ID: WG610076-05 MSD File ID: T4.042117.151955 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Selenium, Dissolved	ND	0.250	0.256	102	0.250	0.254	102	0.892	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17040620 **Worknum:** WG610749
Instrument: ICP-THERMO4 **Method:** 6010C
Serial Dil: WG610749-02 **File ID:** T4.042117.144049 **Dil:** 5 **Units:** ug/L
Sample: L17040610-10 **File ID:** T4.042117.143346 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Selenium	ND	U	3.15		229.00	

U = Result is below MDL.

F = Result is greater than or equal to MDL and less than the RL.

X = Result is greater than or equal to RL and less than 25 times the MDL.

E = %D exceeds control limit of 10% and initial sample result is greater than or equal to 25 times the MDL.

SERIAL_DIL - Modified 09/22/2008

PDF File ID: 5259251

04/24/2017 11:40



Sample Login ID: L17040620 Worknum: WG610749
 Instrument ID: ICP-THERMO4 Method: 6010C
 Post Spike ID: WG610749-01 File ID: T4.042117.143721 Dil: 1 Units: ug/L
 Sample ID: L17040610-10 File ID: T4.042117.143346 Dil: 1 Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
SELENIUM	197		0	U	200	98.3	75 - 125	

N = % Recovery exceeds control limits

F = Result is between MDL and RL

U = Sample result is below MDL. A value of zero is used in the calculation



Login: L17040620 Workgroup (AAB#): WG610749
 Analytical Method: 6010C Instrument ID: ICP-THERMO4
 ICAL Worknum: WG611302 Initial Calibration Date: 21-APR-2017 12:12

	WG611302-01		WG611302-02		WG611302-03		WG611302-04		WG611302-05		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
SELENIUM	0	0.0000500	NA	NA	.008	0.000160	.4	0.00642	.8	0.0129	.999971	

INT = Instrument intensity
 R = Coefficient of correlation
 Q = Data Qualifier
 * = Out of Compliance; R < 0.995



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-07
Instrument ID: ICP-THERMO4 Run Time: 12:19 Method: 6010C
File ID: T4.042117.121930 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-THERI - 21-APR-17
Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
SELENIUM	.032	.064	.032	U

U = Result is less than 2 x MDL
F = Result is between MDL and 2 x MDL
* = Result is above 2 x MDL



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-14
Instrument ID: ICP-THERMO4 Run Time: 12:44 Method: 6010C
File ID: T4.042117.124421 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.0320	0.0640	0.0320	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-16
Instrument ID: ICP-THERMO4 Run Time: 14:08 Method: 6010C
File ID: T4.042117.140850 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.0320	0.0640	0.0320	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-18
 Instrument ID: ICP-THERMO4 Run Time: 14:51 Method: 6010C
 File ID: T4.042117.145124 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.0320	0.0640	0.0320	U

U = Result is less than MDL.
 F = Result is between MDL and RL.
 * = Result is above RL.



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-20
Instrument ID: ICP-THERMO4 Run Time: 15:33 Method: 6010C
File ID: T4.042117.153358 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.0320	0.0640	0.0320	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-22
Instrument ID: ICP-THERMO4 Run Time: 15:59 Method: 6010C
File ID: T4.042117.155904 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.0320	0.0640	0.0320	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-06
 Instrument ID: ICP-THERMO4 Run Time: 12:16 Method: 6010C
 File ID: T4.042117.121605 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Selenium	.4	0.411	103	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-13
Instrument ID: ICP-THERMO4 Run Time: 12:40 Method: 6010C
File ID: T4.042117.124057 Analyst: KKB QC Key: DOD4
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.407	mg/L	102	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-15
Instrument ID: ICP-THERMO4 Run Time: 14:05 Method: 6010C
File ID: T4.042117.140525 Analyst: KKB QC Key: DOD4
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.405	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-17
 Instrument ID: ICP-THERMO4 Run Time: 14:47 Method: 6010C
 File ID: T4.042117.144758 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.406	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-19
 Instrument ID: ICP-THERMO4 Run Time: 15:30 Method: 6010C
 File ID: T4.042117.153032 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.405	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-21
Instrument ID: ICP-THERMO4 Run Time: 15:55 Method: 6010C
File ID: T4.042117.155536 Analyst: KKB QC Key: DOD4
Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.404	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-08
 Instrument ID: ICP-THERMO4 Run Time: 12:23 Method: 6010C
 File ID: T4.042117.122307 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0200	mg/L	125	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/21/2017 Sample ID: WG611302-23
 Instrument ID: ICP-THERMO4 Run Time: 16:02 Method: 6010C
 File ID: T4.042117.160242 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG610749 Cal ID: ICP-TH - 21-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0178	mg/L	111	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17040620
Instrument ID: ICP-THERMO4
Sol. A: WG611302-11
Sol. AB: WG611302-12

File ID: T4.042117.123344
File ID: T4.042117.123723

Workgroup (AAB#): WG610749
Method: 6010C
Units: mg/L
Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Selenium	NS	-0.00275	NS	0.250	0.239	95.6	

NS = Not spiked

* = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.

= Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

+ = Result for unspiked element is outside the acceptance limits of (+/-) 2 times the project method detection limit (MDL). This criteria is only applicable to specific QAPPs.



Login Number: L17040620
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 Method: 6010C

Analyte	Wave Length	AG	AL	AS	B	BA
ALUMINUM	308.20	0	0	0	0	0
ANTIMONY	206.80	0	0.0000410	0	0	0
ARSENIC	189.00	0	0	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	0	0	0	0
CADMIUM	228.80	0	0	0.0145	0	-0.0000800
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0	0	0	0	0
COBALT	228.60	0	0	0	0	0
COPPER	224.70	0	0	0	0	0
IRON	261.10	0	0	0	0	0
LEAD	220.30	0	0.000378	0	0	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	0	0	0	0	0
MANGANESE	257.60	0	0	0	0	0
MOLYBDENUM	202.00	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
PHOSPHORUS	214.90	0	-0.000289	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0	0.0000140	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.10	0	0	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0	0	0	0
THALLIUM	190.80	0	-0.0000120	0	0	0
TIN	189.90	0	0	0	0	0
TITANIUM	337.20	0	0	0	0	0
VANADIUM	292.40	0	0	0	0	0
ZINC	206.20	0	0.0000320	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
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Login Number: L17040620
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 Method: 6010C

Analyte	Wave Length	BE	CA	CD	CO	CR
ALUMINUM	308.20	0	0	0	-0.000820	0
ANTIMONY	206.80	0	0	0	0	0.0260
ARSENIC	189.00	0	0	0	0	-0.00730
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	0	0	0.00343	0
CADMIUM	228.80	0	0	0	-0.00390	0
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0	0	0	0	0
COBALT	228.60	0	0	0	0	-0.000200
COPPER	224.70	0	0	0	0.0000770	-0.00100
IRON	261.10	0	0	0	0	-0.00100
LEAD	220.30	0	0	0	-0.0000130	-0.000132
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	0	0	0	0	0
MANGANESE	257.60	0	0	0	0	0.0000500
MOLYBDENUM	202.00	0	0	0	0	0
NICKEL	231.60	0	0	0	-0.000860	0
PHOSPHORUS	214.90	0	0	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.10	0	0	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0.00000500	0	0	0
THALLIUM	190.80	0	0	0	0.00240	0.000276
TIN	189.90	0	0	0	0	0
TITANIUM	337.20	0	0	0	0	0
VANADIUM	292.40	0	0	0	0	-0.00350
ZINC	206.20	0	0	0	0	-0.00180
ZIRCONIUM	339.10	0	0	0	0	0

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Login Number: L17040620

Date: 01/04/2017

Instrument ID: ICP-THERMO4

Method: 6010C

Analyte	Wave Length	CU	FE	K	LI	MG
ALUMINUM	308.20	0	0	0	0	0
ANTIMONY	206.80	0	0.0000560	0	0	0
ARSENIC	189.00	0	-0.0000490	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	0.000648	0	0	0
CADMIUM	228.80	0	-0.00000500	0	0	0
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0	0.0000400	0	0	0
COBALT	228.60	0	0	0	0	0
COPPER	224.70	0	0.00139	0	0	0
IRON	261.10	0	0	0	0	0
LEAD	220.30	0.000609	0	0	0	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	0	0	0	0	0
MANGANESE	257.60	0	0	0	0	0.0000220
MOLYBDENUM	202.00	0	0	0	0	0
NICKEL	231.60	0	0.0000420	0	0	0
PHOSPHORUS	214.90	0.0390	0.000900	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.10	0	-0.000118	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.90	0	0	0	0	0
TITANIUM	337.20	0	-0.000200	0	0	0
VANADIUM	292.40	0	0.0000700	0	0	0
ZINC	206.20	0	0	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

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Login Number: L17040620
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 Method: 6010C

Analyte	Wave Length	MN	MO	NA	NI	P
ALUMINUM	308.20	0	0.0163	0	0	0
ANTIMONY	206.80	0	0.000910	0	-0.00190	0
ARSENIC	189.00	0	0.000139	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	-0.00190	0	0	0
CADMIUM	228.80	0	0.0000320	0	-0.000770	0
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0.000360	0	0	0	0
COBALT	228.60	0	-0.00200	0	0.000100	0
COPPER	224.70	0	0.00160	0	-0.0123	0
IRON	261.10	0	0	0	0	0
LEAD	220.30	0	-0.000610	0	0.000110	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	-0.00290	-0.0230	0	0	0
MANGANESE	257.60	0	0	0	0	0
MOLYBDENUM	202.00	0	0.0000300	0	0	0
NICKEL	231.60	0	0	0	0	0
PHOSPHORUS	214.90	0	0.00710	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0.000600	0.000580	0	0	0
SILICON	212.40	0	-0.354	0	0	0
SILVER	328.10	0	-0.0000100	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0	0	0	0
THALLIUM	190.80	0.00100	0	0	0	0
TIN	189.90	0	0	0	0	0
TITANIUM	337.20	0	-0.000153	0	0	0
VANADIUM	292.40	-0.000200	-0.00160	0	0	0
ZINC	206.20	0	0	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

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Login Number: L17040620
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 Method: 6010C

Analyte	Wave Length	PB	SB	SE	SI	SN
ALUMINUM	308.20	0	0	0	0	0
ANTIMONY	206.80	0	0	0	0	-0.0320
ARSENIC	189.00	0	0	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	0	0	0	0
CADMIUM	228.80	0	0	0	0	0
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0	0	0	0	0
COBALT	228.60	0	0	0	0	0
COPPER	224.70	0.00440	0	0	0	0
IRON	261.10	0	0	0	0	0
LEAD	220.30	0	0	0	0	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	0	0	0	0	0
MANGANESE	257.60	0	0	0	0	0
MOLYBDENUM	202.00	0	0	0	0	0
NICKEL	231.60	0	0	0	0	0
PHOSPHORUS	214.90	0	0	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.10	0	0	0	0	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0	0	0	0
THALLIUM	190.80	0	0	0	0	0
TIN	189.90	0	0	0	0	0
TITANIUM	337.20	0	0	0	0	0
VANADIUM	292.40	0	0	0	0	0
ZINC	206.20	0	0	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

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Login Number: L17040620
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 Method: 6010C

Analyte	Wave Length	SR	TI	TL	V	ZN
ALUMINUM	308.20	0	0	0	0.0720	0
ANTIMONY	206.80	0	0.000500	0	-0.00360	0
ARSENIC	189.00	0	0	0	0.000107	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	-0.00000700	0	0.000990	0
BORON	249.60	0	0	0	0	0
CADMIUM	228.80	0	0	0	0.000102	0
CALCIUM	422.60	0	0	0	0	0
CHROMIUM	267.70	0	0.0000550	0	0	0
COBALT	228.60	0	0.00170	0	0.0000200	0
COPPER	224.70	0	0.000269	0	0	0
IRON	261.10	0	0	0	0	0
LEAD	220.30	0	0	0	-0.000126	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.10	0	-0.00290	0	0	0
MANGANESE	257.60	0	0	0	0	0
MOLYBDENUM	202.00	0	0	0	-0.000110	0
NICKEL	231.60	0	0	0	0	0
PHOSPHORUS	214.90	0	0	0	-0.00100	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.10	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.10	0	-0.000720	0	-0.000260	0
SODIUM	589.50	0	0	0	0	0
STRONTIUM	407.70	0	0	0	0	0
THALLIUM	190.80	0	-0.00100	0	-0.0420	0
TIN	189.90	0	-0.00190	0	0	0
TITANIUM	337.20	0	0	0	0	0
VANADIUM	292.40	0	0.000820	0	0	0
ZINC	206.20	0	0	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

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Login Number: L17040620
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 Method: 6010C

Analyte	Wave Length	ZR
ALUMINUM	308.20	0
ANTIMONY	206.80	0
ARSENIC	189.00	0
BARIUM	455.40	0
BERYLLIUM	313.10	0
BORON	249.60	0
CADMIUM	228.80	0
CALCIUM	422.60	0
CHROMIUM	267.70	0
COBALT	228.60	0
COPPER	224.70	0
IRON	261.10	0
LEAD	220.30	0
LITHIUM	670.70	0
MAGNESIUM	279.10	0
MANGANESE	257.60	0
MOLYBDENUM	202.00	0
NICKEL	231.60	0
PHOSPHORUS	214.90	0
POTASSIUM	766.40	0
SELENIUM	196.10	0
SILICON	212.40	0
SILVER	328.10	0
SODIUM	589.50	0
STRONTIUM	407.70	0
THALLIUM	190.80	0
TIN	189.90	0
TITANIUM	337.20	0
VANADIUM	292.40	0
ZINC	206.20	0
ZIRCONIUM	339.10	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5259243
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Login Number: L17040620 Date: 04/05/2017
 Instrument ID: ICP-THERMO4 Method: 6010C

Analyte	Integration Time (Sec.)	Concentration (ug/L)
Aluminum	10.00	900.0
Antimony	20.00	45.0
Arsenic	10.00	45.0
Barium	10.00	45.0
Beryllium	10.00	1.8
Boron	20.00	45.0
Cadmium	20.00	4.5
Calcium	8.00	270.0
Chromium	20.00	36.0
Cobalt	20.00	45.0
Copper	20.00	180.0
Iron	8.00	720.0
Lead	20.00	225.0
Lithium	8.00	36.0
Magnesium	8.00	900.0
Manganese	10.00	36.0
Molybdenum	20.00	18.0
Nickel	20.00	90.0
Phosphorus	20.00	180.0
Potassium	8.00	360.0
Selenium	20.00	90.0
Silicon	20.00	36.0
Silver	10.00	4.5
Sodium	8.00	270.0
Strontium	8.00	9.0
Thallium	20.00	18.0
Tin	20.00	45.0
Titanium	8.00	45.0
Vanadium	20.00	27.0
Zinc	20.00	45.0
Zirconium	10.00	45.0

Comments:

All analytes passed acceptance criteria at the specified concentration.



2.1 Metals Data

2.1.2 Metals ICP-MS Data

2.1.2.1 Summary Data

Lab Report #: L17040620

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040620-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP140-7431-GRAB	Prep Method: 3015	Prep Date: 04/14/2017 08:52
Matrix: Water	Analytical Method: 6020A	Cal Date: 04/14/2017 10:09
Workgroup #: WG610246	Analyst: JYH	Run Date: 04/14/2017 13:00
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: NI.041417.130000
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Silver, Total	7440-22-4	0.00100	U	0.00200	0.00100	0.000500
U	Analyte was not detected. The concentration is below the reported LOD.					

2.1.2.2 QC Summary Data

Example 6020 Calculations
Perkin Elmer ELAN 6100

1.0 Initial Calibration (ICAL) Parameters

The system performs linear regression from data consisting of a blank and three standards.

2.0 Calculating the concentration (C) of an element in water using data from prep log, run log, and quantitation report (note:the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system (ug/L)

Vf = Final volume

Vi = Initial volume

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in (ug/L)

Example:

0.1

100

40

1

0.25

3.0 Calculating the concentration (C) of an element in soil using data from prep log, run log, and quantitation report (note: the data system performs this calculation automatically when correction factors have been entered):

$$Cx = Cs \times \frac{Vf}{Vi} \times D$$

Where:

Cs = Concentration computed by the data system (ug/L)

Vf = Final volume

Vi = Initial volume

D = Dilution factor as a multiplier (10X = 10)

Cx = Concentration of element in (ug/kg)

Example:

0.1

200

0.5

1

40

4.0 Adjusting the concentration to dry weight:

$$Cdry = \frac{Cx \times 100}{Px}$$

Where:

Cx = Concentration calculated as received (wet basis)

Px = Percent solids of sample (%wt)

$Cdry$ = Concentration calculated as dry weight (ug/kg)

Example:

40

80

50

50 ug/kg = 0.050 mg/kg

Perkin Elmer ELAN ICP/MS

STANDARDS KEY

QC Std 1 - ICV

QC Std 2 - ICB

QC Std 3 - LLICV

QC Std 4 - ICSA

QC Std 5 - ICSAB

QC Std 6 - CCV

QC Std 7 - CCB

QC Std 8 - LLCCV

Calibration Solutions

Analyte	Stock Conc. (mg/L)	S1 (mg/L)	S2 (mg/L)	S3 (mg/L)	S4 (mg/L)
Al	10	0	0.0004	0.05	0.1
Sb	10	0	0.0004	0.05	0.1
As	10	0	0.0004	0.05	0.1
Ba	10	0	0.0004	0.05	0.1
Be	10	0	0.0004	0.05	0.1
Ca	1000	0	0.04	5	10
Cd	10	0	0.0004	0.05	0.1
Cr	10	0	0.0004	0.05	0.1
Co	10	0	0.0004	0.05	0.1
Cu	10	0	0.0004	0.05	0.1
Fe	1000	0	0.04	5	10
Pb	10	0	0.0004	0.05	0.1
Mg	1000	0	0.04	5	10
Mn	10	0	0.0004	0.05	0.1
Ni	10	0	0.0004	0.05	0.1
K	1000	0	0.04	5	10
Se	10	0	0.0004	0.05	0.1
Ag	10	0	0.0004	0.05	0.1
Na	1000	0	0.04	5	10
Tl	10	0	0.0004	0.05	0.1
V	10	0	0.0004	0.05	0.1
U	1000	0	0.0004	0.05	0.1
Zn	10	0	0.0004	0.05	0.1

Workgroup: WG610193
 Analyst: VC
 Spike Analyst: VC
 Run Date: 04/14/2017 08:52
 Method: 3015
 Balance: BAL016
 Instrument: MW-3
 Instrument Start: 04/14/2017 08:56

SOP: ME407 Revision 19
 Spike Solution: STD80296
 Spike Witness: ERP
 40 & 50 ML. DIGESTION TU COA19487
 HNO3 Lot #: COA19650
 MS Filters- fisher-Lot# RRGT38288

SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG610193-02	BLANK	1	20 mL	50 mL	184.771 g	184.771 g	
2	WG610193-03	LCS	1	20 mL	50 mL	184.968 g	184.957 g	.25 mL
3	L17040610-02	SAMP	1	20 mL	50 mL	185.764 g	185.765 g	
4	L17040610-04	SAMP	1	20 mL	50 mL	183.639 g	183.635 g	
5	L17040610-06	SAMP	1	20 mL	50 mL	182.041 g	182.037 g	
6	L17040610-08	SAMP	1	20 mL	50 mL	182.545 g	182.538 g	
7	L17040610-10	SAMP	1	20 mL	50 mL	183.26 g	183.249 g	
8	L17040610-12	SAMP	1	20 mL	50 mL	185.232 g	185.221 g	
9	L17040610-14	SAMP	1	20 mL	50 mL	184.721 g	184.705 g	
10	L17040610-16	SAMP	1	20 mL	50 mL	182.556 g	182.544 g	
11	L17040610-18	SAMP	1	20 mL	50 mL	184.577 g	184.566 g	
12	L17040610-20	SAMP	1	20 mL	50 mL	185.218 g	185.208 g	
13	L17040610-22	SAMP	1	20 mL	50 mL	184.301 g	184.291 g	
14	WG610193-01	REF	1	20 mL	50 mL	182.918 g	182.906 g	
15	L17040610-24	RS02	1	20 mL	50 mL	182.918 g	182.906 g	
16	WG610193-04	MS	1	20 mL	50 mL	185.479 g	185.469 g	.25 mL
17	L17040610-26	MS02	1	20 mL	50 mL	185.479 g	185.469 g	.25 mL
18	WG610193-05	MSD	1	20 mL	50 mL	182.162 g	182.15 g	.25 mL
19	L17040610-28	SD02	1	20 mL	50 mL	182.162 g	182.15 g	.25 mL
20	L17040610-30	SAMP	1	20 mL	50 mL	182.097 g	182.09 g	
21	L17040610-32	SAMP	1	20 mL	50 mL	183.241 g	183.23 g	
22	L17040610-34	SAMP	1	20 mL	50 mL	184.344 g	184.33 g	
23	L17040610-36	SAMP	1	20 mL	50 mL	182.646 g	182.634 g	
24	L17040610-38	SAMP	1	20 mL	50 mL	184.618 g	184.611 g	
25	L17040618-01	SAMP	1	20 mL	50 mL	182.375 g	182.356 g	
26	L17040620-01	SAMP	1	20 mL	50 mL	183.395 g	183.382 g	

Analyst: Vicki Collier

Reviewer: Erin Patten



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 041417A.REP

Analyst1: JYH Analyst2: N/A

Method: 6020/6020A/200.8 SOP: ME700A Rev: 3

Maintenance Log ID: _____

Calibration Std: STD81368 ICV Std: STD81367 Post Spike: STD79415

ICSA: STD81369 ICSAB: STD81136 Int. Std: RGT39300

CCV: STD81129 LLCCV: STD81372 Tuning Sol : STD81373

Stannous : _____ Hydroxylamine : _____

Workgroups: 610269,609798,609914,608658,610246

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	NI.041417.095651	Blank	Blank		1		04/14/17 09:56
2	NI.041417.095956	WG610270-01	Calibration Point		1		04/14/17 09:59
3	NI.041417.100301	WG610270-02	Calibration Point		1		04/14/17 10:03
4	NI.041417.100607	WG610270-03	Calibration Point		1		04/14/17 10:06
5	NI.041417.100912	WG610270-04	Calibration Point		1		04/14/17 10:09
6	NI.041417.101219	WG610270-05	Initial Calibration Verification		1		04/14/17 10:12
7	NI.041417.101526	WG610270-06	Initial Calib Blank		1		04/14/17 10:15
8	NI.041417.101833	WG610270-07	Low Level Initial Calibration V		1		04/14/17 10:18
9	NI.041417.102139	WG610270-08	Interference Check		1		04/14/17 10:21
10	NI.041417.102444	WG610270-09	Interference Check		1		04/14/17 10:24
11	NI.041417.102751	WG610270-10	CCV		1		04/14/17 10:27
12	NI.041417.103056	WG610270-11	CCB		1		04/14/17 10:30
13	NI.041417.103533	L17040009-36	IDL15-ICP-ELAN	20/50	1		04/14/17 10:35
14	NI.041417.103845	L17040009-37	IDL16-ICP-ELAN	20/50	1		04/14/17 10:38
15	NI.041417.104151	L17040009-38	IDL17-ICP-ELAN	20/50	1		04/14/17 10:41
16	NI.041417.104456	L17040009-39	IDL18-ICP-ELAN	20/50	1		04/14/17 10:44
17	NI.041417.104801	L17040009-40	IDL19-ICP-ELAN	20/50	1		04/14/17 10:48
18	NI.041417.105107	L17040009-41	IDL20-ICP-ELAN	20/50	1		04/14/17 10:51
19	NI.041417.105413	L17040009-42	IDL21-ICP-ELAN	20/50	1		04/14/17 10:54
20	NI.041417.105721	WG610270-12	CCV		1		04/14/17 10:57
21	NI.041417.110026	WG610270-13	CCB		1		04/14/17 11:00
22	NI.041417.110334	L17040003-01	MDL-1	.25/100	1		04/14/17 11:03
23	NI.041417.110639	L17040005-01	LOQ-1	.25/100	1		04/14/17 11:06
24	NI.041417.110945	L17040002-01	MDL-1	20/50	1		04/14/17 11:09
25	NI.041417.111250	L17040004-01	LOQ-1	20/50	1		04/14/17 11:12
26	NI.041417.111555	L17031685-01	LF 6-7 SW11	20/50	1		04/14/17 11:15
27	NI.041417.111903	WG610270-14	CCV		1		04/14/17 11:19
28	NI.041417.112208	WG610270-15	CCB		1		04/14/17 11:22
29	NI.041417.113001	WG610193-02	Method/Prep Blank	20/50	1		04/14/17 11:30
30	NI.041417.113306	WG610193-03	Laboratory Control S	20/50	1		04/14/17 11:33
31	NI.041417.113611	L17040610-24	8714 P		1	WG610193-01	04/14/17 11:36
32	NI.041417.113917	L17040610-26	8714 P MS	20/50	1	WG610193-04	04/14/17 11:39
33	NI.041417.114222	L17040610-28	8714 P MSD	20/50	1	WG610193-05	04/14/17 11:42
34	NI.041417.114528	L17040610-02	8910 PR	20/50	1		04/14/17 11:45

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K: K Buck



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 041417A.REP

Analyst1: JYH Analyst2: N/A

Method: 6020/6020A/200.8 SOP: ME700A Rev: 3

Maintenance Log ID: _____

Calibration Std: STD81368 ICV Std: STD81367 Post Spike: STD79415

ICSA: STD81369 ICSAB: STD81136 Int. Std: RGT39300

CCV: STD81129 LLCCV: STD81372 Tuning Sol : STD81373

Stannous : _____ Hydroxylamine : _____

Workgroups: 610269,609798,609914,608658,610246

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	NI.041417.114833	L17040610-04	8906 L	20/50	1		04/14/17 11:48
36	NI.041417.115138	WG610246-01	Post Digestion Spike		1	L17040610-04	04/14/17 11:51
37	NI.041417.115444	WG610246-02	Serial Dilution		5	L17040610-04	04/14/17 11:54
38	NI.041417.115749	WG610246-02	Serial Dilution		25	L17040610-04	04/14/17 11:57
39	NI.041417.120056	WG610270-16	CCV		1		04/14/17 12:00
40	NI.041417.120402	WG610270-17	CCB		1		04/14/17 12:04
41	NI.041417.120728	L17040610-06	8716 P	20/50	1		04/14/17 12:07
42	NI.041417.121033	L17040610-08	8908 L	20/50	1		04/14/17 12:10
43	NI.041417.121339	L17040610-10	8002	20/50	1		04/14/17 12:13
44	NI.041417.121644	L17040610-12	8905 L	20/50	1		04/14/17 12:16
45	NI.041417.121950	L17040610-14	8905 L DUP	20/50	1		04/14/17 12:19
46	NI.041417.122256	L17040610-16	8905 U	20/50	1		04/14/17 12:22
47	NI.041417.122601	L17040610-18	8912 L	20/50	1		04/14/17 12:26
48	NI.041417.122905	L17040610-20	8912 U	20/50	1		04/14/17 12:29
49	NI.041417.123210	L17040610-22	8004	20/50	1		04/14/17 12:32
50	NI.041417.123515	L17040610-30	8911 U	20/50	1		04/14/17 12:35
51	NI.041417.123822	WG610270-18	CCV		1		04/14/17 12:38
52	NI.041417.124127	WG610270-19	CCB		1		04/14/17 12:41
53	NI.041417.124434	L17040610-32	8911 U DUP	20/50	1		04/14/17 12:44
54	NI.041417.124739	L17040610-34	8902 L	20/50	1		04/14/17 12:47
55	NI.041417.125044	L17040610-36	8902 U	20/50	1		04/14/17 12:50
56	NI.041417.125349	L17040610-38	8907 U	20/50	1		04/14/17 12:53
57	NI.041417.125654	L17040618-01	LH18/24-SP650-6431-GRAB	20/50	1		04/14/17 12:56
58	NI.041417.130000	L17040620-01	LH18/24-SP140-7431-GRAB	20/50	1		04/14/17 13:00
59	NI.041417.130646	L17040610-06	8716 P	20/50	50		04/14/17 13:06
60	NI.041417.130951	L17040610-08	8908 L	20/50	50		04/14/17 13:09
61	NI.041417.131256	L17040610-12	8905 L	20/50	50		04/14/17 13:12
62	NI.041417.131602	L17040610-14	8905 L DUP	20/50	50		04/14/17 13:16
63	NI.041417.131909	WG610270-20	CCV		1		04/14/17 13:19
64	NI.041417.132215	WG610270-21	CCB		1		04/14/17 13:22
65	NI.041417.132521	L17040610-36	8902 U	20/50	50		04/14/17 13:25
66	NI.041417.132829	WG610270-22	CCV		1		04/14/17 13:28
67	NI.041417.133134	WG610270-23	CCB		1		04/14/17 13:31
68	NI.041417.133441	WG610270-24	Low Level Continuing Calibra		1		04/14/17 13:34

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K: K Buck



Microbac Laboratories Inc.

Data Checklist

Date: 14-APR-2017
 Analyst: JYH
 Analyst: NA
 Method: 6020/6020A/200.8
 Instrument: ICP-MS2
 Curve Workgroup: 610270
 Runlog ID: 81553
 Analytical Workgroups: 610269,609798,609914,608658,610246

STD ID#s on Runlog	X
Calibration/Linearity	X
ICV/CCV	X
ICV RSD < 3% (EPA 200.7 only)	
ICB/CCB	X
ICSA/ICSAB	X
CRI	
Blank/LCS	X
MS/MSD	X
Post Spike/Serial Dilution	X
Upload Results	X
Data Qualifiers	
Generate PDF Instrument Data	X
Sign/Annotate PDF Data	X
Upload Curve Data	X
Workgroup Forms	X
Case Narrative	610,618,620
Client Forms	X
Level X	
Level 3	
Level 4	1685,002,003,004,005,618,620
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	JYH
Secondary Reviewer	KKB
Comments	

Primary Reviewer:
14-APR-2017

Secondary Reviewer:
14-APR-2017



Analytical Method:6020A
Login Number:L17040620

AAB#:WG610246

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP140-7431-GRAB	01	04/12/17					04/14/2017	1.7	180		04/14/17	1.9	180	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17040620 Prep Date: 04/14/17 08:52 Sample ID: WG610193-02
 Instrument ID: ICP-MS2 Run Date: 04/14/17 11:30 Prep Method: 3015
 File ID: NI.041417.113001 Analyst: JYH Method: 6020A
 Workgroup (AAB#): WG610246 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: ICP-MS-14-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Silver, Total	0.000500	0.00200	0.000500	1	U

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5248466
 14-APR-2017 13:52



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610193-03
Instrument ID: ICP-MS2 Run Time: 11:33 Prep Method: 3015
File ID: NI.041417.113306 Analyst: JYH Method: 6020A
Workgroup (AAB#): WG610246 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD80296 Cal ID: ICP-MS - 14-APR-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Silver, Total	0.125	0.125	100	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 5248467
Report generated: 04/14/2017 13:52



Loginnum: L17040620 Cal ID: ICP-MS2- Worknum: WG610246
 Instrument ID: ICP-MS2 Contract #: _____ Method: 6020A
 Parent ID: WG610193-01 File ID: NI.041417.113611 Dil: 1 Matrix: WATER
 Sample ID: WG610193-04 MS File ID: NI.041417.113917 Dil: 1 Units: mg/L
 Sample ID: WG610193-05 MSD File ID: NI.041417.114222 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Silver	ND	0.125	0.123	98.3	0.125	0.123	98.2	0.0598	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17040620 **Worknum:** WG610246
Instrument: ICP-MS2 **Method:** 6020A
Serial Dil: WG610246-02 **File ID:** NI.041417.115444 **Dil:** 5 **Units:** ug/L
Sample: L17040610-04 **File ID:** NI.041417.114833 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Silver	ND	U	ND	U		

U = Result is below MDL.

F = Result is greater than or equal to MDL and less than the RL.

X = Result is greater than or equal to RL and less than 100 times the MDL.

E = %D exceeds control limit of 10% and initial sample result is greater than or equal to 100 times the MDL.

SERIAL_DIL - Modified 09/22/2008

PDF File ID: 5248463

04/14/2017 13:52



Sample Login ID: L17040620 Worknum: WG610246
 Instrument ID: ICP-MS2 Method: 6020A
 Post Spike ID: WG610246-01 File ID: NI.041417.115138 Dil: 1 Units: ug/L
 Sample ID: L17040610-04 File ID: NI.041417.114833 Dil: 1 Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
SILVER	50.6		0	U	50	101.3	75 - 125	

N = % Recovery exceeds control limits

F = Result is between MDL and RL

U = Sample result is below MDL. A value of zero is used in the calculation



Microbac Laboratories Inc.
Initial Calibration Summary

00853799

Login: L17040620 Workgroup (AAB#): WG610246
Analytical Method: 6020A Instrument ID: ICP-MS2
ICAL Worknum: WG610270 Initial Calibration Date: 14-APR-2017 10:09

	WG610270-01		WG610270-02		WG610270-03		WG610270-04		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
SILVER	0	99.0	.4	390	50	264000	100	505000	.999999	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-06
Instrument ID: ICP-MS2 Run Time: 10:15 Method: 6020A
File ID: NI.041417.101526 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG610246 Cal ID: ICP-MS2 - 14-APR-17
Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
SILVER	.2	.8	.2	U

U = Result is less than 2 x MDL
F = Result is between MDL and 2 x MDL
* = Result is above 2 x MDL



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-11
 Instrument ID: ICP-MS2 Run Time: 10:30 Method: 6020A
 File ID: NI.041417.103056 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.200	0.800	0.200	U

U = Result is less than MDL.
 F = Result is between MDL and RL.
 * = Result is above RL.

CCB - Modified 03/05/2008
 PDF File ID: 5248356
 Report generated 04/14/2017 13:53



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-15
Instrument ID: ICP-MS2 Run Time: 11:22 Method: 6020A
File ID: NI.041417.112208 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.200	0.800	0.200	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-17
 Instrument ID: ICP-MS2 Run Time: 12:04 Method: 6020A
 File ID: NI.041417.120402 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.200	0.800	0.200	U

U = Result is less than MDL.
 F = Result is between MDL and RL.
 * = Result is above RL.

CCB - Modified 03/05/2008
 PDF File ID: 5248356
 Report generated 04/14/2017 13:53



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-19
Instrument ID: ICP-MS2 Run Time: 12:41 Method: 6020A
File ID: NI.041417.124127 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.200	0.800	0.200	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-21
Instrument ID: ICP-MS2 Run Time: 13:22 Method: 6020A
File ID: NI.041417.132215 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Silver	0.200	0.800	0.200	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-05
 Instrument ID: ICP-MS2 Run Time: 10:12 Method: 6020A
 File ID: NI.041417.101219 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Silver	50	49.2	98.4	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-10
 Instrument ID: ICP-MS2 Run Time: 10:27 Method: 6020A
 File ID: NI.041417.102751 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.0500	0.0497	mg/L	99.3	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-14
 Instrument ID: ICP-MS2 Run Time: 11:19 Method: 6020A
 File ID: NI.041417.111903 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.0500	0.0496	mg/L	99.1	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-16
 Instrument ID: ICP-MS2 Run Time: 12:00 Method: 6020A
 File ID: NI.041417.120056 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.0500	0.0494	mg/L	98.7	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-18
 Instrument ID: ICP-MS2 Run Time: 12:38 Method: 6020A
 File ID: NI.041417.123822 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.0500	0.0490	mg/L	98.0	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-20
 Instrument ID: ICP-MS2 Run Time: 13:19 Method: 6020A
 File ID: NI.041417.131909 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.0500	0.0496	mg/L	99.2	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-07
 Instrument ID: ICP-MS2 Run Time: 10:18 Method: 6020A
 File ID: NI.041417.101833 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.400	0.396	ug/L	99.1	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17040620 Run Date: 04/14/2017 Sample ID: WG610270-24
 Instrument ID: ICP-MS2 Run Time: 13:34 Method: 6020A
 File ID: NI.041417.133441 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG610246 Cal ID: ICP-MS - 14-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.400	0.348	ug/L	86.9	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17040620
 Instrument ID: ICP-MS2
 Sol. A: WG610270-08
 Sol. AB: WG610270-09

File ID: NI.041417.102139
 File ID: NI.041417.102444

Workgroup (AAB#): WG610246
 Method: 6020A
 Units: ug/L
 Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Silver	NS	-0.00370	NS	100	91.5	91.5	

NS = Not spiked

* = Recovery of spiked element is outside acceptance limit of 80% - 120% of true value.

= Result for unspiked element is outside the acceptance limits of (+/-) the project reporting limit (RL).

+ = Result for unspiked element is outside the acceptance limits of (+/-) 2 times the project method detection limit (MDL). This criteria is only applicable to specific QAPPs.



INTERNAL STANDARD REPORT

Login: L17040620 Analytical Method: 6020
 Analytical Workgroup: WG610246 Matrix: 1
 Instrument: ICP-MS2 Analyst: JYH
 ICAL Date: 14-APR-2017 09:59

Sample	Type	Run Date	BISMUTH	GERMANIUM	INDIUM
			% Rec	% Rec	% Rec
L17040610-04	SAMP	14-APR-2017 11:48	100.097	96.512	98.072
L17040620-01	SAMP	14-APR-2017 13:00	95.949	97.26	96.735
WG610193-02	BLANK	14-APR-2017 11:30	99.032	95.569	96.671
WG610193-03	LCS	14-APR-2017 11:33	101.092	97.609	99.415
WG610246-01	PSPK	14-APR-2017 11:51	99.834	96.575	97.47
WG610246-02	SERIAL	14-APR-2017 11:54	94.181	88.193	90.519
WG610270-05	ICV	14-APR-2017 10:12	97.123	93.429	95.384
WG610270-06	ICB	14-APR-2017 10:15	98.641	93.446	95.824
WG610270-07	LLICV	14-APR-2017 10:18	97.252	92.492	94.272
WG610270-08	ICS	14-APR-2017 10:21	96.452	93.059	95.078
WG610270-09	ICS	14-APR-2017 10:24	98.984	95.221	95.251
WG610270-10	CCV	14-APR-2017 10:27	99.611	94.717	96.697
WG610270-11	CCB	14-APR-2017 10:30	101.325	95.176	97.053
WG610270-14	CCV	14-APR-2017 11:19	99.92	95.576	97.313
WG610270-15	CCB	14-APR-2017 11:22	99.953	96.356	96.931
WG610270-16	CCV	14-APR-2017 12:00	100.777	97.991	98.585
WG610270-17	CCB	14-APR-2017 12:04	101.521	97.022	97.622
WG610270-18	CCV	14-APR-2017 12:38	101.642	95.443	97.35
WG610270-19	CCB	14-APR-2017 12:41	102.456	95.839	97.906
WG610270-20	CCV	14-APR-2017 13:19	100.656	98.67	99.829
WG610270-21	CCB	14-APR-2017 13:22	100.826	96.134	99.095
WG610270-24	LLCCV	14-APR-2017 13:34	99.525	94.356	96.975

Acceptance criteria: 30% - 120% Underlined recoveries are out of range
 Acceptance criteria for CCVs and CCBs for method SW846-6020: 80% - 120%

INT_STD_ICPMS - Modified 07/28/2010
 PDF File ID: 5248468
 Report generated: 04/14/2017 13:52



Login Number: L17040620 Date: 04/12/2017
Instrument ID: ICP-MS2 Method: 6020A

Analyte	Integration Time (Sec.)	Concentration (ug/L)
Antimony	1.00	100.0
Arsenic	1.00	100.0
Barium	1.00	100.0
Cadmium	1.00	100.0
Chromium	1.00	100.0
Cobalt	1.00	100.0
Copper	1.00	100.0
Lead	1.00	100.0
Manganese	1.00	100.0
Nickel	1.00	100.0
Selenium	1.00	100.0
Silver	1.00	100.0
Thallium	1.00	100.0
Uranium	1.00	100.0
Vanadium	1.00	100.0
Zinc	1.00	100.0

Comments:

All analytes passed acceptance criteria at the specified concentration.



2.2 General Chemistry Data

2.2.1 Hexavalent Chromium Data

2.2.1.1 Summary Data

Lab Report #: L17040620

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040620-01	PrePrep Method: N/A	Instrument: UV-2600
Client ID: LH18/24-SP140-7431-GRAB	Prep Method: 7196A	Prep Date: N/A
Matrix: Water	Analytical Method: 7196A	Cal Date: 03/10/2017 13:59
Workgroup #: WG610118	Analyst: DLP	Run Date: 04/13/2017 14:00
Collect Date: 04/12/2017 15:00	Dilution: 1	File ID: 00.1704131400-07
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chromium, Hexavalent	18540-29-9	0.0100	U	0.0200	0.0100	0.00500
U	Analyte was not detected. The concentration is below the reported LOD.					

2.2.1.2 QC Summary Data

Example Calculations for Visible Spectrophotometric Methods

Linear Calibration Model

Step 1 - Retrieve Curve Data from ICAL

m = slope of the linear equation
 b = intercept from the linear equation
 y = instrument response as absorbance or OD
 x = concentration of analyte (mg/L)
 $y = mx + b$

Step 2: Calculate the instrument concentration, x

Where:

$$x = (y - b)/m$$

Step 3: Solve for analyte concentration in sample, Cx

$$C_x = (x) (D)$$

Example Calculation (LCS):

Value of m from plot:	7.809
Value of b from plot:	0.0004135
Absorbance of unknown from quantitation report (y):	0.31
Calculated concentration (x):	0.03964483
Dilution factor (D):	1.00
Concentration of analyte in sample, C _y :	0.0396 mg/L

SmartChem Autoanalyzer - Quadratic Calibration for Chloride and Sulfate

Step 1 - Retrieve Curve Data from Smartchem ICAL

A, B, C = constants from the ICAL quadratic regression

x = instrument response as absorbance or OD

y = concentration of analyte (mg/L)

Step 2: Calculate the instrument concentration, y

Where:

$$y = Ax^2 + Bx + C$$

Step 3: Solve for analyte concentration in sample, C_y

$$C_y = (y) (D)$$

Example Calculation (LCS):

Value of A from plot:	101.2796
Value of B from plot:	318.9056
Value of C from plot:	-2.2712
Absorbance of unknown from quantitation report (x):	0.1583
Calculated concentration (y):	50.7495108
Dilution factor (D):	1.00
Concentration of analyte in sample, C _y :	50.75 mg/L

Microbac Laboratories Inc.

Data Checklist

Date: 13-APR-2017
 Analyst: DLP
 Analyst: NA
 Method: CR-6
 Instrument: UV-2600
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG610118

Calibration/Linearity	
Second Source Check	03-10-17
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	
QC Violation Sheet	
Case Narratives	
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	
Primary Reviewer	DLP
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
14-APR-2017

Secondary Reviewer:
14-APR-2017

Dwight Payne

Denna Johnson



Analytical Method: 7196A
Login Number: L17040620

AAB#: WG610118

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP140-7431-GRAB	01	04/12/17					04/13/2017	1	1		04/13/17	1	1	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040620 Work Group: WG610118
 Blank File ID: 00.1704131400-03 Blank Sample ID: WG610118-01
 Prep Date: 04/13/17 14:00 Instrument ID: UV-2600
 Analyzed Date: 04/13/17 14:00 Method: 7196A
 Analyst: DLP

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG610118-02	00.1704131400-04	04/13/17 14:00	
LCS2	WG610118-03	00.1704131400-05	04/13/17 14:00	
LH18/24-SP140-7431-GRAB	L17040620-01	00.1704131400-07	04/13/17 14:00	
DUP	WG610118-05	00.1704131400-08	04/13/17 14:00	

Report Name: BLANK_SUMMARY
 PDF File ID: 5246753
 Report generated 04/14/2017 09:23



Login Number: L17040620 Prep Date: 04/13/17 14:00 Sample ID: WG610118-01
 Instrument ID: UV-2600 Run Date: 04/13/17 14:00 Prep Method: 7196A
 File ID: 00.1704131400-03 Analyst: DLP Method: 7196A
 Workgroup (AAB#): WG610118 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: UV-260-12-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Chromium, Hexavalent	0.00500	0.0200	0.00500	1	U

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5246754
 14-APR-2017 09:23



Login Number: L17040620 Analyst: DLP Prep Method: 7196A
 Instrument ID: UV-2600 Matrix: Water Method: 7196A
 Workgroup (AAB#): WG610118 Units: mg/L
 QC Key: DOD4 Lot #: STD80875
 Sample ID: WG610118-02 LCS File ID: 00.1704131400-04 Run Date: 04/13/2017 14:00
 Sample ID: WG610118-03 LCS2 File ID: 00.1704131400-05 Run Date: 04/13/2017 14:00

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Chromium, Hexavalent	0.100	0.102	102	0.100	0.102	102	0.733	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5246755
 Report generated: 04/14/2017 09:23



2.2.1.3 Raw Data

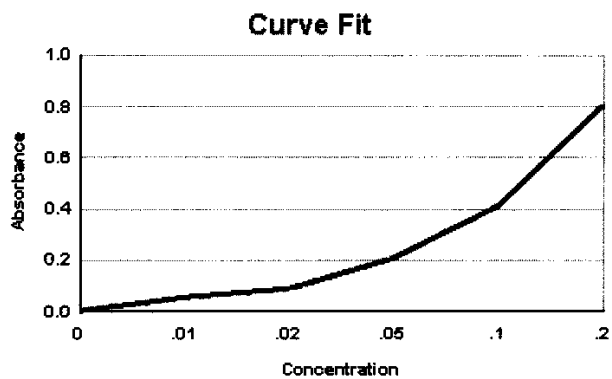
Microbac Laboratories Inc.
INITIAL CALIBRATION

Workgroup: WG605850
Analytical Method: 3500CR
Instrument ID: UV-2600

Analyst: ADG
Initial Calibration Date: 03/10/2017

Analyte: **CHROMIUM, HEXAVALENT**
Number of Points: 6
Slope: 4.01048
Y-Intercept: 0.00616935
Coef. Of Correlation (R^2): 0.999893
Coef. Of Correlation (R): 0.999947

Concentration X	Absorbance Y	X^2	$X * Y$	Y-Fitted (mX^2+B)
0.00	0.00300	0.00	0.00	0.00616935
0.0100	0.0520	0.000100	0.000520	0.0462742
0.0200	0.0840	0.000400	0.00168	0.0863790
0.0500	0.206	0.00250	0.0103	0.206694
0.100	0.408	0.0100	0.0408	0.407218
0.200	0.808	0.0400	0.162	0.808266



WG_ICAL_CAL_WET - Modified 03/06/2008
Report generated 03/10/2017 15:28



Microbac Laboratories Inc.
ALTERNATE SOURCE REPORT

Workgroup #: WG605850Instrument ID: UV-2600File ID: 00.1703101359-07Run Date: 03/10/2017CCV ID: WG605850-07Run Time: 13:59Units: mg/LAnalyst: ADGAnalyte: CHROMIUM, HEXAVALENT Cal ID: UV-260 - 10-MAR-17 13:59:06

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.1	0.103	4.18	3.0	

* Exceeds %D Limit

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

WET_WG_SSCV - Modified 03/06/2008
Report generated 03/10/2017 15:29



CHROMIUM (6)

(Cr6)

Standard Methods 3500 Cr-D (18th, 19th), 3500Cr-B(20th)

SPEC: UV 2600

SOP K2186 Rev. # 22

SW846 7196A

Curve ID: 605850 3-10-17

SOP OVAP K3500-Cr Rev. # _____

CCV: 81080873

LCS: 81080875

Spike: 81080874

RGT: 39797

Matrix: Liquid (mg/L)

Daily dilution: 1.5/100 =

Daily dilution: 10.2/100 =

Daily dilution: 0.2/50

RGT: 18997

Soil (mg/Kg)

Daily dilution: 0.05

Daily dilution: 0.10

Daily dilution: 0.10

Sample	Volume (mL)	pH adj. to 2 ± 0.5	Dilution	Cell size (cm)	Absorbance @ 540 nm
CCV: mg/L(1 cm)	100				
CCV: <u>0.05</u> mg/L(5 cm)	100	✓		<u>5 cm</u>	<u>0.215</u>
Blank/CCB:	100	✓		<u>5 cm</u>	<u>0.001</u>
LCS: ppm	100	✓		<u>5 cm</u>	<u>0.414</u>
LCSDUP: ppm	100	✓		<u>5 cm</u>	<u>0.417</u>
<u>04-618-01</u>	100	✓		<u>5 cm</u>	<u>0.005</u>
<u>04-620-01</u>	100	✓		<u>5 cm</u>	<u>0.004</u>
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
CCV: (1 cm)	100				
CCV: (5 cm)	100				
CCB:	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
DUP <u>04-620-01</u>	100	✓		<u>5 cm</u>	<u>0.004</u>
MS: (<u>04-618-01</u>)	100	✓		<u>5 cm</u>	<u>0.381</u>
MSD: ()	100				
CCV: (1 cm)	100				
CCV: <u>0.05</u> (5 cm)	100	✓		<u>5</u>	<u>0.214</u>
CCB:	100			<u>5 cm</u>	<u>0.001</u>

Analyst: Quinty Poyner

Date / Time: 04-13-17 11400

SW846 7196 (Dup and/or MS every 10 samples)

SM3500 Cr (Dup and MS/MSD every 20 samples)

DCN#125185



Microbac Laboratories Inc.
SAMPLE REPORT

Workgroup: WG610118Analyst: DLPAnalyte: CHROMIUM, HEXAVALENTDate: 04/13/2017

Sample ID	I Vol	F Vol	Response	Slope	Y Intercept	Anal. Conc.	Rep. Conc.	Dil	Units
WG610118-01	100	100	0.00100	4.010	0.006169	-0.0012890	-0.0012890	1	mg/L
WG610118-02	100	100	0.414	4.010	0.006169	0.10169	0.10169	1	mg/L
WG610118-03	100	100	0.417	4.010	0.006169	0.10244	0.10244	1	mg/L
L17040618-01	100	100	0.00500	4.010	0.006169	-0.00029157	ND	1	mg/L
WG610118-06	100	100	0.00500	4.010	0.006169	-0.00029157	-0.00029157	1	mg/L
WG610118-04	100	100	0.00400	4.010	0.006169	-0.00054092	-0.00054092	1	mg/L
L17040620-01	100	100	0.00400	4.010	0.006169	-0.00054092	ND	1	mg/L
WG610118-05	100	100	0.00400	4.010	0.006169	-0.00054092	-0.00054092	1	mg/L
WG610118-07	100	100	0.381	4.010	0.006169	0.093463	0.093463	1	mg/L

UV SAMPLE REPORT - Modified 03/06/2008

Report generated 04/14/2017 08:14



Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00853835

Workgroup #: WG610180 Instrument ID: UV-2600
File ID: 00.1704131400-01 Run Date: 04/13/2017
CCV ID: WG610180-01 Run Time: 14:00
Units: mg/L Analyst: DLP
Analyte: CHROMIUM, HEXAVALENT Cal ID: UV-260 - 12-APR-17

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.05	0.0521	4.30	4.2	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/14/2017 08:10



Workgroup #: WG610180
File ID: 00.1704131400-10
CCV ID: WG610180-03
Units: mg/L
Analyte: CHROMIUM, HEXAVALENT

Instrument ID: UV-2600
Run Date: 04/13/2017
Run Time: 14:00
Analyst: DLP
Cal ID: UV-260 - 12-APR-17

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.05	0.0518	4.28	3.6	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/14/2017 08:10



3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
April 24, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
OJE - OMOYEMWEN J. ENGLISH	PDM - PIERCE D. MORRIS
PIT - MICROBAC WARRENDALE	REK - BOB E. KYER
RLB - BOB BUCHANAN	RNP - RICK N. PETTY
SAV - SARAH A. VANDENBERG	SCB - SARAH C. BOGOLIN
SCJ - SUE ELLEN C. JOHNSON	SDC - SHALYN D. CONLEY
TB - TODD BOYLE	TMB - TIFFANY M. BAILEY
TMM - TAMMY M. MORRIS	VC - VICKI COLLIER
WTD - WADE T. DELONG	XXX - UNAVAILABLE OR SUBCONTRACT

List of Valid Qualifiers

April 24, 2017

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample receipt exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample receipt exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentatively identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound



List of Valid Qualifiers

April 24, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample receipt exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below



Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17040620

Account: 2551

Project: 2551.096

Samples: 1

Due Date: 24-APR-2017

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17040620-01	893435	AG-MS SE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	13-APR-2017 11:05	BRG		
2	PREP	W1	DIG	13-APR-2017 12:07	AC	CLS	
3	ANALYZ*	DIG	METALS	14-APR-2017 10:55	JYH	AC	
4	STORE	DIG	A1	14-APR-2017 13:58	BRG	ERP	

**Sample extract/digestate/leachate*

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17040620-01	893436	CR-6

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	13-APR-2017 11:05	BRG		
2	ANALYZ	W1	WET	13-APR-2017 11:27	DLP	BRG	

A1 - Sample Archive (COLD)
 A2 - Sample Archive (AMBIENT)
 F1 - Volatiles Freezer in Login
 V1 - Volatiles Refrigerator in Login
 W1 - Walkin Cooler in Login



NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
 Total Halide by Bomb Combustion (TX)
 Particle Sizing - 200 Mesh (PS200)
 Specific Gravity/Density (SPGRAV)
 Total Residual Chlorine (CL-TRL)
 Total Volatile Solids (all forms) (TVS)
 Total Coliform Bacteria (all methods)
 Fecal Coliform Bacteria (all methods)
 Sulfite (SO₃)
 Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS

Nitrogen, Ammonia by Method 350.1
 Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
 Phenolics, Total by Method 420.1
 ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
 Acetic acid
 Butyric acid
 Lactic acid
 Propionic acid
 Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
 1-Methylnaphthalene
 1,4-Dioxane
 Atrazine
 Benzaldehyde
 Biphenyl
 Caprolactam
 Hexamethylphosphoramide (HMPA)
 Pentachlorobenzene
 Pentachloroethane

NELAP Accreditation by Laboratory SOP**NONPOTABLE WATER**OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALSOVD MSS01/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP**SOLID AND HAZARDOUS CHEMICALS**OVD MSV01/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)

Laboratory Report Number: L17040687

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on April 25 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



Lab Report #: L17040687

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00114105	I	3.0		J4616882309	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

**Lab Report #:** L17040687**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP650-6432-GRAB	L17040687-01	04/13/2017 15:00	04/14/2017 09:35



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	NH3
Prep Batch Number(s):	WG610659	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-25 17:39:39



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	NH3
Prep Batch Number(s):	WG610659	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	NH3
Prep Batch Number(s):	WG610659	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	NH3
Prep Batch Number(s):	WG610659	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	NH3
Prep Batch Number(s):	WG610659	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	NH3
Prep Batch Number(s):	WG610659	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	PO4
Prep Batch Number(s):	WG610249	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-25 17:38:33



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	PO4
Prep Batch Number(s):	WG610249	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	PO4
Prep Batch Number(s):	WG610249	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	PO4
Prep Batch Number(s):	WG610249	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	PO4
Prep Batch Number(s):	WG610249	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	PO4
Prep Batch Number(s):	WG610249	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	TOC
Prep Batch Number(s):	WG610660	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-25 17:40:52



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	TOC
Prep Batch Number(s):	WG610660	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	TOC
Prep Batch Number(s):	WG610660	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	TOC
Prep Batch Number(s):	WG610660	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	TOC
Prep Batch Number(s):	WG610660	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040687
Project Name:		Method:	TOC
Prep Batch Number(s):	WG610660	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-25 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

Lab Report #: L17040687
 Lab Project #: 2551.096
 Project Name: Longhorn Army Ammunition
 Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040687-01	PrePrep Method: N/A	Instrument: SMARTCHEM2
Client ID: LH18/24-SP650-6432-GRAB	Prep Method: 350.1	Prep Date: N/A
Matrix: Water	Analytical Method: 350.1	Cal Date:
Workgroup #: WG610659	Analyst: TMM	Run Date: 04/19/2017 10:43
Collect Date: 04/13/2017 15:00	Dilution: 20	File ID: S2170419001.042
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrogen, Ammonia	7664-41-7	21.9		4.00	2.00	1.00

Certificate of Analysis

Sample #: L17040687-01	PrePrep Method: N/A	Instrument: V-1200
Client ID: LH18/24-SP650-6432-GRAB	Prep Method: 365.2	Prep Date: N/A
Matrix: Water	Analytical Method: 365.2	Cal Date: 03/09/2017 11:26
Workgroup #: WG610249	Analyst: DLP	Run Date: 04/14/2017 15:20
Collect Date: 04/13/2017 15:00	Dilution: 5	File ID: 00.1704141520-06
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Orthophosphate	14265-44-2	3.95		0.500	0.250	0.125

Certificate of Analysis

Sample #: L17040687-01	PrePrep Method: N/A	Instrument: TOC-VWP
Client ID: LH18/24-SP650-6432-GRAB	Prep Method: 415.1	Prep Date: N/A
Matrix: Water	Analytical Method: 415.1	Cal Date: 02/10/2017 10:25
Workgroup #: WG610660	Analyst: ADG	Run Date: 04/19/2017 09:26
Collect Date: 04/13/2017 15:00	Dilution: 25	File ID: TC04192017.008
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	239		50.0	25.0	12.5

2.1 General Chemistry Data

2.1.1 Ammonia Data

2.1.1.1 Summary Data

Lab Report #: L17040687

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040687-01	PrePrep Method: N/A	Instrument: SMARTCHEM2
Client ID: LH18/24-SP650-6432-GRAB	Prep Method: 350.1	Prep Date: N/A
Matrix: Water	Analytical Method: 350.1	Cal Date:
Workgroup #: WG610659	Analyst: TMM	Run Date: 04/19/2017 10:43
Collect Date: 04/13/2017 15:00	Dilution: 20	File ID: S2170419001.042
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrogen, Ammonia	7664-41-7	21.9		4.00	2.00	1.00

2.1.1.2 QC Summary Data

Example Ammonia Calculations

$$(\text{absorbance} - \text{intercept}) / (\text{slope} * \text{dilution}) = \text{mg/L}$$

where:

absorbance = reading from the spectrophotometer

intercept = calculated from calibration standard absorbencies

slope = calculated from calibration standard absorbencies

dilution = dilution of the distillate in decimal form (ex. 1/5 dilution = 0.2)

Microbac Laboratories Inc.

Data Checklist

Date: 19-APR-2017
 Analyst: TMM
 Analyst: NA
 Method: NH3
 Instrument: SC2
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG610659

Calibration/Linearity	4/19/17
Second Source Check	
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	X
QC Violation Sheet	
Case Narratives	
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	TMM
Secondary Reviewer	
Comments	

Primary Reviewer:
19-APR-2017

Jammy Morris

Secondary Reviewer:



Analytical Method: 350.1
Login Number: L17040687

AAB#: WG610659

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6432-GRAB	01	04/13/17					04/19/2017	5.8	28		04/19/17	5.8	28	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17040687 Prep Date: 04/19/17 10:24 Sample ID: WG610659-01
Instrument ID: SMARTCHEM2 Run Date: 04/19/17 10:24 Prep Method: 350.1
File ID: S2170419001.035 Analyst: TMM Method: 350.1
Workgroup (AAB#): WG610659 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: SMARTC-19-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Nitrogen, Ammonia	0.0500	0.200	0.0500	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5256463
20-APR-2017 14:39



Login Number: L17040687 Analyst: TMM Prep Method: 350.1
 Instrument ID: SMARTCHEM2 Matrix: Water Method: 350.1
 Workgroup (AAB#): WG610659 Units: mg/L
 QC Key: DOD4 Lot #: STD80299
 Sample ID: WG610659-02 LCS File ID: S2170419001.012 Run Date: 04/19/2017 10:01
 Sample ID: WG610659-03 LCS2 File ID: S2170419001.013 Run Date: 04/19/2017 10:04

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Nitrogen, Ammonia	2.00	1.93	96.5	2.00	1.95	97.4	0.944	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5256464
 Report generated: 04/20/2017 14:39



2.1 General Chemistry Data

2.1.2 Orthophosphate Data

2.1.2.1 Summary Data

Lab Report #: L17040687

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040687-01	PrePrep Method: N/A	Instrument: V-1200
Client ID: LH18/24-SP650-6432-GRAB	Prep Method: 365.2	Prep Date: N/A
Matrix: Water	Analytical Method: 365.2	Cal Date: 03/09/2017 11:26
Workgroup #: WG610249	Analyst: DLP	Run Date: 04/14/2017 15:20
Collect Date: 04/13/2017 15:00	Dilution: 5	File ID: 00.1704141520-06
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Orthophosphate	14265-44-2	3.95		0.500	0.250	0.125

2.1.2.2 QC Summary Data

Example Calculations for Visible Spectrophotometric Methods

Linear Calibration Model

Step 1 - Retrieve Curve Data from ICAL

m = slope of the linear equation
 b = intercept from the linear equation
 y = instrument response as absorbance or OD
 x = concentration of analyte (mg/L)
 $y = mx + b$

Step 2: Calculate the instrument concentration, x

Where:

$$x = (y - b)/m$$

Step 3: Solve for analyte concentration in sample, Cx

$$C_x = (x) (D)$$

Example Calculation (LCS):

Value of m from plot:	7.809
Value of b from plot:	0.0004135
Absorbance of unknown from quantitation report (y):	0.31
Calculated concentration (x):	0.03964483
Dilution factor (D):	1.00
Concentration of analyte in sample, C _y :	0.0396 mg/L

SmartChem Autoanalyzer - Quadratic Calibration for Chloride and Sulfate

Step 1 - Retrieve Curve Data from Smartchem ICAL

A, B, C = constants from the ICAL quadratic regression

x = instrument response as absorbance or OD

y = concentration of analyte (mg/L)

Step 2: Calculate the instrument concentration, y

Where:

$$y = Ax^2 + Bx + C$$

Step 3: Solve for analyte concentration in sample, C_y

$$C_y = (y) (D)$$

Example Calculation (LCS):

Value of A from plot:	101.2796
Value of B from plot:	318.9056
Value of C from plot:	-2.2712
Absorbance of unknown from quantitation report (x):	0.1583
Calculated concentration (y):	50.7495108
Dilution factor (D):	1.00
Concentration of analyte in sample, C _y :	50.75 mg/L

Microbac Laboratories Inc.

Data Checklist

Date: 14-APR-2017
 Analyst: DLP
 Analyst: NA
 Method: PO4
 Instrument: V-1200
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG610249

Calibration/Linearity	
Second Source Check	03-09-17
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	
Client Forms	
QC Violation Sheet	X
Case Narratives	
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	
Primary Reviewer	DLP
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
14-APR-2017

Secondary Reviewer:
24-APR-2017

Dwight Payne

Denna Johnson



Analytical Method: 365.2
Login Number: L17040687

AAB#: WG610249

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6432-GRAB	01	04/13/17					04/14/2017	1	2		04/14/17	1	2	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17040687 Prep Date: 04/14/17 15:20 Sample ID: WG610249-01
Instrument ID: V-1200 Run Date: 04/14/17 15:20 Prep Method: 365.2
File ID: 00.1704141520-03 Analyst: DLP Method: 365.2
Workgroup (AAB#): WG610249 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: V-1200-12-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Orthophosphate	0.0250	0.100	0.0250	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5258843
24-APR-2017 09:08



Login Number: L17040687 Analyst: DLP Prep Method: 365.2
 Instrument ID: V-1200 Matrix: Water Method: 365.2
 Workgroup (AAB#): WG610249 Units: mg/L
 QC Key: DOD4 Lot #: STD81455

Sample ID: WG610249-02 LCS File ID: 00.1704141520-04 Run Date: 04/14/2017 15:20
 Sample ID: WG610249-03 LCS2 File ID: 00.1704141520-05 Run Date: 04/14/2017 15:20

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Orthophosphate	1.00	1.01	101	1.00	1.02	102	0.947	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5258844
 Report generated: 04/24/2017 09:08



2.1.2.3 Raw Data

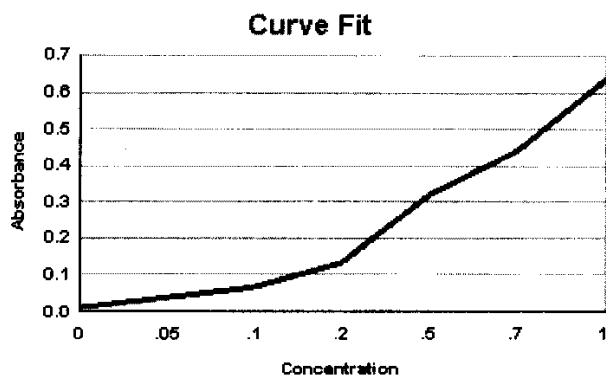
Microbac Laboratories Inc.
INITIAL CALIBRATION

Workgroup: WG605653
Analytical Method: 300
Instrument ID: V-1200

Analyst: ADG
Initial Calibration Date: 03/09/2017

Analyte: **ORTHOPHOSPHATE**
Number of Points: 7
Slope: 0.626650
Y-Intercept: 0.00514888
Coef. Of Correlation (R^2): 0.999901
Coef. Of Correlation (R): 0.999951

Concentration X	Absorbance Y	X ²	X * Y	Y-Fitted (mX ² +B)
0.00	0.00700	0.00	0.00	0.00514888
0.0500	0.0380	0.00250	0.00190	0.0364814
0.100	0.0670	0.0100	0.00670	0.0678139
0.200	0.129	0.0400	0.0258	0.130479
0.500	0.318	0.250	0.159	0.318474
0.700	0.440	0.490	0.308	0.443804
1.00	0.635	1.00	0.635	0.631799



WG_ICAL_CAL_WET - Modified 03/06/2008
Report generated 03/09/2017 12:03



Microbac Laboratories Inc.
ALTERNATE SOURCE REPORT

Workgroup #: WG605653
 File ID: 00.1703091126-08
 CCV ID: WG605653-08
 Units: mg/L
 Analyte: ORTHOPHOSPHATE

Instrument ID: V-1200
 Run Date: 03/09/2017
 Run Time: 11:26
 Analyst: ADG
 Cal ID: V-1200 - 09-MAR-17 11:26:07

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	1	0.999	0.631	0.1	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds

WET_WG_SSCV - Modified 03/06/2008
 Report generated 03/09/2017 12:06



Microbac Laboratories Inc.
SAMPLE REPORT

Workgroup: WG610249

Analyst: DLP

Analyte: ORTHOPHOSPHATE

Date: 04/14/2017

Sample ID	I Vol	F Vol	Response	Slope	Y Intercept	Anal. Conc.	Rep. Conc.	Dil	Units
WG610249-01	50	50	0.00900	0.6267	0.005149	0.0061456	0.0061456	1	mg/L
WG610249-02	50	50	0.636	0.6267	0.005149	1.0067	1.0067	1	mg/L
WG610249-03	50	50	0.642	0.6267	0.005149	1.0163	1.0163	1	mg/L
L17040687-01	50	50	0.500	0.6267	0.005149	0.78968	3.9484	5	mg/L
WG610249-04	50	50	0.500	0.6267	0.005149	0.78968	3.9484	5	mg/L
WG610249-05	50	50	0.494	0.6267	0.005149	0.78010	3.9005	5	mg/L
WG610249-06	50	50	0.533	0.6267	0.005149	0.84234	4.2117	5	mg/L

UV_SAMPLE_REPORT - Modified 03/06/2008

Report generated 04/14/2017 16:13

Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00853897

Workgroup #: WG610315 Instrument ID: V-1200
File ID: 00.1704141520-01 Run Date: 04/14/2017
CCV ID: WG610315-01 Run Time: 15:20
Units: mg/L Analyst: DLP
Analyte: ORTHOPHOSPHATE Cal ID: V-1200 - 12-APR-17

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	.5	0.538	0.684	7.6	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/14/2017 16:12



Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00853898

Workgroup #: WG610315 Instrument ID: V-1200
File ID: 00.1704141520-09 Run Date: 04/14/2017
CCV ID: WG610315-03 Run Time: 15:20
Units: mg/L Analyst: DLP
Analyte: ORTHOPHOSPHATE Cal ID: V-1200 - 12-APR-17

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	.5	0.538	0.684	7.6	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/14/2017 16:12



2.1 General Chemistry Data

2.1.3 Total Organic Carbon Data

2.1.3.1 Summary Data

Lab Report #: L17040687

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040687-01	PrePrep Method: N/A	Instrument: TOC-VWP
Client ID: LH18/24-SP650-6432-GRAB	Prep Method: 415.1	Prep Date: N/A
Matrix: Water	Analytical Method: 415.1	Cal Date: 02/10/2017 10:25
Workgroup #: WG610660	Analyst: ADG	Run Date: 04/19/2017 09:26
Collect Date: 04/13/2017 15:00	Dilution: 25	File ID: TC04192017.008
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	239		50.0	25.0	12.5

2.1.3.2 QC Summary Data

**Total Organic Carbon Example Calculations
(Direct Readout Parameter)**

$$(\text{Readout})/(\text{dilution}) = \text{mg/L}$$

where:

Readout = direct readout from the instrument

dilution = dilution in decimal form (ex. 1/5 dilution = 0.2)

Microbac Laboratories Inc.

Data Checklist

Date: 19-APR-2017
 Analyst: ADG
 Analyst: NA
 Method: TOC
 Instrument: TOCVMP
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG610660

Calibration/Linearity	02/10/17
Second Source Check	
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	X
QC Violation Sheet	
Case Narratives	
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	
Primary Reviewer	ADG
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
20-APR-2017

April Greene

Secondary Reviewer:
24-APR-2017

Denna Johnson



Analytical Method: 415.1
Login Number: L17040687

AAB#: WG610660

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6432-GRAB	01	04/13/17					04/19/2017	5.8	28		04/19/17	5.8	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040687 Work Group: WG610660
 Blank File ID: TC04192017.004 Blank Sample ID: WG610660-01
 Prep Date: 04/19/17 08:06 Instrument ID: TOC-VWP
 Analyzed Date: 04/19/17 08:06 Method: 415.1
 Analyst: ADG

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG610660-02	TC04192017.005	04/19/17 08:17	01
LCS2	WG610660-03	TC04192017.006	04/19/17 08:29	01
LH18/24-SP650-6432-GRAB	L17040687-01	TC04192017.008	04/19/17 09:26	DL01
DUP	WG610660-05	TC04192017.024	04/19/17 14:41	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5256632
 Report generated 04/20/2017 15:27



Login Number: L17040687 Prep Date: 04/19/17 08:06 Sample ID: WG610660-01
Instrument ID: TOC-VWP Run Date: 04/19/17 08:06 Prep Method: 415.1
File ID: TC04192017.004 Analyst: ADG Method: 415.1
Workgroup (AAB#): WG610660 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: TOC-VW-10-FEB-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Total Organic Carbon	0.500	2.00	0.500	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5256633
20-APR-2017 15:27



Login Number: L17040687 Analyst: ADG Prep Method: 415.1
 Instrument ID: TOC-VWP Matrix: Water Method: 415.1
 Workgroup (AAB#): WG610660 Units: mg/L
 QC Key: DOD4 Lot #: STD80787
 Sample ID: WG610660-02 LCS File ID: TC04192017.005 Run Date: 04/19/2017 08:17
 Sample ID: WG610660-03 LCS2 File ID: TC04192017.006 Run Date: 04/19/2017 08:29

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Total Organic Carbon	25.0	25.8	103	25.0	25.8	103	0.116	85 - 115	15	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5256634
 Report generated: 04/20/2017 15:27



2.1.3.3 Raw Data

Curve

~~WG 602411~~
~~WG 602476~~ *dm/1/13/17*
 WG 602481

Total Organic Carbon

MAKE DAILY

CCV (TOC): _____ LCS (TOC): _____
 (5/200)(1000) = 25mg/L (5/200)(1000) = 25mg/L

CCV (TIC): _____ MS (TOC): _____
 (5/200)(1000) = 25mg/L _____

Calibration Curve Date: _____ Reagent: RET 35944
RET 37673

SM5310-C : Matrix 2 WG _____
 EPA 415.1/9060A(mod): Matrix 1 WG _____ SOP: K 4151 Rev. 18 *dm/1/13/17*
 Instrument: Shimadza TOC-VWP/ASI

- drain reservoir filled
 ASI water bottle full
 dilution water bottle full
- DAILY CHECK
 3rd bottle full
 sufficient gas
 sufficient persulfate
- sufficient acid
 waste container

Position	Sample ID	Dilution	Position	Sample ID	Dilution	Position	Sample ID	Dilution
1	TC Curve		26	TC Curve		51		
2	TC ICV		27	Std 79318		52	See SOP	
3	TIC Curve		28			53	for point	
4	TIC ICV		29	TIC Curve		54	preparation	
5			30	Std 80415		55		
6			31			56		
7			32			57		
8			33	TOC (TC)		58		
9			34	ICV		59		
10			35	Std 77870		60	5/200 (1000) = 25	
11			36			61		
12			37	TIC ICV		62		
13			38	Std 80416		63		
14			39			64		
15			40			65		
16			41			66		
17			42			67		
18			43			68		
19	all points		44	analyzed in duplicate		69		
20			45			70		
21			46			71		
22			47			72		
23			48			73		
24			49			74		
25			50			75		

Analyst: David Merckli Date/Time: 2/10/17

DCN#123915



C:\TOC3201\Data\CURVES-02-10-2017.t32

	Analysis	Sample Name	Result	Status	Date / Time	Vial
1	TC	TCCURVE		Complete	2/10/2017 10:29:51 A	0, 1, 2, 3, 4, 5
2	TC	TOC ICV	TC:23.90mg/L	Complete	2/10/2017 10:47:48 A	6
3	IC	TICCURVE		Complete	2/10/2017 3:55:41 PM	0, 1, 2, 3, 4, 5
4	IC	TIC CURVE	IC:24.27mg/L	Complete	2/10/2017 4:12:07 PM	6
5	TC		TC:0.000mg/L	Complete	2/10/2017 4:31:41 PM	7
6	IC	TOC/TIC	IC:8.571mg/L	Complete	2/10/2017 4:42:05 PM	7
7	TC	TOC/TIC	TC:32.10mg/L	Complete	2/10/2017 5:01:02 PM	7

2/13/2017 7:01:58 AM

1/1

2/12/2017 11:18:36 AM

CURVES-02-10-2017.i32

Instr. Information

System
DetectorTOCVW ASI
Wet Chemical

Cal. Curve

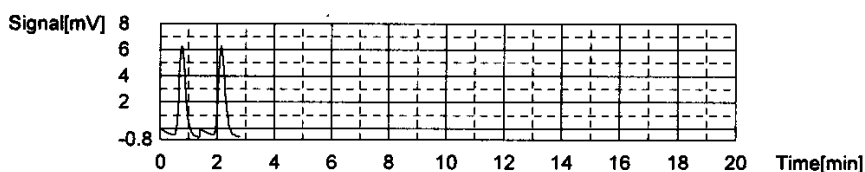
Sample Name: TCCURVE
 Sample ID: Untitled
 Cal. Curve: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
 Status: Completed

Type	Anal.
Standard	TC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.83	500uL	1	*****		2/10/2017 9:36:31 AM
2	10.82	500uL	1	*****		2/10/2017 9:40:05 AM

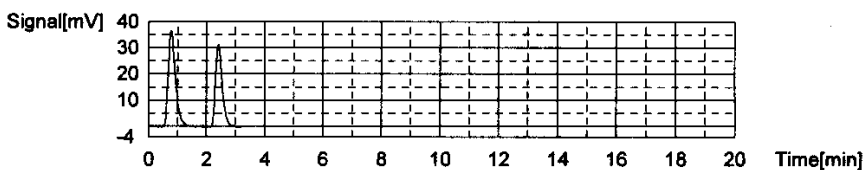
Acid Add. 0.000%
 Mean Area 10.82



Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	64.31	500uL	1	*****		2/10/2017 9:45:28 AM
2	51.52	500uL	1	*****		2/10/2017 9:49:19 AM

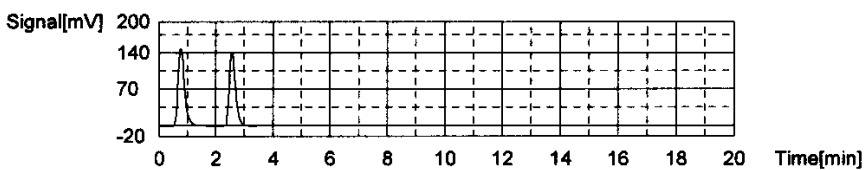
Acid Add. 0.000%
 Mean Area 57.92



Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	238.4	500uL	1	*****		2/10/2017 9:55:04 AM
2	216.3	500uL	1	*****		2/10/2017 9:58:58 AM

Acid Add. 0.000%
 Mean Area 227.4

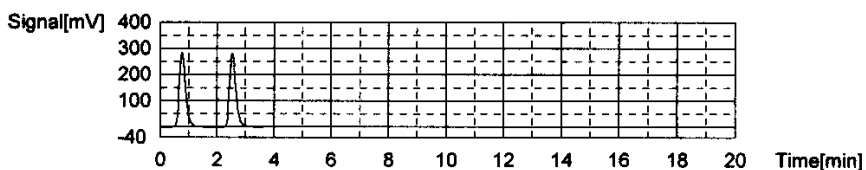


Conc: 10.00mg/L

1/6

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	442.5	500uL	1	*****		2/10/2017 10:04:41 AM
2	437.9	500uL	1	*****		2/10/2017 10:08:48 AM

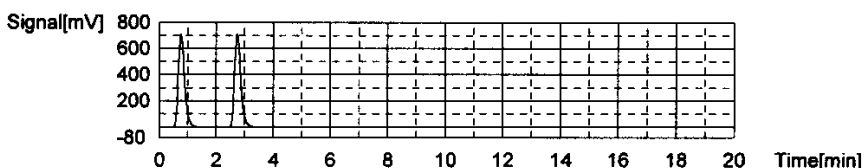
Acid Add. 0.000%
Mean Area 440.2



Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1091	500uL	1	*****		2/10/2017 10:14:47 AM
2	1092	500uL	1	*****		2/10/2017 10:19:05 AM

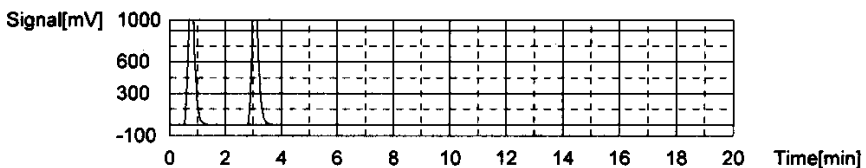
Acid Add. 0.000%
Mean Area 1092



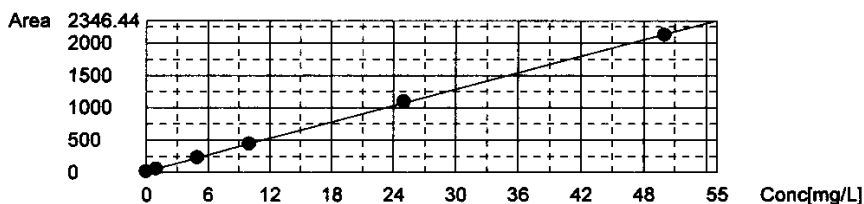
Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	2132	500uL	1	*H*****		2/10/2017 10:25:19 AM
2	2118	500uL	1	*H*****		2/10/2017 10:29:51 AM

Acid Add. 0.000%
Mean Area 2125



Slope: 42.33
Intercept 16.87
r^2 0.999887
Zero Shift No



Sample

Sample Name: TOC ICV
Sample ID: Untitled
Origin: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
Status: Completed
Chk. Result:

Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:23.90mg/L

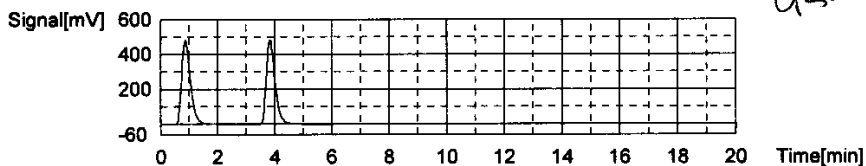
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1029	23.91mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	2/10/2017 10:42:11 AM
2	1028	23.89mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	2/10/2017 10:47:48 AM

95.6%

Mean Area 1029
Mean Conc. 23.90mg/L



Cal. Curve

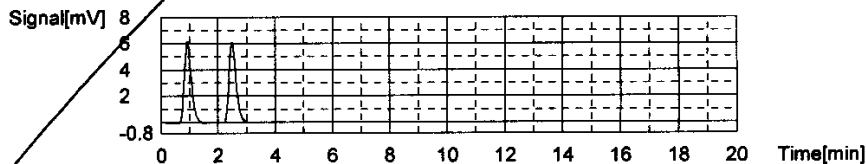
Sample Name: TICCURVE
Sample ID: Untitled
Cal. Curve: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
Status: Completed

Type	Anal.
Standard	TC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.59	500uL	1	*****		2/10/2017 2:49:09 PM
2	10.43	500uL	1	*****		2/10/2017 2:53:06 PM

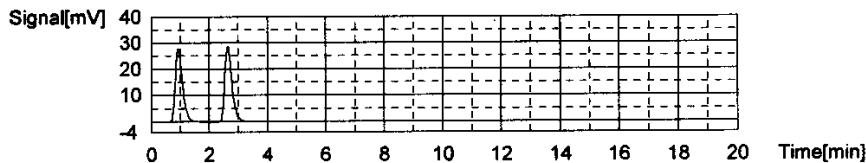
Acid Add. 3.000%
Mean Area 10.51



Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	48.13	500uL	1	*****		2/10/2017 3:00:24 PM
2	49.13	500uL	1	*****		2/10/2017 3:04:41 PM

Acid Add. 3.000%
Mean Area 48.63

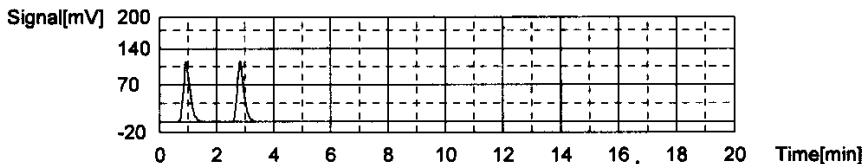


Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	189.0	500uL	1	*****		2/10/2017 3:12:24 PM
2	190.1	500uL	1	*****		2/10/2017 3:16:55 PM

*dcn
3/23/17*

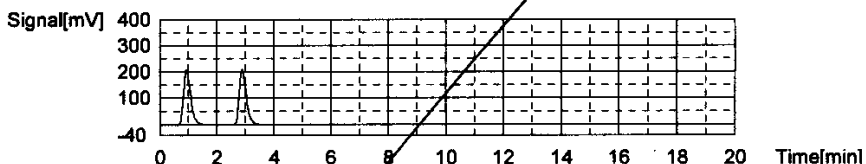
Acid Add. 3.000%
Mean Area 189.6



Conc: 10.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	360.6	500uL	1	*****		2/10/2017 3:24:47 PM
2	362.2	500uL	1	*****		2/10/2017 3:29:24 PM

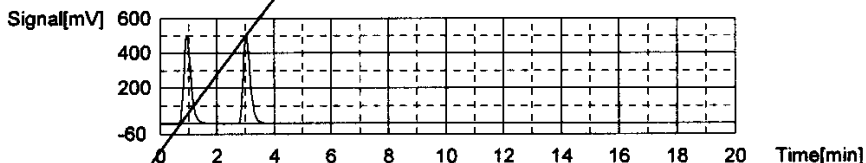
Acid Add. 3.000%
Mean Area 361.4



Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	859.3	500uL	1	*****		2/10/2017 3:37:23 PM
2	856.9	500uL	1	*****		2/10/2017 3:42:16 PM

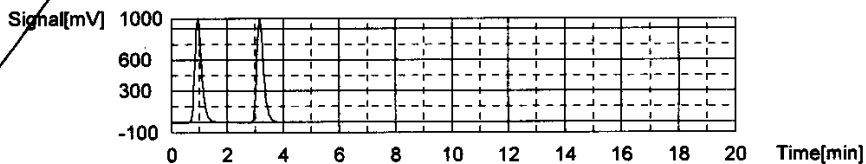
Acid Add. 3.000%
Mean Area 858.1



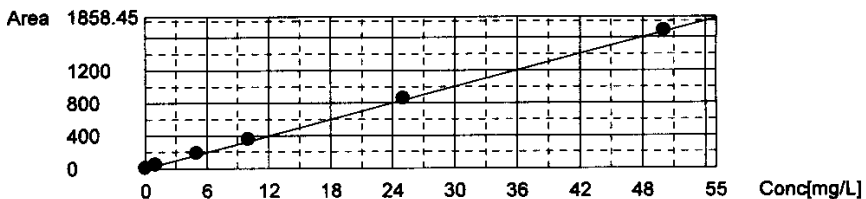
Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1690	500uL	1	*****		2/10/2017 3:50:31 PM
2	1689	500uL	1	*****		2/10/2017 3:55:41 PM

Acid Add. 3.000%
Mean Area 1690



Slope: 33.49
Intercept: 0.000
r^2: 0.999919
Zero Shift: Yes



Sample

dcm

See following pages for curve, slope, intercept
and zero shift unchecked

TOC-V Cal Curve Information
TICCURVE-02-10-2017.2017_02_10_14_45_10.cal

Date of Creation 2:10:17 PM 2/10/2017
User
System TOCVW ASI

Cal. Curve

Sample Name: TICCURVE
Sample ID: Untitled
Cal. Curve: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
Status Completed
Comment:

Type	Anal.
Standard	IC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.59	500uL	1	*****		2/10/2017 2:49:09 PM
2	10.43	500uL	1	*****		2/10/2017 2:53:06 PM

Acid Add. 3.000%
Mean Area 10.51
SD Area 0.1131
CV Area 1.08%
Vial 0

Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	48.13	500uL	1	*****		2/10/2017 3:00:24 PM
2	49.13	500uL	1	*****		2/10/2017 3:04:41 PM

Acid Add. 3.000%
Mean Area 48.63
SD Area 0.7071
CV Area 1.45%
Vial 1

Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	189.0	500uL	1	*****		2/10/2017 3:12:24 PM
2	190.1	500uL	1	*****		2/10/2017 3:16:55 PM

Acid Add. 3.000%
Mean Area 189.6
SD Area 0.7778
CV Area 0.41%
Vial 2

Conc: 10.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	360.6	500uL	1	*****		2/10/2017 3:24:47 PM
2	362.2	500uL	1	*****		2/10/2017 3:29:24 PM

Acid Add. 3.000%
 Mean Area 361.4
 SD Area 1.131
 CV Area 0.31%
 Vial 3

Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	859.3	500uL	1	*****		2/10/2017 3:37:23 PM
2	856.9	500uL	1	*****		2/10/2017 3:42:16 PM

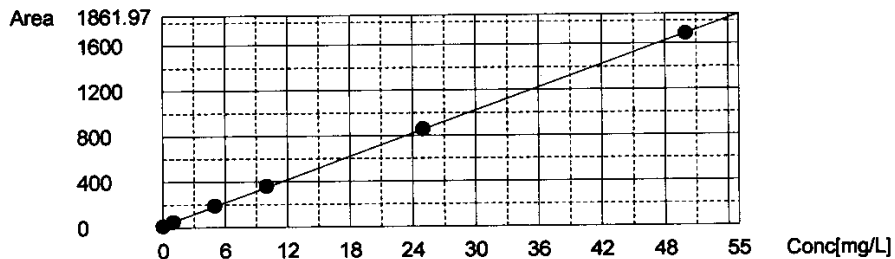
Acid Add. 3.000%
 Mean Area 858.1
 SD Area 1.697
 CV Area 0.20%
 Vial 4

Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1690	500uL	1	*****		2/10/2017 3:50:31 PM
2	1689	500uL	1	*****		2/10/2017 3:55:41 PM

Acid Add. 3.000%
 Mean Area 1690
 SD Area 0.7071
 CV Area 0.04%
 Vial 5

Slope: 33.49
 Intercept 18.41
 r^2 0.999919
 Zero Shift No



Sample Name: TIC CURVE
 Sample ID: Untitled
 Origin: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
 Status: Completed
 Chk. Result:

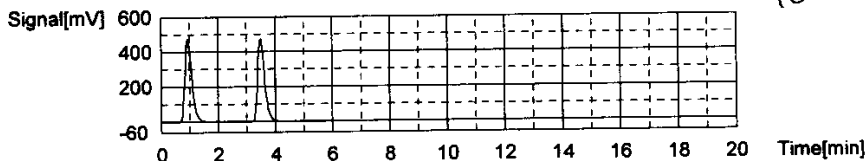
Type	Anal.	Dil.	Result
Unknown	IC	1.000	IC:24.27mg/L

1. Det

Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	810.5	24.20mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	2/10/2017 4:08:15 PM
2	814.6	24.33mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	2/10/2017 4:12:07 PM

Mean Area 812.5
 Mean Conc. 24.27mg/L



Sample

Sample Name: Untitled
 Sample ID: TCCURVE-02-10-2017.2017_02_10_14_14_25.cal
 Origin: Completed
 Status: Completed
 Chk. Result:

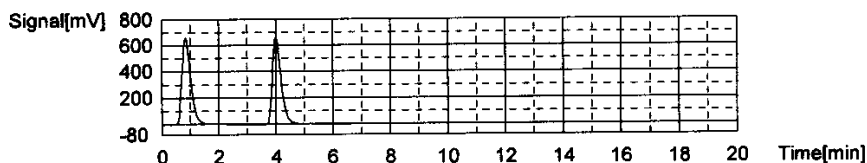
Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:0.000mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1406	0.000mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_14_14	2/10/2017 4:25:42 PM
2	1411	0.000mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_14_14	2/10/2017 4:31:41 PM

Mean Area 1409
 Mean Conc. 0.000mg/L



Sample

Sample Name: TOC/TIC
 Sample ID: Untitled
 Origin: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
 Status: Completed
 Chk. Result:

2/12/2017 11:18:36 AM

CURVES-02-10-2017.i32

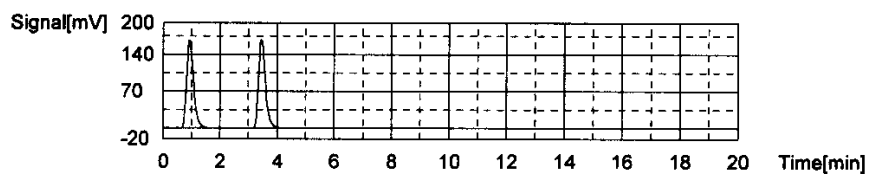
Type	Anal.	Dil.	Result
Unknown	IC	1.000	IC:8.571mg/L

1. Det

Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	286.8	8.565mg/L	500ul	1		TICCURVE-02-10-2017.2017_02_10_14_45	12/10/2017 4:37:09 PM
2	287.2	8.577mg/L	500ul	1		TICCURVE-02-10-2017.2017_02_10_14_45	12/10/2017 4:42:05 PM

Mean Area 287.0
Mean Conc. 8.571mg/L



Sample

Sample Name: TOC/TIC
Sample ID: Untitled
Origin: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
Status: Completed
Chk. Result

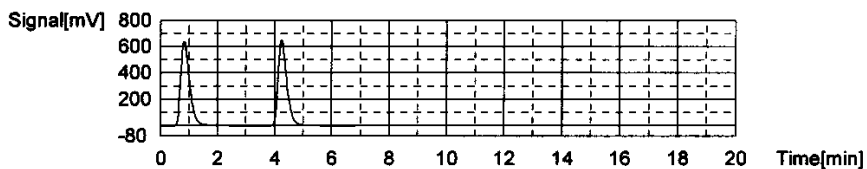
Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:32.10mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1378	32.16mg/L	500ul	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	12/10/2017 4:55:07 PM
2	1373	32.04mg/L	500ul	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	12/10/2017 5:01:02 PM

Mean Area 1376
Mean Conc. 32.10mg/L



6/6

Total Organic Carbon

MAKE DAILY

CCV (TOC): 79381
(5/200)(1000) = 25mg/L

LCS (TOC): 80787
(5/200)(1000) = 25mg/L

CCV (TIC): 80416
(5/200)(1000) = 25mg/L

MS (TOC): 80787
0.4(1000) / 40 = 10

Calibration Curve Date: 2/10/17

Reagent: 39266
39685

SM5310-C : Matrix 2 WG 610660

EPA 415.1/9060A(mod): Matrix 1 WG _____ SOP: K 4151 Rev. 19

Instrument: Shimadza TOC-VWP/ASI

- drain reservoir filled
- ASI water bottle full
- dilution water bottle full
- 3rd bottle full
- sufficient gas
- sufficient persulfate
- sufficient acid waste container

Position	Sample ID	Dilution
1	TIC / RL	
2	TIC	
3	CCV	
4	BK	
5	LCS	
6	LCS	
7	0621-01	
8	0687-01	1/25
9	0717-01	
10	02	
11	03	
12	723-01	
13	789-01	
14	CCV	
15	CCB	
16	789-03	
17	05	
18	07	
19	791-01	
20	03	
21	852-01	
22	856-09	
23	860-01	
24	621-01 D	
25	621-01 MS	

Position	Sample ID	Dilution
26	CCV	
27	CCB	
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		

Position	Sample ID	Dilution
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
71		
72		
73		
74		
75		

Analyst: April Greene Date/Time: 4/11/17 @ 0730

DCN#125284



	Analysis	Sample Name	Result	Status	Date / Time	Vial
1	TOC	TIC/TOC	TOC:27.07mg/L TC:35.63mg/L IC:8.561mg/L	Complete	4/19/2017 7:36:19 AM	1
2	TOC	TIC	TOC:1.816mg/L TC:27.58mg/L IC:25.76mg/L	Complete	4/19/2017 7:48:59 AM	2
3	TOC	CCV	!!Error!! TOC:23.77mg/L TC:23.44mg/L IC:-0.3342mg/L	Complete	4/19/2017 8:01:07 AM	3
4	TOC	WG610660-01 BLK	!!Error!! TOC:0.1160mg/L TC:-0.1480mg/L IC:-0.2640mg/L	Complete	4/19/2017 8:10:01 AM	0
5	TOC	WG610660-02 LCS	!!Error!! TOC:25.76mg/L TC:25.43mg/L IC:-0.3377mg/L	Complete	4/19/2017 8:22:10 AM	5
6	TOC	WG610660-03 LCSDUP	!!Error!! TOC:25.79mg/L TC:25.45mg/L IC:-0.3435mg/L	Complete	4/19/2017 8:34:16 AM	6
7	TOC	L17040621-01	TOC:3.970mg/L TC:29.08mg/L IC:25.11mg/L	Complete	4/19/2017 9:19:34 AM	7
8	TOC	L17040687-01 (25)	TOC:9.564mg/L TC:10.58mg/L IC:1.016mg/L	Complete	4/19/2017 9:40:07 AM	8
9	TOC	L17040717-01	TOC:4.712mg/L TC:32.81mg/L IC:28.10mg/L	Complete	4/19/2017 10:02:37 AM	9
10	TOC	L17040717-02	TOC:1.969mg/L TC:4.766mg/L IC:2.798mg/L	Complete	4/19/2017 10:22:59 AM	10
11	TOC	L17040717-04	TOC:2.858mg/L TC:8.223mg/L IC:5.365mg/L	Complete	4/19/2017 10:43:46 AM	11
12	TOC	L17040723-01	TOC:7.692mg/L TC:30.60mg/L IC:22.91mg/L	Complete	4/19/2017 11:06:17 AM	12
13	TOC	L17040789-01	TOC:3.097mg/L TC:31.00mg/L IC:27.90mg/L	Complete	4/19/2017 11:28:29 AM	13
14	TOC	CCV	!!Error!! TOC:24.61mg/L TC:24.43mg/L IC:-0.1814mg/L	Complete	4/19/2017 11:40:37 AM	14
15	TOC	CCB	!!Error!! TOC:0.09945mg/L TC:-0.1591mg/L IC:-0.2586mg/L	Complete	4/19/2017 11:49:39 AM	0
16	TOC	L17040789-03	TOC:2.716mg/L TC:23.44mg/L IC:20.72mg/L	Complete	4/19/2017 12:11:25 PM	16
17	TOC	L17040789-05	TOC:3.275mg/L TC:32.44mg/L IC:29.17mg/L	Complete	4/19/2017 12:33:24 PM	17
18	TOC	L17040789-07	TOC:3.663mg/L TC:22.95mg/L IC:19.28mg/L	Complete	4/19/2017 12:55:00 PM	18
19	TOC	L17040791-01	TOC:1.143mg/L TC:1.274mg/L IC:0.1313mg/L	Complete	4/19/2017 1:14:54 PM	19
20	TOC	L17040791-03	TOC:1.081mg/L TC:1.112mg/L IC:0.03047mg/L	Complete	4/19/2017 1:34:43 PM	20
21	TOC	L17040852-01	!!Error!! TOC:0.4210mg/L TC:0.1265mg/L IC:-0.2945mg/L	Complete	4/19/2017 1:53:51 PM	21
22	TOC	L17040855-09	TOC:2.657mg/L TC:7.045mg/L IC:4.388mg/L	Complete	4/19/2017 2:15:02 PM	22
23	TOC	L17040860-01	!!Error!! TOC:0.4670mg/L TC:0.1542mg/L IC:-0.3128mg/L	Complete	4/19/2017 2:34:17 PM	23
24	TOC	WG610660-05 DUP	TOC:2.596mg/L TC:13.63mg/L IC:11.04mg/L	Complete	4/19/2017 2:55:03 PM	24
25	TOC	WG610660-06 MS	TOC:15.27mg/L TC:19.64mg/L IC:4.363mg/L	Complete	4/19/2017 3:15:52 PM	25
26	TOC	CCV	!!Error!! TOC:23.61mg/L TC:23.35mg/L IC:-0.2591mg/L	Complete	4/19/2017 3:28:00 PM	26
27	TOC	CCB	!!Error!! TOC:0.1081mg/L TC:-0.1670mg/L IC:-0.2751mg/L	Complete	4/19/2017 3:36:56 PM	0

4/20/2017 8:12:21 AM

04-19-2017-ADG-TOC.132

Instr. Information

System TOCVW ASI
 Detector Wet Chemical

Sample

Sample Name: TIC/TOC
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

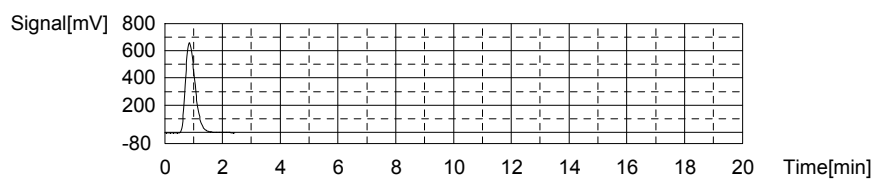
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:27.07mg/L TC:35.63mg/L IC:8.561mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1525	35.63mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 7:31:26 AM

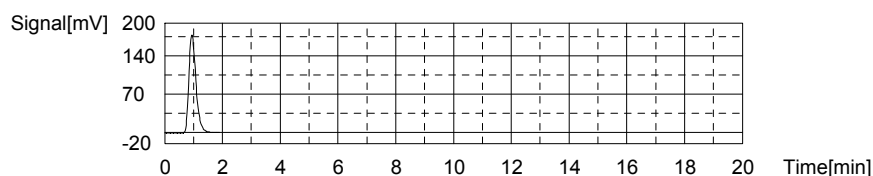
Mean Area 1525
 Mean Conc. 35.63mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	305.1	8.561mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 7:36:19 AM

Mean Area 305.1
 Mean Conc. 8.561mg/L



Sample

Sample Name: TIC
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.816mg/L TC:27.58mg/L IC:25.76mg/L

1. Det

Anal.: TC

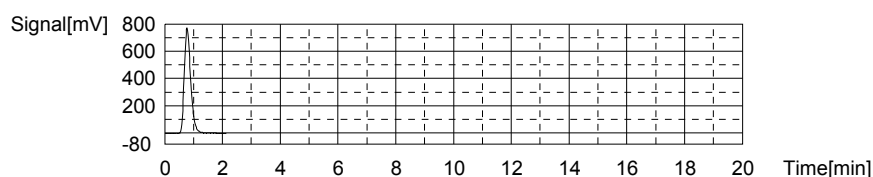
1/19

4/20/2017 8:12:21 AM

04-19-2017-ADG-TOC.i32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1184	27.58mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 7:43:52 AM

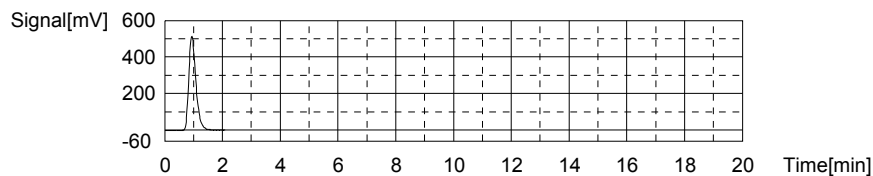
Mean Area 1184
Mean Conc. 27.58mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	881.0	25.76mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 7:48:59 AM

Mean Area 881.0
Mean Conc. 25.76mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

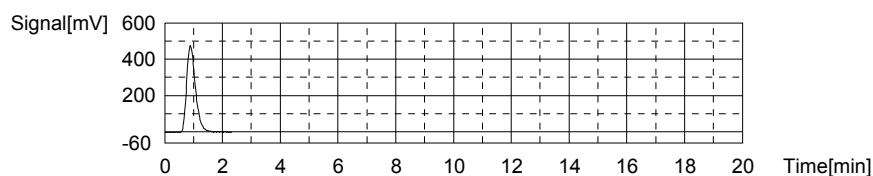
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:23.77mg/L TC:23.44mg/L IC:-0.3342mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1009	23.44mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 7:56:45 AM

Mean Area 1009
Mean Conc. 23.44mg/L



Anal.: IC

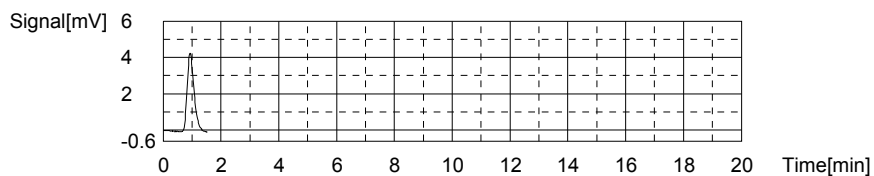
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.223	-0.3342mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 8:01:07 AM

2/19

4/20/2017 8:12:21 AM

04-19-2017-ADG-TOC.t32

Mean Area 7.223
Mean Conc. -0.3342mg/L



Sample

Sample Name: WG610660-01 BLK
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

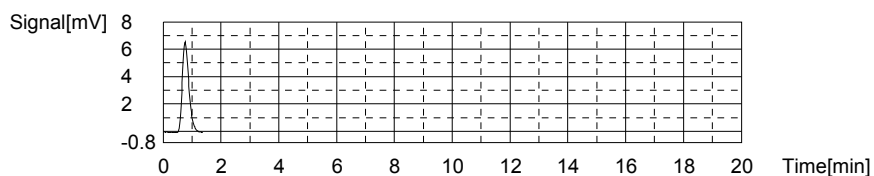
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1160mg/L TC:-0.1480mg/L IC:-0.2640mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.60	-0.1480mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 8:06:07 AM

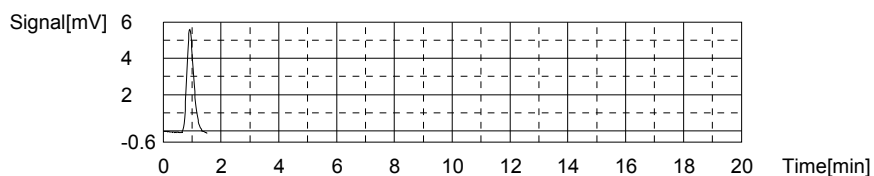
Mean Area 10.60
Mean Conc. -0.1480mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.575	-0.2640mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 8:10:01 AM

Mean Area 9.575
Mean Conc. -0.2640mg/L



Sample

Sample Name: WG610660-02 LCS
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:25.76mg/L TC:25.43mg/L IC:-0.3377mg/L

3/19

4/20/2017 8:12:21 AM

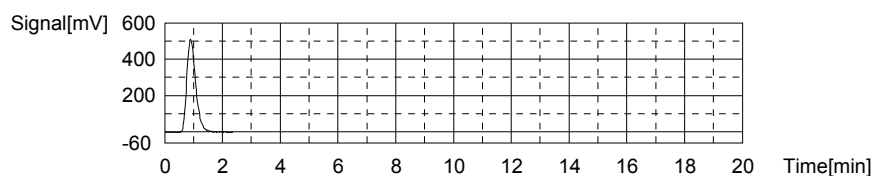
04-19-2017-ADG-TOC.t32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1093	25.43mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 8:17:49 AM

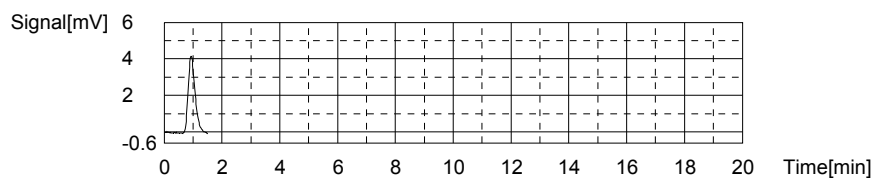
Mean Area 1093
Mean Conc. 25.43mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.105	-0.3377mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 8:22:10 AM

Mean Area 7.105
Mean Conc. -0.3377mg/L



Sample

Sample Name: WG610660-03 LCSDUP
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

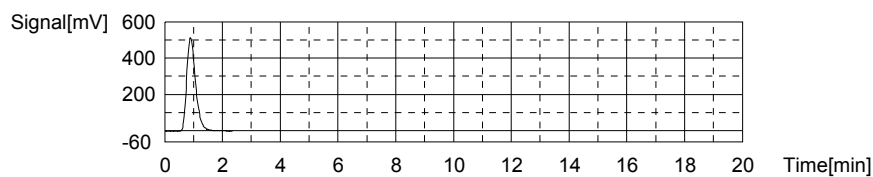
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:25.79mg/L TC:25.45mg/L IC:-0.3435mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1094	25.45mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 8:29:56 AM

Mean Area 1094
Mean Conc. 25.45mg/L

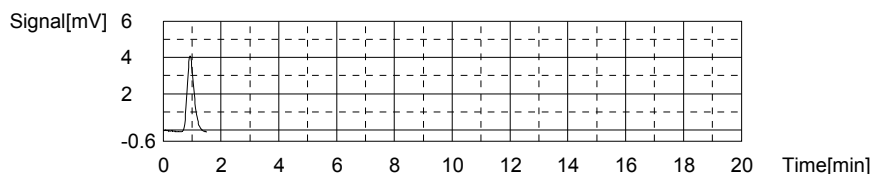


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	6.911	-0.3435mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 8:34:16 AM

4/19

Mean Area 6.911
 Mean Conc. -0.3435mg/L



Sample

Sample Name: L17040621-01
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

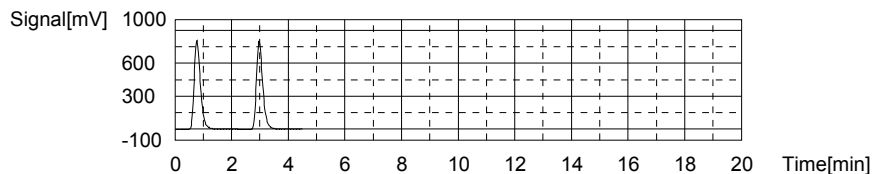
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.970mg/L TC:29.08mg/L IC:25.11mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1246	29.04mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 9:04:59 AM
2	1249	29.11mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 9:09:32 AM

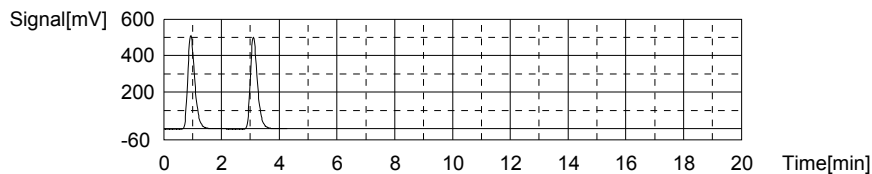
Mean Area 1248
 Mean Conc. 29.08mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	865.3	25.29mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 9:14:42 AM
2	852.9	24.92mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 9:19:34 AM

Mean Area 859.1
 Mean Conc. 25.11mg/L



Sample

Sample Name: L17040687-01 (25)
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

4/20/2017 8:12:21 AM

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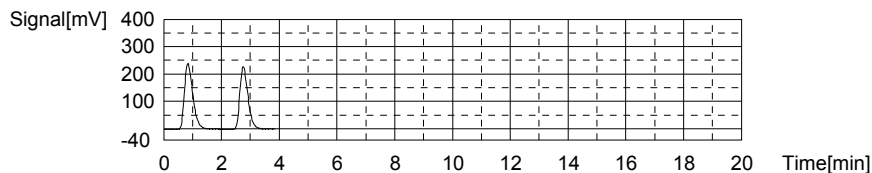
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:9.564mg/L TC:10.58mg/L IC:1.016mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	482.7	11.01mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 9:26:56 AM
2	446.7	10.16mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 9:31:08 AM

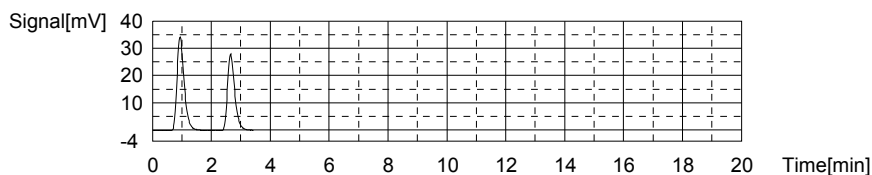
Mean Area 464.7
Mean Conc. 10.58mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	57.63	1.171mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 9:35:47 AM
2	47.27	0.8617mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 9:40:07 AM

Mean Area 52.45
Mean Conc. 1.016mg/L



Sample

Sample Name: L17040717-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

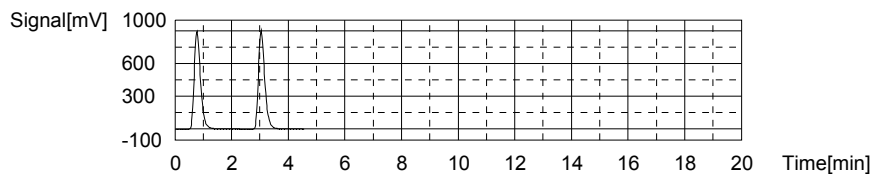
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:4.712mg/L TC:32.81mg/L IC:28.10mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1400	32.68mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 9:47:50 AM
2	1411	32.94mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 9:52:34 AM

Mean Area 1406
Mean Conc. 32.81mg/L



Anal.: IC

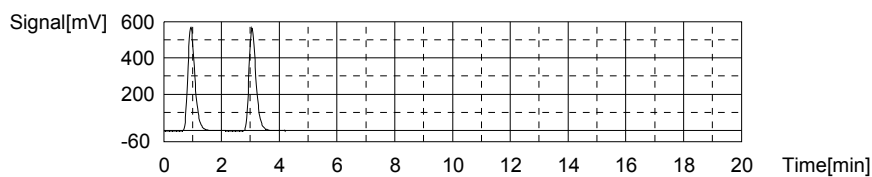
6/19

4/20/2017 8:12:21 AM

04-19-2017-ADG-TOC.t32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	964.8	28.26mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 9:57:39 AM
2	953.7	27.93mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 10:02:37 AM

Mean Area 959.3
Mean Conc. 28.10mg/L



Sample

Sample Name: L17040717-02
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

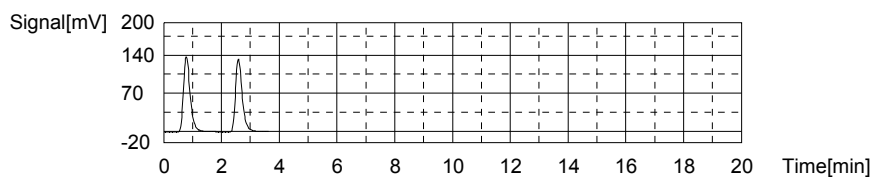
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.969mg/L TC:4.766mg/L IC:2.798mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	221.6	4.837mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 10:09:52 AM
2	215.6	4.695mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 10:13:57 AM

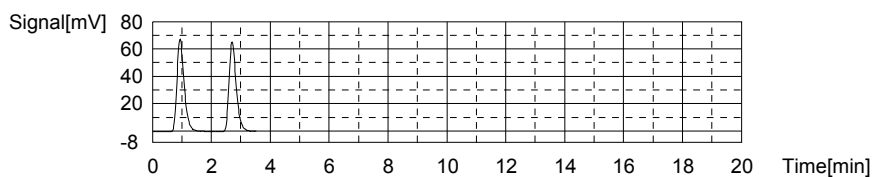
Mean Area 218.6
Mean Conc. 4.766mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	113.9	2.852mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 10:18:35 AM
2	110.3	2.744mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 10:22:59 AM

Mean Area 112.1
Mean Conc. 2.798mg/L



Sample

7/19

4/20/2017 8:12:21 AM

04-19-2017-ADG-TOC.t32

Sample Name: L17040717-04
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

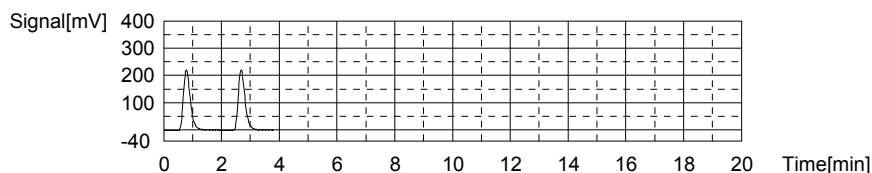
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.858mg/L TC:8.223mg/L IC:5.365mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	365.8	8.244mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 10:30:20 AM
2	364.0	8.202mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 10:34:30 AM

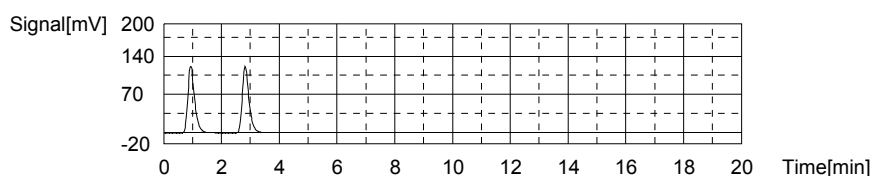
Mean Area 364.9
 Mean Conc. 8.223mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	198.3	5.372mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 10:39:15 AM
2	197.8	5.357mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 10:43:46 AM

Mean Area 198.1
 Mean Conc. 5.365mg/L



Sample

Sample Name: L17040723-01
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:7.692mg/L TC:30.60mg/L IC:22.91mg/L

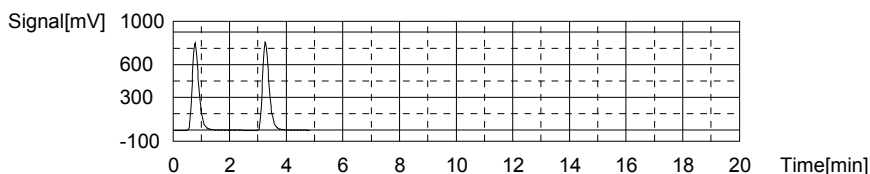
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1302	30.36mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 10:51:42 AM
2	1322	30.84mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 10:56:19 AM

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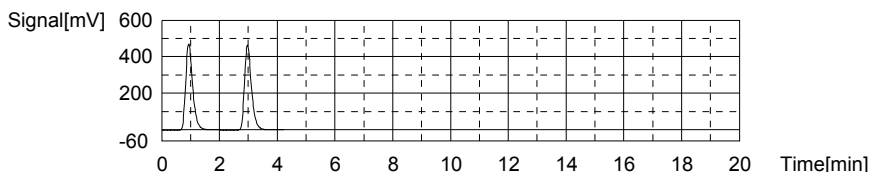
Mean Area 1312
Mean Conc. 30.60mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	792.0	23.10mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 11:01:19 AM
2	779.0	22.71mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 11:06:17 AM

Mean Area 785.5
Mean Conc. 22.91mg/L



Sample

Sample Name: L17040789-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

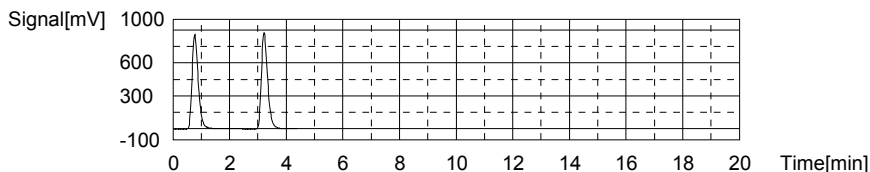
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.097mg/L TC:31.00mg/L IC:27.90mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1320	30.79mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 11:14:11 AM
2	1338	31.21mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 11:18:23 AM

Mean Area 1329
Mean Conc. 31.00mg/L



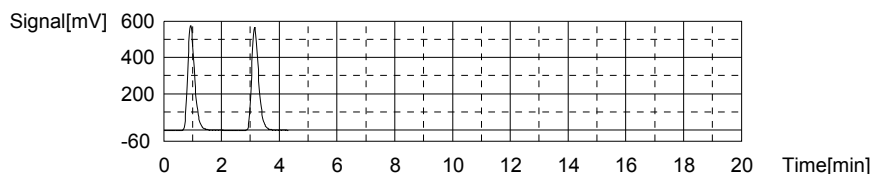
Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	957.6	28.05mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 11:23:39 AM
2	948.0	27.76mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 11:28:29 AM

4/20/2017 8:12:21 AM

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Mean Area 952.8
Mean Conc. 27.90mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

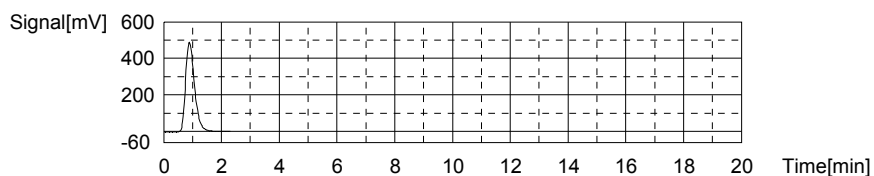
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.61mg/L TC:24.43mg/L IC:-0.1814mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1051	24.43mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 11:36:14 AM

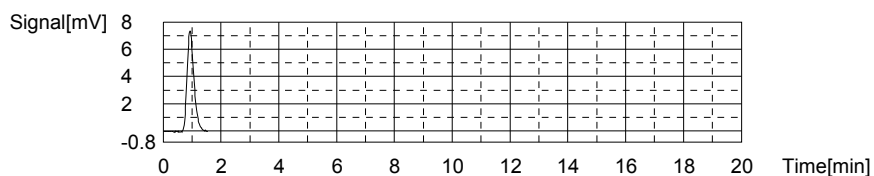
Mean Area 1051
Mean Conc. 24.43mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	12.34	-0.1814mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 11:40:37 AM

Mean Area 12.34
Mean Conc. -0.1814mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.09945mg/L TC:-0.1591mg/L IC:-0.2586mg/L

10/19

4/20/2017 8:12:21 AM

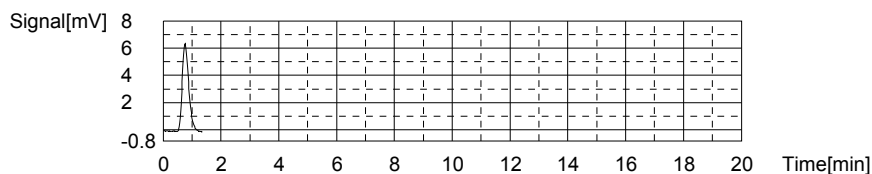
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1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.13	-0.1591mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 11:45:44 AM

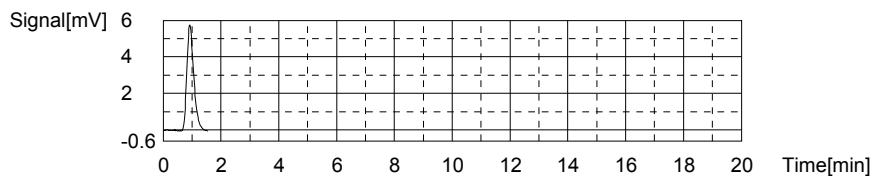
Mean Area 10.13
Mean Conc. -0.1591mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.756	-0.2586mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 11:49:39 AM

Mean Area 9.756
Mean Conc. -0.2586mg/L



Sample

Sample Name: L17040789-03
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

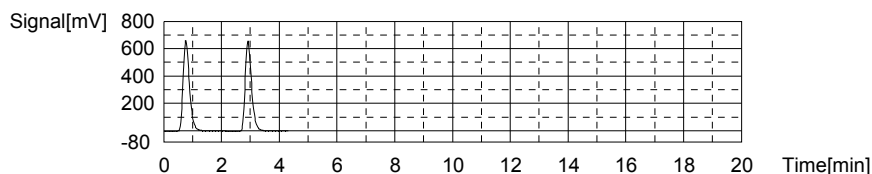
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.716mg/L TC:23.44mg/L IC:20.72mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1011	23.49mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 11:57:15 AM
2	1007	23.39mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 12:01:41 PM

Mean Area 1009
Mean Conc. 23.44mg/L



Anal.: IC

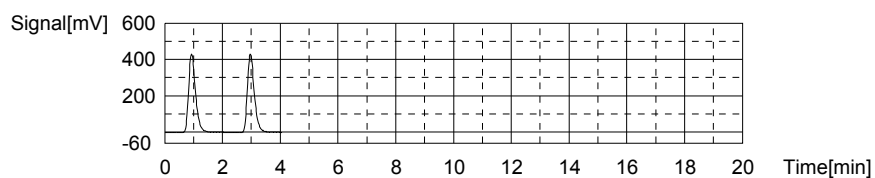
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	712.5	20.73mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 12:06:41 PM
2	712.3	20.72mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 12:11:25 PM

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Mean Area 712.4
Mean Conc. 20.72mg/L



Sample

Sample Name: L17040789-05
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

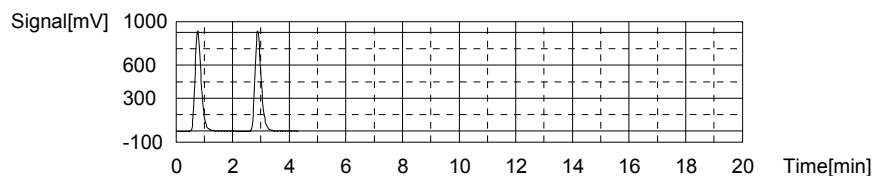
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.275mg/L TC:32.44mg/L IC:29.17mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1388	32.40mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 12:18:59 PM
2	1392	32.49mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 12:23:28 PM

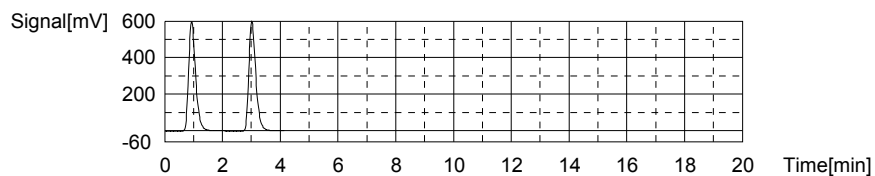
Mean Area 1390
Mean Conc. 32.44mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	994.5	29.15mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 12:28:36 PM
2	995.7	29.19mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 12:33:24 PM

Mean Area 995.1
Mean Conc. 29.17mg/L



Sample

Sample Name: L17040789-07
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

12/19

4/20/2017 8:12:21 AM

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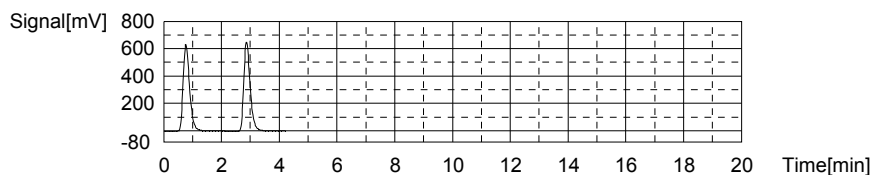
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.663mg/L TC:22.95mg/L IC:19.28mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	980.0	22.76mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 12:40:57 PM
2	996.1	23.14mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 12:45:20 PM

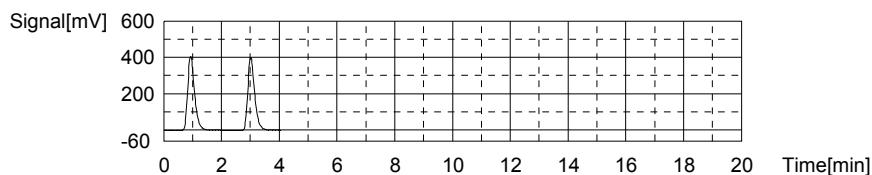
Mean Area 988.0
Mean Conc. 22.95mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	668.5	19.41mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 12:50:22 PM
2	659.7	19.15mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 12:55:00 PM

Mean Area 664.1
Mean Conc. 19.28mg/L



Sample

Sample Name: L17040791-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

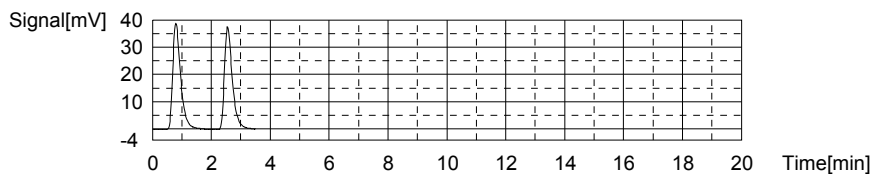
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.143mg/L TC:1.274mg/L IC:0.1313mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	71.83	1.299mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 1:02:12 PM
2	69.74	1.249mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 1:06:13 PM

Mean Area 70.78
Mean Conc. 1.274mg/L



Anal.: IC

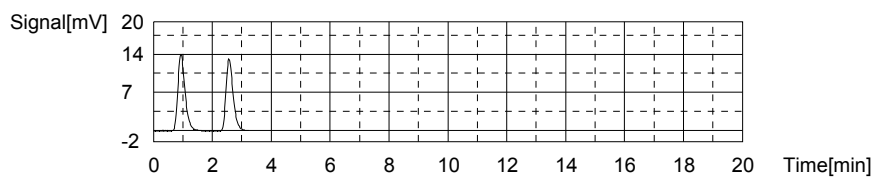
13/19

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No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	23.49	0.1516mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 1:10:43 PM
2	22.13	0.1110mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 1:14:54 PM

Mean Area 22.81
Mean Conc. 0.1313mg/L



Sample

Sample Name: L17040791-03
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

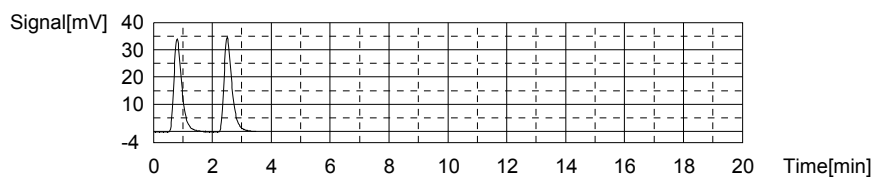
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.081mg/L TC:1.112mg/L IC:0.03047mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	62.85	1.086mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 1:22:03 PM
2	64.98	1.137mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 1:26:07 PM

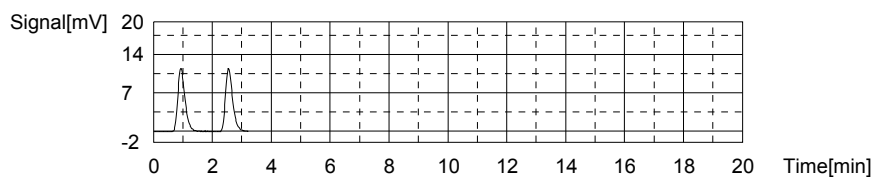
Mean Area 63.92
Mean Conc. 1.112mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	19.38	0.02883mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 1:30:30 PM
2	19.49	0.03212mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 1:34:43 PM

Mean Area 19.44
Mean Conc. 0.03047mg/L



Sample

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Sample Name: L17040852-01
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

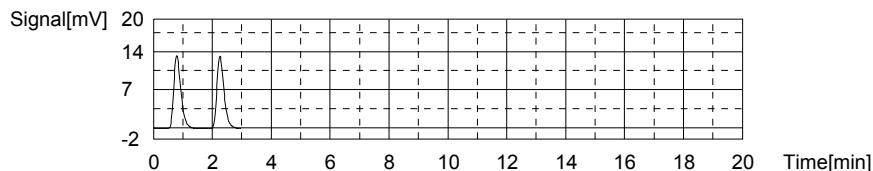
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.4210mg/L TC:0.1265mg/L IC:-0.2945mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	22.33	0.1291mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 1:41:38 PM
2	22.11	0.1239mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 1:45:25 PM

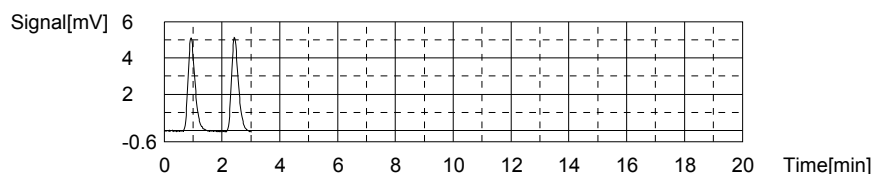
Mean Area 22.22
 Mean Conc. 0.1265mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.499	-0.2961mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 1:49:45 PM
2	8.607	-0.2929mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 1:53:51 PM

Mean Area 8.553
 Mean Conc. -0.2945mg/L



Sample

Sample Name: L17040855-09
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.657mg/L TC:7.045mg/L IC:4.388mg/L

1. Det

Anal.: TC

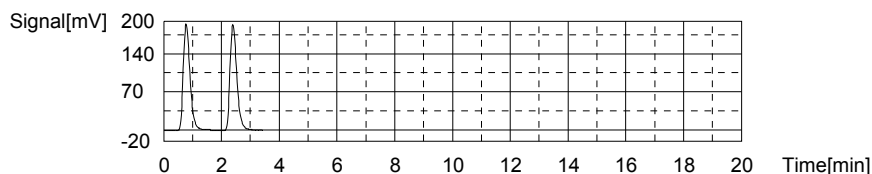
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	312.9	6.994mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 2:00:55 PM
2	317.2	7.096mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 2:05:49 PM

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4/20/2017 8:12:21 AM

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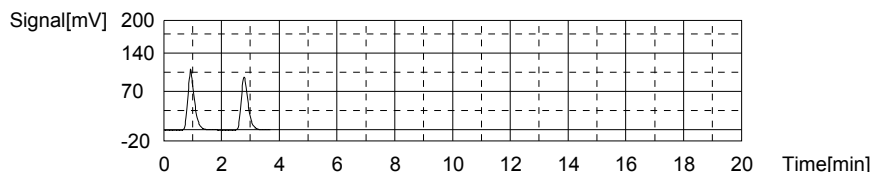
Mean Area 315.1
Mean Conc. 7.045mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	170.1	4.530mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 2:10:30 PM
2	160.6	4.246mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 2:15:02 PM

Mean Area 165.3
Mean Conc. 4.388mg/L



Sample

Sample Name: L17040860-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

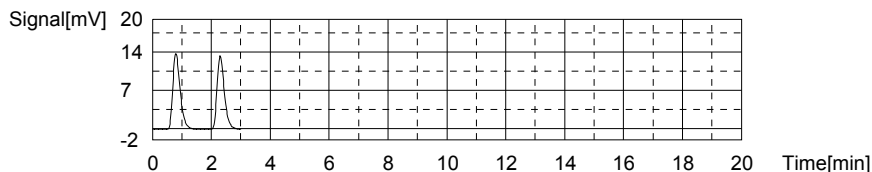
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.4670mg/L TC:0.1542mg/L IC:-0.3128mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	23.86	0.1653mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 2:21:59 PM
2	22.92	0.1431mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 2:25:46 PM

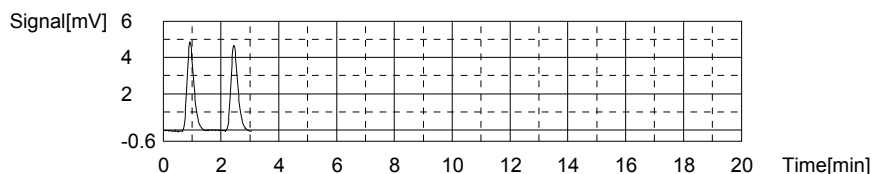
Mean Area 23.39
Mean Conc. 0.1542mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.081	-0.3086mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 2:30:06 PM
2	7.799	-0.3170mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/19/2017 2:34:17 PM

Mean Area 7.940
 Mean Conc. -0.3128mg/L



Sample

Sample Name: WG610660-05 DUP
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

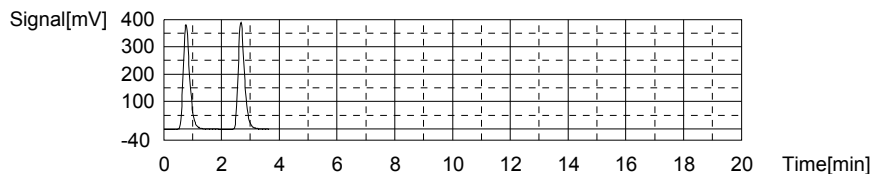
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.596mg/L TC:13.63mg/L IC:11.04mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	589.3	13.52mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 2:41:37 PM
2	598.6	13.74mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 2:45:38 PM

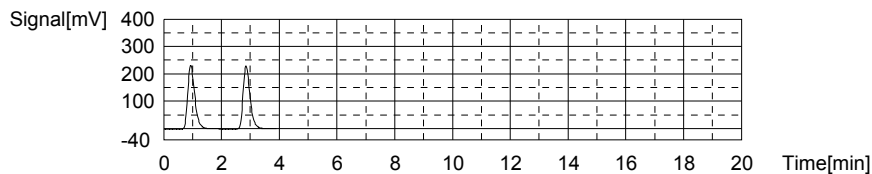
Mean Area 594.0
 Mean Conc. 13.63mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	389.8	11.09mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 2:50:25 PM
2	386.3	10.99mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 2:55:03 PM

Mean Area 388.1
 Mean Conc. 11.04mg/L



Sample

Sample Name: WG610660-06 MS
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

4/20/2017 8:12:21 AM

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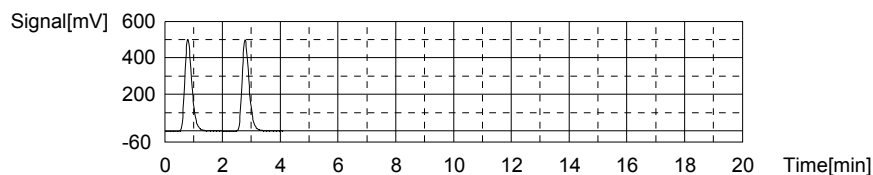
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:15.27mg/L TC:19.64mg/L IC:4.363mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	850.6	19.70mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 3:02:28 PM
2	845.3	19.57mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 3:06:51 PM

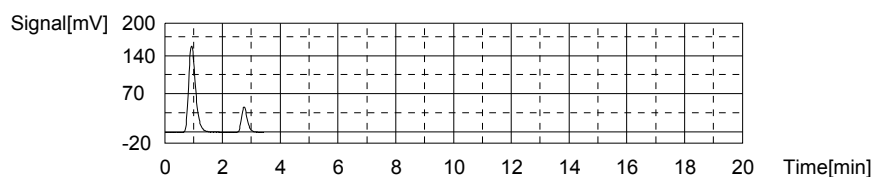
Mean Area 848.0
Mean Conc. 19.64mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	263.7	7.325mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 3:11:37 PM
2	65.35	1.402mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/19/2017 3:15:52 PM

Mean Area 164.5
Mean Conc. 4.363mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

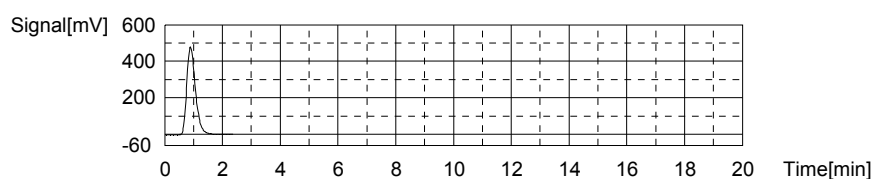
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:23.61mg/L TC:23.35mg/L IC:-0.2591mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1005	23.35mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/19/2017 3:23:39 PM

Mean Area 1005
Mean Conc. 23.35mg/L



Anal.: IC

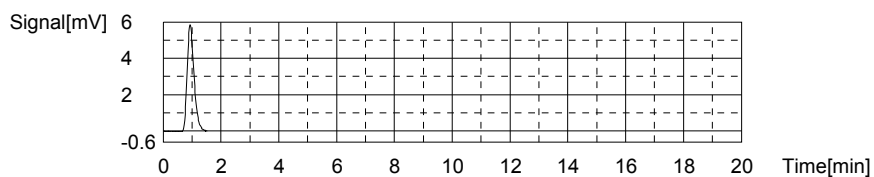
18/19

4/20/2017 8:12:21 AM

04-19-2017-ADG-TOC.t32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.739	-0.2591mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 3:28:00 PM

Mean Area 9.739
Mean Conc. -0.2591mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result:

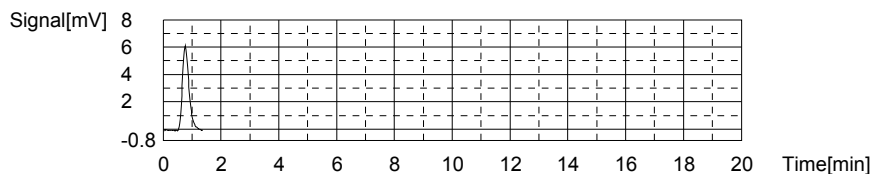
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1081mg/L TC:-0.1670mg/L IC:-0.2751mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.798	-0.1670mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_09_32_54	14/19/2017 3:33:01 PM

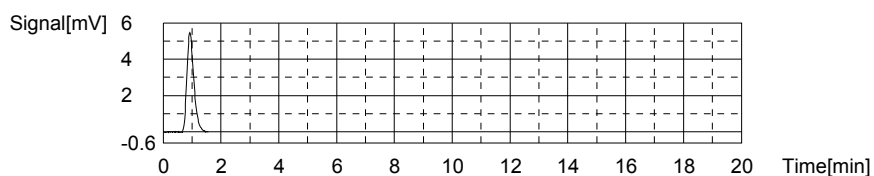
Mean Area 9.798
Mean Conc. -0.1670mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.204	-0.2751mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/19/2017 3:36:56 PM

Mean Area 9.204
Mean Conc. -0.2751mg/L



19/19

3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
April 25, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
OJE - OMOYEMWEN J. ENGLISH	PDM - PIERCE D. MORRIS
PIT - MICROBAC WARRENDALE	REK - BOB E. KYER
RLB - BOB BUCHANAN	RNP - RICK N. PETTY
SAV - SARAH A. VANDENBERG	SCA - SUEELLEN C. ADAMS
SCB - SARAH C. BOGOLIN	SCJ - SUE ELLEN C. JOHNSON
SDC - SHALYN D. CONLEY	TB - TODD BOYLE
TMB - TIFFANY M. BAILEY	TMM - TAMMY M. MORRIS
VC - VICKI COLLIER	WTD - WADE T. DELONG
XXX - UNAVAILABLE OR SUBCONTRACT	

List of Valid Qualifiers

April 25, 2017

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample receipt exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample receipt exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentatively identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound



List of Valid Qualifiers

April 25, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample receipt exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below



CHAIN OF CUSTODY

Name Of Lab Shipping To: **MICROBAC (740) 373-4071 ATTN: STEPHANIE MOSSBURG**

Project: AECOM LONGHORN ARMY AMMIN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS		Project No.: 60256135.GWTP HRUMAR16	
Job: GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES			
Prepared By: Scott Beesinger		P.O. Number	
Field Sample I.D.		Sample Matrix	
LH18/24-SP650-6432-Grab		Water	
LH18/24-SP650-6432-Grab		Water	
Date / Time		Date / Time	
04/13/17 / 15:00		04/13/17 / 15:00	
MS / MSD		No. OF CONTAINERS	
2		2	
AMMONIA-N		X	
ORTHO-PHOSPHATE		X	
TOTAL ORGANIC CARBON		X	
Remarks (Preservatives, etc.)		Lab I.D.#	
H2SO4		H2SO4	
NONE		NONE	

Additional Remarks: Standard TAT on all parameters Send results to Linda Raabe at linda.raabe@aecocom.com or call at 210-253-7518

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
<i>Scott Beesinger</i>	04/13/17	15:30									

For Lab Use Only			
Received At Lab By:	Date	Time	Airbill No.

Temp of Container	Seal No.	Condition

Microbac OVD
 Received: 04/14/2017 09:35
 By: CARA STRICKLER



221000099554

Cara Strickler

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17040687

Account: 2551

Project: 2551.096

Samples: 1

Due Date: 25-APR-2017

Samplenum **Container ID** **Products**
L17040687-01 893940 PO4

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	WET	14-APR-2017 09:58	CLS		
2	STORE	WET	A1	17-APR-2017 08:03	BRG	SDC	

Samplenum **Container ID** **Products**
L17040687-01 893941 TOC

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	14-APR-2017 09:58	CLS		<2
2	ANALYZ	W1	WET	19-APR-2017 07:03	ADG	AZH	
3	STORE	WET	A1	20-APR-2017 09:21	BRG	ADG	

Samplenum **Container ID** **Products**
L17040687-01 893942 NH3

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	14-APR-2017 09:58	CLS		<2
2	ANALYZ	W1	WET	18-APR-2017 08:29	EPT	BRG	
3	STORE	WET	A1	18-APR-2017 13:30	BRG	EPT	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login



NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
 Total Halide by Bomb Combustion (TX)
 Particle Sizing - 200 Mesh (PS200)
 Specific Gravity/Density (SPGRAV)
 Total Residual Chlorine (CL-TRL)
 Total Volatile Solids (all forms) (TVS)
 Total Coliform Bacteria (all methods)
 Fecal Coliform Bacteria (all methods)
 Sulfite (SO₃)
 Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS

Nitrogen, Ammonia by Method 350.1
 Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
 Phenolics, Total by Method 420.1
 ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
 Acetic acid
 Butyric acid
 Lactic acid
 Propionic acid
 Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
 1-Methylnaphthalene
 1,4-Dioxane
 Atrazine
 Benzaldehyde
 Biphenyl
 Caprolactam
 Hexamethylphosphoramide (HMPA)
 Pentachlorobenzene
 Pentachloroethane

NELAP Accreditation by Laboratory SOP**NONPOTABLE WATER**OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALSOVD MSS01/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP**SOLID AND HAZARDOUS CHEMICALS**OVD MSV01/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)



April 13, 2017

Mr. Adriane Steed
Microbac Laboratories, Inc.
158 Starlite Drive
Marietta, Ohio 45750

Re: Perchlorate-Steed
Work Order: 420570

Dear Mr. Steed:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 13, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4778.

Sincerely,

Hope Taylor
Project Manager

Purchase Order: SIGNED QUOTE
Enclosures

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Case Narrative

**Receipt Narrative
for
Microbac Laboratories
SDG: 420570**

April 13, 2017

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on April 13, 2017 for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

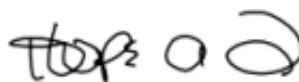
Sample Identification: The laboratory received the following sample:

<u>Laboratory ID</u>	<u>Client ID</u>
420570001	LH18/24-SP650-6431-Grab

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Perchlorates by LCMSMS.



Hope Taylor
Project Manager

Chain of Custody and Supporting Documentation

420570

CHAIN OF CUSTODY

Name Of Lab Shipping To: GEL Laboratories (843) 556-8171 ATTN: HOPE TAYLOR

Project: AECOM LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS		Project No. 60256135.GWTPT HRUMAR16	
Job: GROUNDWATER TREATMENT PLANT MONTHLY EFFLUENT SAMPLES			
Prepared By: Scott Beesinger		P.O. Number	
Field Sample I.D. LH18/24-SP650-6431-Grab	Sample Matrix Water	Date / Time 04/12/17 / 15:00	MS / MSD
No. OF CONTAINERS 1		Analyses PERCHLORATE	
Remarks (Preservatives, etc.) NONE		Lab I.D.#	
Additional Remarks: <u>24 HOUR TURN AROUND TIME</u>			
Relinquished By: <i>Scott Beesinger</i>	Date 04/12/17	Time 15:30	Date 4/12/17
Received By: <i>[Signature]</i>		Time 0930	Date 4/12/17

For Lab Use Only			
Received At Lab By:	Date	Time	Airbill No.
Relinquished By:	Date	Time	Temp of Container
Received By:	Date	Time	Seal No.
Condition			
Remarks:			

Laboratory Certifications

List of current GEL Certifications as of 13 April 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
Microbac Laboratories (MBAC)
SDG #: 420570**

Method/Analysis Information

Procedure: **Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)**

Analytical Method: SW846 6850 Modified

Prep Method: SW846 6850 Modified

Analytical Batch Number: 1655900

Prep Batch Number: 1655898

Sample Analysis

Sample ID	Client ID
420570001	420570001 (LH18/24-SP650-6431-Grab)
1203767394	Interference Check Sample (ICS)
1203767385	Method Blank (MB)
1203767386	Laboratory Control Sample (LCS)
1203767387	420545001(LH18/24-SP140-7431-GRAB) Matrix Spike (MS)
1203767388	420545001(LH18/24-SP140-7431-GRAB) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-067 REV# 14.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG. Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

ICV Requirements

All associated initial calibration verification standard(s) (ICV) met the acceptance criteria.

CCB Requirements

All continuing calibration blanks (CCB) bracketing the analyses associated with this batch were within acceptance criteria.

CCV Requirements

All continuing calibration checks (CCV) requirements were met by all bracketing CCV standards.

Low Level Standard (CRI) Requirements

All low level calibration verification (CRI) requirements were met by all bracketing CRI standards.

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Interference Check Sample (ICS)

The ICS spike recoveries met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 420545001 (LH18/24-SP140-7431-GRAB) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

There was a 0% recovery observed in 1203767387 (LH18/24-SP140-7431-GRABMS) and 1203767388 (LH18/24-SP140-7431-GRABMSD) with an acceptance range of 75-125%. The detected concentrations in the MS and MSD were lower than the detected concentration in the parent sample. The outliers observed for the matrix spikes were due to the background concentration in the parent sample, 420545001 (LH18/24-SP140-7) and the need to dilute all at a 1:4000 dilution prior to analysis.

MS/MSD Relative Percent Difference (RPD) Statement

The RPDs between the MS and MSD met the acceptance limits.

Internal Standard Area Acceptance

The internal standard areas were within the required acceptance criteria for all samples and QC.

Retention Time

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard. The presence of Perchlorate was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by DOD QSM 5.0, has been used. In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

Technical Information**Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based

on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

Samples 1203767387 (LH18/24-SP140-7431-GRABMS) and 1203767388 (LH18/24-SP140-7431-GRABMSD) were diluted to bring the over range concentrations within the calibration range.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Data Exception (DER) Documentation

Data exception report (DER) 1623371 was generated for samples 1203767387 (LH18/24-SP140-7431-GRABMS) and 1203767388 (LH18/24-SP140-7431-GRABMSD) in this SDG/batch.

Manual Integrations

Manual integrations were not required for any data file associated with this SDG.

Method Comments

The samples in this SDG were not originally analyzed using EPA Method 314.0.

Additional Comments

Comments pertaining to Perchlorate-101 and/or the Perchlorate Isotope Ratio are applicable only when the client requests Perchlorate-101 and/or the Perchlorate Isotope Ratio be reported. Due to software constraints, Perchlorate, Perchlorate-101 and/or the Perchlorate Isotope Ratio may appear on raw data and comments referring to them may appear on certain Forms whether or not the client has requested one or all of them be reported. Due to software limitations, all initial calibration blanks must be designated as IPB001 in order for the forms to be correct. The retention time marker, Perchlorate-O (18), is added to all samples, instrument blanks, and standards Prior to injection. It is used to verify the retention time of Perchlorate and Perchlorate-101 and to insure an accurate injection occurred. Due to various anions affecting the recovery of Perchlorate-O (18) and not Perchlorate and Perchlorate-101, the calibration curves of Perchlorate and Perchlorate-101 are internally corrected using Perchlorate-O (18).

Perchlorate Isotope Ratio

The Perchlorate isotope ratio met acceptance criteria for all samples and QC samples. Please see the isotope ratio criteria in the Miscellaneous Section.

System Configuration

The laboratory utilizes a Waters LC 2795 liquid chromatography instrument for Perchlorate analysis. It is coupled with a Micromass Quattro Ultima Mass Spectrometer/Mass Spectrometer. It is designated as LCMSMS #2. It is fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis. The laboratory may also utilize an Agilent 1100 liquid chromatography instrument for Perchlorate analysis. It is coupled with an Applied Biosystems 4000 Mass Spectrometer/Mass Spectrometer, designated as LCMSMS #3 or LCMSMS #4. It is also fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages

electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Chromatographic Columns

The LC-MS/MS Perchlorate analysis was performed on a Quatro Ultima LC/MS/MS.

Chromatographic separation of Perchlorate is accomplished through analysis on the following anion column:

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Qualifier Definition Report
for**

MBAC001 Microbac Laboratories

Client SDG: 420570 GEL Work Order: 420570

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: 

Name: Michael Penny

Date: 14 APR 2017

Title: Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6431-Grab

Date Received: 13-APR-17

GEL Job No (SDG): 420570

GEL Sample ID: 420570001

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.458	ug/L		1	13-APR-17 21:05	per0413020a
	Perchlorate-O(18)			0.489	ug/L		1	13-APR-17 21:05	per0413020a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quality Control Summary

Perchlorate Laboratory Control Sample

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No. (SDG): 420570

Extract Batch Code: 1655898

Date Filtered: 13-APR-17

Matrix: WATER

Sample ID: 1203767386

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.2	ug/L	100		85 - 115
Perchlorate-O(18)		.483	ug/L			-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Interference Check Sample

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No. (SDG): 420570Extract Batch Code: 1655898Date Filtered: 13-APR-17Matrix: WATERSample ID: 1203767394

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.205	ug/L	102		70 - 130
Perchlorate-O(18)		.522	ug/L			

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Spike/Spike Duplicate Summary

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No (SDG): 420570Extract Batch Code: 1655898Date Extracted: 13-APR-17GEL MS/PS ID: 1203767387Client ID: LH18/24-SP140-7431-GRABGEL MSD/PSD ID: 1203767388QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	6630	ug/L	6360	0 *	6580	0 *	3	30	75 - 125
Perchlorate-O(18)	0	1920	ug/L	1770		1880		6		-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate RT And Area Summary

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420570Lab Code: GELHPLC Column: Dionex IonPac AG16Instrument ID: LCMSMS2

Sample ID	Datafile	Run Date	Area	RT	RT CLO4	RRT	Q 0.98-1.02
MidLevel Standard Area	per0413006a	13-APR-17	17155.2				
Lower Area Limit			8577.6				
Upper Area Limit			25732.8				
1203767385	per0413013a	13-APR-17 19:27	17031.1	7.1	7.20552	1.015	
1203767386	per0413014a	13-APR-17 19:41	16517.1	7.1	7.15035	1.007	
1203767394	per0413015a	13-APR-17 19:55	17856.5	6.46	6.516	1.009	
1203767387	per0413017a	13-APR-17 20:23	15116.9	7.04	7.09518	1.008	
1203767388	per0413018a	13-APR-17 20:37	16108.2	7.04	7.09518	1.008	
420570001	per0413020a	13-APR-17 21:05	16724.7	6.43	6.48835	1.009	

Sample Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1655898Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6431-GrabDate Received: 13-APR-17GEL Job No (SDG): 420570GEL Sample ID: 420570001Date Filtered: 13-APR-17Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.458	ug/L		1	13-APR-17 21:05	per0413020a
	Perchlorate-O(18)			0.489	ug/L		1	13-APR-17 21:05	per0413020a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

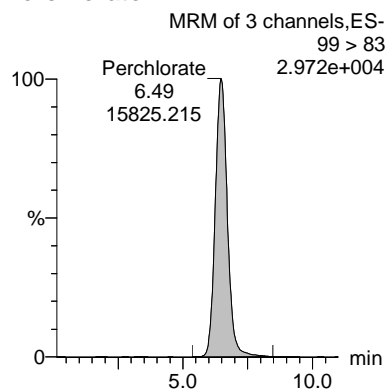
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 04/14/2017

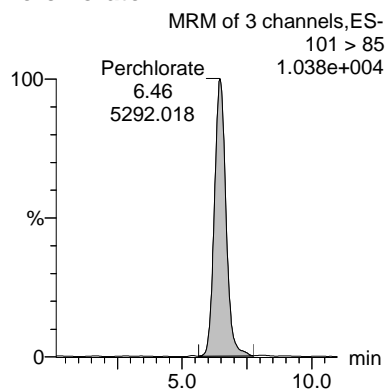
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 04/14/2017

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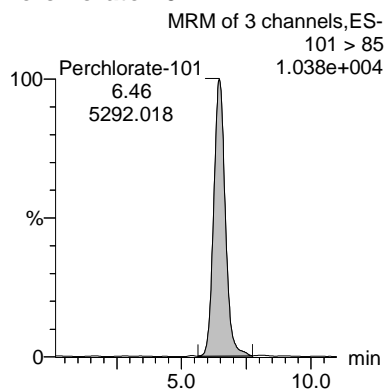
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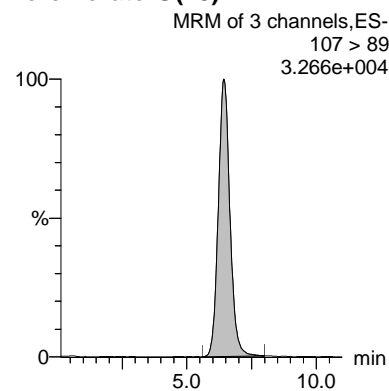
Perchlorate



Perchlorate-101



Perchlorate-O(18)



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420570001	Perchlorate	99 > 83	6.49	15825.215	0.473	bb			0.4582			2460.6... 2.99
420570001	Perchlorate-101	101 > 85	6.46	5292.018	0.158	bb			0.4567			1182.9...
420570001	Perchlorate-O(18)	107 > 89	6.43	16724.748	16724.748	bb			0.4887	97.74	-2.26	3266.0...

Standards

Perchlorate Initial Calibration

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420570Lab Code: GELInstrument ID: LCMSMS2

Date Analyzed: 13-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate

Coefficient of Determination: .

Calibration Curve: 1.03Response Type: Internal StandardCurve Type: RF

Perchlorate Initial Calibration

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420570Lab Code: GELInstrument ID: LCMSMS2

Date Analyzed: 13-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate-101

Coefficient of Determination: .

Calibration Curve: .345Response Type: Internal StandardCurve Type: RF

Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

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Dataset: C:\MassLynx\Perchlorate.PRO\per041317a.qld

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04/14/2017

Last Altered: Friday, April 14, 2017 8:39:46 AM Eastern Daylight Time

Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

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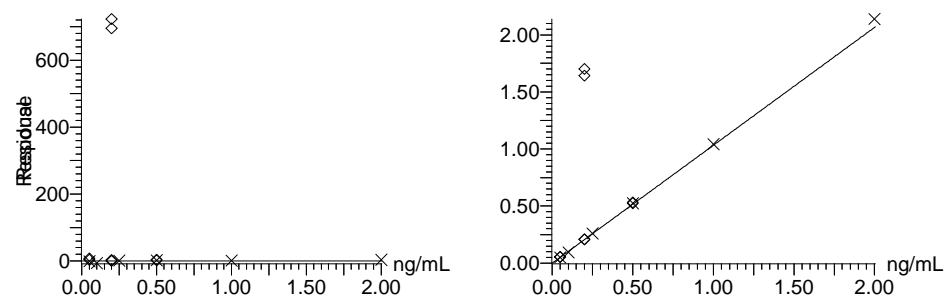
Compound name: Perchlorate

Response Factor: 1.03257

RRF SD: 0.0363028, % Relative SD: 3.51579

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



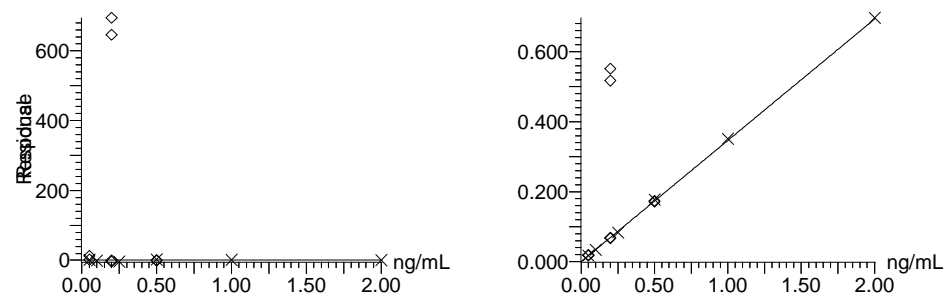
Compound name: Perchlorate-101

Response Factor: 0.346421

RRF SD: 0.00767332, % Relative SD: 2.21503

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per041317a.qld

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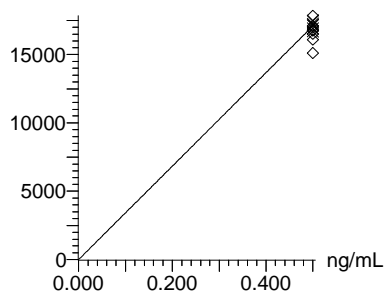
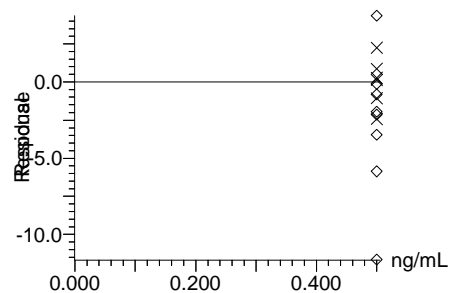
Compound name: Perchlorate-O(18)

Response Factor: 34221.3

RRF SD: 551.513, % Relative SD: 1.61161

Response type: External Std, Area

Curve type: RF



Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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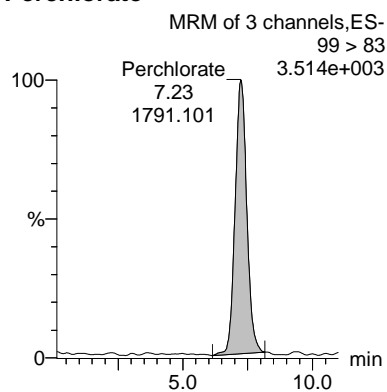
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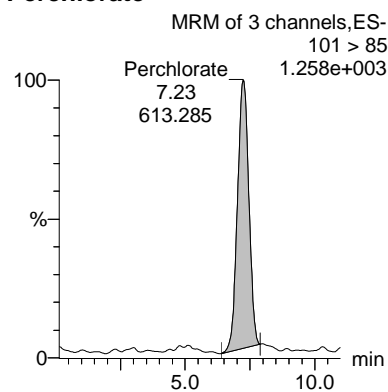
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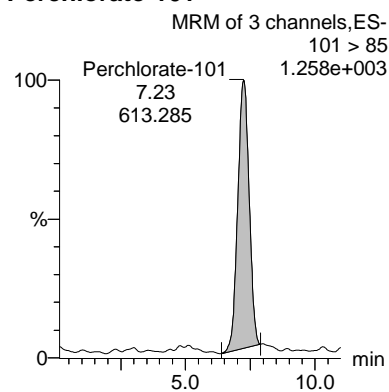
Perchlorate



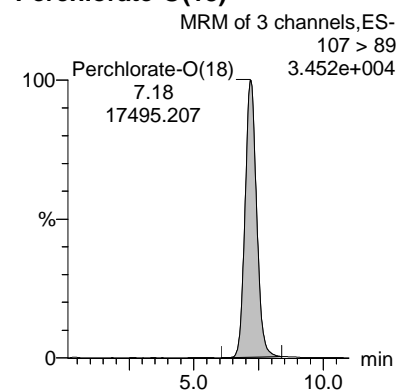
Perchlorate



Perchlorate-101



Perchlorate-O(18)



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WCL170403-01	Perchlorate	99 > 83	7.23	1791.101	0.051	bb			0.0496	99.15	-0.85	322.959	2.92
WCL170403-01	Perchlorate-101	101 > 85	7.23	613.285	0.018	bb			0.0506	101.19	1.19	175.458	
WCL170403-01	Perchlorate-O(18)	107 > 89	7.18	17495.207	17495.207	bb			0.5112	102.25	2.25	3008.6...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

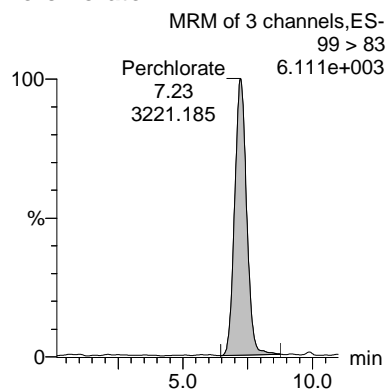
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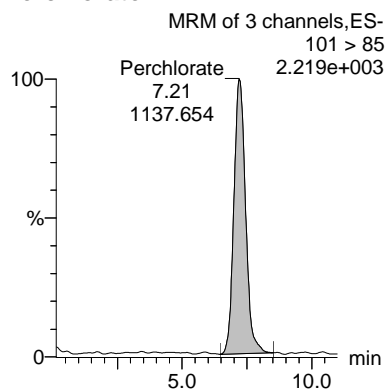
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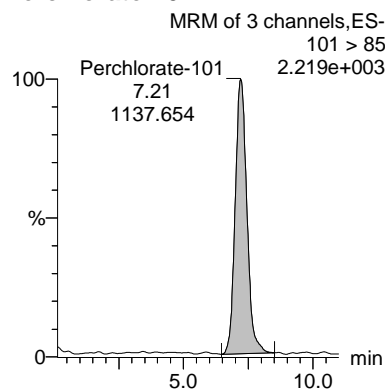
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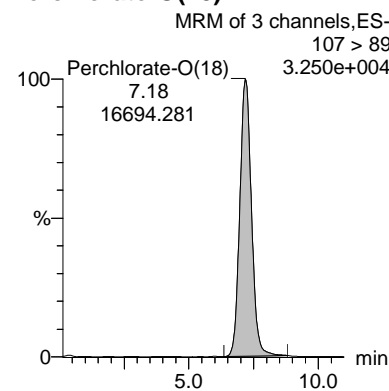
Perchlorate



Perchlorate-101



Perchlorate-O(18)



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WCL170403-02	Perchlorate	99 > 83	7.23	3221.185	0.096	bb			0.0934	93.43	-6.57	813.672	2.83
WCL170403-02	Perchlorate-101	101 > 85	7.21	1137.654	0.034	bb			0.0984	98.36	-1.64	192.991	
WCL170403-02	Perchlorate-O(18)	107 > 89	7.18	16694.281	16694.281	bb			0.4878	97.57	-2.43	2450.6...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

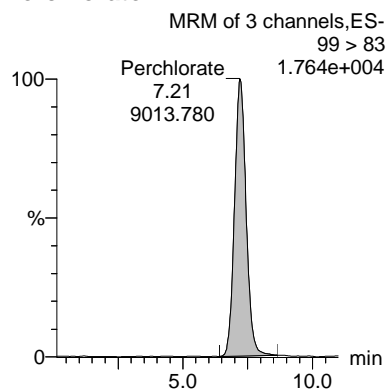
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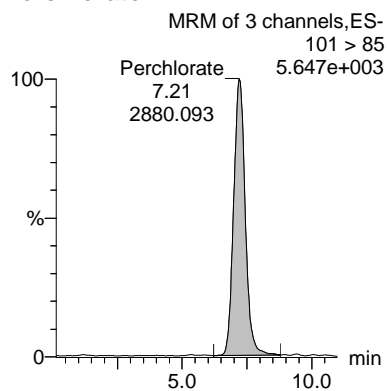
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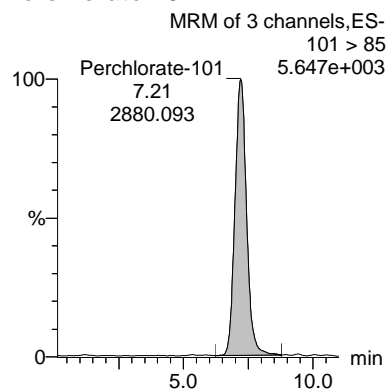
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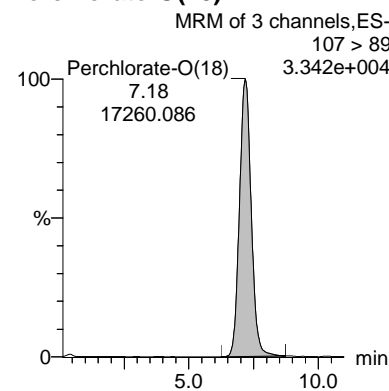
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-03	Perchlorate	99 > 83	7.21	9013.780	0.261	bb			0.2529	101.15	1.15	1044.4...	3.13
WCL170403-03	Perchlorate-101	101 > 85	7.21	2880.093	0.083	bb			0.2408	96.34	-3.66	857.493	
WCL170403-03	Perchlorate-O(18)	107 > 89	7.18	17260.086	17260.086	bb			0.5044	100.87	0.87	1296.3...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

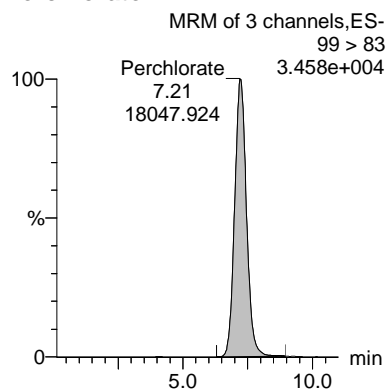
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 04/14/2017

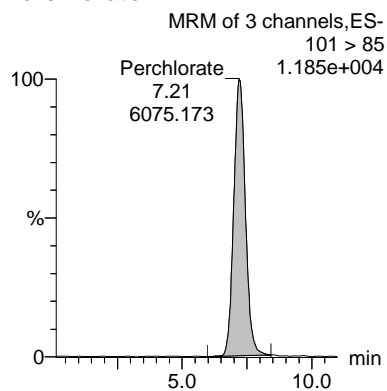
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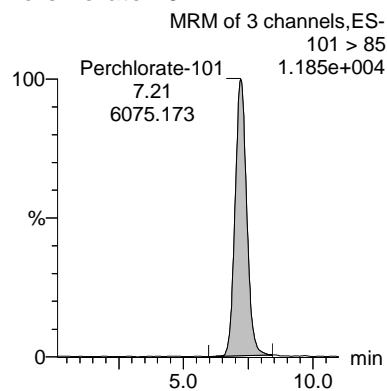
Perchlorate



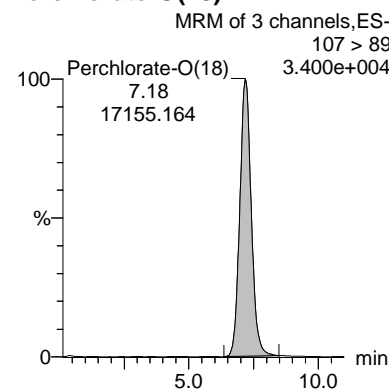
Perchlorate



Perchlorate-101



Perchlorate-O(18)



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WCL170403-04	Perchlorate	99 > 83	7.21	18047.924	0.526	bb			0.5094	101.89	1.89	2426.0...	2.97
WCL170403-04	Perchlorate-101	101 > 85	7.21	6075.173	0.177	bb			0.5111	102.23	2.23	1138.6...	
WCL170403-04	Perchlorate-O(18)	107 > 89	7.18	17155.164	17155.164	bb			0.5013	100.26	0.26	2768.8...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

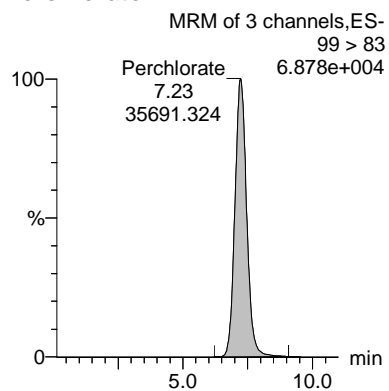
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 04/14/2017

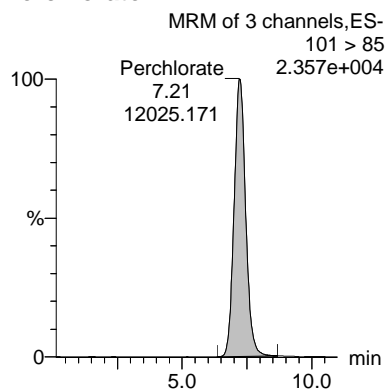
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 04/14/2017

Name: per0413007a
Date: 13-Apr-2017
Time: 18:03:55
ID: WCL170403-05
Vial: 1:1,F

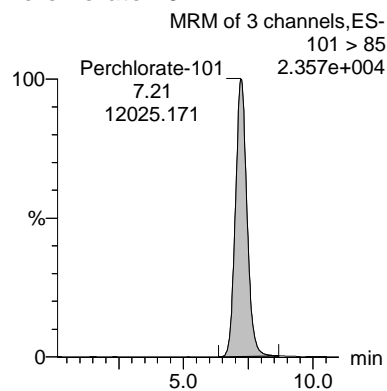
Perchlorate



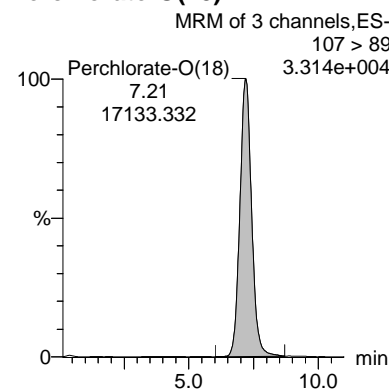
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-05	Perchlorate	99 > 83	7.23	35691.324	1.042	bb			1.0087	100.87	0.87	4321.1...	2.97
WCL170403-05	Perchlorate-101	101 > 85	7.21	12025.171	0.351	bb			1.0130	101.30	1.30	2854.7...	
WCL170403-05	Perchlorate-O(18)	107 > 89	7.21	17133.332	17133.332	bb			0.5007	100.13	0.13	2004.1...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

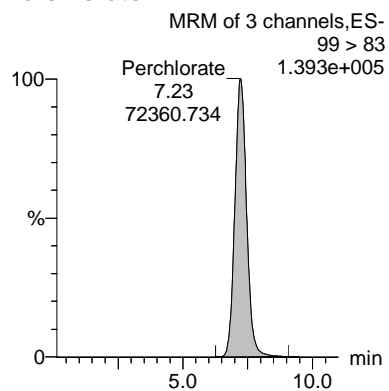
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Last Altered: Friday, April 14, 2017 8:39:46 AM Eastern Daylight Time
Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

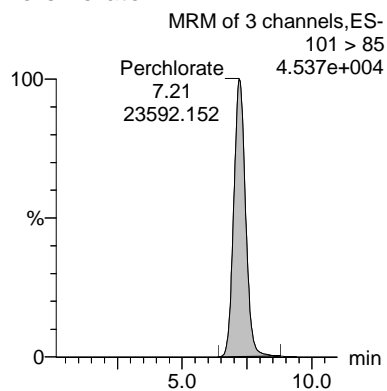
MA
 04/14/2017

Name: per0413008a
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Vial: 1:2,A

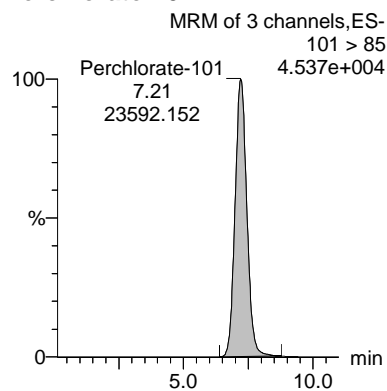
Perchlorate



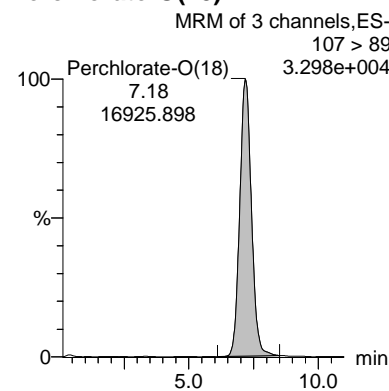
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-06	Perchlorate	99 > 83	7.23	72360.734	2.138	bb			2.0702	103.51	3.51	6391.3...	3.07
WCL170403-06	Perchlorate-101	101 > 85	7.21	23592.152	0.697	bb			2.0118	100.59	0.59	2828.9...	
WCL170403-06	Perchlorate-O(18)	107 > 89	7.18	16925.898	16925.898	bb			0.4946	98.92	-1.08	1566.0...	

Perchlorate Initial Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420570Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.51	101.71	13-APR-17 18:45	per0413010a
Perchlorate Isotope Ratio		3.02		13-APR-17 18:45	per0413010a
Perchlorate-101	.5	.5	100.33	13-APR-17 18:45	per0413010a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

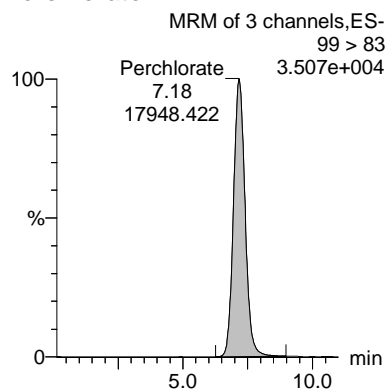
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

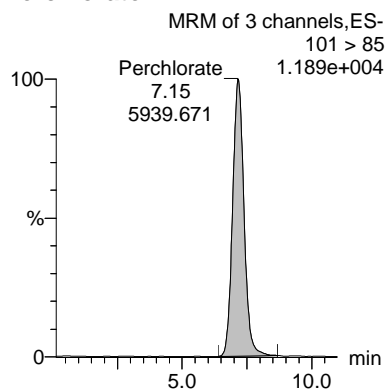
MA
 04/14/2017

Name: per0413010a
Date: 13-Apr-2017
Time: 18:45:52
ID: WCL170403-07ICV
Vial: 1:2,B

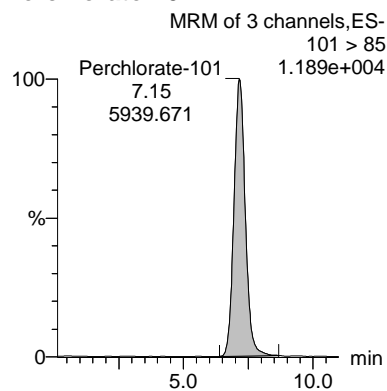
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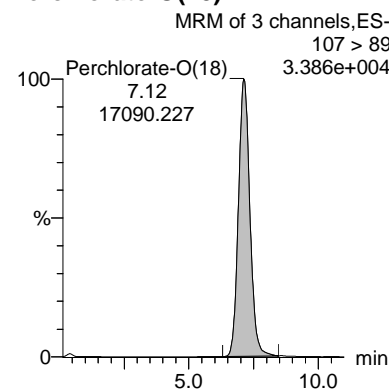
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-07ICV	Perchlorate	99 > 83	7.18	17948.422	0.525	bb			0.5085	101.71	1.71	1901.5...	3.02
WCL170403-07ICV	Perchlorate-101	101 > 85	7.15	5939.671	0.174	bb			0.5016	100.33	0.33	576.924	
WCL170403-07ICV	Perchlorate-O(18)	107 > 89	7.12	17090.227	17090.227	bb			0.4994	99.88	-0.12	2062.5...	

Perchlorate Continuing Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420570Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.52	103	13-APR-17 21:19	per0413021a
Perchlorate Isotope Ratio		3.1		13-APR-17 21:19	per0413021a
Perchlorate-101	.5	.5	99.03	13-APR-17 21:19	per0413021a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

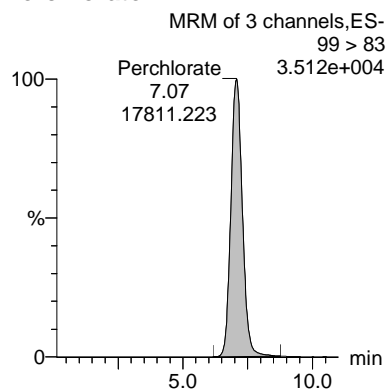
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

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 04/14/2017

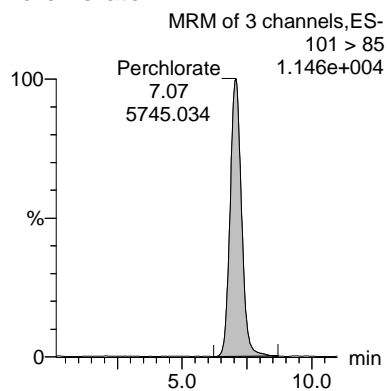
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 04/14/2017

Name: per0413021a
Date: 13-Apr-2017
Time: 21:19:49
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Vial: 1:2,B

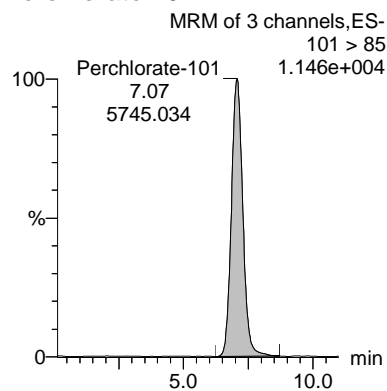
Perchlorate



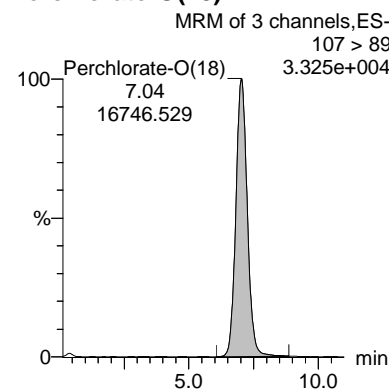
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-07CCV	Perchlorate	99 > 83	7.07	17811.223	0.532	bb			0.5150	103.00	3.00	2811.9...	3.10
WCL170403-07CCV	Perchlorate-101	101 > 85	7.07	5745.034	0.172	bb			0.4951	99.03	-0.97	657.252	
WCL170403-07CCV	Perchlorate-O(18)	107 > 89	7.04	16746.529	16746.529	bb			0.4894	97.87	-2.13	1963.0...	

Perchlorate MDL Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420570Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.05	.05	107.56	13-APR-17 19:13	per0413012a
Perchlorate Isotope Ratio		2.85		13-APR-17 19:13	per0413012a
Perchlorate-101	.05	.06	112.46	13-APR-17 19:13	per0413012a
Perchlorate	.05	.05	103.3	13-APR-17 21:47	per0413023a
Perchlorate Isotope Ratio		3.02		13-APR-17 21:47	per0413023a
Perchlorate-101	.05	.05	101.83	13-APR-17 21:47	per0413023a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

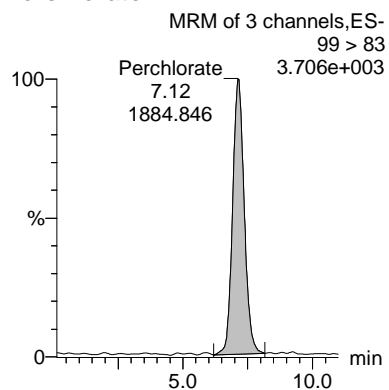
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 04/14/2017

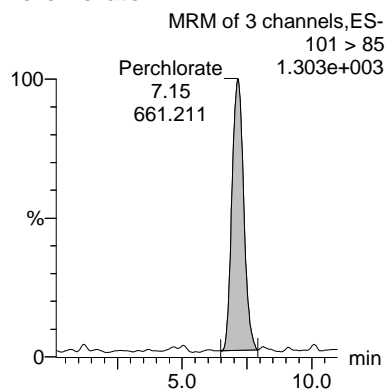
MA
 04/14/2017

Name: per0413012a
Date: 13-Apr-2017
Time: 19:13:51
ID: WCL170403-08CRI
Vial: 1:2,C

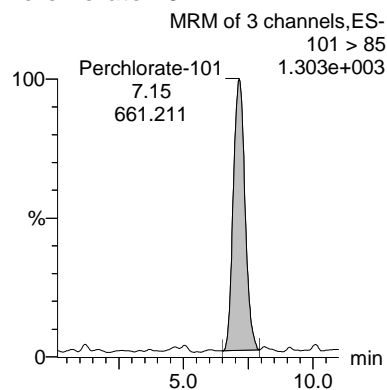
Perchlorate



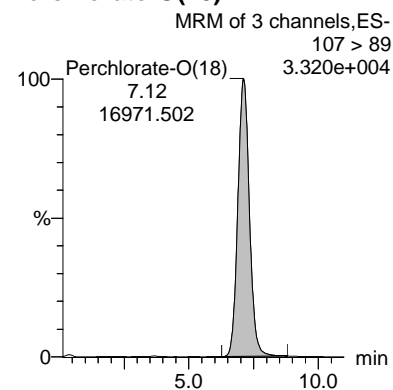
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-08CRI	Perchlorate	99 > 83	7.12	1884.846	0.056	bb			0.0538	107.56	7.56	337.408	2.85
WCL170403-08CRI	Perchlorate-101	101 > 85	7.15	661.211	0.019	bb			0.0562	112.46	12.46	115.132	
WCL170403-08CRI	Perchlorate-O(18)	107 > 89	7.12	16971.502	16971.502	bb			0.4959	99.19	-0.81	2665.3...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

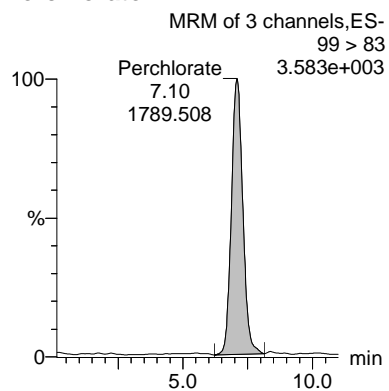
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

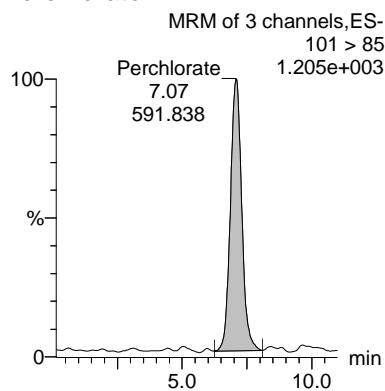
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 04/14/2017

Name: per0413023a
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Time: 21:47:48
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Vial: 1:2,C

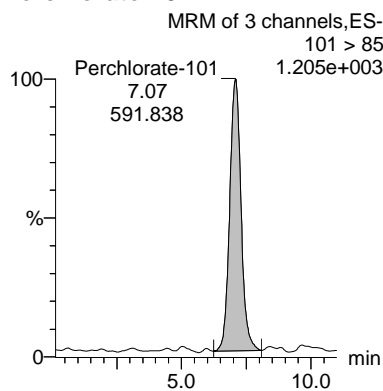
Perchlorate



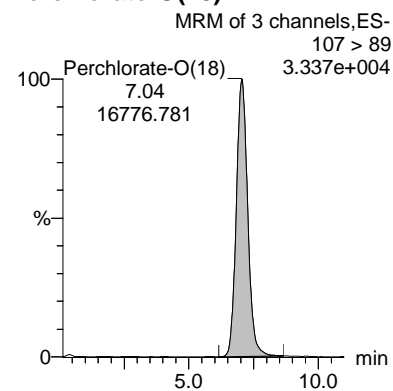
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-08CRI	Perchlorate	99 > 83	7.10	1789.508	0.053	bb			0.0517	103.30	3.30	757.659	3.02
WCL170403-08CRI	Perchlorate-101	101 > 85	7.07	591.838	0.018	bb			0.0509	101.83	1.83	31.635	
WCL170403-08CRI	Perchlorate-O(18)	107 > 89	7.04	16776.781	16776.781	bb			0.4902	98.05	-1.95	457.811	

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample No.

MBLab Code: GELDate Received: 13-APR-17Instrument: LCMSMSGEL Job No (SDG): 420570Method: EPA 6850 ModifiedGEL Sample ID: 1203767385Matrix: WATERDate Filtered: 13-APR-17Extraction Batch ID: 1655898Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	13-APR-17 19:27	per0413013a
	Perchlorate-O(18)			0.498	ug/L		1	13-APR-17 19:27	per0413013a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

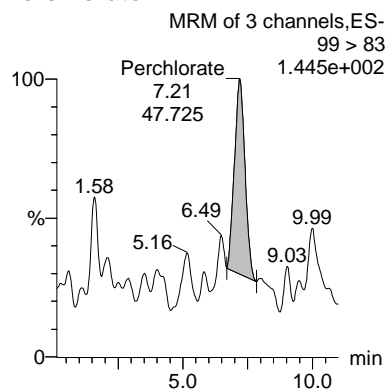
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 04/14/2017

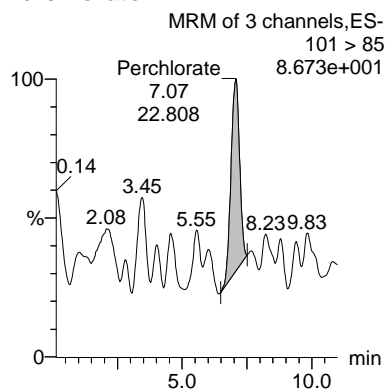
MA
 04/14/2017

Name: per0413013a
Date: 13-Apr-2017
Time: 19:27:52
ID: 1203767385
Vial: 1:3,A

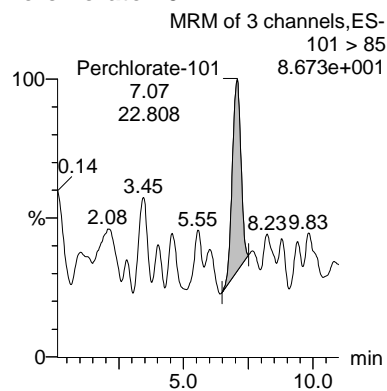
Perchlorate



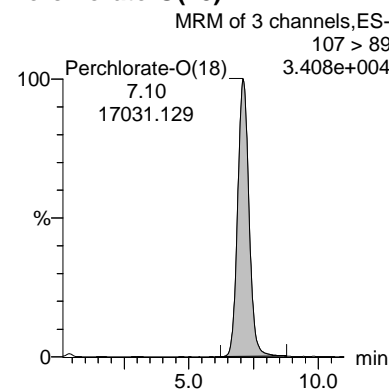
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
1203767385	Perchlorate	99 > 83	7.21	47.725	0.001	bb			0.0014			9.280 2.09
1203767385	Perchlorate-101	101 > 85	7.07	22.808	0.001	bb			0.0019			8.280
1203767385	Perchlorate-O(18)	107 > 89	7.10	17031.129	17031.129	bb			0.4977	99.54	-0.46	2642.1...

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LCS

Date Received: 13-APR-17

GEL Job No (SDG): 420570

GEL Sample ID: 1203767386

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L		1	13-APR-17 19:41	per0413014a
	Perchlorate-O(18)			0.483	ug/L		1	13-APR-17 19:41	per0413014a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

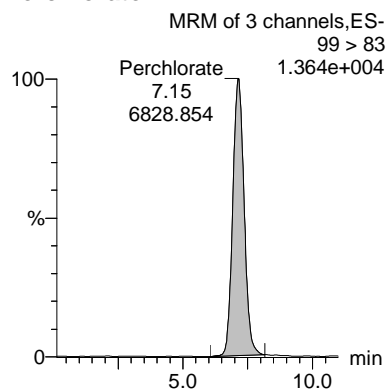
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

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 04/14/2017

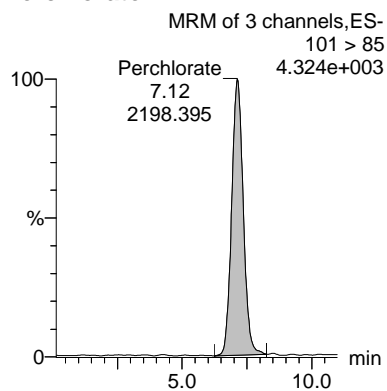
MA
 04/14/2017

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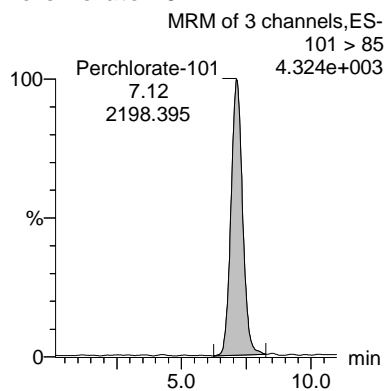
Perchlorate



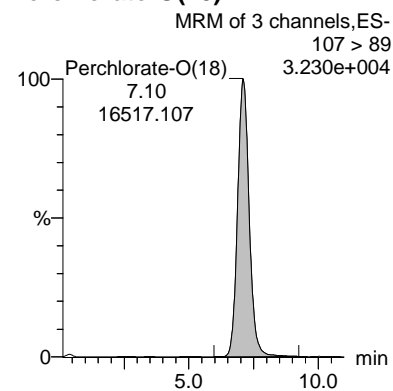
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203767386	Perchlorate	99 > 83	7.15	6828.854	0.207	bb			0.2002	100.10	0.10	1718.0...	3.11
1203767386	Perchlorate-101	101 > 85	7.12	2198.395	0.067	bb			0.1921	96.05	-3.95	712.142	
1203767386	Perchlorate-O(18)	107 > 89	7.10	16517.107	16517.107	bb			0.4827	96.53	-3.47	1803.5...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 420570

GEL Sample ID: 1203767394

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.205	ug/L		1	13-APR-17 19:55	per0413015a
	Perchlorate-O(18)			0.522	ug/L		1	13-APR-17 19:55	per0413015a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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Dataset: C:\MassLynx\Perchlorate.PRO\per041317a.qld

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04/14/2017

Last Altered: Friday, April 14, 2017 8:39:46 AM Eastern Daylight Time

Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

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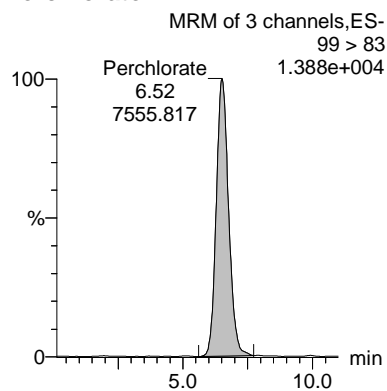
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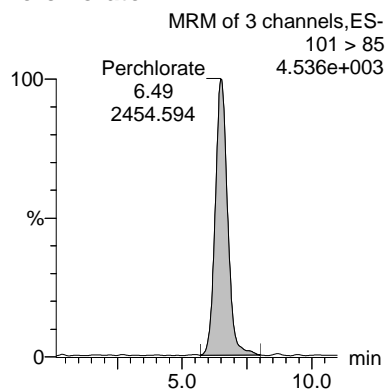
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Vial: 1:3,C

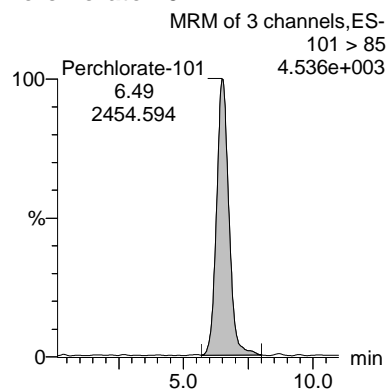
Perchlorate



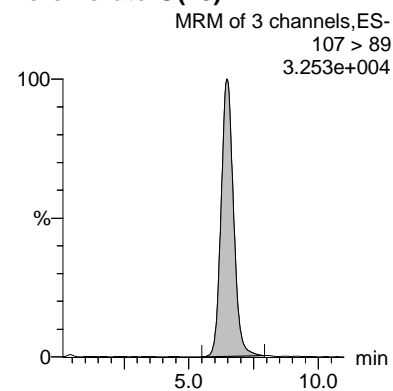
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203767394	Perchlorate	99 > 83	6.52	7555.817	0.212	bb			0.2049	102.45	2.45	788.238	3.08
1203767394	Perchlorate-101	101 > 85	6.49	2454.594	0.069	bb			0.1984	99.20	-0.80	342.562	
1203767394	Perchlorate-O(18)	107 > 89	6.46	17856.494	17856.494	bb			0.5218	104.36	4.36	2195.4...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP140-7431-GRABMS

Date Received: 13-APR-17

GEL Job No (SDG): 420570

GEL Sample ID: 1203767387

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	200	800	6360	ug/L		4000	13-APR-17 20:23	per0413017a
	Perchlorate-O(18)			1770	ug/L		4000	13-APR-17 20:23	per0413017a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

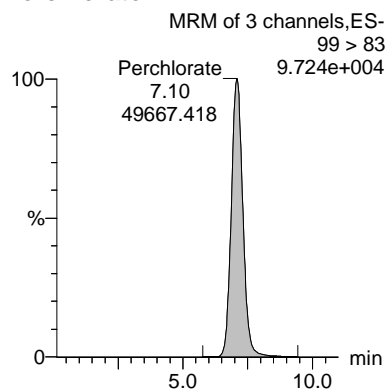
Dataset: C:\MassLynx\Perchlorate.PRO\per041317a.qld
Last Altered: Friday, April 14, 2017 8:39:46 AM Eastern Daylight Time
Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

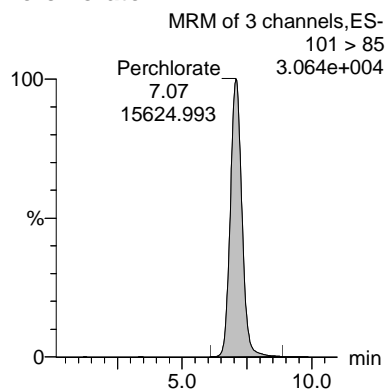
MA
 04/14/2017

Name: per0413017a
Date: 13-Apr-2017
Time: 20:23:50
ID: 1203767387
Vial: 1:3,E

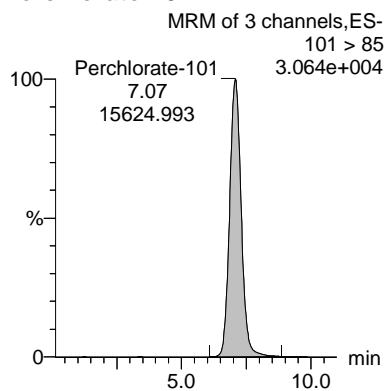
Perchlorate



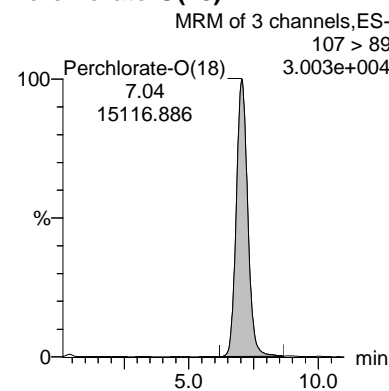
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203767387	Perchlorate	99 > 83	7.10	49667.418	1.643	bb			1.5910	795.48	695.48	6732.7...	3.18
1203767387	Perchlorate-101	101 > 85	7.07	15624.993	0.517	bb			1.4918	745.92	645.92	2624.1...	
1203767387	Perchlorate-O(18)	107 > 89	7.04	15116.886	15116.886	bb			0.4417	88.35	-11.65	1363.3...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP140-7431-GRABMSD

Date Received: 13-APR-17

GEL Job No (SDG): 420570

GEL Sample ID: 1203767388

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	200	800	6580	ug/L		4000	13-APR-17 20:37	per0413018a
	Perchlorate-O(18)			1880	ug/L		4000	13-APR-17 20:37	per0413018a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

Page 18 of 23

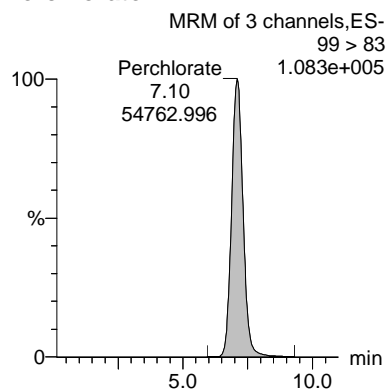
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Last Altered: Friday, April 14, 2017 8:39:46 AM Eastern Daylight Time
Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
04/14/2017

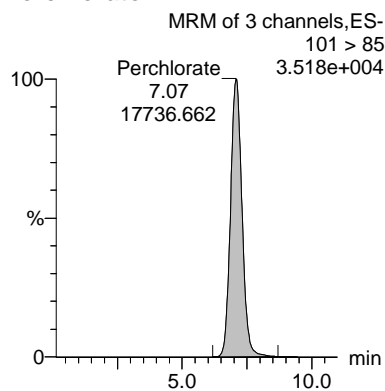
MA
04/14/2017

Name: per0413018a
Date: 13-Apr-2017
Time: 20:37:50
ID: 1203767388
Vial: 1:3,F

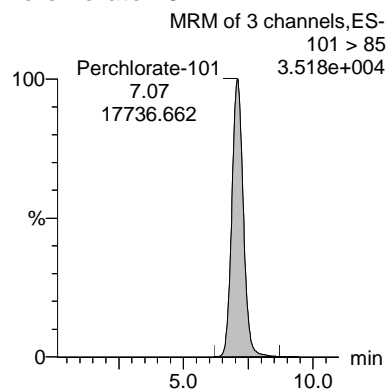
Perchlorate



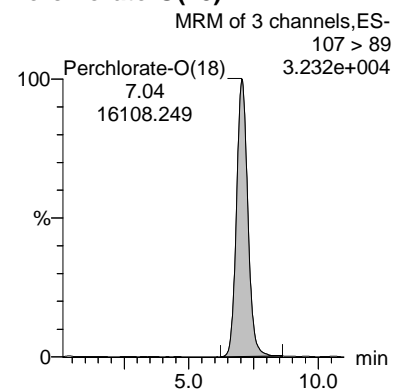
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203767388	Perchlorate	99 > 83	7.10	54762.996	1.700	bb			1.6462	823.12	723.12	7621.9...	3.09
1203767388	Perchlorate-101	101 > 85	7.07	17736.662	0.551	bb			1.5892	794.62	694.62	5890.5...	
1203767388	Perchlorate-O(18)	107 > 89	7.04	16108.249	16108.249	bb			0.4707	94.14	-5.86	2364.8...	

Perchlorate Initial Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420570Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	13-APR-17	per0413001a	IPB001
Perchlorate-101	0.00	0	NA	13-APR-17	per0413001a	IPB001
Perchlorate	0.00	0	NA	13-APR-17	per0413002a	IPB001
Perchlorate-101	0.00	0	NA	13-APR-17	per0413002a	IPB001

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per041317a.qld
 Last Altered: Friday, April 14, 2017 8:39:46 AM Eastern Daylight Time
 Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

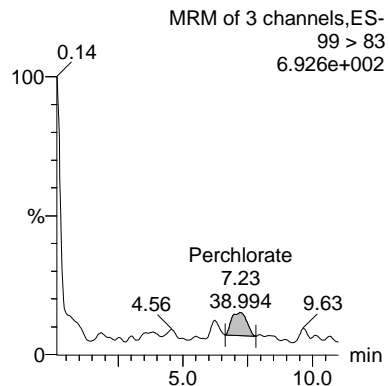
GL
 04/14/2017

MA
 04/14/2017

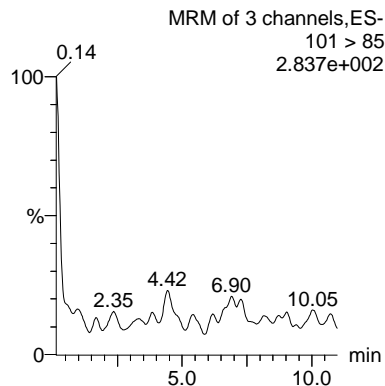
Method: C:\MassLynx\Perchlorate.PRO\MethDB\per041317a.mdb 14 Apr 2017 08:39:22
 Calibration: C:\MassLynx\Perchlorate.PRO\CurveDB\per041317a.cdb 14 Apr 2017 08:39:45

Name: per0413001a
 Date: 13-Apr-2017
 Time: 16:39:50
 ID: IPB001
 Vial: 1:1,A

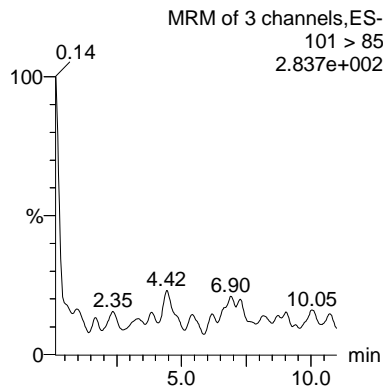
Perchlorate



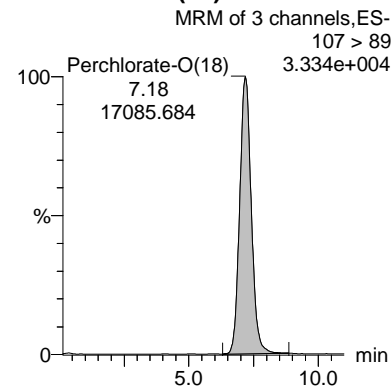
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83	7.23	38.994	0.001	bb			0.0011			2.303 0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	7.18	17085.684	17085.684	bb			0.4993	99.85	-0.15	1622.0...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

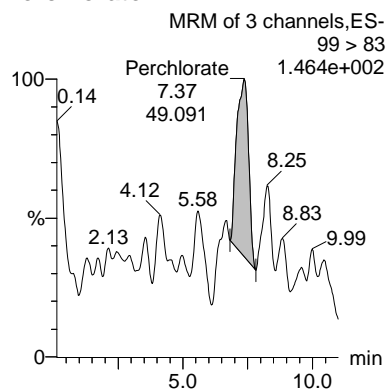
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

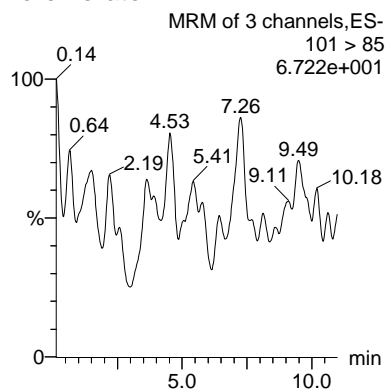
MA
 04/14/2017

Name: per0413002a
Date: 13-Apr-2017
Time: 16:53:54
ID: IPB001
Vial: 1:1,A

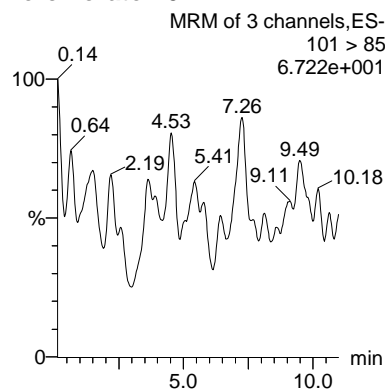
Perchlorate



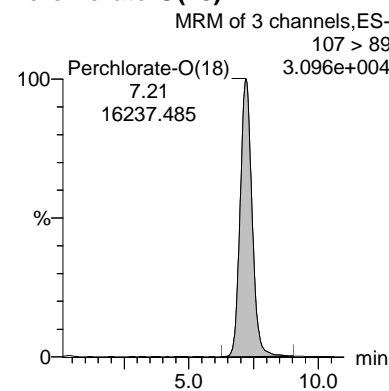
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83	7.37	49.091	0.002	bb			0.0015			5.322 0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	7.21	16237.485	16237.485	bb			0.4745	94.90	-5.10	1879.9...

Perchlorate Continuing Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420570Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	13-APR-17	per0413009a	IPB002
Perchlorate-101	0.00	0	NA	13-APR-17	per0413009a	IPB002
Perchlorate	0.00	0	NA	13-APR-17	per0413011a	IPB003
Perchlorate-101	0.00	0	NA	13-APR-17	per0413011a	IPB003
Perchlorate	0.00	0	NA	13-APR-17	per0413019a	IPB004
Perchlorate-101	0.00	0	NA	13-APR-17	per0413019a	IPB004
Perchlorate	0.00	0	NA	13-APR-17	per0413022a	IPB005
Perchlorate-101	0.00	0	NA	13-APR-17	per0413022a	IPB005

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

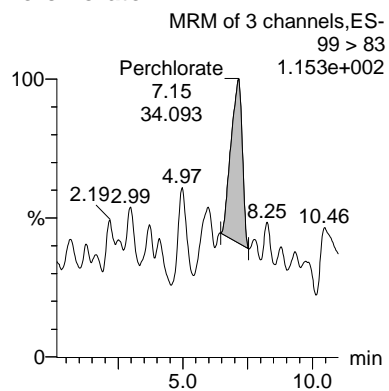
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 Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GC
 04/14/2017

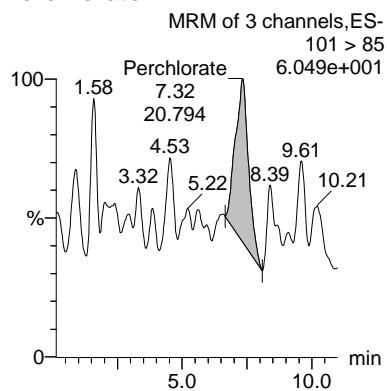
MA
 04/14/2017

Name: per0413009a
Date: 13-Apr-2017
Time: 18:31:53
ID: IPB002
Vial: 1:1,A

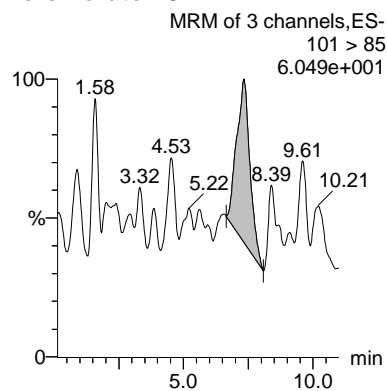
Perchlorate



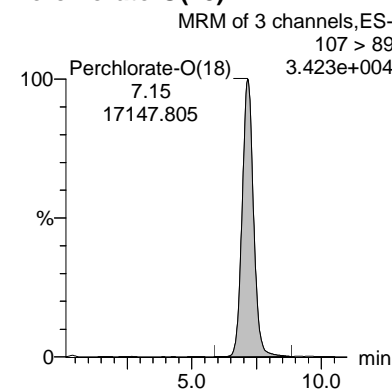
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB002	Perchlorate	99 > 83	7.15	34.093	0.001	bb			0.0010			7.121 1.64
IPB002	Perchlorate-101	101 > 85	7.32	20.794	0.001	bb			0.0018			3.071
IPB002	Perchlorate-O(18)	107 > 89	7.15	17147.805	17147.805	bb			0.5011	100.22	0.22	1902.0...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

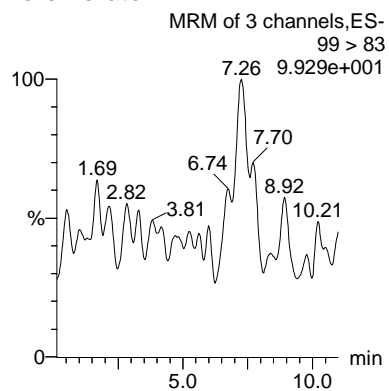
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

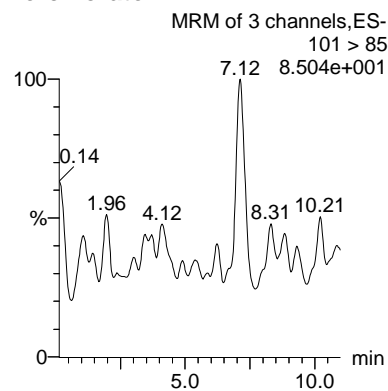
MA
 04/14/2017

Name: per0413011a
Date: 13-Apr-2017
Time: 18:59:51
ID: IPB003
Vial: 1:1,A

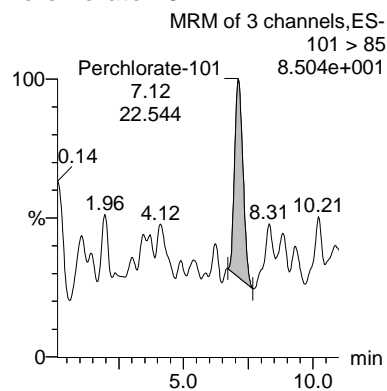
Perchlorate



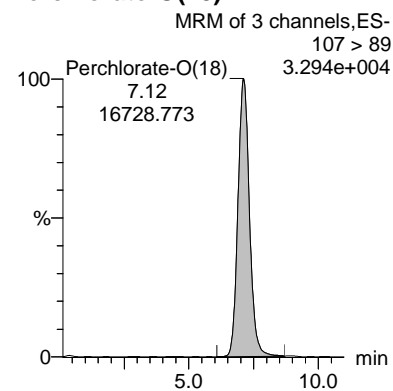
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB003	Perchlorate	99 > 83										0.00
IPB003	Perchlorate-101	101 > 85	7.12	22.544	0.001	bb			0.0019			6.227
IPB003	Perchlorate-O(18)	107 > 89	7.12	16728.773	16728.773	bb			0.4888	97.77	-2.23	2282.3...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

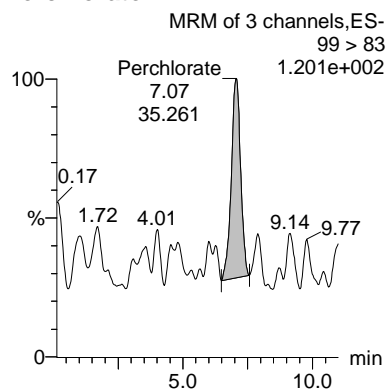
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GL
 04/14/2017

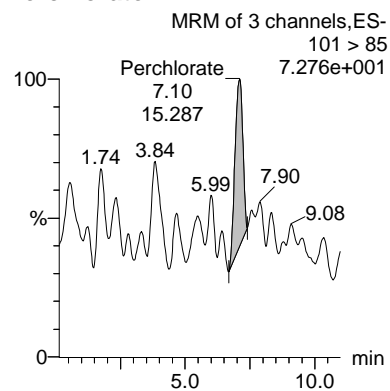
MA
 04/14/2017

Name: per0413019a
Date: 13-Apr-2017
Time: 20:51:49
ID: IPB004
Vial: 1:1,A

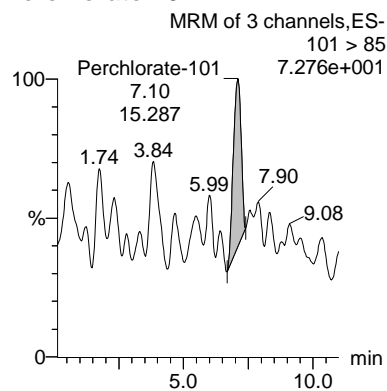
Perchlorate



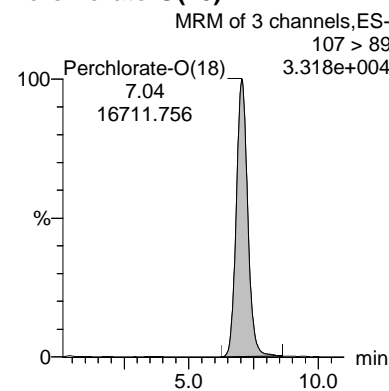
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB004	Perchlorate	99 > 83	7.07	35.261	0.001	bb			0.0010			7.088 2.31
IPB004	Perchlorate-101	101 > 85	7.10	15.287	0.000	bb			0.0013			6.237
IPB004	Perchlorate-O(18)	107 > 89	7.04	16711.756	16711.756	bb			0.4883	97.67	-2.33	2125.1...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

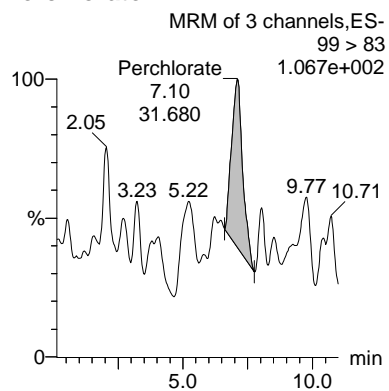
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GL
 04/14/2017

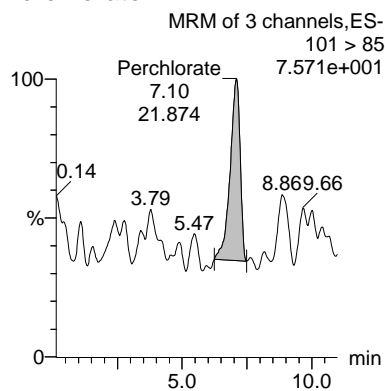
MA
 04/14/2017

Name: per0413022a
 Date: 13-Apr-2017
 Time: 21:33:48
 ID: IPB005
 Vial: 1:1,A

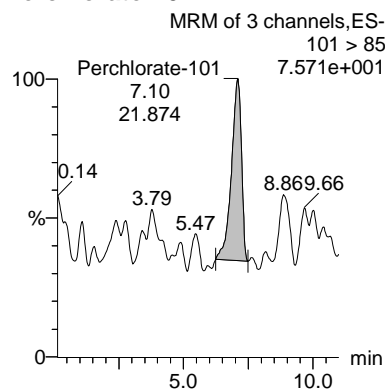
Perchlorate



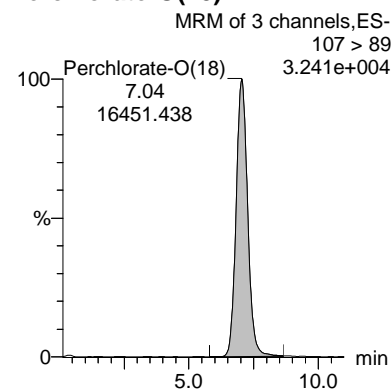
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB005	Perchlorate	99 > 83	7.10	31.680	0.001	bb			0.0009			8.232 1.45
IPB005	Perchlorate-101	101 > 85	7.10	21.874	0.001	bb			0.0019			9.905
IPB005	Perchlorate-O(18)	107 > 89	7.04	16451.438	16451.438	bb			0.4807	96.15	-3.85	1913.6...

Miscellaneous

Prep Logbook

Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)

Batch ID: 1655898 Verified by: _____
 Analyst: Grace Cappelmann
 Method: SW846 6850 Modified

Lab SOP: GL-OA-E-067 REV# 14
 Instrument: LCMSMS Manual Instrument

Sample ID	Prep Date	Initial Volume (mL)	Final Volume (mL)	Prepped Factor (mL/mL)
1203767385 MB	13-APR-2017 12:00:00	10	10	1
1203767386 LCS	13-APR-2017 12:00:00	10	10	1
1203767394 ICS	13-APR-2017 12:00:00	10	10	1
420545001	13-APR-2017 12:00:00	10	10	1
1203767387 MS (420545001)	13-APR-2017 12:00:00	10	10	1
1203767388 MSD (420545001)	13-APR-2017 12:00:00	10	10	1
420570001	13-APR-2017 12:00:00	10	10	1

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
ICS	1203767394	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	De-salting cartridge: 161107-2.5-Ba/Ag/H
LCS	1203767386	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MS	1203767387	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MSD	1203767388	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
RGNT	All	TYPE 1 Water for HPLC	2457559	10	mL	
RGNT	All	500 ppm Carbonate, Bicarbonate, Chloride, Sulfate	2463729	10	mL	

GEL ORGANIC RUN LOG

INSTRUMENT ID: LC-MS/MS#2

Date: 04/13/17

Method: EPA 6850-Modified

Extr. Injection Volume: 20uL

Int. Std.: UCL161103-01

Sequence Number: per041317a

Mobile Phase Lot#: 2536603, 2457559

SOP: GL-OA-E-067

Initial Calibration Date: 04/13/17

Standard-Samp Reagent Lot#.: 2457559

Alt Check Std. ID: WCL170403-07

DataFile	Sample	Analyst	Injection Date	Batch	SDG	Dilution	Client	Comments	QC_Flag
per0413001a	IPB001	GXC1	4/13/2017 16:39			1		USE	B
per0413002a	IPB001	GXC1	4/13/2017 16:53			1		USE	B
per0413003a	WCLICAL-01	GXC1	4/13/2017 17:07			1		USE	I
per0413004a	WCLICAL-02	GXC1	4/13/2017 17:21			1		USE	I
per0413005a	WCLICAL-03	GXC1	4/13/2017 17:35			1		USE	I
per0413006a	WCLICAL-04	GXC1	4/13/2017 17:49			1		USE	I
per0413007a	WCLICAL-05	GXC1	4/13/2017 18:03			1		USE	I
per0413008a	WCLICAL-06	GXC1	4/13/2017 18:17			1		USE	I
per0413009a	IPB002	GXC1	4/13/2017 18:31			1		USE	B
per0413010a	WCLICV	GXC1	4/13/2017 18:45			1		USE	C
per0413011a	IPB003	GXC1	4/13/2017 18:59			1		USE	B
per0413012a	WCLCRI	GXC1	4/13/2017 19:13			1		USE	C
per0413013a	1203767385	GXC1	4/13/2017 19:27	1655900	Various	1	MBAC	USE	S
per0413014a	1203767386	GXC1	4/13/2017 19:41	1655900	Various	1	MBAC	USE	S
per0413015a	1203767394	GXC1	4/13/2017 19:55	1655900	Various	1	MBAC	USE	S
per0413016a	420545001	GXC1	4/13/2017 20:09	1655900	420545	4000	MBAC	USE	S
per0413017a	1203767387	GXC1	4/13/2017 20:23	1655900	420545	4000	MBAC	USE	S
per0413018a	1203767388	GXC1	4/13/2017 20:37	1655900	420545	4000	MBAC	USE	S
per0413019a	IPB004	GXC1	4/13/2017 20:51			1		USE	B
per0413020a	420570001	GXC1	4/13/2017 21:05	1655900	420570	1	MBAC	USE	S
per0413021a	WCLCCV	GXC1	4/13/2017 21:19			1		USE	C
per0413022a	IPB005	GXC1	4/13/2017 21:33			1		USE	B
per0413023a	WCLCRI	GXC1	4/13/2017 21:47			1		USE	C

DATA EXCEPTION REPORT

Mo.Day Yr. 14-APR-17	Division: Federal	Quality Criteria: Others	Type: Process
Instrument Type: LC-MS/MS	Test / Method: SW846-6850 Modified	Matrix Type: Liquid	Client Code: MBAC001
Batch ID: 1655900	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 420545,420570			
Application Issues: Failed Recovery for MS/MSD, or PS/PSD			
Specification and Requirements Exception Description:		DER Disposition:	
1. There was a 0% recovery observed in 1203767387 (MS) and 1203767388 (MSD) with an acceptance range of 75-125%. The detected concentrations in the MS and MSD were lower than the detected concentration in the parent sample.		2. The outliers observed for the matrix spikes were due to the background concentration in the parent sample, 420545001 (LH18/24-SP140-7) and the need to dilute all at a 1:4000 dilution prior to analysis. Will report data and note in case narrative.	

Originator's Name:

Grace Cappelmann 14-APR-17

Data Validator/Group Leader:

Michael Penny 14-APR-17

Isotope Ratio Criteria

Isotope Ratio $^{35}\text{Cl}/^{37}\text{Cl}$

2.31-3.85

Tune Criteria

The tuning solution is introduced directly into the mass spectrometer using the ESI interface in the positive ion mode. The mass range scanned is 20 to 1100 amu using at least six scans. The observed mass for the target compound in the daily calibration standards must be within 0.2 amu of the expected value. If it is greater than 0.2 amu, then a mass calibration is performed and the instrument is re-calibrated.



April 13, 2017

Mr. Adriane Steed
Microbac Laboratories, Inc.
158 Starlite Drive
Marietta, Ohio 45750

Re: Perchlorate-Steed
Work Order: 420545

Dear Mr. Steed:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 13, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4778.

Sincerely,

Hope Taylor
Project Manager

Purchase Order: SIGNED QUOTE
Enclosures

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Case Narrative

**Receipt Narrative
for
Microbac Laboratories
SDG: 420545**

April 13, 2017

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on April 13, 2017 for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

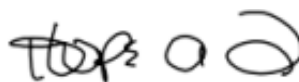
Sample Identification: The laboratory received the following sample:

<u>Laboratory ID</u>	<u>Client ID</u>
420545001	LH18/24-SP140-7431-GRAB

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Perchlorates by LCMSMS.



Hope Taylor
Project Manager

Chain of Custody and Supporting Documentation

420545

CHAIN OF CUSTODY

Name Of Lab Shipping To: GEL Laboratories (843) 556 - 8171 ATTN: HOPE TAYLOR

Page 1 of 1

Project: AECOM LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS		Project No.: 60256135.GWTPT HRUMAR16	
Job: GROUNDWATER TREATMENT PLANT MONTHLY INFLUENT SAMPLES			
Prepared By: Scott Beesinger		P.O. Number	
Field Sample I.D.: LH18/24-SP140-7 7151 RD	Sample Matrix Water	Date / Time 04/12/17 / 15:00	MS / MSD 1
Analyses PERCHLORATE		No. OF CONTAINERS 1	Remarks (Preservatives, etc.) NONE
Lab I.D.#		Date	
Received By: <i>Scott Beesinger</i>		Date 04/12/17	Time 15:30
Relinquished By: <i>[Signature]</i>		Date 4/13/17	Time 9:30
Additional Remarks:		24 HOUR TURN AROUND TIME	

Received At Lab By:				For Lab Use Only			
Date	Time	Airbill No.	Date	Time	Temp of Container	Seal No.	Condition
Remarks:							

Laboratory Certifications

List of current GEL Certifications as of 13 April 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
Microbac Laboratories (MBAC)
SDG #: 420545**

Method/Analysis Information

Procedure: **Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)**

Analytical Method: SW846 6850 Modified

Prep Method: SW846 6850 Modified

Analytical Batch Number: 1655900

Prep Batch Number: 1655898

Sample Analysis

Sample ID	Client ID
420545001	420545001 (LH18/24-SP140-7431-GRAB)
1203767394	Interference Check Sample (ICS)
1203767385	Method Blank (MB)
1203767386	Laboratory Control Sample (LCS)
1203767387	420545001(LH18/24-SP140-7431-GRAB) Matrix Spike (MS)
1203767388	420545001(LH18/24-SP140-7431-GRAB) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-067 REV# 14.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG. Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

ICV Requirements

All associated initial calibration verification standard(s) (ICV) met the acceptance criteria.

CCB Requirements

All continuing calibration blanks (CCB) bracketing the analyses associated with this batch were within acceptance criteria.

CCV Requirements

All continuing calibration checks (CCV) requirements were met by all bracketing CCV standards.

Low Level Standard (CRI) Requirements

All low level calibration verification (CRI) requirements were met by all bracketing CRI standards.

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Interference Check Sample (ICS)

The ICS spike recoveries met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 420545001 (LH18/24-SP140-7431-GRAB) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

There was a 0% recovery observed in 1203767387 (LH18/24-SP140-7431-GRABMS) and 1203767388 (LH18/24-SP140-7431-GRABMSD) with an acceptance range of 75-125%. The detected concentrations in the MS and MSD were lower than the detected concentration in the parent sample. The outliers observed for the matrix spikes were due to the background concentration in the parent sample, 420545001 (LH18/24-SP140-7) and the need to dilute all at a 1:4000 dilution prior to analysis.

MS/MSD Relative Percent Difference (RPD) Statement

The RPDs between the MS and MSD met the acceptance limits.

Internal Standard Area Acceptance

The internal standard areas were within the required acceptance criteria for all samples and QC.

Retention Time

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard. The presence of Perchlorate was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by DOD QSM 5.0, has been used. In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

Technical Information**Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based

on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

Samples 1203767387 (LH18/24-SP140-7431-GRABMS), 1203767388 (LH18/24-SP140-7431-GRABMSD) and 420545001 (LH18/24-SP140-7431-GRAB) were diluted to bring the over range concentrations within the calibration range.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Data Exception (DER) Documentation

Data exception report (DER) 1623371 was generated for samples 1203767387 (LH18/24-SP140-7431-GRABMS) and 1203767388 (LH18/24-SP140-7431-GRABMSD) in this SDG/batch.

Manual Integrations

Manual integrations were not required for any data file associated with this SDG.

Method Comments

The samples in this SDG were not originally analyzed using EPA Method 314.0.

Additional Comments

Comments pertaining to Perchlorate-101 and/or the Perchlorate Isotope Ratio are applicable only when the client requests Perchlorate-101 and/or the Perchlorate Isotope Ratio be reported. Due to software constraints, Perchlorate, Perchlorate-101 and/or the Perchlorate Isotope Ratio may appear on raw data and comments referring to them may appear on certain Forms whether or not the client has requested one or all of them be reported. Due to software limitations, all initial calibration blanks must be designated as IPB001 in order for the forms to be correct. The retention time marker, Perchlorate-O (18), is added to all samples, instrument blanks, and standards Prior to injection. It is used to verify the retention time of Perchlorate and Perchlorate-101 and to insure an accurate injection occurred. Due to various anions affecting the recovery of Perchlorate-O (18) and not Perchlorate and Perchlorate-101, the calibration curves of Perchlorate and Perchlorate-101 are internally corrected using Perchlorate-O (18).

Perchlorate Isotope Ratio

The Perchlorate isotope ratio met acceptance criteria for all samples and QC samples. Please see the isotope ratio criteria in the Miscellaneous Section.

System Configuration

The laboratory utilizes a Waters LC 2795 liquid chromatography instrument for Perchlorate analysis. It is coupled with a Micromass Quattro Ultima Mass Spectrometer/Mass Spectrometer. It is designated as LCMSMS #2. It is fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis. The laboratory may also utilize an Agilent 1100 liquid chromatography instrument for Perchlorate analysis. It is coupled with an Applied Biosystems 4000 Mass Spectrometer/Mass Spectrometer, designated as LCMSMS #3 or LCMSMS #4. It is also fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In

an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Chromatographic Columns

The LC-MS/MS Perchlorate analysis was performed on a Quatro Ultima LC/MS/MS.

Chromatographic separation of Perchlorate is accomplished through analysis on the following anion column:

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Qualifier Definition Report
for**

MBAC001 Microbac Laboratories

Client SDG: 420545 GEL Work Order: 420545

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: 

Name: Michael Penny

Date: 14 APR 2017

Title: Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP140-7431-GRAB

Date Received: 13-APR-17

GEL Job No (SDG): 420545

GEL Sample ID: 420545001

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	200	800	6630	ug/L		4000	13-APR-17 20:09	per0413016a
	Perchlorate-O(18)			1920	ug/L		4000	13-APR-17 20:09	per0413016a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quality Control Summary

Perchlorate Laboratory Control Sample

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No. (SDG): 420545

Extract Batch Code: 1655898

Date Filtered: 13-APR-17

Matrix: WATER

Sample ID: 1203767386

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.2	ug/L	100		85 - 115
Perchlorate-O(18)		.483	ug/L			-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Interference Check Sample

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No. (SDG): 420545Extract Batch Code: 1655898Date Filtered: 13-APR-17Matrix: WATERSample ID: 1203767394

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.205	ug/L	102		70 - 130
Perchlorate-O(18)		.522	ug/L			

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Spike/Spike Duplicate Summary

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No (SDG): 420545Extract Batch Code: 1655898Date Extracted: 13-APR-17GEL MS/PS ID: 1203767387Client ID: LH18/24-SP140-7431-GRABGEL MSD/PSD ID: 1203767388QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	6630	ug/L	6360	0 *	6580	0 *	3	30	75 - 125
Perchlorate-O(18)	0	1920	ug/L	1770		1880		6		-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate RT And Area Summary

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420545Lab Code: GELHPLC Column: Dionex IonPac AG16Instrument ID: LCMSMS2

Sample ID	Datafile	Run Date	Area	RT	RT CLO4	RRT	Q 0.98-1.02
MidLevel Standard Area	per0413006a	13-APR-17	17155.2				
Lower Area Limit			8577.6				
Upper Area Limit			25732.8				
1203767385	per0413013a	13-APR-17 19:27	17031.1	7.1	7.20552	1.015	
1203767386	per0413014a	13-APR-17 19:41	16517.1	7.1	7.15035	1.007	
1203767394	per0413015a	13-APR-17 19:55	17856.5	6.46	6.516	1.009	
420545001	per0413016a	13-APR-17 20:09	16453.9	7.04	7.09518	1.008	
1203767387	per0413017a	13-APR-17 20:23	15116.9	7.04	7.09518	1.008	
1203767388	per0413018a	13-APR-17 20:37	16108.2	7.04	7.09518	1.008	

Sample Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP140-7431-GRAB

Date Received: 13-APR-17

GEL Job No (SDG): 420545

GEL Sample ID: 420545001

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	200	800	6630	ug/L		4000	13-APR-17 20:09	per0413016a
	Perchlorate-O(18)			1920	ug/L		4000	13-APR-17 20:09	per0413016a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

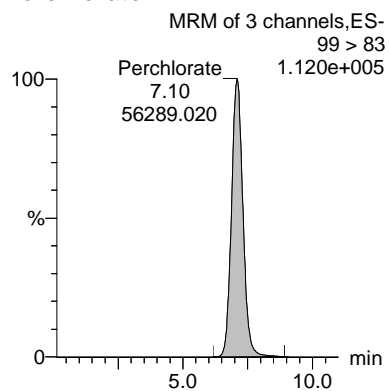
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Last Altered: Friday, April 14, 2017 8:39:46 AM Eastern Daylight Time
Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

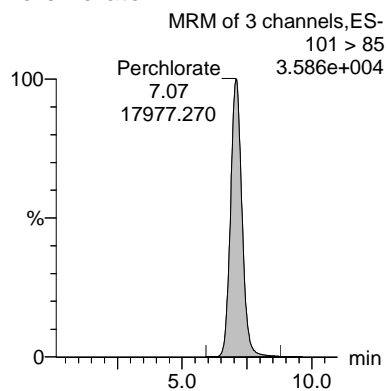
MA
 04/14/2017

Name: per0413016a
Date: 13-Apr-2017
Time: 20:09:51
ID: 420545001
Vial: 1:3,D

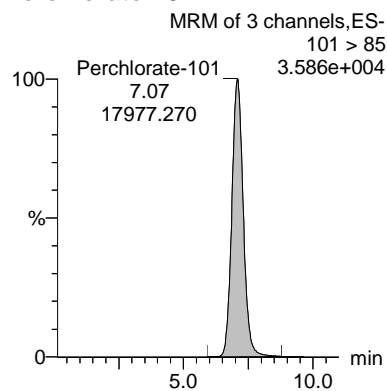
Perchlorate



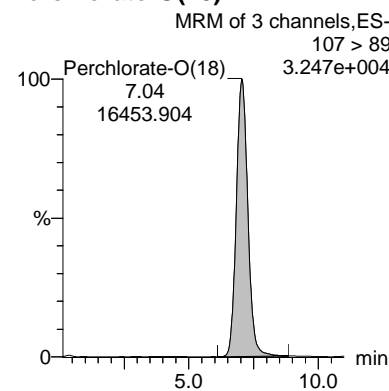
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
420545001	Perchlorate	99 > 83	7.10	56289.020	1.711	bb			1.6566			7979.1... 3.13
420545001	Perchlorate-101	101 > 85	7.07	17977.270	0.546	bb			1.5770			2994.4...
420545001	Perchlorate-O(18)	107 > 89	7.04	16453.904	16453.904	bb			0.4808	96.16	-3.84	2139.4...

Standards

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 420545

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 13-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate

Coefficient of Determination: .

Calibration Curve: 1.03

Response Type: Internal Standard

Curve Type: RF

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 420545

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 13-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate-101

Coefficient of Determination: .

Calibration Curve: .345

Response Type: Internal Standard

Curve Type: RF

Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Page 1 of 2

Dataset: C:\MassLynx\Perchlorate.PRO\per041317a.qld

GL
04/14/2017MA
04/14/2017

Last Altered: Friday, April 14, 2017 8:39:46 AM Eastern Daylight Time

Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

Method: C:\MassLynx\Perchlorate.PRO\MethDB\per041317a.mdb 14 Apr 2017 08:39:22**Calibration: C:\MassLynx\Perchlorate.PRO\CurveDB\per041317a.cdb 14 Apr 2017 08:39:45**

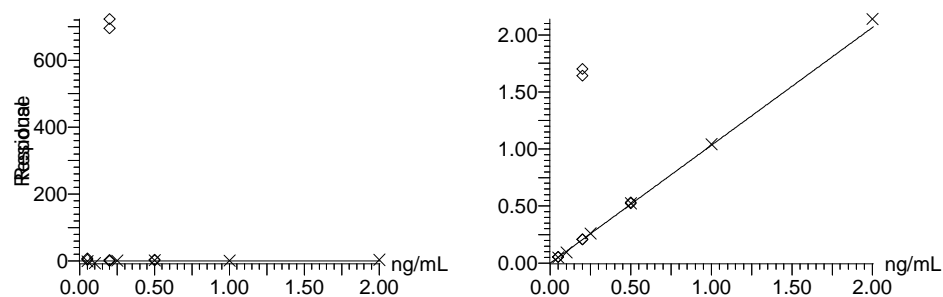
Compound name: Perchlorate

Response Factor: 1.03257

RRF SD: 0.0363028, % Relative SD: 3.51579

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



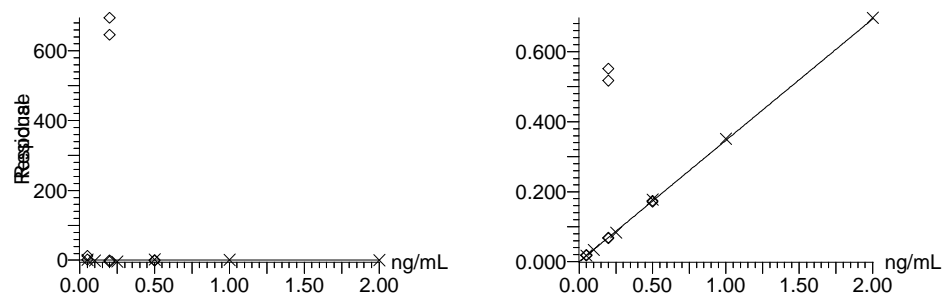
Compound name: Perchlorate-101

Response Factor: 0.346421

RRF SD: 0.00767332, % Relative SD: 2.21503

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per041317a.qld

Last Altered: Friday, April 14, 2017 8:39:46 AM Eastern Daylight Time

Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

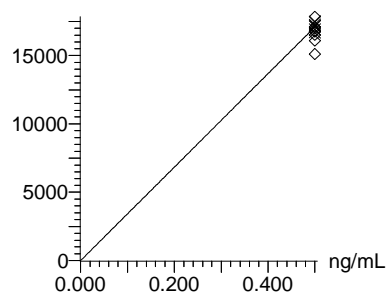
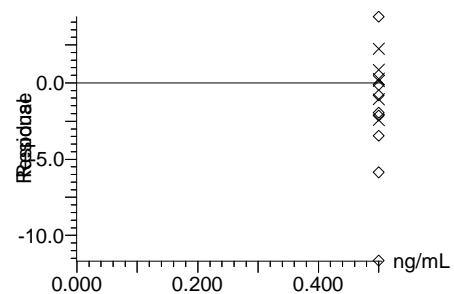
Compound name: Perchlorate-O(18)

Response Factor: 34221.3

RRF SD: 551.513, % Relative SD: 1.61161

Response type: External Std, Area

Curve type: RF



Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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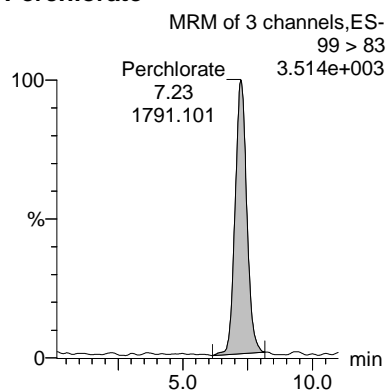
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GL
04/14/2017

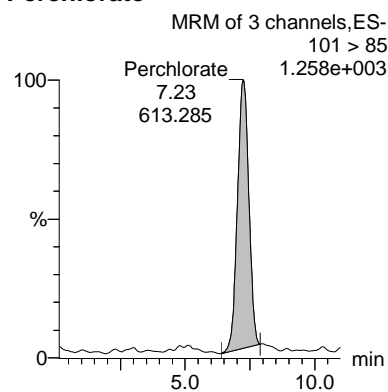
MA
04/14/2017

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Vial: 1:1,B

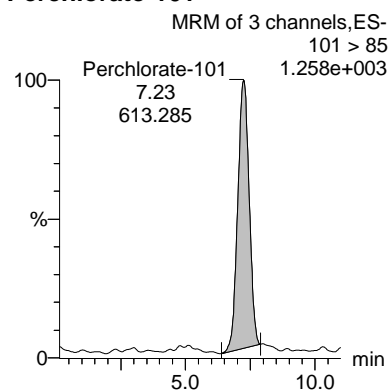
Perchlorate



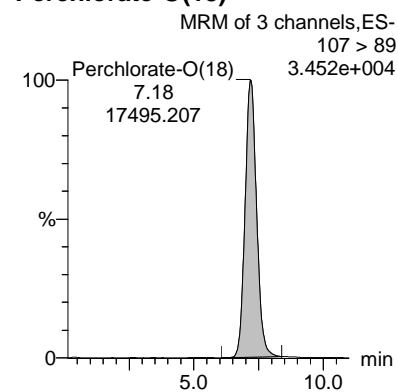
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-01	Perchlorate	99 > 83	7.23	1791.101	0.051	bb			0.0496	99.15	-0.85	322.959	2.92
WCL170403-01	Perchlorate-101	101 > 85	7.23	613.285	0.018	bb			0.0506	101.19	1.19	175.458	
WCL170403-01	Perchlorate-O(18)	107 > 89	7.18	17495.207	17495.207	bb			0.5112	102.25	2.25	3008.6...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

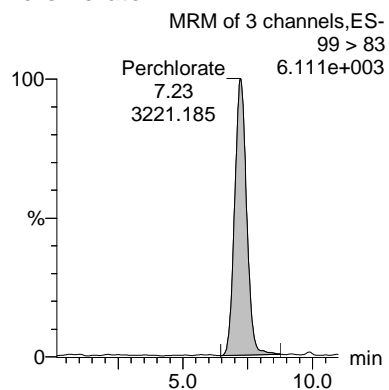
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GL
 04/14/2017

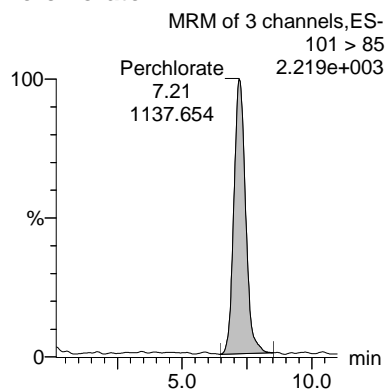
MA
 04/14/2017

Name: per0413004a
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Vial: 1:1,C

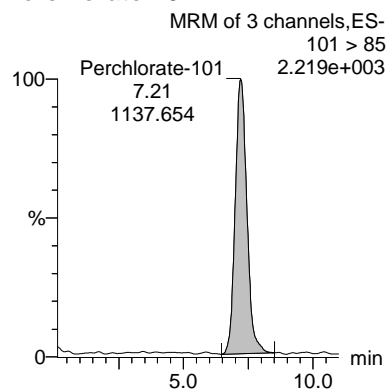
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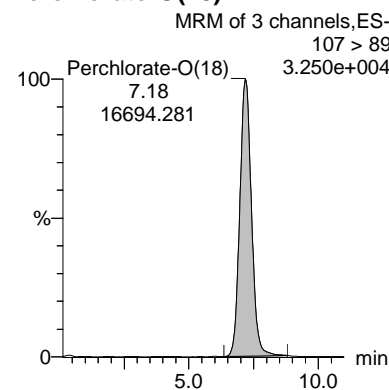
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-02	Perchlorate	99 > 83	7.23	3221.185	0.096	bb			0.0934	93.43	-6.57	813.672	2.83
WCL170403-02	Perchlorate-101	101 > 85	7.21	1137.654	0.034	bb			0.0984	98.36	-1.64	192.991	
WCL170403-02	Perchlorate-O(18)	107 > 89	7.18	16694.281	16694.281	bb			0.4878	97.57	-2.43	2450.6...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

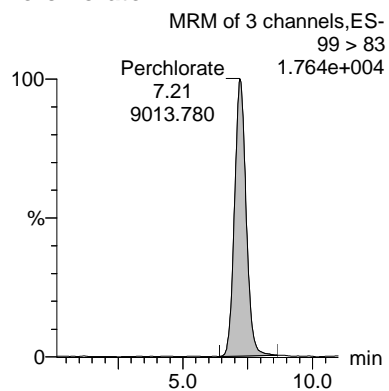
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

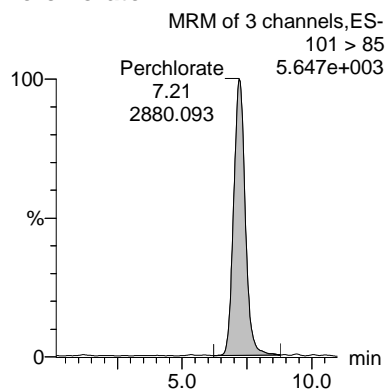
MA
 04/14/2017

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Date: 13-Apr-2017
Time: 17:35:58
ID: WCL170403-03
Vial: 1:1,D

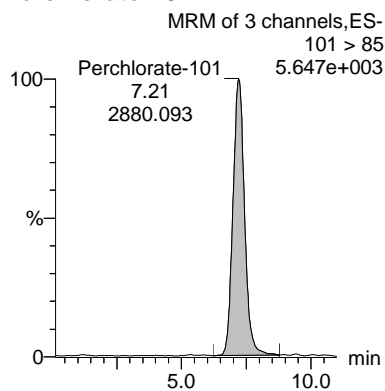
Perchlorate



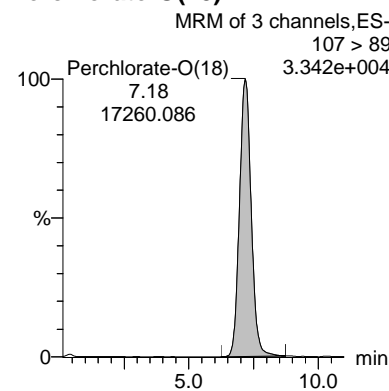
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-03	Perchlorate	99 > 83	7.21	9013.780	0.261	bb			0.2529	101.15	1.15	1044.4...	3.13
WCL170403-03	Perchlorate-101	101 > 85	7.21	2880.093	0.083	bb			0.2408	96.34	-3.66	857.493	
WCL170403-03	Perchlorate-O(18)	107 > 89	7.18	17260.086	17260.086	bb			0.5044	100.87	0.87	1296.3...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

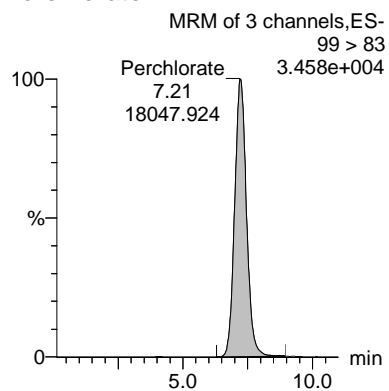
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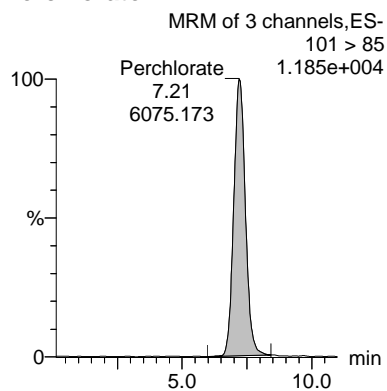
MA
 04/14/2017

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Time: 17:49:57
ID: WCL170403-04
Vial: 1:1,E

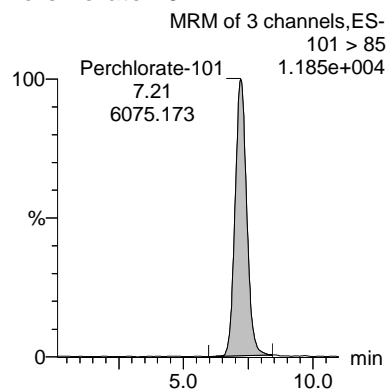
Perchlorate



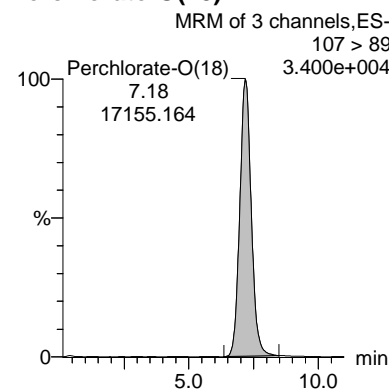
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-04	Perchlorate	99 > 83	7.21	18047.924	0.526	bb			0.5094	101.89	1.89	2426.0...	2.97
WCL170403-04	Perchlorate-101	101 > 85	7.21	6075.173	0.177	bb			0.5111	102.23	2.23	1138.6...	
WCL170403-04	Perchlorate-O(18)	107 > 89	7.18	17155.164	17155.164	bb			0.5013	100.26	0.26	2768.8...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

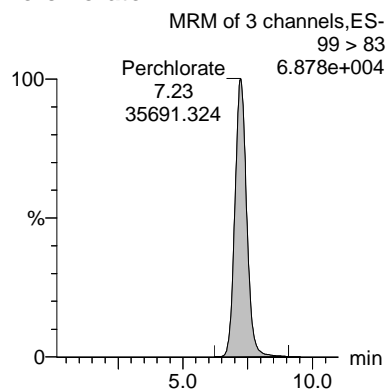
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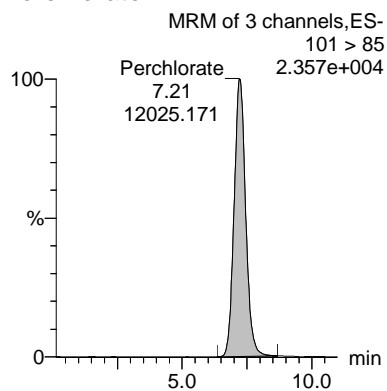
MA
 04/14/2017

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Time: 18:03:55
ID: WCL170403-05
Vial: 1:1,F

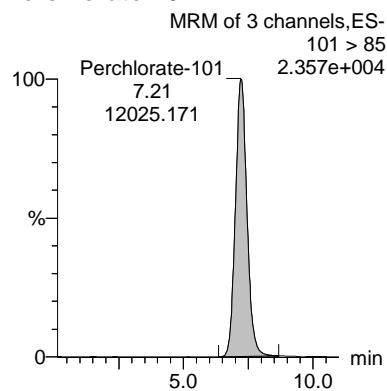
Perchlorate



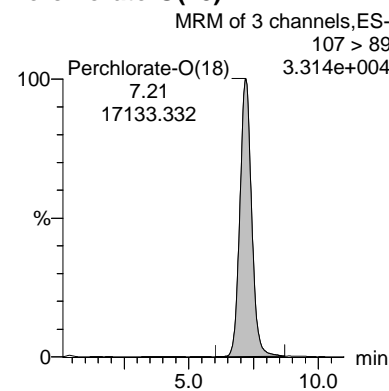
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-05	Perchlorate	99 > 83	7.23	35691.324	1.042	bb			1.0087	100.87	0.87	4321.1...	2.97
WCL170403-05	Perchlorate-101	101 > 85	7.21	12025.171	0.351	bb			1.0130	101.30	1.30	2854.7...	
WCL170403-05	Perchlorate-O(18)	107 > 89	7.21	17133.332	17133.332	bb			0.5007	100.13	0.13	2004.1...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

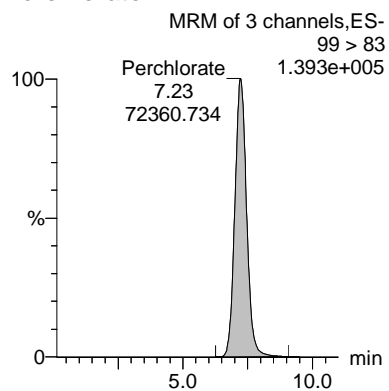
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 04/14/2017

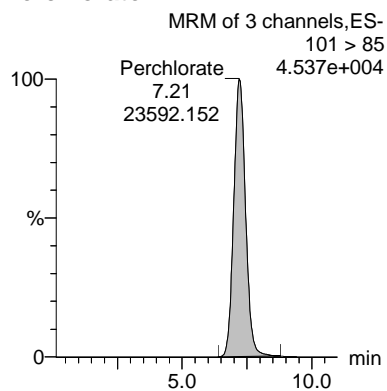
MA
 04/14/2017

Name: per0413008a
Date: 13-Apr-2017
Time: 18:17:52
ID: WCL170403-06
Vial: 1:2,A

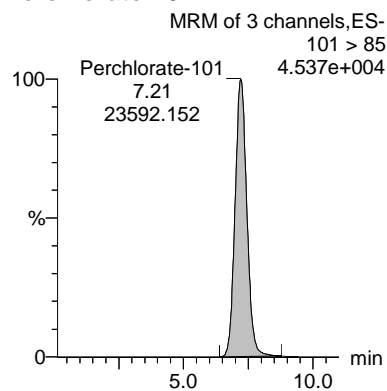
Perchlorate



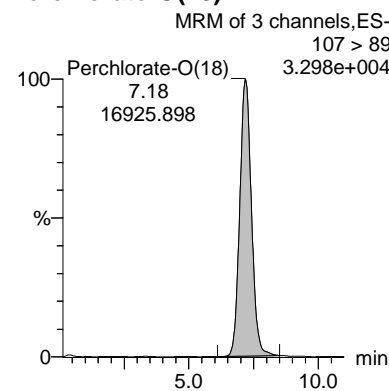
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-06	Perchlorate	99 > 83	7.23	72360.734	2.138	bb			2.0702	103.51	3.51	6391.3...	3.07
WCL170403-06	Perchlorate-101	101 > 85	7.21	23592.152	0.697	bb			2.0118	100.59	0.59	2828.9...	
WCL170403-06	Perchlorate-O(18)	107 > 89	7.18	16925.898	16925.898	bb			0.4946	98.92	-1.08	1566.0...	

Perchlorate Initial Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420545Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.51	101.71	13-APR-17 18:45	per0413010a
Perchlorate Isotope Ratio		3.02		13-APR-17 18:45	per0413010a
Perchlorate-101	.5	.5	100.33	13-APR-17 18:45	per0413010a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

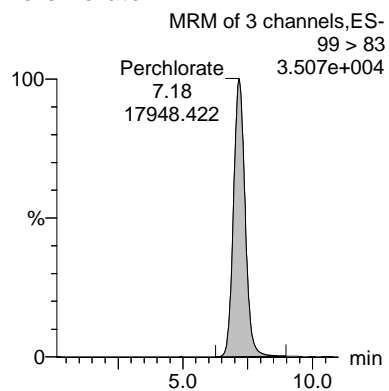
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

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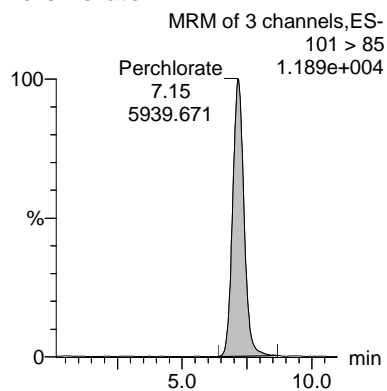
MA
 04/14/2017

Name: per0413010a
Date: 13-Apr-2017
Time: 18:45:52
ID: WCL170403-07ICV
Vial: 1:2,B

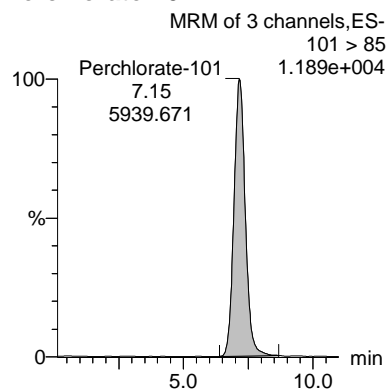
Perchlorate



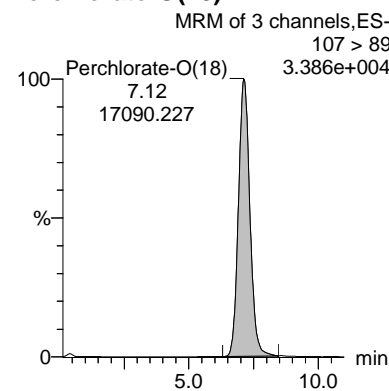
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-07ICV	Perchlorate	99 > 83	7.18	17948.422	0.525	bb			0.5085	101.71	1.71	1901.5...	3.02
WCL170403-07ICV	Perchlorate-101	101 > 85	7.15	5939.671	0.174	bb			0.5016	100.33	0.33	576.924	
WCL170403-07ICV	Perchlorate-O(18)	107 > 89	7.12	17090.227	17090.227	bb			0.4994	99.88	-0.12	2062.5...	

Perchlorate Continuing Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420545Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.52	103	13-APR-17 21:19	per0413021a
Perchlorate Isotope Ratio		3.1		13-APR-17 21:19	per0413021a
Perchlorate-101	.5	.5	99.03	13-APR-17 21:19	per0413021a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

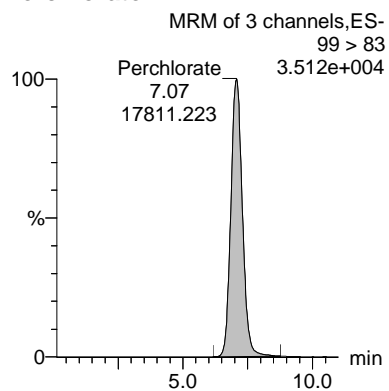
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GL
 04/14/2017

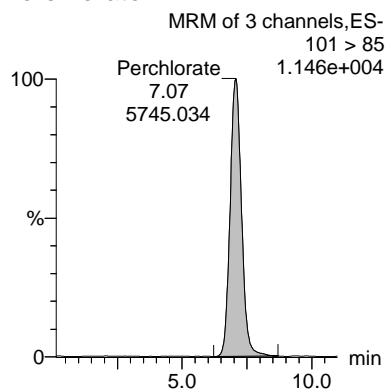
MA
 04/14/2017

Name: per0413021a
Date: 13-Apr-2017
Time: 21:19:49
ID: WCL170403-07CCV
Vial: 1:2,B

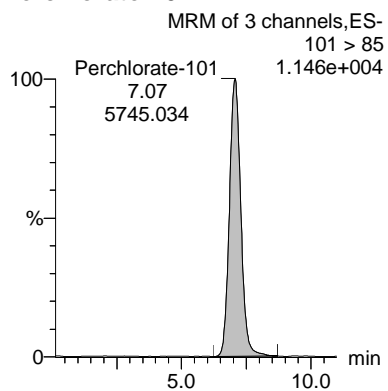
Perchlorate



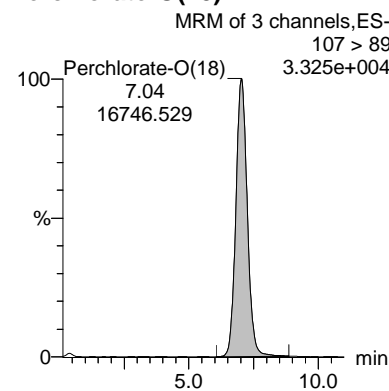
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-07CCV	Perchlorate	99 > 83	7.07	17811.223	0.532	bb			0.5150	103.00	3.00	2811.9...	3.10
WCL170403-07CCV	Perchlorate-101	101 > 85	7.07	5745.034	0.172	bb			0.4951	99.03	-0.97	657.252	
WCL170403-07CCV	Perchlorate-O(18)	107 > 89	7.04	16746.529	16746.529	bb			0.4894	97.87	-2.13	1963.0...	

Perchlorate MDL Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420545Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.05	.05	107.56	13-APR-17 19:13	per0413012a
Perchlorate Isotope Ratio		2.85		13-APR-17 19:13	per0413012a
Perchlorate-101	.05	.06	112.46	13-APR-17 19:13	per0413012a
Perchlorate	.05	.05	103.3	13-APR-17 21:47	per0413023a
Perchlorate Isotope Ratio		3.02		13-APR-17 21:47	per0413023a
Perchlorate-101	.05	.05	101.83	13-APR-17 21:47	per0413023a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

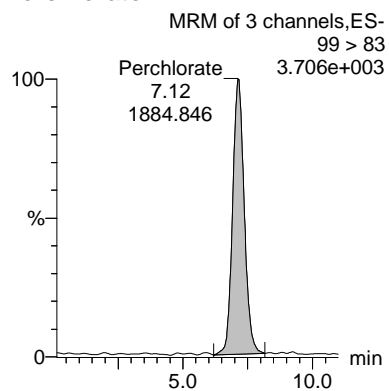
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

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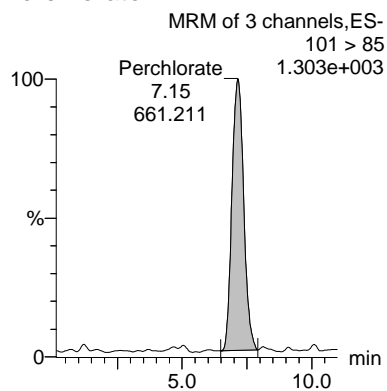
MA
 04/14/2017

Name: per0413012a
Date: 13-Apr-2017
Time: 19:13:51
ID: WCL170403-08CRI
Vial: 1:2,C

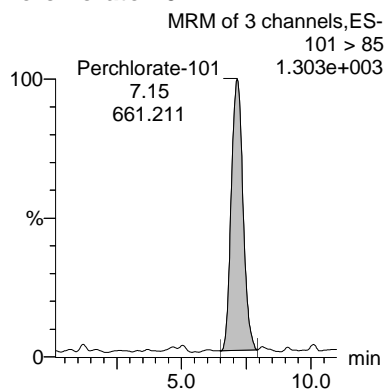
Perchlorate



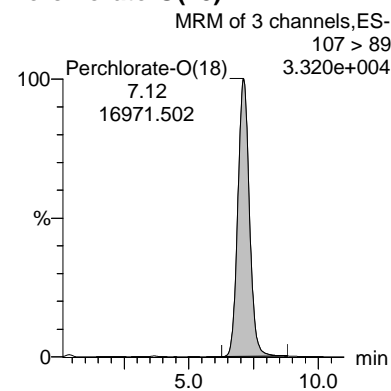
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-08CRI	Perchlorate	99 > 83	7.12	1884.846	0.056	bb			0.0538	107.56	7.56	337.408	2.85
WCL170403-08CRI	Perchlorate-101	101 > 85	7.15	661.211	0.019	bb			0.0562	112.46	12.46	115.132	
WCL170403-08CRI	Perchlorate-O(18)	107 > 89	7.12	16971.502	16971.502	bb			0.4959	99.19	-0.81	2665.3...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

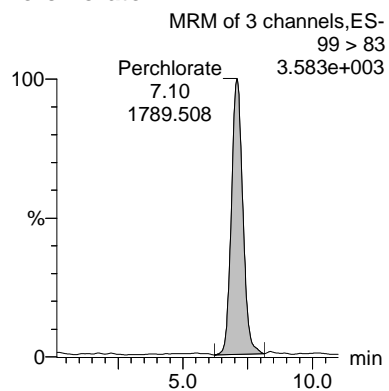
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GL
 04/14/2017

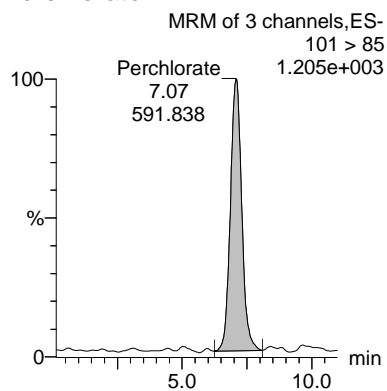
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 04/14/2017

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Vial: 1:2,C

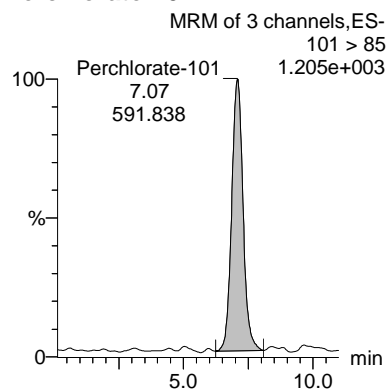
Perchlorate



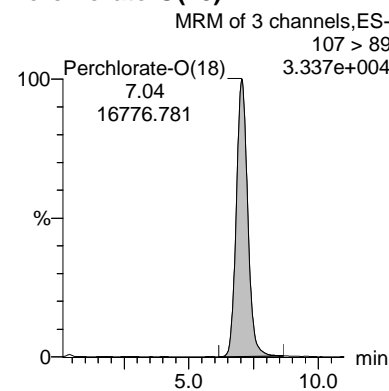
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-08CRI	Perchlorate	99 > 83	7.10	1789.508	0.053	bb			0.0517	103.30	3.30	757.659	3.02
WCL170403-08CRI	Perchlorate-101	101 > 85	7.07	591.838	0.018	bb			0.0509	101.83	1.83	31.635	
WCL170403-08CRI	Perchlorate-O(18)	107 > 89	7.04	16776.781	16776.781	bb			0.4902	98.05	-1.95	457.811	

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

MB

Date Received: 13-APR-17

GEL Job No (SDG): 420545

GEL Sample ID: 1203767385

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	13-APR-17 19:27	per0413013a
	Perchlorate-O(18)			0.498	ug/L		1	13-APR-17 19:27	per0413013a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

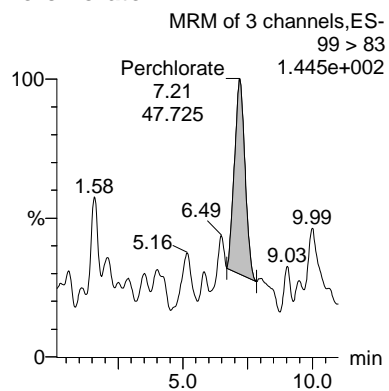
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

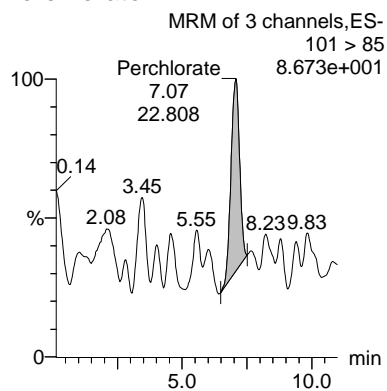
MA
 04/14/2017

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Time: 19:27:52
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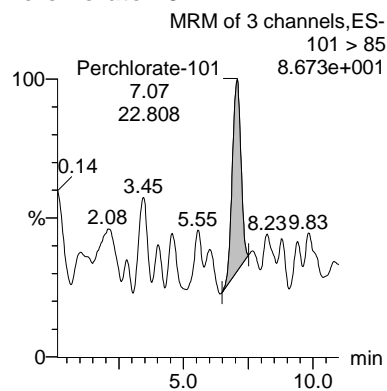
Perchlorate



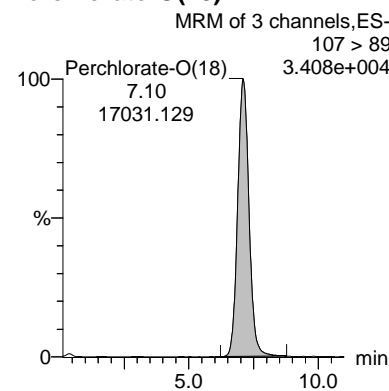
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
1203767385	Perchlorate	99 > 83	7.21	47.725	0.001	bb			0.0014			9.280 2.09
1203767385	Perchlorate-101	101 > 85	7.07	22.808	0.001	bb			0.0019			8.280
1203767385	Perchlorate-O(18)	107 > 89	7.10	17031.129	17031.129	bb			0.4977	99.54	-0.46	2642.1...

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LCS

Date Received: 13-APR-17

GEL Job No (SDG): 420545

GEL Sample ID: 1203767386

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L		1	13-APR-17 19:41	per0413014a
	Perchlorate-O(18)			0.483	ug/L		1	13-APR-17 19:41	per0413014a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

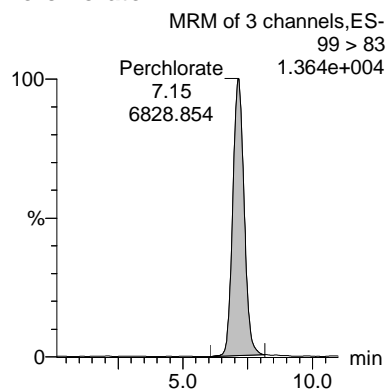
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

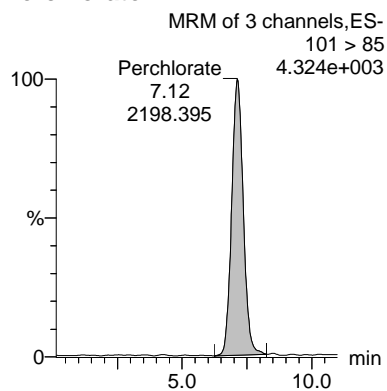
MA
 04/14/2017

Name: per0413014a
Date: 13-Apr-2017
Time: 19:41:52
ID: 1203767386
Vial: 1:3,B

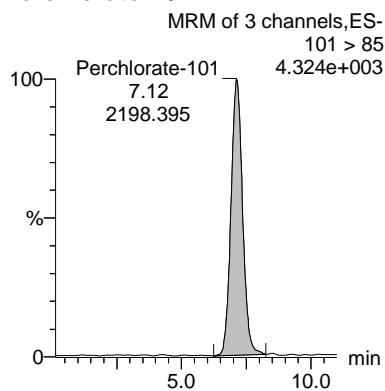
Perchlorate



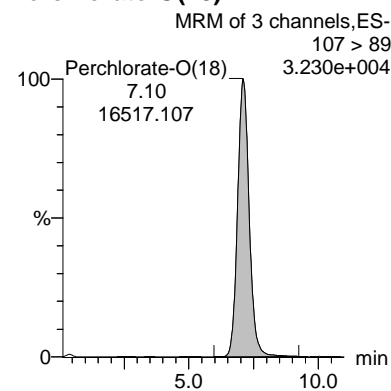
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203767386	Perchlorate	99 > 83	7.15	6828.854	0.207	bb			0.2002	100.10	0.10	1718.0...	3.11
1203767386	Perchlorate-101	101 > 85	7.12	2198.395	0.067	bb			0.1921	96.05	-3.95	712.142	
1203767386	Perchlorate-O(18)	107 > 89	7.10	16517.107	16517.107	bb			0.4827	96.53	-3.47	1803.5...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 420545

GEL Sample ID: 1203767394

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.205	ug/L		1	13-APR-17 19:55	per0413015a
	Perchlorate-O(18)			0.522	ug/L		1	13-APR-17 19:55	per0413015a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

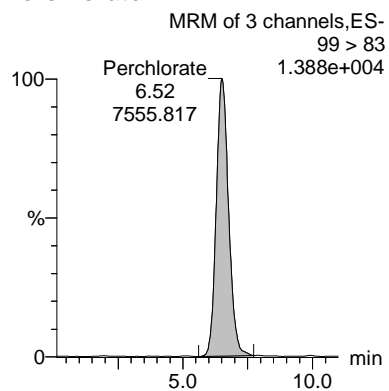
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 Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

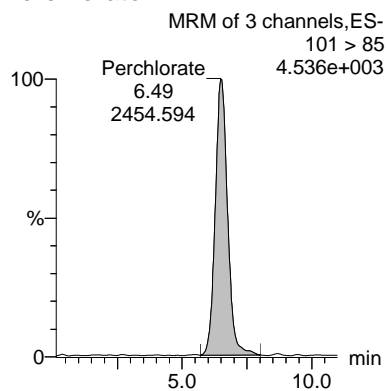
MA
 04/14/2017

Name: per0413015a
Date: 13-Apr-2017
Time: 19:55:52
ID: 1203767394
Vial: 1:3,C

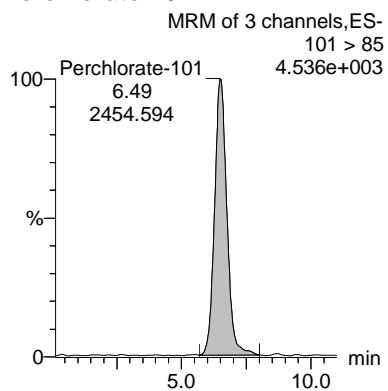
Perchlorate



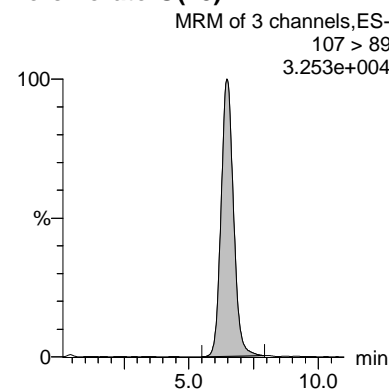
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203767394	Perchlorate	99 > 83	6.52	7555.817	0.212	bb			0.2049	102.45	2.45	788.238	3.08
1203767394	Perchlorate-101	101 > 85	6.49	2454.594	0.069	bb			0.1984	99.20	-0.80	342.562	
1203767394	Perchlorate-O(18)	107 > 89	6.46	17856.494	17856.494	bb			0.5218	104.36	4.36	2195.4...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655898

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP140-7431-GRABMS

Date Received: 13-APR-17

GEL Job No (SDG): 420545

GEL Sample ID: 1203767387

Date Filtered: 13-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	200	800	6360	ug/L		4000	13-APR-17 20:23	per0413017a
	Perchlorate-O(18)			1770	ug/L		4000	13-APR-17 20:23	per0413017a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

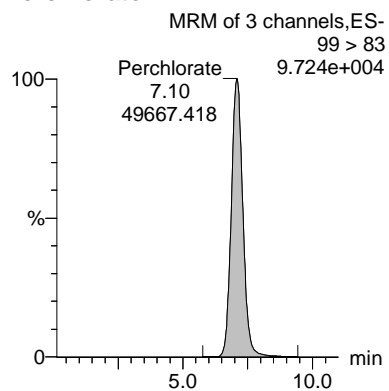
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GL
 04/14/2017

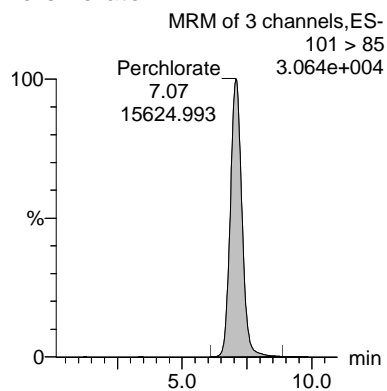
MA
 04/14/2017

Name: per0413017a
Date: 13-Apr-2017
Time: 20:23:50
ID: 1203767387
Vial: 1:3,E

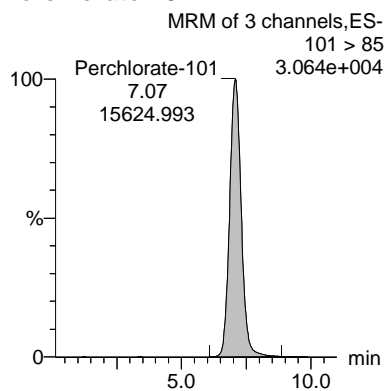
Perchlorate



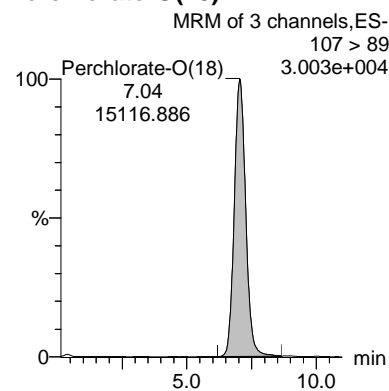
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203767387	Perchlorate	99 > 83	7.10	49667.418	1.643	bb			1.5910	795.48	695.48	6732.7...	3.18
1203767387	Perchlorate-101	101 > 85	7.07	15624.993	0.517	bb			1.4918	745.92	645.92	2624.1...	
1203767387	Perchlorate-O(18)	107 > 89	7.04	15116.886	15116.886	bb			0.4417	88.35	-11.65	1363.3...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1655898Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP140-7431-GRABMSDDate Received: 13-APR-17GEL Job No (SDG): 420545GEL Sample ID: 1203767388Date Filtered: 13-APR-17Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	200	800	6580	ug/L		4000	13-APR-17 20:37	per0413018a
	Perchlorate-O(18)			1880	ug/L		4000	13-APR-17 20:37	per0413018a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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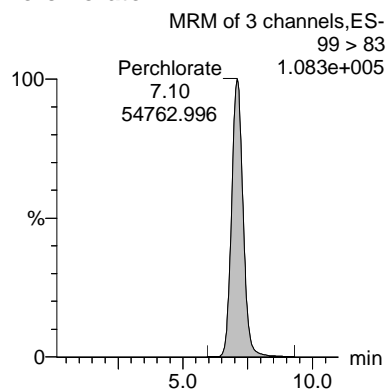
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GL
04/14/2017

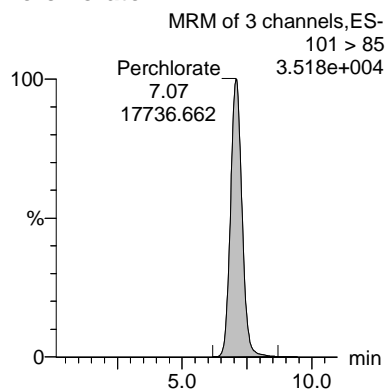
MA
04/14/2017

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Vial: 1:3,F

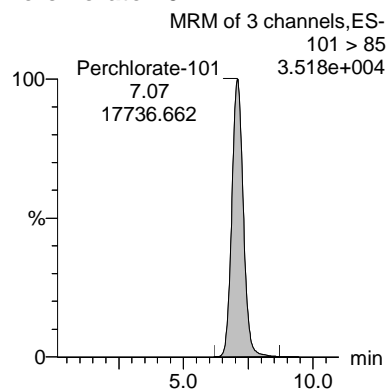
Perchlorate



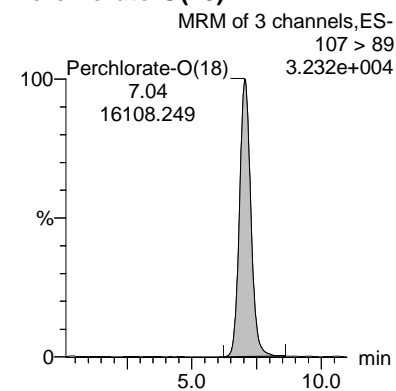
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203767388	Perchlorate	99 > 83	7.10	54762.996	1.700	bb			1.6462	823.12	723.12	7621.9...	3.09
1203767388	Perchlorate-101	101 > 85	7.07	17736.662	0.551	bb			1.5892	794.62	694.62	5890.5...	
1203767388	Perchlorate-O(18)	107 > 89	7.04	16108.249	16108.249	bb			0.4707	94.14	-5.86	2364.8...	

Perchlorate Initial Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420545Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	13-APR-17	per0413001a	IPB001
Perchlorate-101	0.00	0	NA	13-APR-17	per0413001a	IPB001
Perchlorate	0.00	0	NA	13-APR-17	per0413002a	IPB001
Perchlorate-101	0.00	0	NA	13-APR-17	per0413002a	IPB001

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per041317a.qld
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 Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

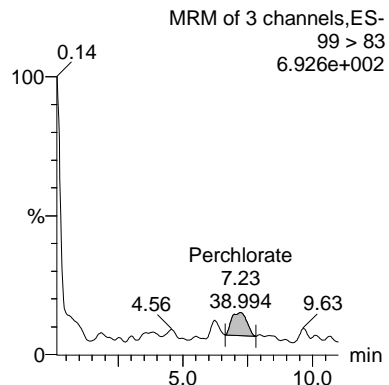
GL
 04/14/2017

MA
 04/14/2017

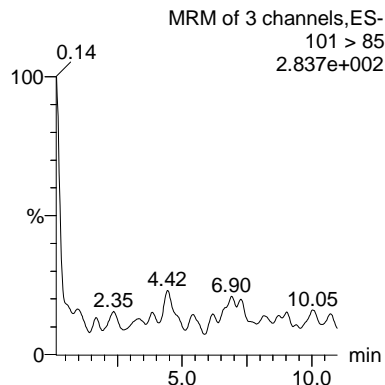
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Name: per0413001a
 Date: 13-Apr-2017
 Time: 16:39:50
 ID: IPB001
 Vial: 1:1,A

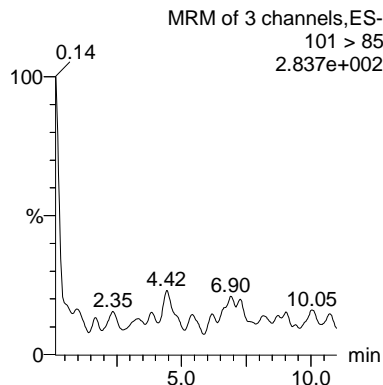
Perchlorate



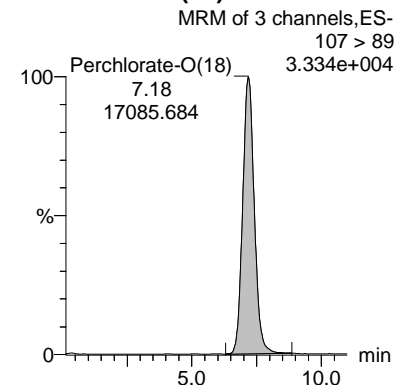
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83	7.23	38.994	0.001	bb			0.0011			2.303 0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	7.18	17085.684	17085.684	bb			0.4993	99.85	-0.15	1622.0...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

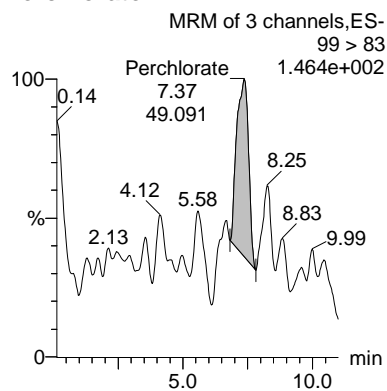
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GL
 04/14/2017

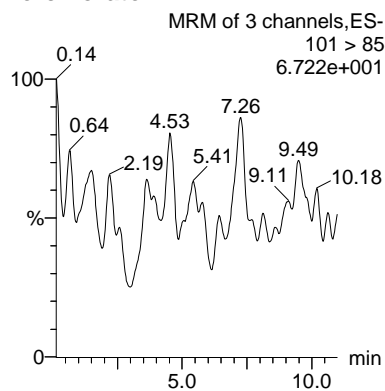
MA
 04/14/2017

Name: per0413002a
Date: 13-Apr-2017
Time: 16:53:54
ID: IPB001
Vial: 1:1,A

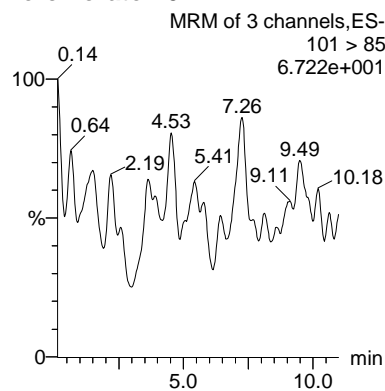
Perchlorate



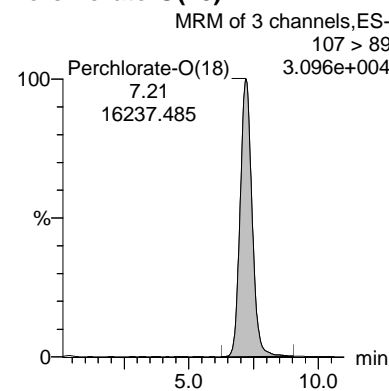
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83	7.37	49.091	0.002	bb			0.0015			5.322 0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	7.21	16237.485	16237.485	bb			0.4745	94.90	-5.10	1879.9...

Perchlorate Continuing Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420545Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	13-APR-17	per0413009a	IPB002
Perchlorate-101	0.00	0	NA	13-APR-17	per0413009a	IPB002
Perchlorate	0.00	0	NA	13-APR-17	per0413011a	IPB003
Perchlorate-101	0.00	0	NA	13-APR-17	per0413011a	IPB003
Perchlorate	0.00	0	NA	13-APR-17	per0413019a	IPB004
Perchlorate-101	0.00	0	NA	13-APR-17	per0413019a	IPB004
Perchlorate	0.00	0	NA	13-APR-17	per0413022a	IPB005
Perchlorate-101	0.00	0	NA	13-APR-17	per0413022a	IPB005

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

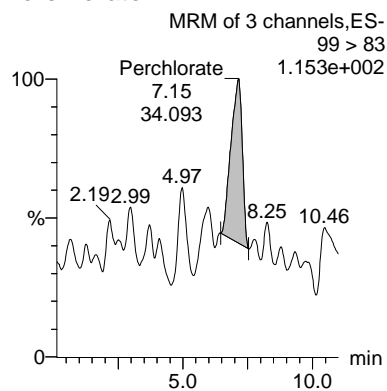
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 Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

GL
 04/14/2017

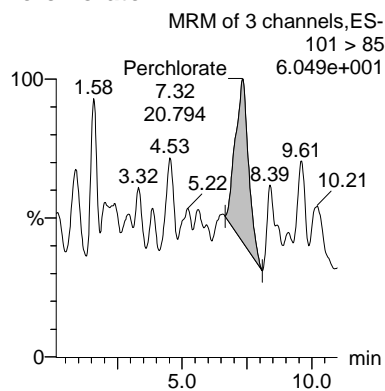
MA
 04/14/2017

Name: per0413009a
 Date: 13-Apr-2017
 Time: 18:31:53
 ID: IPB002
 Vial: 1:1,A

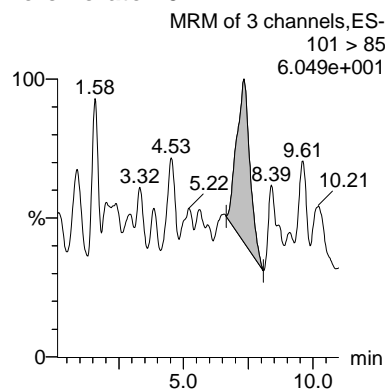
Perchlorate



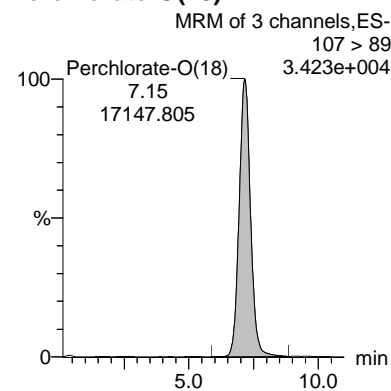
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB002	Perchlorate	99 > 83	7.15	34.093	0.001	bb			0.0010			7.121 1.64
IPB002	Perchlorate-101	101 > 85	7.32	20.794	0.001	bb			0.0018			3.071
IPB002	Perchlorate-O(18)	107 > 89	7.15	17147.805	17147.805	bb			0.5011	100.22	0.22	1902.0...

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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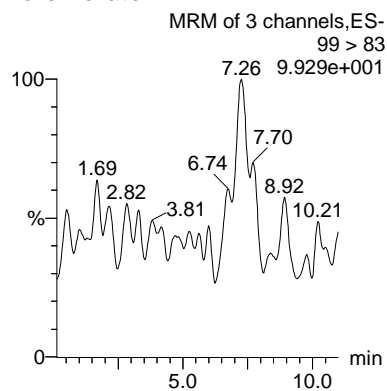
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Printed: Friday, April 14, 2017 8:47:32 AM Eastern Daylight Time

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04/14/2017

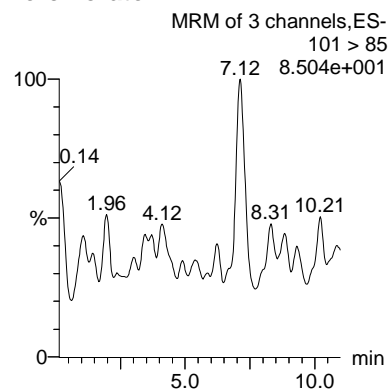
MA
04/14/2017

Name: per0413011a
Date: 13-Apr-2017
Time: 18:59:51
ID: IPB003
Vial: 1:1,A

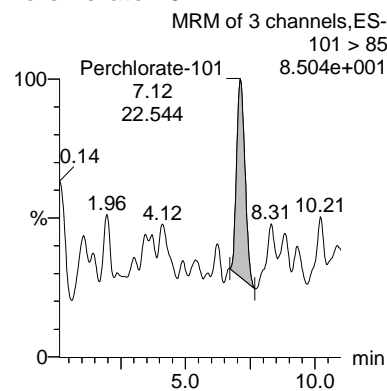
Perchlorate



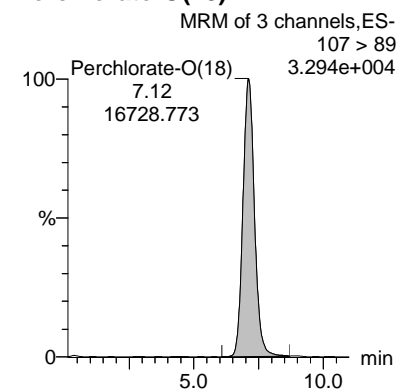
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB003	Perchlorate	99 > 83										0.00
IPB003	Perchlorate-101	101 > 85	7.12	22.544	0.001	bb			0.0019			6.227
IPB003	Perchlorate-O(18)	107 > 89	7.12	16728.773	16728.773	bb			0.4888	97.77	-2.23	2282.3...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

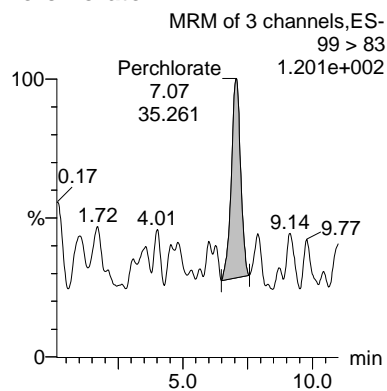
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 04/14/2017

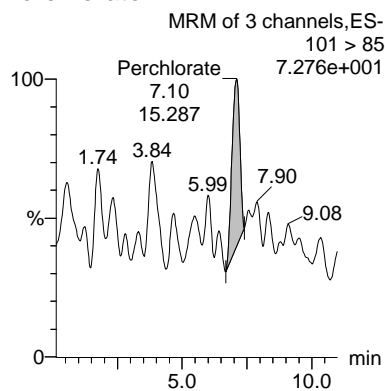
MA
 04/14/2017

Name: per0413019a
Date: 13-Apr-2017
Time: 20:51:49
ID: IPB004
Vial: 1:1,A

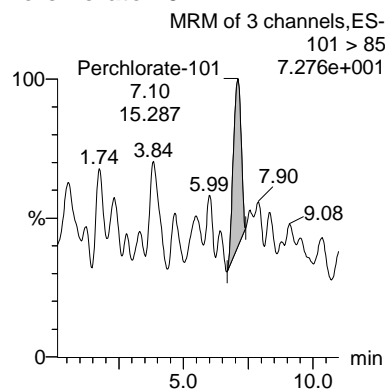
Perchlorate



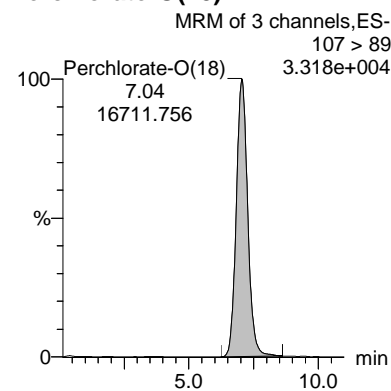
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB004	Perchlorate	99 > 83	7.07	35.261	0.001	bb			0.0010			7.088 2.31
IPB004	Perchlorate-101	101 > 85	7.10	15.287	0.000	bb			0.0013			6.237
IPB004	Perchlorate-O(18)	107 > 89	7.04	16711.756	16711.756	bb			0.4883	97.67	-2.33	2125.1...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

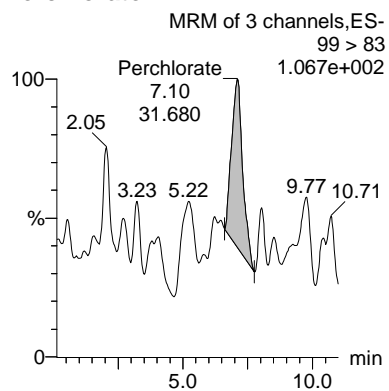
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GL
 04/14/2017

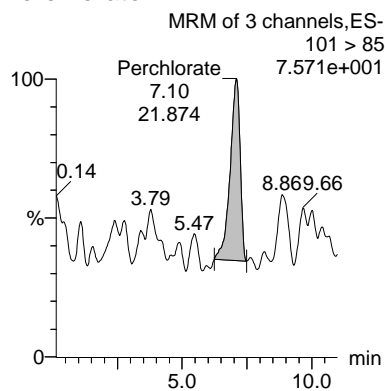
MA
 04/14/2017

Name: per0413022a
Date: 13-Apr-2017
Time: 21:33:48
ID: IPB005
Vial: 1:1,A

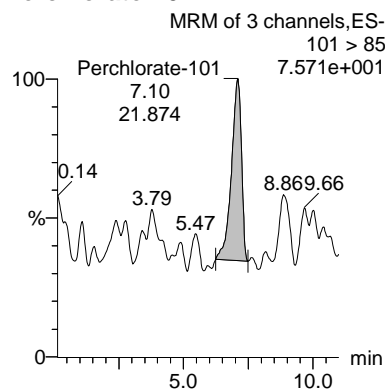
Perchlorate



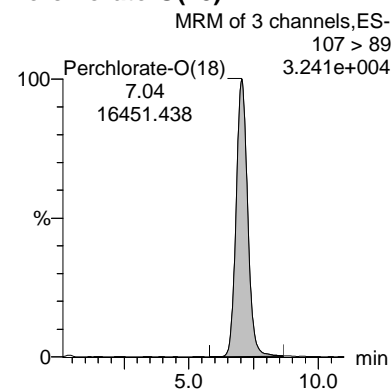
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB005	Perchlorate	99 > 83	7.10	31.680	0.001	bb			0.0009			8.232 1.45
IPB005	Perchlorate-101	101 > 85	7.10	21.874	0.001	bb			0.0019			9.905
IPB005	Perchlorate-O(18)	107 > 89	7.04	16451.438	16451.438	bb			0.4807	96.15	-3.85	1913.6...

Miscellaneous

Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)

Batch ID: 1655898 Verified by: _____
 Analyst: Grace Cappelmann
 Method: SW846 6850 Modified

Lab SOP: GL-OA-E-067 REV# 14
 Instrument: LCMSMS Manual Instrument

Sample ID	Prep Date	Initial Volume (mL)	Final Volume (mL)	Prepped Factor (mL/mL)
1203767385 MB	13-APR-2017 12:00:00	10	10	1
1203767386 LCS	13-APR-2017 12:00:00	10	10	1
1203767394 ICS	13-APR-2017 12:00:00	10	10	1
420545001	13-APR-2017 12:00:00	10	10	1
1203767387 MS (420545001)	13-APR-2017 12:00:00	10	10	1
1203767388 MSD (420545001)	13-APR-2017 12:00:00	10	10	1
420570001	13-APR-2017 12:00:00	10	10	1

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
ICS	1203767394	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	De-salting cartridge: 161107-2.5-Ba/Ag/H
LCS	1203767386	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MS	1203767387	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MSD	1203767388	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
RGNT	All	TYPE 1 Water for HPLC	2457559	10	mL	
RGNT	All	500 ppm Carbonate, Bicarbonate, Chloride, Sulfate	2463729	10	mL	

GEL ORGANIC RUN LOG

INSTRUMENT ID: LC-MS/MS#2

Date: 04/13/17

Method: EPA 6850-Modified

Extr. Injection Volume: 20uL

Int. Std.: UCL161103-01

Sequence Number: per041317a

Mobile Phase Lot#: 2536603, 2457559

SOP: GL-OA-E-067

Initial Calibration Date: 04/13/17

Standard-Samp Reagent Lot#.: 2457559

Alt Check Std. ID: WCL170403-07

DataFile	Sample	Analyst	Injection Date	Batch	SDG	Dilution	Client	Comments	QC_Flag
per0413001a	IPB001	GXC1	4/13/2017 16:39			1		USE	B
per0413002a	IPB001	GXC1	4/13/2017 16:53			1		USE	B
per0413003a	WCLICAL-01	GXC1	4/13/2017 17:07			1		USE	I
per0413004a	WCLICAL-02	GXC1	4/13/2017 17:21			1		USE	I
per0413005a	WCLICAL-03	GXC1	4/13/2017 17:35			1		USE	I
per0413006a	WCLICAL-04	GXC1	4/13/2017 17:49			1		USE	I
per0413007a	WCLICAL-05	GXC1	4/13/2017 18:03			1		USE	I
per0413008a	WCLICAL-06	GXC1	4/13/2017 18:17			1		USE	I
per0413009a	IPB002	GXC1	4/13/2017 18:31			1		USE	B
per0413010a	WCLICV	GXC1	4/13/2017 18:45			1		USE	C
per0413011a	IPB003	GXC1	4/13/2017 18:59			1		USE	B
per0413012a	WCLCRI	GXC1	4/13/2017 19:13			1		USE	C
per0413013a	1203767385	GXC1	4/13/2017 19:27	1655900	Various	1	MBAC	USE	S
per0413014a	1203767386	GXC1	4/13/2017 19:41	1655900	Various	1	MBAC	USE	S
per0413015a	1203767394	GXC1	4/13/2017 19:55	1655900	Various	1	MBAC	USE	S
per0413016a	420545001	GXC1	4/13/2017 20:09	1655900	420545	4000	MBAC	USE	S
per0413017a	1203767387	GXC1	4/13/2017 20:23	1655900	420545	4000	MBAC	USE	S
per0413018a	1203767388	GXC1	4/13/2017 20:37	1655900	420545	4000	MBAC	USE	S
per0413019a	IPB004	GXC1	4/13/2017 20:51			1		USE	B
per0413020a	420570001	GXC1	4/13/2017 21:05	1655900	420570	1	MBAC	USE	S
per0413021a	WCLCCV	GXC1	4/13/2017 21:19			1		USE	C
per0413022a	IPB005	GXC1	4/13/2017 21:33			1		USE	B
per0413023a	WCLCRI	GXC1	4/13/2017 21:47			1		USE	C

DATA EXCEPTION REPORT

Mo.Day Yr. 14-APR-17	Division: Federal	Quality Criteria: Others	Type: Process
Instrument Type: LC-MS/MS	Test / Method: SW846-6850 Modified	Matrix Type: Liquid	Client Code: MBAC001
Batch ID: 1655900	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 420545,420570			
Application Issues: Failed Recovery for MS/MSD, or PS/PSD			
Specification and Requirements Exception Description:		DER Disposition:	
1. There was a 0% recovery observed in 1203767387 (MS) and 1203767388 (MSD) with an acceptance range of 75-125%. The detected concentrations in the MS and MSD were lower than the detected concentration in the parent sample.		2. The outliers observed for the matrix spikes were due to the background concentration in the parent sample, 420545001 (LH18/24-SP140-7) and the need to dilute all at a 1:4000 dilution prior to analysis. Will report data and note in case narrative.	

Originator's Name:

Grace Cappelmann 14-APR-17

Data Validator/Group Leader:

Michael Penny 14-APR-17

Isotope Ratio Criteria

Isotope Ratio $^{35}\text{Cl}/^{37}\text{Cl}$

2.31-3.85

Tune Criteria

The tuning solution is introduced directly into the mass spectrometer using the ESI interface in the positive ion mode. The mass range scanned is 20 to 1100 amu using at least six scans. The observed mass for the target compound in the daily calibration standards must be within 0.2 amu of the expected value. If it is greater than 0.2 amu, then a mass calibration is performed and the instrument is re-calibrated.



April 26, 2017

Mr. Adriane Steed
Microbac Laboratories, Inc.
158 Starlite Drive
Marietta, Ohio 45750

Re: Perchlorate-Steed
Work Order: 420730

Dear Mr. Steed:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 14, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4778.

Sincerely,

Hope Taylor
Project Manager

Purchase Order: SIGNED QUOTE
Enclosures

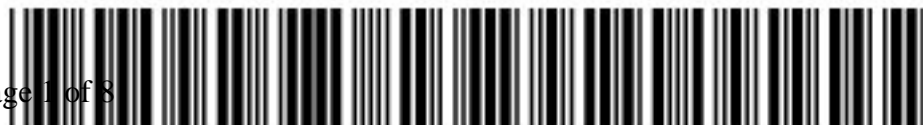


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Case Narrative

**Receipt Narrative
for
Microbac Laboratories
SDG: 420730**

April 26, 2017

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on April 14, 2017 for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

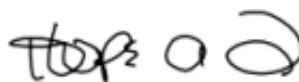
Sample Identification: The laboratory received the following sample:

<u>Laboratory ID</u>	<u>Client ID</u>
420730001	LH18/24-SP650-6432-Grab

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Perchlorates by LCMSMS.



Hope Taylor
Project Manager

Chain of Custody and Supporting Documentation

420730

CHAIN OF CUSTODY

Name Of Lab Shipping To: GEL Laboratories (843) 556-8171 ATTN: HOPE TAYLOR

Project: AECOM LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS		Project No.: 60256135.GWTP HRUMAR16	
Job: GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES			
Prepared By: Scott Beesinger		P.O. Number	
Field Sample I.D. LH18/24-SP650-6432-Grab	Sample Matrix Water	Date / Time 04/13/17 / 15:00	MS / MSD 1
NO. OF CONTAINERS 1		PERCHLORATE	
Analyses		Remarks (Preservatives, etc.)	Lab I.D.#
Additional Remarks: STANDARD TAT Send results to Linda Raabe at linda.raabe@aecom.com or call at 210-253-7518			
Relinquished By: Scott Beesinger	Date 04/13/17	Time 15:30	Received By: [Signature]
Date 4-14-17	Time 9:35	Relinquished By:	Date 4/14/17
Time 15:30	Received By:	Date 4-14-17	Time 9:35

Received At Lab By:			
Date	Time	Airbill No.	For Lab Use Only
Date	Time	Date	Temp of Container
Date	Time	Date	Seal No.
Date	Time	Date	Condition
Remarks:			

Laboratory Certifications

List of current GEL Certifications as of 26 April 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
Microbac Laboratories (MBAC)
SDG #: 420730**

Method/Analysis Information

Procedure: **Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)**

Analytical Method: SW846 6850 Modified

Prep Method: SW846 6850 Modified

Analytical Batch Number: 1657660

Prep Batch Number: 1657659

Sample Analysis

Sample ID	Client ID
420730001	420730001 (LH18/24-SP650-6432-Grab)
1203771533	Interference Check Sample (ICS)
1203771529	Method Blank (MB)
1203771530	Laboratory Control Sample (LCS)
1203771531	420730001(LH18/24-SP650-6432-Grab) Matrix Spike (MS)
1203771532	420730001(LH18/24-SP650-6432-Grab) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-067 REV# 14.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG. Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

ICV Requirements

All associated initial calibration verification standard(s) (ICV) met the acceptance criteria.

CCB Requirements

All continuing calibration blanks (CCB) bracketing the analyses associated with this batch were within acceptance criteria.

CCV Requirements

All continuing calibration checks (CCV) requirements were met by all bracketing CCV standards.

Low Level Standard (CRI) Requirements

All low level calibration verification (CRI) requirements were met by all bracketing CRI standards.

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Interference Check Sample (ICS)

The ICS spike recoveries met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 420730001 (LH18/24-SP650-6432-Grab) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPDs between the MS and MSD met the acceptance limits.

Internal Standard Area Acceptance

The internal standard areas were within the required acceptance criteria for all samples and QC.

Retention Time

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard. The presence of Perchlorate was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by DOD QSM 5.0, has been used. In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

Technical Information**Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Manual Integrations

Manual integrations were not required for any data file associated with this SDG.

Method Comments

The samples in this SDG were not originally analyzed using EPA Method 314.0.

Additional Comments

Comments pertaining to Perchlorate-101 and/or the Perchlorate Isotope Ratio are applicable only when the client requests Perchlorate-101 and/or the Perchlorate Isotope Ratio be reported. Due to software constraints, Perchlorate, Perchlorate-101 and/or the Perchlorate Isotope Ratio may appear on raw data and comments referring to them may appear on certain Forms whether or not the client has requested one or all of them be reported. Due to software limitations, all initial calibration blanks must be designated as IPB001 in order for the forms to be correct. The retention time marker, Perchlorate-O (18), is added to all samples, instrument blanks, and standards Prior to injection. It is used to verify the retention time of Perchlorate and Perchlorate-101 and to insure an accurate injection occurred. Due to various anions affecting the recovery of Perchlorate-O (18) and not Perchlorate and Perchlorate-101, the calibration curves of Perchlorate and Perchlorate-101 are internally corrected using Perchlorate-O (18).

Perchlorate Isotope Ratio

The Perchlorate isotope ratio met acceptance criteria for all samples and QC samples. Please see the isotope ratio criteria in the Miscellaneous Section.

System Configuration

The laboratory utilizes a Waters LC 2795 liquid chromatography instrument for Perchlorate analysis. It is coupled with a Micromass Quattro Ultima Mass Spectrometer/Mass Spectrometer. It is designated as LCMSMS #2. It is fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis. The laboratory may also utilize an Agilent 1100 liquid chromatography instrument for Perchlorate analysis. It is coupled with an Applied Biosystems 4000 Mass Spectrometer/Mass Spectrometer, designated as LCMSMS #3 or LCMSMS #4. It is also fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An

electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Chromatographic Columns

The LC-MS/MS Perchlorate analysis was performed on a Quatro Ultima LC/MS/MS.

Chromatographic separation of Perchlorate is accomplished through analysis on the following anion column:

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Qualifier Definition Report
for**

MBAC001 Microbac Laboratories

Client SDG: 420730 GEL Work Order: 420730

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: **Name:** Michael Penny**Date:** 21 APR 2017**Title:** Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6432-Grab

Date Received: 14-APR-17

GEL Job No (SDG): 420730

GEL Sample ID: 420730001

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	20-APR-17 18:18	per0420016a
	Perchlorate-O(18)			0.487	ug/L		1	20-APR-17 18:18	per0420016a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quality Control Summary

Perchlorate Laboratory Control Sample

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No. (SDG): 420730

Extract Batch Code: 1657659

Date Filtered: 20-APR-17

Matrix: WATER

Sample ID: 1203771530

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.194	ug/L	97		85 - 115
Perchlorate-O(18)		.487	ug/L			-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Interference Check Sample

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No. (SDG): 420730Extract Batch Code: 1657659Date Filtered: 20-APR-17Matrix: WATERSample ID: 1203771533

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.199	ug/L	99		70 - 130
Perchlorate-O(18)		.512	ug/L			

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Spike/Spike Duplicate Summary

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No (SDG): 420730Extract Batch Code: 1657659Date Extracted: 20-APR-17GEL MS/PS ID: 1203771531Client ID: LH18/24-SP650-6432-GrabGEL MSD/PSD ID: 1203771532QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	0.0136	ug/L	0.206	96	.21	98	2	30	75 - 125
Perchlorate-O(18)	0	0.487	ug/L	0.485		.479		1		-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate RT And Area Summary

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420730Lab Code: GELHPLC Column: Dionex IonPac AG16Instrument ID: LCMSMS2

Sample ID	Datafile	Run Date	Area	RT	RT CLO4	RRT	Q 0.98-1.02
MidLevel Standard Area	per0420006a	20-APR-17	22576.4				
Lower Area Limit			11288.2				
Upper Area Limit			33864.6				
1203771529	per0420013a	20-APR-17 17:45	21004.2	5.3			
1203771530	per0420014a	20-APR-17 17:56	21537.5	5.3	5.32985	1.006	
1203771533	per0420015a	20-APR-17 18:07	22641.5	5.16	5.21952	1.012	
420730001	per0420016a	20-APR-17 18:18	21539.6	5.11	5.13683	1.005	
1203771531	per0420017a	20-APR-17 18:29	21469.6	5.08	5.10918	1.006	
1203771532	per0420018a	20-APR-17 18:40	21191.1	5.08	5.10918	1.006	

Sample Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6432-Grab

Date Received: 14-APR-17

GEL Job No (SDG): 420730

GEL Sample ID: 420730001

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	20-APR-17 18:18	per0420016a
	Perchlorate-O(18)			0.487	ug/L		1	20-APR-17 18:18	per0420016a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

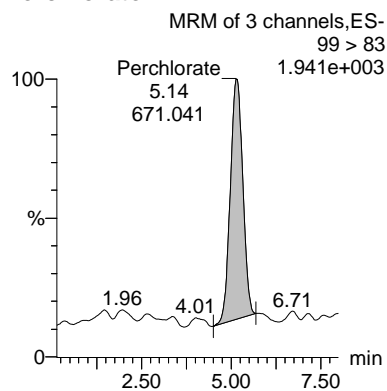
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 04/21/2017

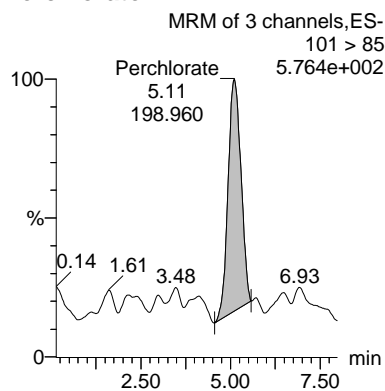
MA
 04/21/2017

Name: per0420016a
Date: 20-Apr-2017
Time: 18:18:35
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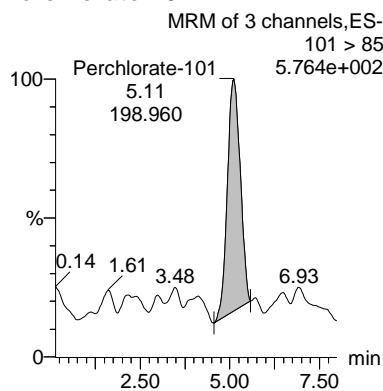
Perchlorate



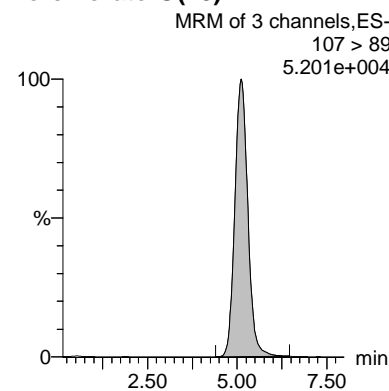
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
420730001	Perchlorate	99 > 83	5.14	671.041	0.016	bb			0.0136			57.275 3.37
420730001	Perchlorate-101	101 > 85	5.11	198.960	0.005	bb			0.0128			28.436
420730001	Perchlorate-O(18)	107 > 89	5.11	21539.586	21539.586	bb			0.4869	97.39	-2.61	2082.0...

Standards

Perchlorate Initial Calibration

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420730Lab Code: GELInstrument ID: LCMSMS2

Date Analyzed: 20-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname

Perchlorate

Coefficient of Determination:

Calibration Curve:

1.14167

Response Type:

Internal Standard

Curve Type:

RF

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 420730

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 20-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate-101

Coefficient of Determination: .

Calibration Curve: .36167

Response Type: Internal Standard

Curve Type: RF

Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Page 1 of 2

Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld

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04/21/2017

Last Altered: Friday, April 21, 2017 8:45:46 AM Eastern Daylight Time

Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

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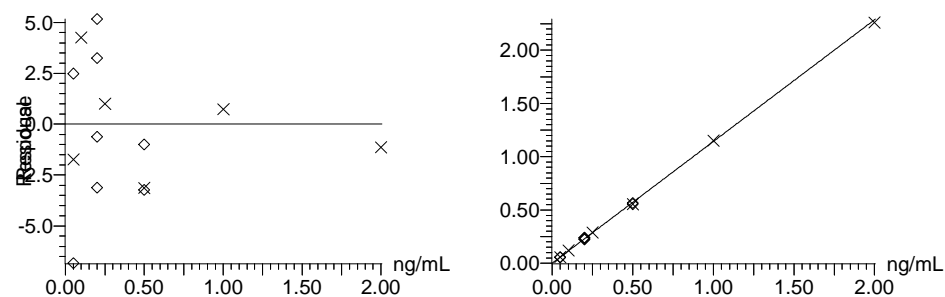
Compound name: Perchlorate

Response Factor: 1.14289

RRF SD: 0.0296455, % Relative SD: 2.59391

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



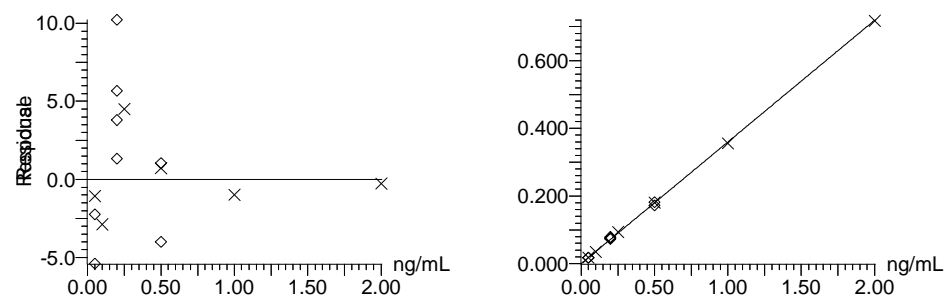
Compound name: Perchlorate-101

Response Factor: 0.359566

RRF SD: 0.00899148, % Relative SD: 2.50064

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld

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Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

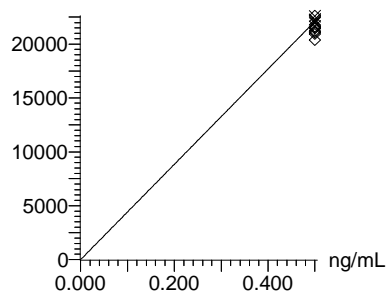
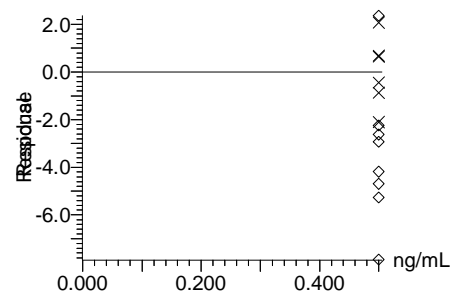
Compound name: Perchlorate-O(18)

Response Factor: 44234.1

RRF SD: 643.87, % Relative SD: 1.45559

Response type: External Std, Area

Curve type: RF



Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

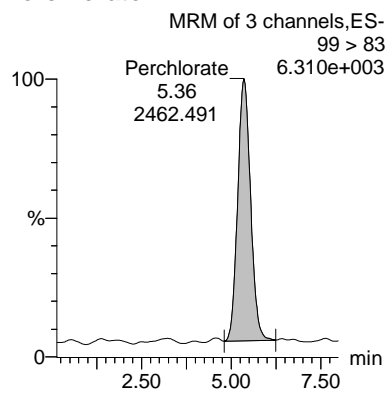
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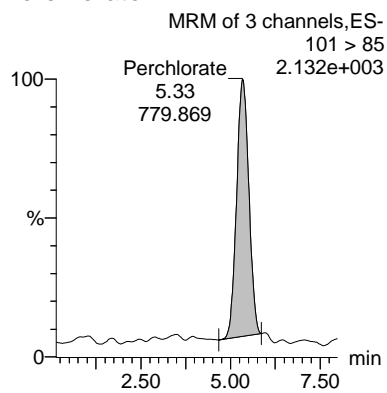
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 04/21/2017

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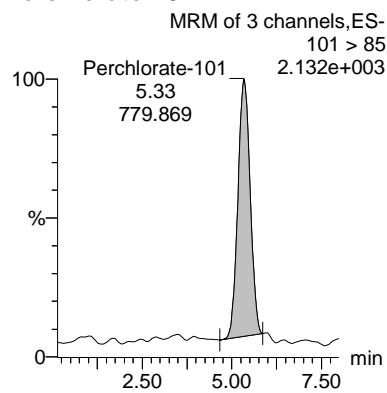
Perchlorate



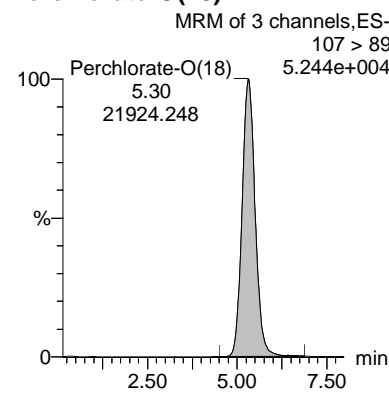
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-01	Perchlorate	99 > 83	5.36	2462.491	0.056	bb			0.0491	98.28	-1.72	109.147	3.16
WCL170417-01	Perchlorate-101	101 > 85	5.33	779.869	0.018	bb			0.0495	98.93	-1.07	77.284	
WCL170417-01	Perchlorate-O(18)	107 > 89	5.30	21924.248	21924.248	bb			0.4956	99.13	-0.87	3548.7...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

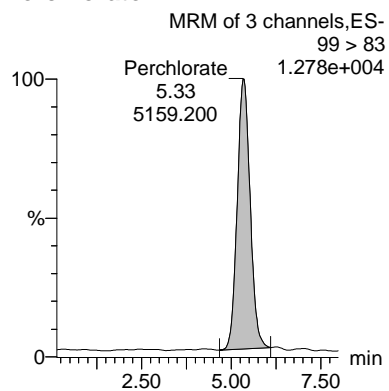
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 04/21/2017

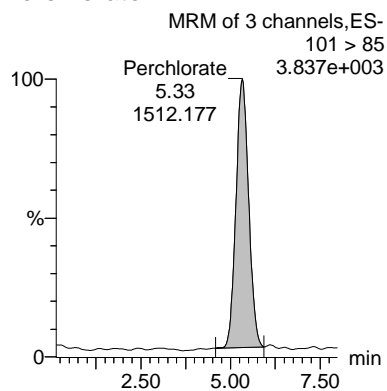
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 04/21/2017

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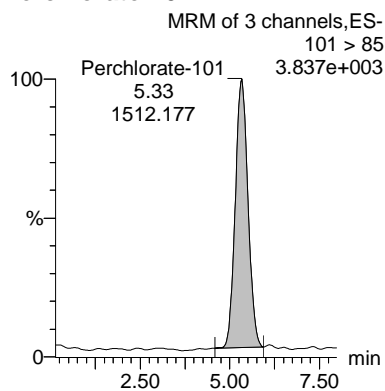
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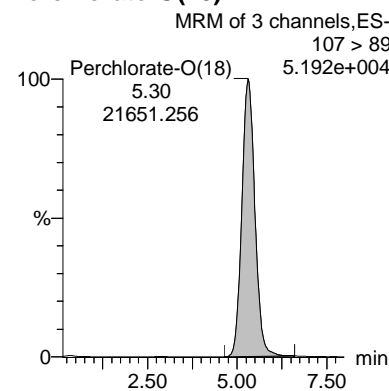
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-02	Perchlorate	99 > 83	5.33	5159.200	0.119	bb			0.1042	104.25	4.25	540.709	3.41
WCL170417-02	Perchlorate-101	101 > 85	5.33	1512.177	0.035	bb			0.0971	97.12	-2.88	122.779	
WCL170417-02	Perchlorate-O(18)	107 > 89	5.30	21651.256	21651.256	bb			0.4895	97.89	-2.11	2515.8...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

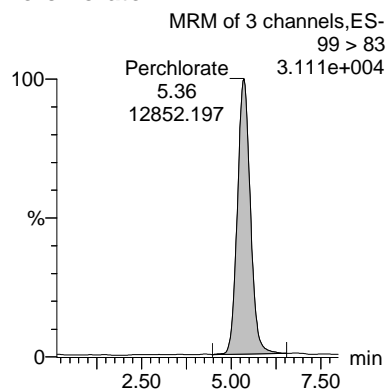
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 04/21/2017

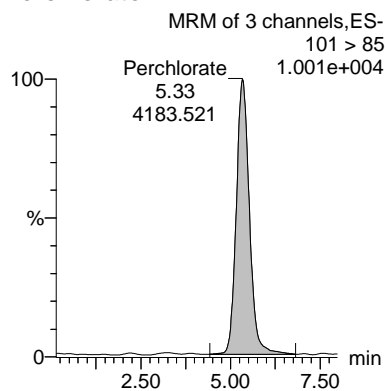
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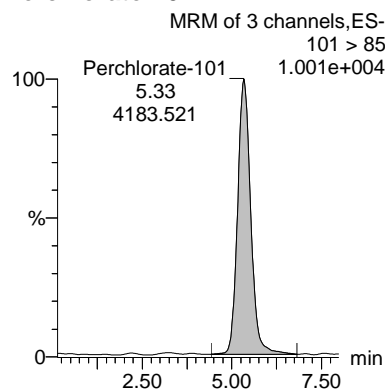
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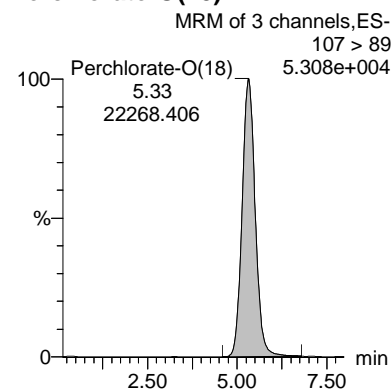
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-03	Perchlorate	99 > 83	5.36	12852.197	0.289	bb			0.2525	101.00	1.00	661.296	3.07
WCL170417-03	Perchlorate-101	101 > 85	5.33	4183.521	0.094	bb			0.2612	104.50	4.50	351.387	
WCL170417-03	Perchlorate-O(18)	107 > 89	5.33	22268.406	22268.406	bb			0.5034	100.68	0.68	1472.3...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

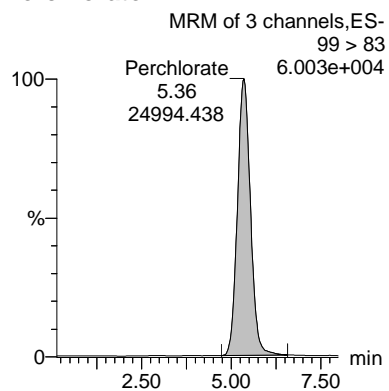
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GL
 04/21/2017

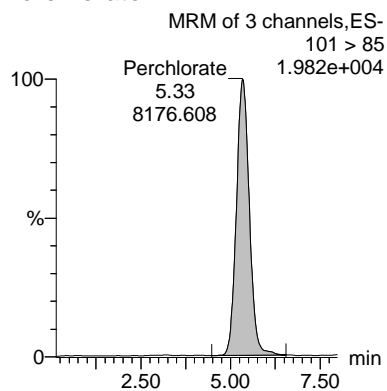
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 04/21/2017

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Date: 20-Apr-2017
Time: 16:29:00
ID: WCL170417-04
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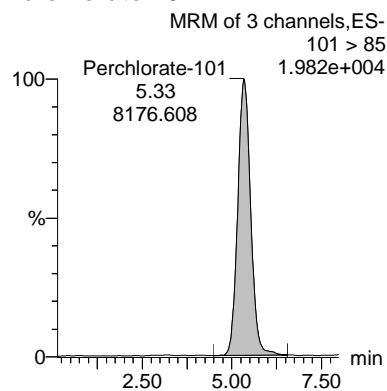
Perchlorate



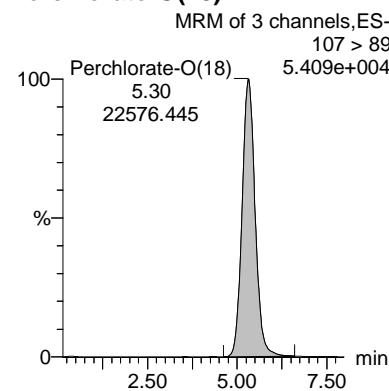
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-04	Perchlorate	99 > 83	5.36	24994.438	0.554	bb			0.4843	96.87	-3.13	1614.8...	3.06
WCL170417-04	Perchlorate-101	101 > 85	5.33	8176.608	0.181	bb			0.5036	100.73	0.73	1249.2...	
WCL170417-04	Perchlorate-O(18)	107 > 89	5.30	22576.445	22576.445	bb			0.5104	102.08	2.08	2590.2...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

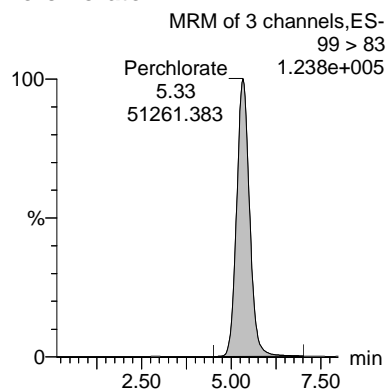
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GL
 04/21/2017

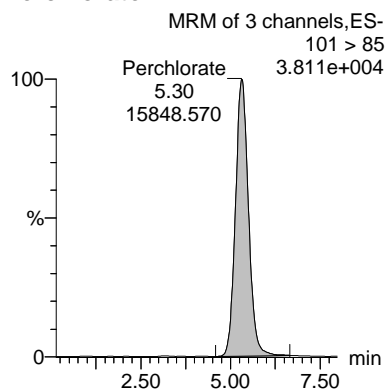
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 04/21/2017

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ID: WCL170417-05
Vial: 1:1,F

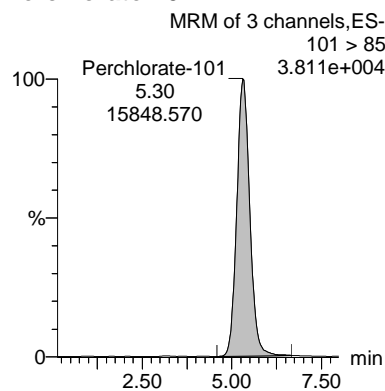
Perchlorate



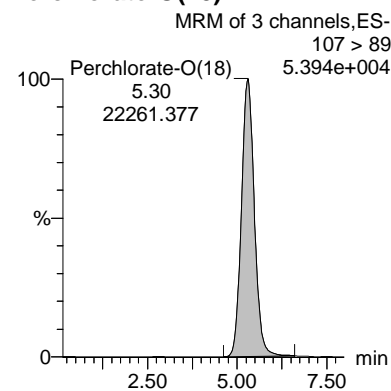
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-05	Perchlorate	99 > 83	5.33	51261.383	1.151	bb			1.0074	100.74	0.74	2490.8...	3.23
WCL170417-05	Perchlorate-101	101 > 85	5.30	15848.570	0.356	bb			0.9900	99.00	-1.00	1716.0...	
WCL170417-05	Perchlorate-O(18)	107 > 89	5.30	22261.377	22261.377	bb			0.5033	100.65	0.65	1840.5...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

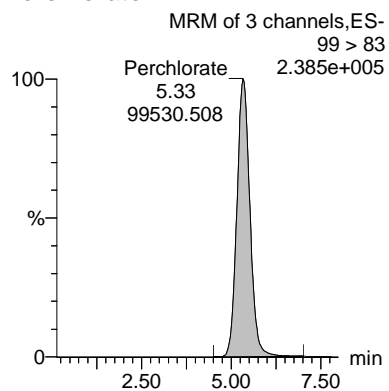
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Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

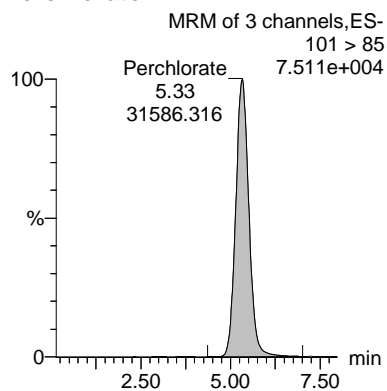
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 04/21/2017

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Date: 20-Apr-2017
Time: 16:50:52
ID: WCL170417-06
Vial: 1:2,A

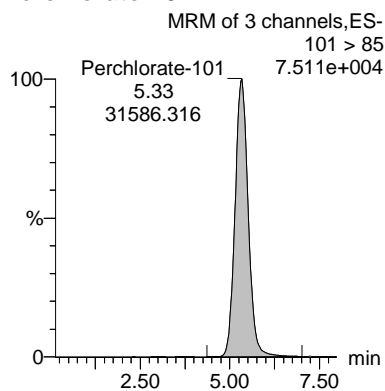
Perchlorate



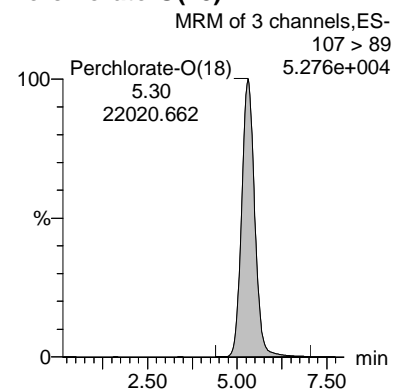
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-06	Perchlorate	99 > 83	5.33	99530.508	2.260	bb			1.9774	98.87	-1.13	5033.6...	3.15
WCL170417-06	Perchlorate-101	101 > 85	5.33	31586.316	0.717	bb			1.9946	99.73	-0.27	5008.5...	
WCL170417-06	Perchlorate-O(18)	107 > 89	5.30	22020.662	22020.662	bb			0.4978	99.56	-0.44	1880.1...	

Perchlorate Initial Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420730Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.48	96.78	20-APR-17 17:12	per0420010a
Perchlorate Isotope Ratio		3.04		20-APR-17 17:12	per0420010a
Perchlorate-101	.5	.51	101.04	20-APR-17 17:12	per0420010a

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

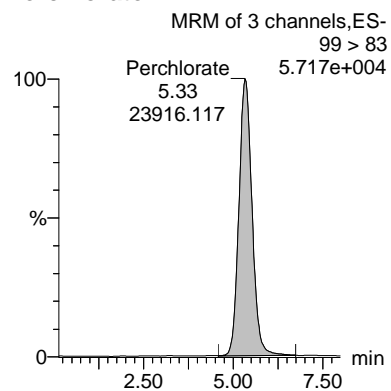
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04/21/2017

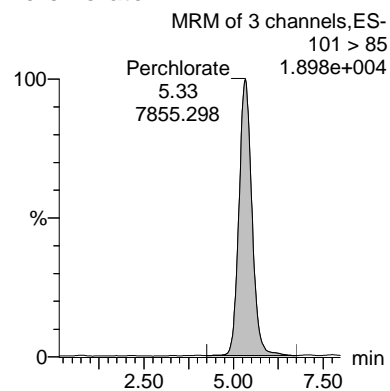
MA
04/21/2017

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Date: 20-Apr-2017
Time: 17:12:46
ID: WCL170417-07ICV
Vial: 1:2,B

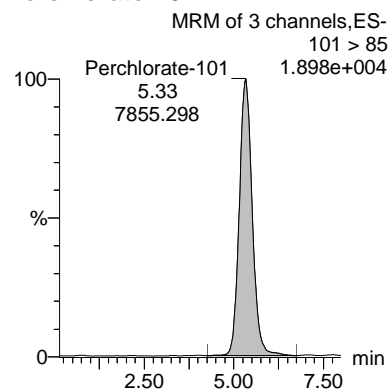
Perchlorate



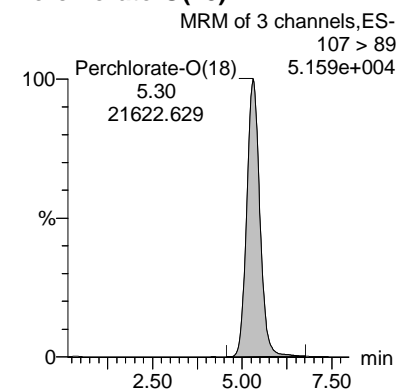
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-07ICV	Perchlorate	99 > 83	5.33	23916.117	0.553	bb			0.4839	96.78	-3.22	939.890	3.04
WCL170417-07ICV	Perchlorate-101	101 > 85	5.33	7855.298	0.182	bb			0.5052	101.04	1.04	598.217	
WCL170417-07ICV	Perchlorate-O(18)	107 > 89	5.30	21622.629	21622.629	bb			0.4888	97.76	-2.24	6519.1...	

Perchlorate Continuing Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420730Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.5	99.01	20-APR-17 19:24	per0420022a
Perchlorate Isotope Ratio		3.28		20-APR-17 19:24	per0420022a
Perchlorate-101	.5	.48	96.01	20-APR-17 19:24	per0420022a

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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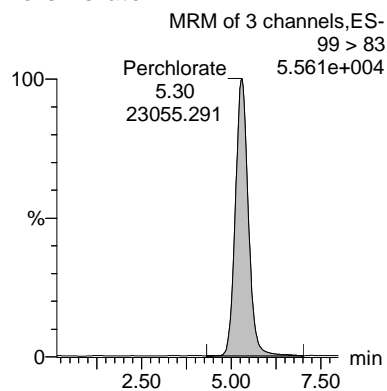
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04/21/2017

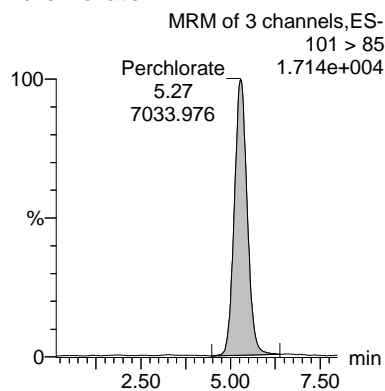
MA
04/21/2017

Name: per0420022a
Date: 20-Apr-2017
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Vial: 1:2,B

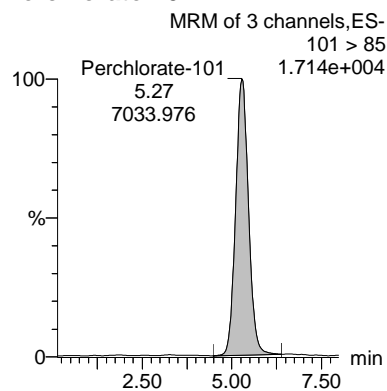
Perchlorate



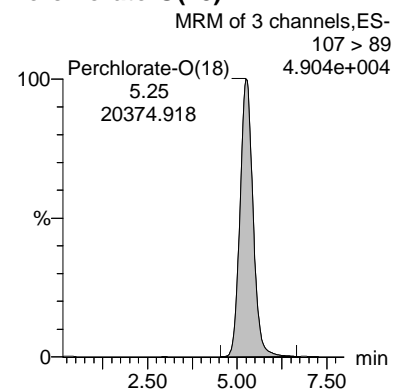
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-07CCV	Perchlorate	99 > 83	5.30	23055.291	0.566	bb			0.4950	99.01	-0.99	1302.3...	3.28
WCL170417-07CCV	Perchlorate-101	101 > 85	5.27	7033.976	0.173	bb			0.4801	96.01	-3.99	712.454	
WCL170417-07CCV	Perchlorate-O(18)	107 > 89	5.25	20374.918	20374.918	bb			0.4606	92.12	-7.88	3530.2...	

Perchlorate MDL Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420730Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.05	.05	93.17	20-APR-17 17:34	per0420012a
Perchlorate Isotope Ratio		3.03		20-APR-17 17:34	per0420012a
Perchlorate-101	.05	.05	97.76	20-APR-17 17:34	per0420012a
Perchlorate	.05	.05	102.49	20-APR-17 19:46	per0420024a
Perchlorate Isotope Ratio		3.44		20-APR-17 19:46	per0420024a
Perchlorate-101	.05	.05	94.6	20-APR-17 19:46	per0420024a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

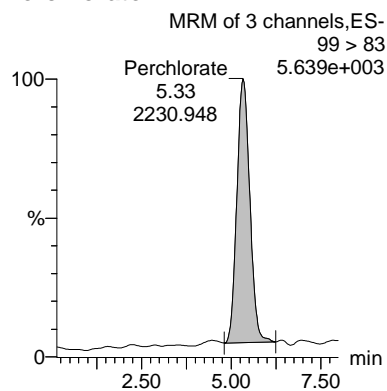
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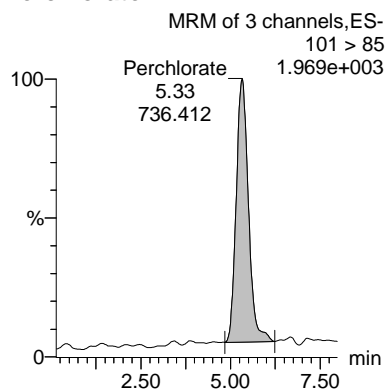
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 04/21/2017

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Vial: 1:2,C

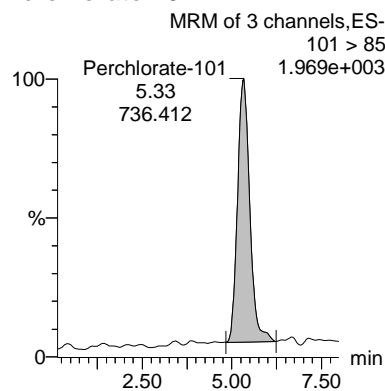
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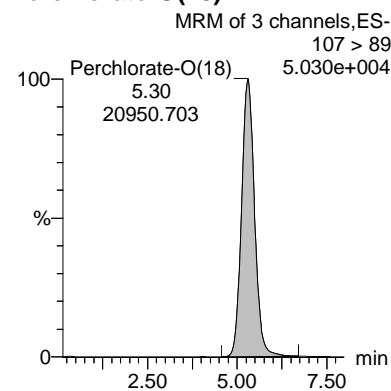
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-08CRI	Perchlorate	99 > 83	5.33	2230.948	0.053	bb			0.0466	93.17	-6.83	131.953	3.03
WCL170417-08CRI	Perchlorate-101	101 > 85	5.33	736.412	0.018	bb			0.0489	97.76	-2.24	110.318	
WCL170417-08CRI	Perchlorate-O(18)	107 > 89	5.30	20950.703	20950.703	bb			0.4736	94.73	-5.27	6290.0...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

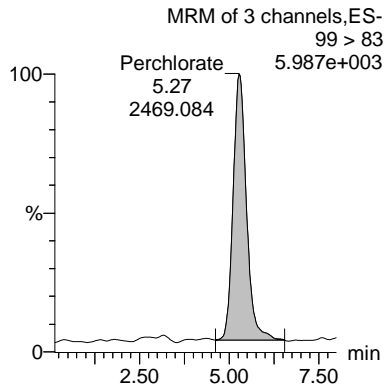
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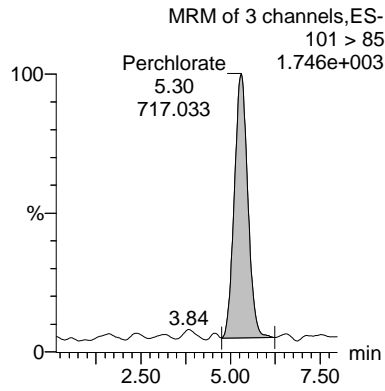
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Time: 19:46:17
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Vial: 1:2,C

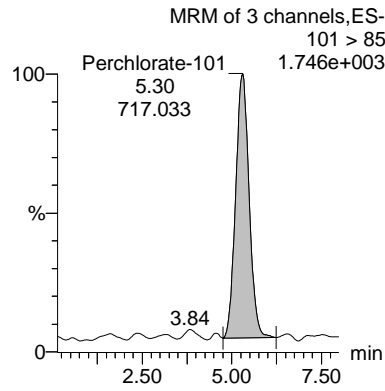
Perchlorate



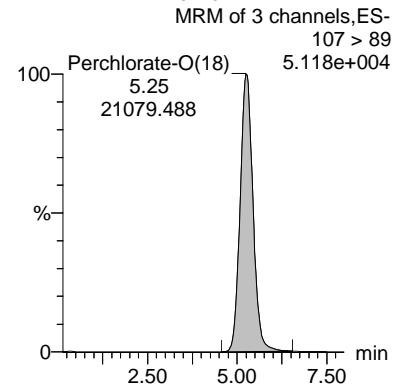
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-08CRI	Perchlorate	99 > 83	5.27	2469.084	0.059	bb			0.0512	102.49	2.49	194.530	3.44
WCL170417-08CRI	Perchlorate-101	101 > 85	5.30	717.033	0.017	bb			0.0473	94.60	-5.40	78.829	
WCL170417-08CRI	Perchlorate-O(18)	107 > 89	5.25	21079.488	21079.488	bb			0.4765	95.31	-4.69	2376.4...	

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

MB

Date Received: 20-APR-17

GEL Job No (SDG): 420730

GEL Sample ID: 1203771529

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	20-APR-17 17:45	per0420013a
	Perchlorate-O(18)			0.475	ug/L		1	20-APR-17 17:45	per0420013a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

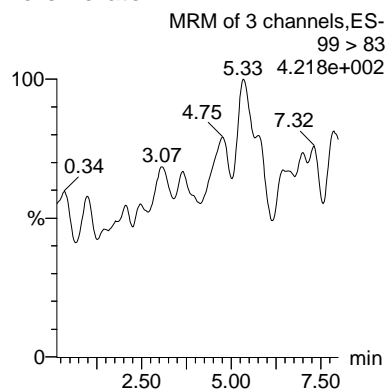
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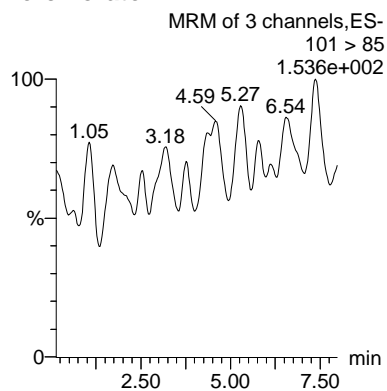
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 04/21/2017

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Time: 17:45:41
ID: 1203771529
Vial: 1:3,A

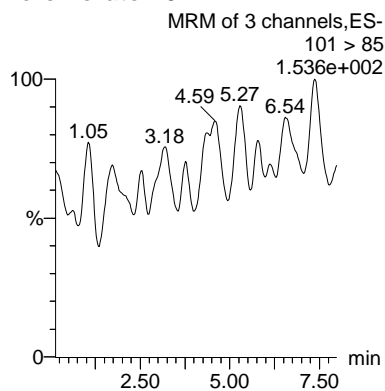
Perchlorate



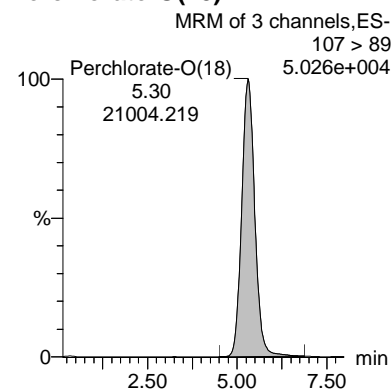
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
1203771529	Perchlorate	99 > 83										0.00
1203771529	Perchlorate-101	101 > 85										
1203771529	Perchlorate-O(18)	107 > 89	5.30	21004.219	21004.219	bb			0.4748	94.97	-5.03	4315.3...

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LCS

Date Received: 20-APR-17

GEL Job No (SDG): 420730

GEL Sample ID: 1203771530

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.194	ug/L	J	1	20-APR-17 17:56	per0420014a
	Perchlorate-O(18)			0.487	ug/L		1	20-APR-17 17:56	per0420014a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

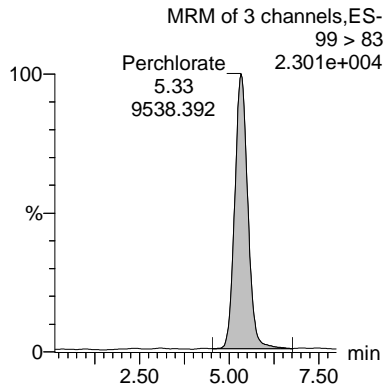
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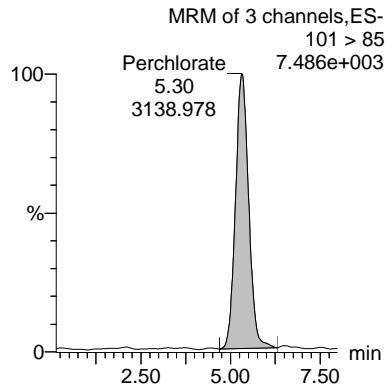
MA
 04/21/2017

Name: per0420014a
Date: 20-Apr-2017
Time: 17:56:39
ID: 1203771530
Vial: 1:3,B

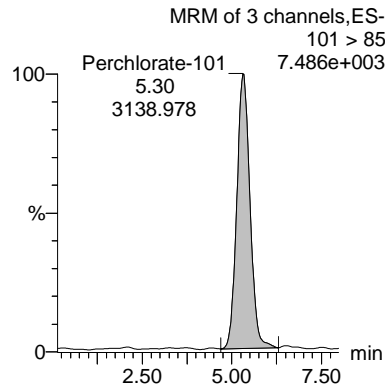
Perchlorate



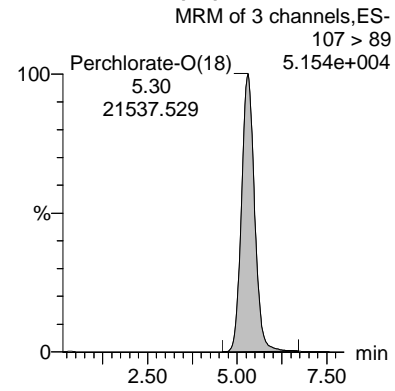
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203771530	Perchlorate	99 > 83	5.33	9538.392	0.221	bb			0.1938	96.88	-3.12	895.674	3.04
1203771530	Perchlorate-101	101 > 85	5.30	3138.978	0.073	bb			0.2027	101.33	1.33	312.496	
1203771530	Perchlorate-O(18)	107 > 89	5.30	21537.529	21537.529	bb			0.4869	97.38	-2.62	3209.6...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 420730

GEL Sample ID: 1203771533

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.199	ug/L	J	1	20-APR-17 18:07	per0420015a
	Perchlorate-O(18)			0.512	ug/L		1	20-APR-17 18:07	per0420015a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

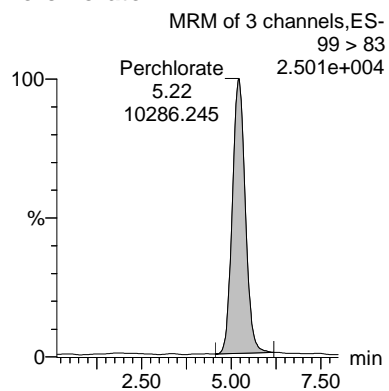
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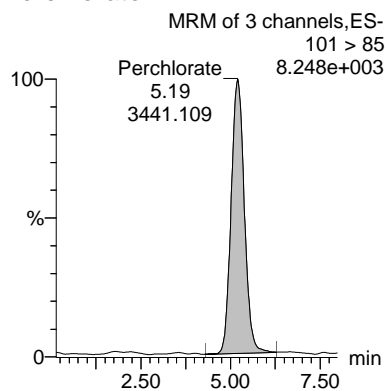
MA
 04/21/2017

Name: per0420015a
Date: 20-Apr-2017
Time: 18:07:37
ID: 1203771533
Vial: 1:3,C

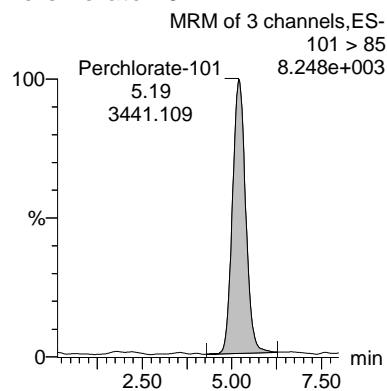
Perchlorate



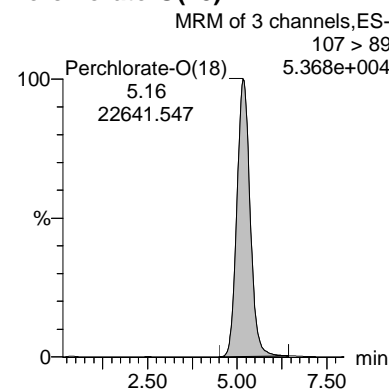
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203771533	Perchlorate	99 > 83	5.22	10286.245	0.227	bb			0.1988	99.38	-0.62	488.550	2.99
1203771533	Perchlorate-101	101 > 85	5.19	3441.109	0.076	bb			0.2113	105.67	5.67	355.887	
1203771533	Perchlorate-O(18)	107 > 89	5.16	22641.547	22641.547	bb			0.5119	102.37	2.37	2967.9...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1657659Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6432-GrabMSDate Received: 14-APR-17GEL Job No (SDG): 420730GEL Sample ID: 1203771531Date Filtered: 20-APR-17Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.206	ug/L		1	20-APR-17 18:29	per0420017a
	Perchlorate-O(18)			0.485	ug/L		1	20-APR-17 18:29	per0420017a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =
Instrument Value X $\frac{\text{Concentrated Extract Volume}}{\text{Aliquot}}$ X $\frac{1}{\% \text{Solids}}$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

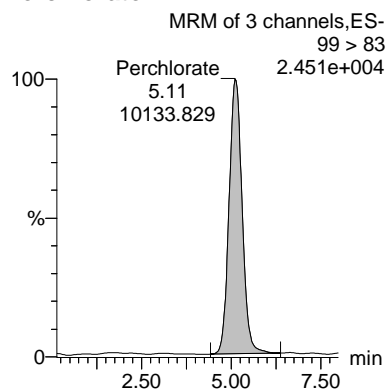
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Printed: Friday, April 21, 2017 10:06:43 AM Eastern Daylight Time

GL
 04/21/2017

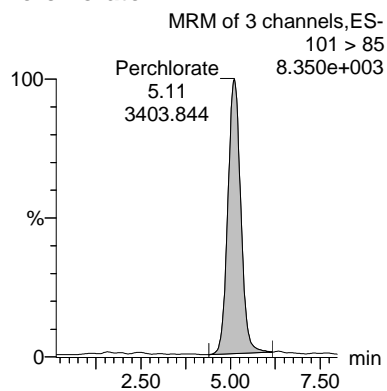
MA
 04/21/2017

Name: per0420017a
Date: 20-Apr-2017
Time: 18:29:32
ID: 1203771531
Vial: 1:3,E

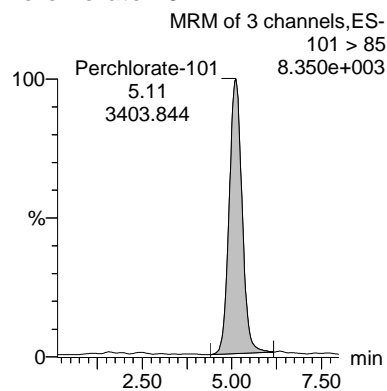
Perchlorate



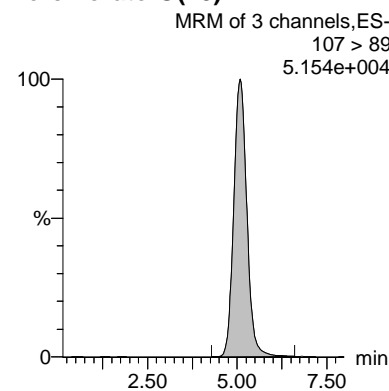
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203771531	Perchlorate	99 > 83	5.11	10133.829	0.236	bb			0.2065	103.25	3.25	462.253	2.98
1203771531	Perchlorate-101	101 > 85	5.11	3403.844	0.079	bb			0.2205	110.23	10.23	875.622	
1203771531	Perchlorate-O(18)	107 > 89	5.08	21469.563	21469.563	bb			0.4854	97.07	-2.93	3600.4...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6432-GrabMSD

Date Received: 14-APR-17

GEL Job No (SDG): 420730

GEL Sample ID: 1203771532

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.210	ug/L		1	20-APR-17 18:40	per0420018a
	Perchlorate-O(18)			0.479	ug/L		1	20-APR-17 18:40	per0420018a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

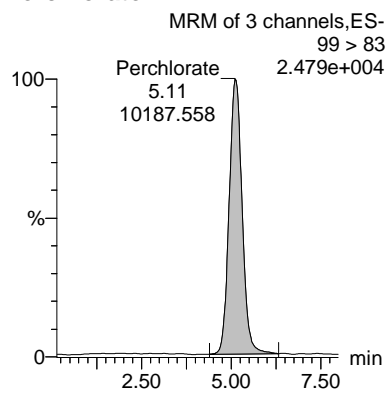
Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld
Last Altered: Friday, April 21, 2017 8:45:46 AM Eastern Daylight Time
Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

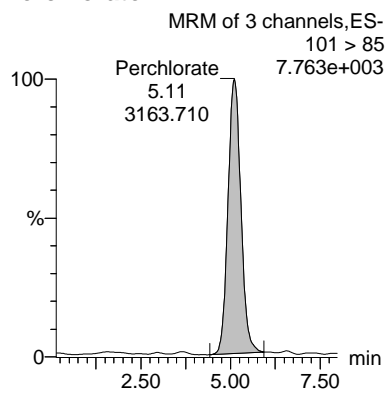
MA
 04/21/2017

Name: per0420018a
Date: 20-Apr-2017
Time: 18:40:30
ID: 1203771532
Vial: 1:3,F

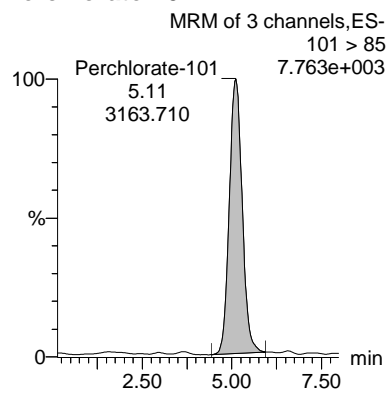
Perchlorate



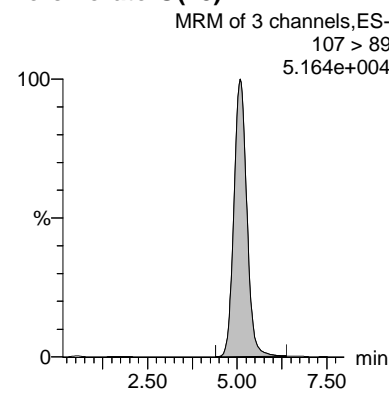
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203771532	Perchlorate	99 > 83	5.11	10187.558	0.240	bb			0.2103	105.16	5.16	496.444	3.22
1203771532	Perchlorate-101	101 > 85	5.11	3163.710	0.075	bb			0.2076	103.80	3.80	269.187	
1203771532	Perchlorate-O(18)	107 > 89	5.08	21191.072	21191.072	bb			0.4791	95.81	-4.19	3939.6...	

Perchlorate Initial Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420730Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	20-APR-17	per0420001a	IPB001
Perchlorate-101	0.00	0	NA	20-APR-17	per0420001a	IPB001
Perchlorate	0.00	0	NA	20-APR-17	per0420002a	IPB001
Perchlorate-101	0.00	0	NA	20-APR-17	per0420002a	IPB001

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld
 Last Altered: Friday, April 21, 2017 8:45:46 AM Eastern Daylight Time
 Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

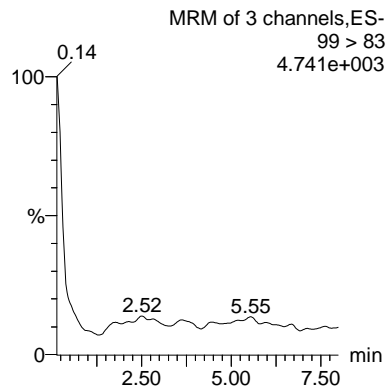
GC
 04/21/2017

MA
 04/21/2017

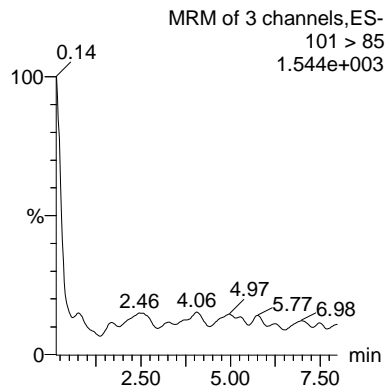
Method: C:\MassLynx\Perchlorate.PRO\MethDB\per042017a.mdb 21 Apr 2017 08:45:14
 Calibration: C:\MassLynx\Perchlorate.PRO\CurveDB\per042017a.cdb 21 Apr 2017 08:45:45

Name: per0420001a
 Date: 20-Apr-2017
 Time: 15:34:11
 ID: IPB001
 Vial: 1:1,A

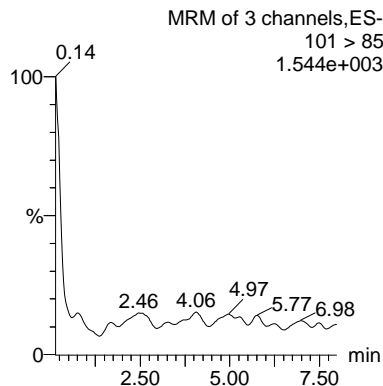
Perchlorate



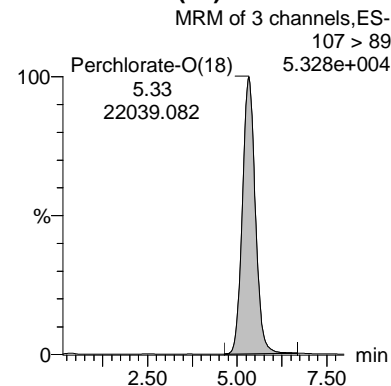
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83										0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	5.33	22039.082	22039.082	bb			0.4982	99.65	-0.35	2779.8...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

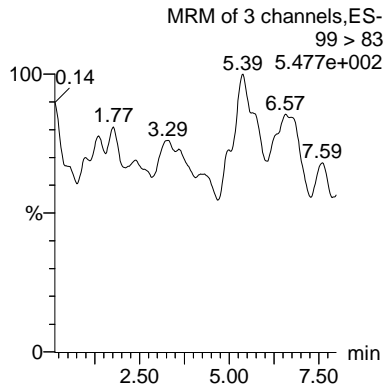
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 Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

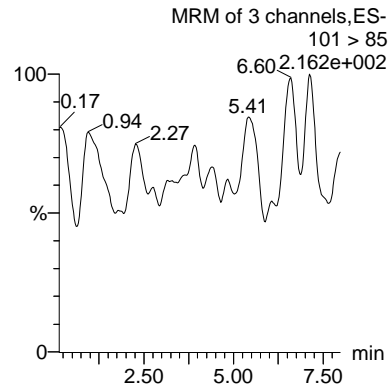
MA
 04/21/2017

Name: per0420002a
Date: 20-Apr-2017
Time: 15:45:12
ID: IPB001
Vial: 1:1,A

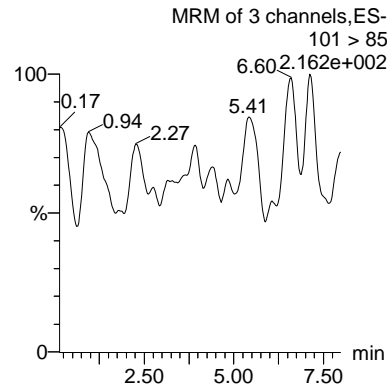
Perchlorate



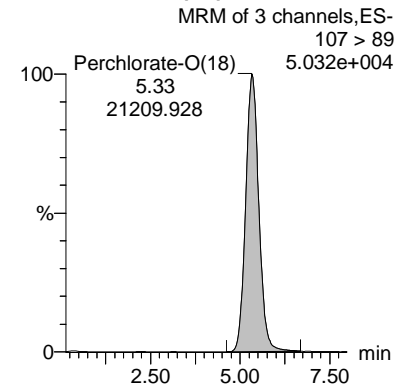
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83										0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	5.33	21209.928	21209.928	bb			0.4795	95.90	-4.10	2997.9...

Perchlorate Continuing Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420730Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	20-APR-17	per0420009a	IPB002
Perchlorate-101	0.00	0	NA	20-APR-17	per0420009a	IPB002
Perchlorate	0.00	0	NA	20-APR-17	per0420011a	IPB003
Perchlorate-101	0.00	0	NA	20-APR-17	per0420011a	IPB003
Perchlorate	0.00	0	NA	20-APR-17	per0420021a	IPB004
Perchlorate-101	0.00	0	NA	20-APR-17	per0420021a	IPB004
Perchlorate	0.00	0	NA	20-APR-17	per0420023a	IPB005
Perchlorate-101	0.00	0	NA	20-APR-17	per0420023a	IPB005

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

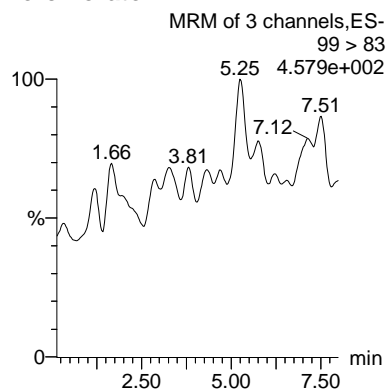
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Last Altered: Friday, April 21, 2017 8:45:46 AM Eastern Daylight Time
Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

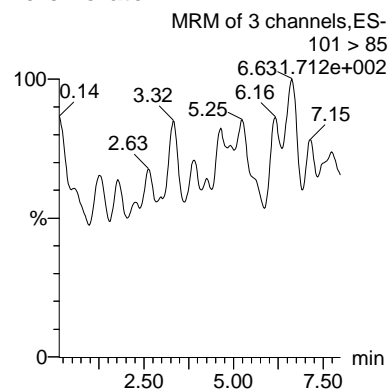
MA
 04/21/2017

Name: per0420009a
Date: 20-Apr-2017
Time: 17:01:49
ID: IPB002
Vial: 1:1,A

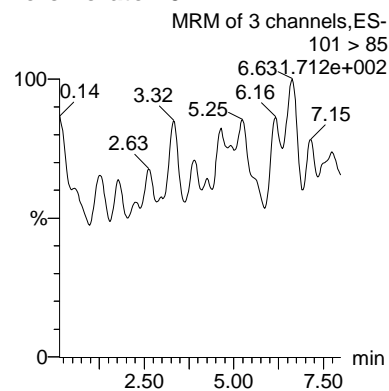
Perchlorate



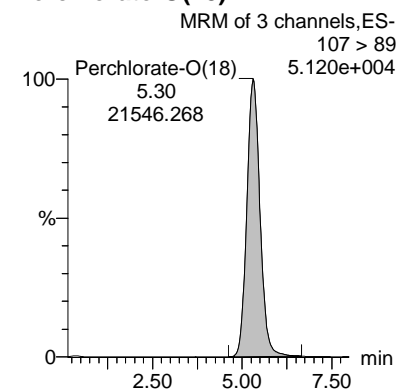
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB002	Perchlorate	99 > 83										0.00
IPB002	Perchlorate-101	101 > 85										
IPB002	Perchlorate-O(18)	107 > 89	5.30	21546.268	21546.268	bb			0.4871	97.42	-2.58	1685.9...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

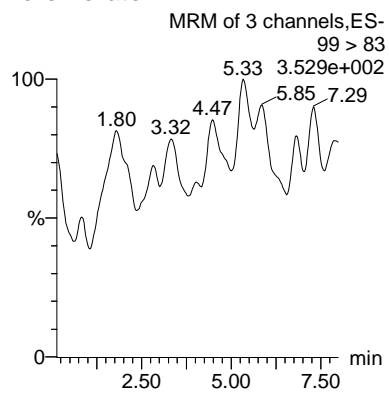
Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld
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Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

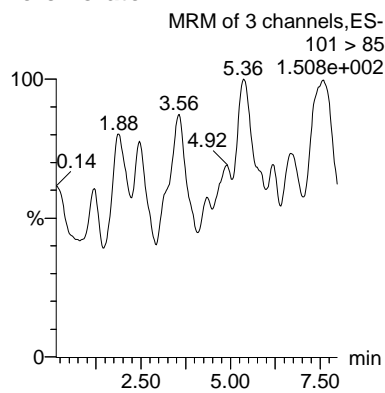
MA
 04/21/2017

Name: per0420011a
Date: 20-Apr-2017
Time: 17:23:45
ID: IPB003
Vial: 1:1,A

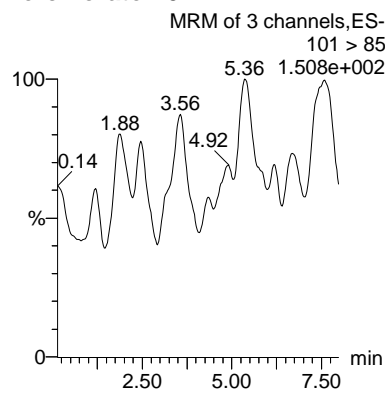
Perchlorate



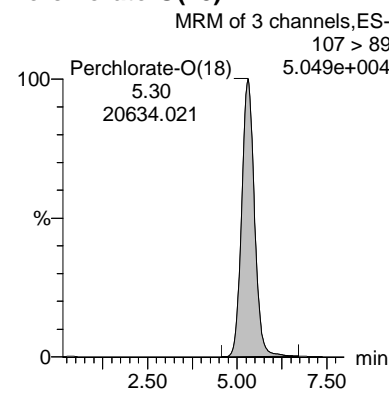
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB003	Perchlorate	99 > 83										0.00
IPB003	Perchlorate-101	101 > 85										
IPB003	Perchlorate-O(18)	107 > 89	5.30	20634.021	20634.021	bb			0.4665	93.29	-6.71	4230.1...

Quantify Sample Report MassLynx 4.0 SP4

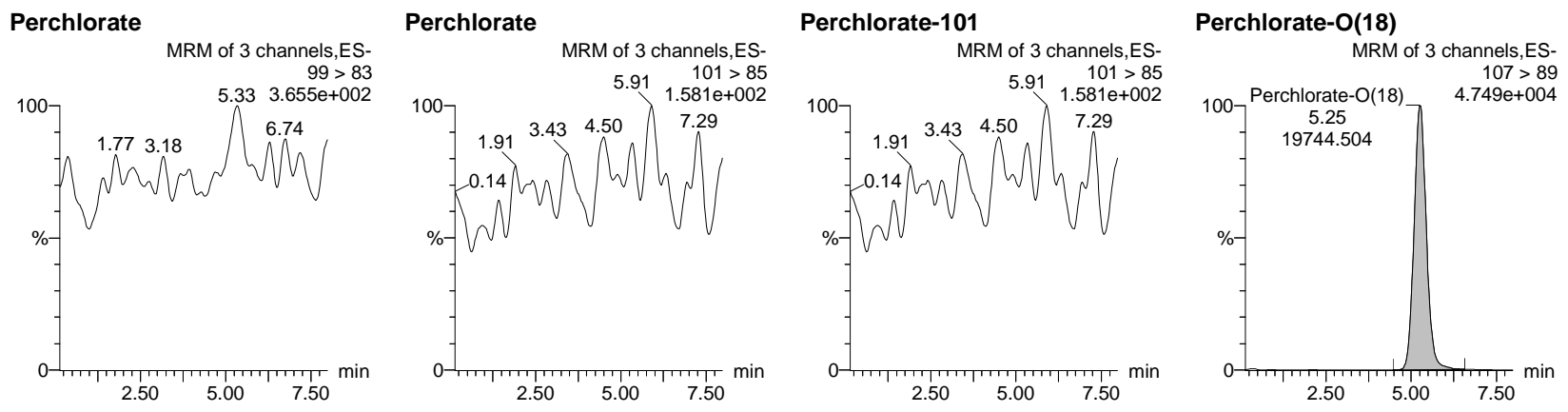
The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld
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 Printed: Friday, April 21, 2017 10:06:43 AM Eastern Daylight Time

GL
04/21/2017

MA
04/21/2017

Name: per0420021a
 Date: 20-Apr-2017
 Time: 19:13:24
 ID: IPB004
 Vial: 1:1,A



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB004	Perchlorate	99 > 83										0.00
IPB004	Perchlorate-101	101 > 85										
IPB004	Perchlorate-O(18)	107 > 89	5.25	19744.504	19744.504	bb			0.4464	89.27	-10.73	2646.5...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

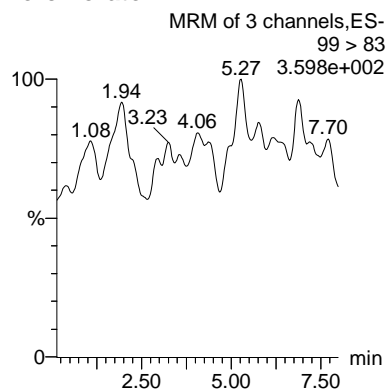
Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld
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Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

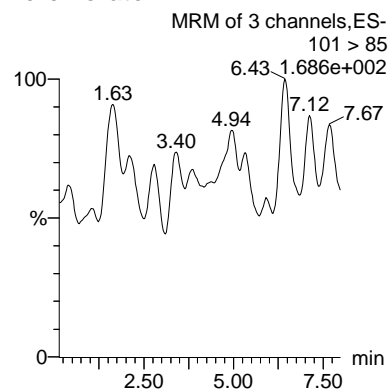
MA
 04/21/2017

Name: per0420023a
Date: 20-Apr-2017
Time: 19:35:19
ID: IPB005
Vial: 1:1,A

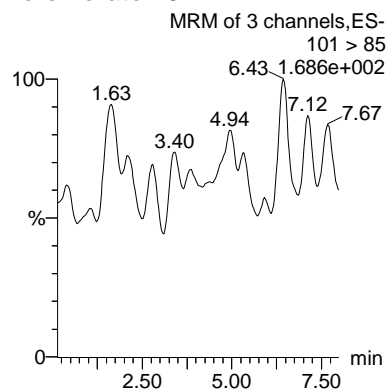
Perchlorate



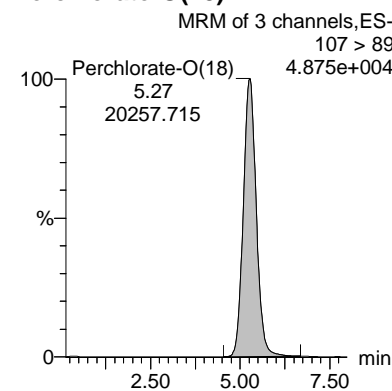
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB005	Perchlorate	99 > 83										0.00
IPB005	Perchlorate-101	101 > 85										
IPB005	Perchlorate-O(18)	107 > 89	5.27	20257.715	20257.715	bb			0.4580	91.59	-8.41	4181.6...

Miscellaneous

Prep Logbook

Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)

Batch ID: 1657659 Verified by: _____
 Analyst: Grace Cappelmann
 Method: SW846 6850 Modified

Lab SOP: GL-OA-E-067 REV# 14
 Instrument: LCMSMS Manual Instrument

Sample ID	Prep Date	Initial Volume (mL)	Final Volume (mL)	Prepped Factor (mL/mL)
1203771529 MB	20-APR-2017 11:30:00	10	10	1
1203771530 LCS	20-APR-2017 11:30:00	10	10	1
1203771533 ICS	20-APR-2017 11:30:00	10	10	1
420730001	20-APR-2017 11:30:00	10	10	1
1203771531 MS (420730001)	20-APR-2017 11:30:00	10	10	1
1203771532 MSD (420730001)	20-APR-2017 11:30:00	10	10	1
421097001	20-APR-2017 11:30:00	10	10	1
421097002	20-APR-2017 11:30:00	10	10	1

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
ICS	1203771533	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	De-salting cartridge: 170221-2.5-Ba/Ag/H
LCS	1203771530	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MS	1203771531	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MSD	1203771532	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
RGNT	All	TYPE 1 Water for HPLC	2457559	10	mL	
RGNT	All	500 ppm Carbonate, Bicarbonate, Chloride, Sulfate	2463729	10	mL	

GEL ORGANIC RUN LOG

INSTRUMENT ID: LC-MS/MS#2

Date: 04/20/17

Method: EPA 6850-Modified

Extr. Injection Volume: 20uL

Int. Std.: UCL161103-01

Sequence Number: per042017a

Mobile Phase Lot#: 2536603, 2457559

SOP: GL-OA-E-067

Initial Calibration Date: 04/20/17

Standard-Samp Reagent Lot#: 2457559

Alt Check Std. ID: WCL170417-07

DataFile	Sample	Analyst	Injection Date	Batch	SDG	Dilution	Client	Comments	QC_Flag
per0420001a	IPB001	GXC1	4/20/2017 15:34			1		USE	B
per0420002a	IPB001	GXC1	4/20/2017 15:45			1		USE	B
per0420003a	WCLICAL-01	GXC1	4/20/2017 15:56			1		USE	I
per0420004a	WCLICAL-02	GXC1	4/20/2017 16:07			1		USE	I
per0420005a	WCLICAL-03	GXC1	4/20/2017 16:18			1		USE	I
per0420006a	WCLICAL-04	GXC1	4/20/2017 16:29			1		USE	I
per0420007a	WCLICAL-05	GXC1	4/20/2017 16:39			1		USE	I
per0420008a	WCLICAL-06	GXC1	4/20/2017 16:50			1		USE	I
per0420009a	IPB002	GXC1	4/20/2017 17:01			1		USE	B
per0420010a	WCLICV	GXC1	4/20/2017 17:12			1		USE	C
per0420011a	IPB003	GXC1	4/20/2017 17:23			1		USE	B
per0420012a	WCLCRI	GXC1	4/20/2017 17:34			1		USE	C
per0420013a	1203771529	GXC1	4/20/2017 17:45	1657660	Various	1	MBAC	USE	S
per0420014a	1203771530	GXC1	4/20/2017 17:56	1657660	Various	1	MBAC	USE	S
per0420015a	1203771533	GXC1	4/20/2017 18:07	1657660	Various	1	MBAC	USE	S
per0420016a	420730001	GXC1	4/20/2017 18:18	1657660	420730	1	MBAC	USE	S
per0420017a	1203771531	GXC1	4/20/2017 18:29	1657660	420730	1	MBAC	USE	S
per0420018a	1203771532	GXC1	4/20/2017 18:40	1657660	420730	1	MBAC	USE	S
per0420019a	421097001	GXC1	4/20/2017 18:51	1657660	421097	1	MBAC	USE	S
per0420020a	421097002	GXC1	4/20/2017 19:02	1657660	421097	10000	MBAC	USE	S
per0420021a	IPB004	GXC1	4/20/2017 19:13			1		USE	B
per0420022a	WCLCCV	GXC1	4/20/2017 19:24			1		USE	C
per0420023a	IPB005	GXC1	4/20/2017 19:35			1		USE	B
per0420024a	WCLCRI	GXC1	4/20/2017 19:46			1		USE	C

Isotope Ratio Criteria

Isotope Ratio $^{35}\text{Cl}/^{37}\text{Cl}$

2.31-3.85

Tune Criteria

The tuning solution is introduced directly into the mass spectrometer using the ESI interface in the positive ion mode. The mass range scanned is 20 to 1100 amu using at least six scans. The observed mass for the target compound in the daily calibration standards must be within 0.2 amu of the expected value. If it is greater than 0.2 amu, then a mass calibration is performed and the instrument is re-calibrated.



Laboratory Report Number: L17040971

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on April 25 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com

Lab Report #: L17040971

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00112413	H	3.0		J4616882265	X
00113657	H	2.0		J4616882201	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

**Lab Report #:** L17040971**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP650-6433	L17040971-01	04/19/2017 15:00	04/20/2017 09:43
TRIP BLANK	L17040971-02	04/19/2017 00:01	04/20/2017 09:43



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040971
Project Name:		Method:	9056
Prep Batch Number(s):	WG611183	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-24 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2017-04-24 16:37:48



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040971
Project Name:		Method:	9056
Prep Batch Number(s):	WG611183	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-24 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040971
Project Name:		Method:	9056
Prep Batch Number(s):	WG611183	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-24 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			1
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040971
Project Name:		Method:	9056
Prep Batch Number(s):	WG611183	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-24 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040971
Project Name:		Method:	9056
Prep Batch Number(s):	WG611183	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-24 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17040971
Project Name:		Method:	9056
Prep Batch Number(s):	WG611183	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-24 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

1. The MS/MSD yielded high recoveries due to the presence of target analytes in the reference sample.

Lab Report #: L17040971

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040971-01	PrePrep Method: N/A	Instrument: HPMS6
Client ID: LH18/24-SP650-6433	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 04/05/2017 22:09
Workgroup #: WG610923	Analyst: TMB	Run Date: 04/20/2017 15:47
Collect Date: 04/19/2017 15:00	Dilution: 1	File ID: 6M146581
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.83	J	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.752	J	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	3.58		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	108	70	120	
4-Bromofluorobenzene	107	75	120	
Dibromofluoromethane	103	85	115	
Toluene-d8	105	85	120	
J	Estimated value ; the analyte concentration was less than the LOQ.			
U	Analyte was not detected. The concentration is below the reported LOD.			

Lab Report #: L17040971
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040971-01	PrePrep Method: N/A	Instrument: IC3
Client ID: LH18/24-SP650-6433	Prep Method: 9056	Prep Date: 04/21/2017 16:25
Matrix: Water	Analytical Method: 9056	Cal Date: 12/01/2016 17:22
Workgroup #: WG611183	Analyst: CAS	Run Date: 04/21/2017 17:46
Collect Date: 04/19/2017 15:00	Dilution: 10	File ID: I3_042117-07
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfate	14808-79-8	44.0		20.0	10.0	5.00
J	Estimated value ; the analyte concentration was greater than the highest standard					

Lab Report #: L17040971
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040971-01	PrePrep Method: N/A	Instrument: IC3
Client ID: LH18/24-SP650-6433	Prep Method: 9056	Prep Date: 04/21/2017 16:25
Matrix: Water	Analytical Method: 9056	Cal Date: 12/01/2016 17:22
Workgroup #: WG611183	Analyst: CAS	Run Date: 04/21/2017 19:08
Collect Date: 04/19/2017 15:00	Dilution: 100	File ID: I3_042117-11
Sample Tag: DL02	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	906		40.0	20.0	10.0
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17040971

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040971-02	PrePrep Method: N/A	Instrument: HPMS6
Client ID: TRIP BLANK	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 04/05/2017 22:09
Workgroup #: WG610923	Analyst: TMB	Run Date: 04/20/2017 15:17
Collect Date: 04/19/2017 00:01	Dilution: 1	File ID: 6M146580
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	106	70	120	
4-Bromofluorobenzene	107	75	120	
Dibromofluoromethane	103	85	115	
Toluene-d8	105	85	120	
U	Analyte was not detected. The concentration is below the reported LOD.			

Lab Report #: L17040971

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

2.1 Volatiles Data

2.1.1 Volatiles GCMS Data (8260)

2.1.1.1 Summary Data

Certificate of Analysis

Sample #: L17040971-01	PrePrep Method: N/A	Instrument: HPMS6
Client ID: LH18/24-SP650-6433	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 04/05/2017 22:09
Workgroup #: WG610923	Analyst: TMB	Run Date: 04/20/2017 15:47
Collect Date: 04/19/2017 15:00	Dilution: 1	File ID: 6M146581
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.83	J	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.752	J	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	3.58		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	108	70	120	
4-Bromofluorobenzene	107	75	120	
Dibromofluoromethane	103	85	115	
Toluene-d8	105	85	120	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Certificate of Analysis

Sample #: L17040971-02

PrePrep Method: N/A

Instrument: HPMS6

Client ID: TRIP BLANK

Prep Method: 5030B/5030C/5035A

Prep Date: N/A

Matrix: Water

Analytical Method: 8260B

Cal Date: 04/05/2017 22:09

Workgroup #: WG610923

Analyst: TMB

Run Date: 04/20/2017 15:17

Collect Date: 04/19/2017 00:01

Dilution: 1

File ID: 6M146580

Sample Tag: 01

Units: ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,2-Dichloroethane-d4	106	70	120			
4-Bromofluorobenzene	107	75	120			
Dibromofluoromethane	103	85	115			
Toluene-d8	105	85	120			
U	Analyte was not detected. The concentration is below the reported LOD.					

2.1.1.2 QC Summary Data

Example 8260 Calculations

1.0 Calculating the Response Factor (RF) from the initial calibration (ICAL) data:

$$RF = [(Ax) (Cis)] / [(Ais) (Cx)]$$

Example

where:

Ax = Area of the characteristic ion for the compound being measured:	3399156
Cis = Concentration of the specific internal standard (ug/mL)	25
Ais = Area of the characteristic ion of the specific internal standard	846471
Cx = Concentration of the compound in the standard being measured (ug/mL)	100
RF = Calculated Response Factor	1.0039

2.0 Calculating the concentration (C) of a compound in water using the average RF: *

$$Cx = [(Ax) (Cis) (Vn)(D)] / [(Ais) (RF) (Vs)]$$

Example

where:

Ax = Area of the characteristic ion for the compound being measured	3122498
Cis = Concentration of the specific internal standard (ug/L)	25
D = Dilution factor for sample as a multiplier (10x = 10)	1
Ais = Area of the characteristic ion of the specific internal standard	611048
RF = Average RF from the ICAL	1.004
Vs = Purge volume of sample (mL)	10
Vn = Nominal purge volume of sample (mL) (10.0 mL)	10
Cx = Concentration of the compound in the sample being measured (ug/L)	127.2428

3.0 Calculating the concentration (C) of a compound in soil using the average RF: *

$$Cx = [(Ax) (Cis) (Wn)(D)] / [(Ais) (RF) (Ws)]$$

Example

where:

Ax = Area of the characteristic ion for the compound being measured	3122498
Cis = Concentration of the specific internal standard (ug/L)	25
D = Dilution factor for sample as a multiplier (10x = 10)	1
Ais = Area of the characteristic ion of the specific internal standard	611048
RF = Average RF from the ICAL	1.004
Ws = Weight of sample purged (g)	5
Wn = Nominal purge weight (g) (5.0 g)	5
Cx = Concentration of the compound in the sample being measured (ug/L)	127.2428

Dry weight correction:

Percent solids (PCT_S)	50
Cd = (Cx) (100)/PCT_S	254.4856

* Concentrations appearing on the instrument quantitation reports are on-column results and do not take into account initial volume, final volume, and the dilution factor.

4.0 Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, $y = mx + b$

y = response ratio = response of analyte / response of IS = Ax/Ais

x = amount ratio = concentration analyte/concentration internal standard = Cx / Cis

m = slope from curve = 0.213

b = intercept from curve = - 0.00642

Step 2: Calculate y from Quantitation Report

$$y = 86550/593147 = 0.1459$$

Step 3: Solve for x

$$x = (y - b)/m = [(0.1459 - (-0.00642))/0.213] = 0.7152$$

Step 4: Solve for analyte concentration Cx

$$Cx = Cis (x) = (25.0)(0.7152) = 17.88$$

Example Spreadsheet Calculation:

Slope from curve, m:	0.213
Intercept from curve, b:	-0.00642
Area of analyte, Ax:	86550
Area of Internal Standard, Ais:	593147
Concentration of IS, Cis	25.00
Response Ratio:	0.145917
Amount Ratio:	0.715195
Concentration:	17.87988
Units of Internal Standard:	ug/L

5.0 Concentration from Quadratic Regression**Step 1 - Retrieve Curve Data from Plot, $y = Ax^2 + Bx + C$**

Where:

$$Ax^2 + Bx + (C - y) = 0$$

A, B, C = constants from the ICAL quadratic regression

y = Response ratio = Area of analyte/Area of internal standard (IS)

x = Amount ratio = Concentration of analyte/concentration of IS

Step 2: Calculate y from Quantitation Report

$$y = Ax/Ais$$

Step 3: Solve for x using the quadratic formula

$$Ax^2 + Bx + C - y = 0$$

$$x = \frac{b \pm \sqrt{(b^2 - 4a(c - y))}}{2a} \quad (\text{Two possible solutions})$$

Step 4: Solve for analyte concentration Cx

$$Cx = (Cis)(\text{Amount ratio})$$

Example Spreadsheet Calculation:

Value of A from plot:	-0.00629
Value of B from plot:	0.511
Value of C from plot:	-0.0276
Area of unknown from quantitation report:	293821
Area of IS from quantitation report:	784848
Response ratio, y:	0.374367
C - y:	-0.40197
Root 1 - Computed amount ratio, X1:	80.44567
Root 2 - Computed amount ratio, X2:	0.794396 use this solution
Concentration of IS, Cis:	25.00
Concentration of analyte, Cx:	19.86 ug/L

Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 011217
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01 Rev: 24
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01 Rev: 18
 Maintenance Log ID: 54037

Internal Standard: STD79772 Surrogate Standard: STD79772
 CCV: STD79829; STD79571 LCS: STD79908; STD79496 MS/MSD: STD79909
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG598323; WG598431

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M144707	WG598323-01 50ng BFB STD 8260	NA	1	1	STD79474	01/12/17 08:36
6M144708	WG598323-02 5ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 09:02
6M144709	WG598323-03 20ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 09:37
6M144710	WG598323-04 50ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 10:10
6M144711	WG598323-05 100ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 10:42
6M144712	WG598323-06 200ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 11:14
6M144713	WG598323-07 300ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 11:47
6M144714	WG598323-08 400ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 12:19
6M144715	WG598323-09 500ug/L A9/FOO STD	NA	1	1	STD79571	01/12/17 12:52
6M144716	rinse	NA	1	1		01/12/17 13:25
6M144717	WG598323-10 100ug/L ALT SRC STD A9/F	NA	1	1	STD79496	01/12/17 13:56
6M144718	WG598430-01 50ng BFB STD 8260	NA	1	1	STD79474	01/12/17 14:27
6M144719	WG598430-02 50ug/L CCV STD 8260	NA	1	1	STD79829	01/12/17 14:52
6M144720	WG598452-01 100ug/L A9 CCV STD 8260	NA	1	1	STD79571	01/12/17 15:27
6M144721	WG598431-01 VBLK0112 BLANK STD 826	NA	1	1		01/12/17 15:59
6M144722	WG598431-02 20ug/L LCS STD 8260	NA	1	1	STD79908	01/12/17 16:32
6M144723	L16120615-05 B MS 826-A9-SPE	7	1	1	STD79909	01/12/17 17:04
6M144724	L16120615-06 B MSD 826-A9-SPE	7	1	1	STD79909	01/12/17 17:37
6M144725	WG598431-03 100ug/L A9/FOO LCS	NA	1	1	STD79496	01/12/17 18:09
6M144726	L16120718-01 B TB 826-AP-SPE	<2	1	1		01/12/17 18:42
6M144727	L16120973-01 B TB 826-AP-SPE	<2	1	1		01/12/17 19:14
6M144728	L16120615-01 B 826-AP-SPE	7	1	1		01/12/17 19:46
6M144729	L16120615-02 B 826-AP-SPE	7	1	1		01/12/17 20:19
6M144730	L16120615-03 B EB 826-AP-SPE	4	1	1		01/12/17 20:51
6M144731	L16120615-04 B RS 826-AP-SPE	7	1	1		01/12/17 21:23
6M144732	L16120615-07 B 826-AP-SPE	4	1	1		01/12/17 21:55
6M144733	L16120615-08 B 826-AP-SPE	7	1	1		01/12/17 22:27
6M144734	L16120615-09 B 826-AP-SPE	7	1	1		01/12/17 22:59
6M144735	L16120718-02 B 826-AP-SPE	7	1	1		01/12/17 23:31
6M144736	L16120718-03 B 826-AP-SPE	7	1	1		01/13/17 00:03
6M144737	L16120718-04 B 826-AP-SPE	4	1	1		01/13/17 00:36
6M144738	L16120718-05 B 826-AP-SPE	4	1	1		01/13/17 01:08
6M144739	L16120718-06 B 826-AP-SPE	7	1	1		01/13/17 01:40
6M144740	L16120718-07 B 826-AP-SPE	7	1	1		01/13/17 02:12

Approved: January 13, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 011217
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01 Rev: 24
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01 Rev: 18
 Maintenance Log ID: 54037

Internal Standard: STD79772 Surrogate Standard: STD79772
 CCV: STD79829; STD79571 LCS: STD79908; STD79496 MS/MSD: STD79909
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG598323; WG598431

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M144741	RINSE	NA	1	1		01/13/17 02:44
6M144742	WG598431-07 VBLK0112 BLANK STD 624	NA	2	1		01/13/17 03:16
6M144743	L17010300-04 A 624	7	2	1		01/13/17 03:47
6M144744	L17010466-03 A 624-SPE	7	2	1		01/13/17 04:20
6M144745	L17010446-02 A 624-SPE1	7	2	1		01/13/17 04:52
6M144746	CCV	NA	1	1		01/13/17 05:24
6M144747	RINSE	NA	1	1		01/13/17 05:56
6M144748	RINSE	NA	1	1		01/13/17 06:28

Approved: January 13, 2017

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Sarah Vandenberg



Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 040517
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54116

Internal Standard: STD81235 Surrogate Standard: STD81235
 CCV: STD81194 LCS: STD81257 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG608938

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M146219	WG608938-01 50ng BFB STD 8260	NA	1	1	STD80989	04/05/17 14:24
6M146220	WG608938-01 50ng BFB STD 8260	NA	1	1	STD80989	04/05/17 14:38
6M146221	WG608938-01 50ng BFB STD 8260	NA	1	1	STD80989	04/05/17 16:29
6M146222	RINSE	NA	1	1	STD80989	04/05/17 16:54
6M146223	WG608938-02 0.3ug/L STD 8260	NA	1	1	STD81194	04/05/17 17:25
6M146224	WG608938-03 0.4ug/L STD 8260	NA	1	1	STD81194	04/05/17 17:57
6M146225	WG608938-04 1ug/L STD 8260	NA	1	1	STD81194	04/05/17 18:28
6M146226	WG608938-05 2ug/L STD 8260	NA	1	1	STD81194	04/05/17 19:00
6M146227	WG608938-06 5ug/L STD 8260	NA	1	1	STD81194	04/05/17 19:31
6M146228	WG608938-07 20ug/L STD 8260	NA	1	1	STD81194	04/05/17 20:02
6M146229	WG608938-08 50ug/L STD 8260	NA	1	1	STD81194	04/05/17 20:34
6M146230	WG608938-09 100ug/L STD 8260	NA	1	1	STD81194	04/05/17 21:06
6M146231	WG608938-10 200ug/L STD 8260	NA	1	1	STD81194	04/05/17 21:37
6M146232	WG608938-11 300ug/L STD 8260	NA	1	1	STD81194	04/05/17 22:09
6M146233	RINSE	NA	1	1		04/05/17 22:40

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1	X			
File ID: 6M146219				
Tune failed, DNR.				
2	X			
File ID: 6M146220				
Tune failed, DNR. Clipped the column and repalced the ferrule on the column.				

Approved: April 07, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 040617
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1

Maintenance Log ID: _____

Internal Standard: STD81235 Surrogate Standard: STD81235
 CCV: STD81194; STD80642 LCS: STD81257 MS/MSD: STD81257
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG608987

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M146234	RINSE	NA	1	1		04/06/17 12:16
6M146235	RINSE	NA	1	1		04/06/17 13:19
6M146236	WG609128-01 50ng BFB STD 8260	NA	1	1	STD80989	04/06/17 13:59
6M146237	WG609128-02 50ug/L CCV STD 8260	NA	1	1	STD81194	04/06/17 14:24
6M146238	WG608979-01 100ug/L A9 CCV STD 8260	NA	1	1	STD80642	04/06/17 14:54
6M146239	WG608987-01 VBLK0406 BLANK STD 826	NA	1	1		04/06/17 15:26
6M146240	WG608938-12 20ug/L ALT SRC STD 8260	NA	1	1	STD81257	04/06/17 15:57
6M146241	WG608987-02 20ug/L LCS STD 8260	NA	1	1	STD81257	04/06/17 16:28
6M146242	L17040128-01 B 1000X 826-SPE D1	<2	1	1000		04/06/17 16:59
6M146243	L17031533-15 A 826-SPE	<2	1	1		04/06/17 17:30
6M146244	L17031574-17 A RS 826-SPE	NA	1	1		04/06/17 18:01
6M146245	L17031574-18 A MS 826-SPE	NA	1	1	STD81257	04/06/17 18:32
6M146246	L17031574-19 A MSD 826-SPE	NA	1	1	STD81257	04/06/17 19:02
6M146247	L17040128-02 B 200X 826-SPE D1	10	1	200		04/06/17 19:32
6M146248	L17031574-28 TB A 826-SPE	<2	1	1		04/06/17 20:03
6M146249	L17031690-02 TB A 826-SPE	<2	1	1		04/06/17 20:33
6M146250	L17040002-01 LOQ 826-SPE	NA	1	1	STD81310	04/06/17 21:03
6M146251	L17040004-01 LOD 826-SPE	NA	1	1	STD81310	04/06/17 21:33
6M146252	L17031690-01 A 826-SPE	<2	1	1		04/06/17 22:04
6M146253	L17031574-25 A 826-SPE	<2	1	1		04/06/17 22:34
6M146254	L17031574-24 A 826-SPE	<2	1	1		04/06/17 23:04
6M146255	L17031574-27 A 2.5X 826-SPE	<2	1	2.5		04/06/17 23:35
6M146256	L17031574-26 A 826-SPE	<2	1	1		04/07/17 00:05
6M146257	L17031574-23 A 826-SPE	<2	1	1		04/07/17 00:35
6M146258	L17040173-01 A 10X 826-TC	5	17	10		04/07/17 01:06
6M146259	ccv	NA	1	1		04/07/17 01:36
6M146260	rinse	NA	1	1		04/07/17 02:06
6M146261	rinse	NA	1	1		04/07/17 02:36
6M146262	WG608867-01 A FBLK 10X 826-TC	NA	17	10		04/07/17 03:06

Comments

Seq.	Rerun	Dil.	Reason	Analytes
14	X	1000	Over Calibration Range	D.ETHER

Approved: April 07, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 040617
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/ OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/ OVAP PAT01 Rev: 18/1
 Maintenance Log ID: _____

Internal Standard: STD81235 Surrogate Standard: STD81235
 CCV: STD81194; STD80642 LCS: STD81257 MS/MSD: STD81257
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG608987

Comments:

Comments

Seq.	Rerun	Dil.	Reason	Analytes
File ID: 6M146247				
20	X	5	Over Calibration Range	CIS12-DCE
File ID: 6M146253				
21	X	5	Over Calibration Range	CIS12-DCE
File ID: 6M146254				

Approved: April 07, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS6 Dataset: 042017
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 24/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: _____

Internal Standard: STD81412 Surrogate Standard: STD81412
 CCV: STD81447 LCS: STD81461 MS/MSD: STD81461
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG610923

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
6M146574	WG610922-01 50ng BFB STD 8260	NA	1	1	STD81491	04/20/17 12:18
6M146575	WG610922-02 50ug/L CCV STD 8260	NA	1	1	STD81447	04/20/17 12:43
6M146576	WG610922-02 50ug/L CCV STD 8260	NA	1	1	STD81447	04/20/17 13:16
6M146577	WG000000-01 100ug/L A9 CCV STD 8260	NA	1	1	STD81397	04/20/17 13:46
6M146578	WG610923-01 VBLK0420 BLANK STD 826	NA	1	1		04/20/17 14:17
6M146579	WG610923-02 20ug/L LCS STD 8260	NA	1	1	STD81461	04/20/17 14:48
6M146580	L17040971-02 A TB 826-SPE	<2	1	1		04/20/17 15:17
6M146581	L17040971-01 A 826-SPE	<2	1	1		04/20/17 15:47
6M146582	L17040958-01 A EB 826-SPE	<2	1	1		04/20/17 16:18
6M146583	L17040958-02 A TB 826-SPE	<2	1	1		04/20/17 16:49
6M146584	L17040958-03 A RS 826-SPE	7	1	1		04/20/17 17:20
6M146585	L17040958-06 A 826-SPE	3	1	1		04/20/17 17:50
6M146586	L17040958-04 A MS 826-SPE	7	1	1	STD81461	04/20/17 18:21
6M146587	L17040958-05 A MSD 826-SPE	7	1	1	STD81461	04/20/17 18:51
6M146588	RINSE	NA	1	1		04/20/17 19:22
6M146589	RINSE	NA	1	1		04/20/17 19:52
6M146590	WG610923-06 VBLK0420 BLANK STD 624	NA	2	1		04/20/17 20:23
6M146591	L17040914-02 B 2.5X 624-SPE 00	7	2	2.5		04/20/17 20:53
6M146592	CCV	NA	1	1		04/20/17 21:25
6M146593	RINSE	NA	1	1		04/20/17 21:55
6M146594	RINSE	NA	1	1		04/20/17 22:26

Comments

Seq.	Rerun	Dil.	Reason	Analytes
2	X			
File ID: 6M146575				
22-DCP was low. DNR.				
4				
File ID: 6M146577				
Not needed, DNR.				

Approved: April 24, 2017

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Microbac Laboratories Inc.

Data Checklist

Date: 12-JAN-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624
 Instrument: HPMS6
 Curve Workgroup: NA
 Runlog ID: 79799
 Analytical Workgroups: WG598323; WG598431

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	X
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	X
Samples	X
TCL Hits	X
Spectra of TCL Hits	TMB
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	SAV
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
13-JAN-2017

Tiffany Bailey

Secondary Reviewer:
13-JAN-2017

Sarah Vandenberg



Microbac Laboratories Inc.

Data Checklist

Date: 05-APR-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS6
 Curve Workgroup: NA
 Runlog ID: 81399
 Analytical Workgroups: WG608938

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	X
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	NA
Samples	X
TCL Hits	X
Spectra of TCL Hits	TMB
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	FJB
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
06-APR-2017

Tiffany Bailey

Secondary Reviewer:
07-APR-2017

F. J. Bailey



Microbac Laboratories Inc.

Data Checklist

Date: 06-APR-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS6
 Curve Workgroup: NA
 Runlog ID: 81412
 Analytical Workgroups: WG608987

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	X
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	X
Samples	X
TCL Hits	X
Spectra of TCL Hits	TMB
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	X
Reruns	X
Manual Integrations	X
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	SAV
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
07-APR-2017

Tiffany Bailey

Secondary Reviewer:
07-APR-2017

Sarah Vandenberg



Microbac Laboratories Inc.

Data Checklist

Date: 20-APR-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624
 Instrument: HPMS6
 Curve Workgroup: NA
 Runlog ID: 81655
 Analytical Workgroups: WG610923

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	X
Samples	X
TCL Hits	X
Spectra of TCL Hits	TMB
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	TMB
Secondary Reviewer	SAV
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
21-APR-2017

Tiffany Bailey

Secondary Reviewer:
24-APR-2017

Sarah Vandenberg



Analytical Method:8260B
Login Number:L17040971

AAB#:WG610923

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6433	01	04/19/17					04/20/2017	1	14		04/20/17	1	14	
TRIP BLANK	02	04/19/17					04/20/2017	1.6	14		04/20/17	1.6	14	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17040971
 Instrument Id: HPMS6
 Workgroup (AAB#): WG610923

Method: 8260
 CAL ID: HPMS6-05-APR-17
 Matrix: Water

Sample Number	Dilution	Tag	1	2	3	4
L17040971-01	1.00	01	108	103	107	105
L17040971-02	1.00	01	106	103	107	105
WG610923-01	1.00	01	106	103	107	104
WG610923-02	1.00	01	106	104	105	104
WG610923-06	1.00	01	104	97.9	108	104

Surrogates	Surrogate Limits		
1 - 1,2-Dichloroethane-d4	70	-	120
2 - Dibromofluoromethane	85	-	115
3 - 4-Bromofluorobenzene	75	-	120
4 - Toluene-d8	85	-	120

Underline = Result out of surrogate limits

DL = surrogate diluted out

ND = surrogate not detected



METHOD BLANK SUMMARY

Login Number: L17040971 Work Group: WG610923
 Blank File ID: 6M146578 Blank Sample ID: WG610923-01
 Prep Date: 04/20/17 14:17 Instrument ID: HPMS6
 Analyzed Date: 04/20/17 14:17 Method: 8260B
 Analyst: TMB

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG610923-02	6M146579	04/20/17 14:48	01
TRIP BLANK	L17040971-02	6M146580	04/20/17 15:17	01
LH18/24-SP650-6433	L17040971-01	6M146581	04/20/17 15:47	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5259462
 Report generated 04/24/2017 13:05



METHOD BLANK SUMMARY

Login Number: L17040971
 Blank File ID: 6M146590
 Prep Date: 04/20/17 20:23
 Analyzed Date: 04/20/17 20:23
 Analyst: TMB

Work Group: WG610923
 Blank Sample ID: WG610923-06
 Instrument ID: HPMS6
 Method: 8260B

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG610923-02	6M146579	04/20/17 14:48	01
TRIP BLANK	L17040971-02	6M146580	04/20/17 15:17	01
LH18/24-SP650-6433	L17040971-01	6M146581	04/20/17 15:47	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5259462
 Report generated 04/24/2017 13:05



Login Number: L17040971 Prep Date: 04/20/17 14:17 Sample ID: WG610923-01
 Instrument ID: HPMS6 Run Date: 04/20/17 14:17 Prep Method: 5030B/5030C/503
 File ID: 6M146578 Analyst: TMB Method: 8260B
 Workgroup (AAB#): WG610923 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS6-05-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
1,1,1-Trichloroethane	0.250	1.00	0.250	1	U
1,1,2-Trichloroethane	0.250	1.00	0.250	1	U
1,1-Dichloroethane	0.125	0.500	0.125	1	U
1,1-Dichloroethene	0.500	2.00	0.500	1	U
1,2-Dichloroethane	0.250	1.00	0.250	1	U
Acetone	2.50	10.0	2.50	1	U
Benzene	0.125	0.500	0.125	1	U
Carbon tetrachloride	0.250	1.00	0.250	1	U
Chloroform	0.125	0.500	0.125	1	U
Ethylbenzene	0.250	1.00	0.250	1	U
Methylene chloride	0.250	1.00	0.250	1	U
m,p-Xylene	0.500	2.00	0.500	1	U
o-Xylene	0.250	1.00	0.250	1	U
Styrene	0.125	0.500	0.125	1	U
Tetrachloroethene	0.250	1.00	0.250	1	U
Trichloroethene	0.250	1.00	0.250	1	U
Toluene	0.250	1.00	0.250	1	U
Vinyl chloride	0.250	1.00	0.250	1	U

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	106	70 - 120	PASS
4-Bromofluorobenzene	107	75 - 120	PASS
Dibromofluoromethane	103	85 - 115	PASS
Toluene-d8	104	85 - 120	PASS

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5257071
 24-APR-2017 13:05



Login Number: L17040971 Prep Date: 04/20/17 20:23 Sample ID: WG610923-06
 Instrument ID: HPMS6 Run Date: 04/20/17 20:23 Prep Method: 5030B/5030C/503
 File ID: 6M146590 Analyst: TMB Method: 8260B
 Workgroup (AAB#): WG610923 Matrix: Water 2 Units: ug/L
 Contract #: _____ Cal ID: HPMS6-05-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
1,1,1-Trichloroethane	0.250	1.00	0.250	1	U
1,1,2-Trichloroethane	0.250	1.00	0.250	1	U
1,1-Dichloroethane	0.125	0.500	0.125	1	U
1,1-Dichloroethene	0.500	2.00	0.500	1	U
1,2-Dichloroethane	0.250	1.00	0.250	1	U
Acetone	2.50	10.0	2.50	1	U
Benzene	0.125	0.500	0.125	1	U
Carbon tetrachloride	0.250	1.00	0.250	1	U
Chloroform	0.125	0.500	0.125	1	U
Ethylbenzene	0.250	1.00	0.250	1	U
Methylene chloride	0.250	1.00	0.250	1	U
m,p-Xylene	0.500	2.00	0.500	1	U
o-Xylene	0.250	1.00	0.250	1	U
Styrene	0.125	0.500	0.125	1	U
Tetrachloroethene	0.250	1.00	0.250	1	U
Trichloroethene	0.250	1.00	0.250	1	U
Toluene	0.250	1.00	0.250	1	U
Vinyl chloride	0.250	1.00	0.250	1	U

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	104	70 - 120	PASS
4-Bromofluorobenzene	108	75 - 120	PASS
Dibromofluoromethane	97.9	85 - 115	PASS
Toluene-d8	104	85 - 120	PASS

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5257071
 24-APR-2017 13:05



Login Number: L17040971 Run Date: 04/20/2017 Sample ID: WG610923-02
 Instrument ID: HPMS6 Run Time: 14:48 Prep Method: 5030B/5030C/503
 File ID: 6M146579 Analyst: TMB Method: 8260B
 Workgroup (AAB#): WG610923 Matrix: Water Units: ug/L
 QC Key: DOD4 Lot#: STD81461 Cal ID: HPMS6-05-APR-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
1,1,1-Trichloroethane	20.0	20.6	103	65 - 130	
1,1,2-Trichloroethane	20.0	19.1	95.4	75 - 125	
1,1-Dichloroethane	20.0	20.4	102	70 - 135	
1,1-Dichloroethene	20.0	20.7	103	70 - 130	
1,2-Dichloroethane	20.0	20.4	102	70 - 130	
Acetone	20.0	23.3	117	40 - 140	
Benzene	20.0	19.5	97.7	80 - 120	
Carbon tetrachloride	20.0	19.3	96.5	65 - 140	
Chloroform	20.0	18.8	94.2	65 - 135	
Ethylbenzene	20.0	18.6	93.1	75 - 125	
Methylene chloride	20.0	19.4	96.9	55 - 140	
m,p-Xylene	40.0	37.4	93.4	75 - 130	
o-Xylene	20.0	19.0	94.9	80 - 120	
Styrene	20.0	19.1	95.7	65 - 135	
Tetrachloroethene	20.0	19.3	96.7	45 - 150	
Trichloroethene	20.0	18.6	93.0	70 - 125	
Toluene	20.0	19.2	95.8	75 - 120	
Vinyl chloride	20.0	22.8	114	50 - 145	

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	106	70 - 120	PASS
4-Bromofluorobenzene	105	75 - 120	PASS
Dibromofluoromethane	104	85 - 115	PASS
Toluene-d8	104	85 - 120	PASS

* EXCEEDS %REC LIMIT

LCS - Modified 03/06/2008
 PDF File ID: 5257072
 Report generated: 04/24/2017 13:05



BFB

Login Number: L17040971 Tune ID: WG598323-01
 Instrument: HPMS6 Run Date: 01/12/2017
 Analyst: TMB Run Time: 08:36
 Workgroup: WG598323 File ID: 6M144707
 Cal ID: HPMS6-12-JAN-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	19.2	7923	PASS
75.0	95.0	30.0	60.0	54.8	22651	PASS
95.0	95.0	100	100	100	41304	PASS
96.0	95.0	5.00	9.00	7.28	3007	PASS
173	174	0	2.00	0.352	116	PASS
174	95.0	50.0	100	79.8	32963	PASS
175	174	5.00	9.00	8.22	2709	PASS
176	174	95.0	101	97.3	32071	PASS
177	176	5.00	9.00	6.69	2147	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG598323-02	STD	01	01/12/2017 09:02	
WG598323-03	STD	01	01/12/2017 09:37	
WG598323-04	STD	01	01/12/2017 10:10	
WG598323-05	STD-CCV	01	01/12/2017 10:42	
WG598323-06	STD	01	01/12/2017 11:14	
WG598323-07	STD	01	01/12/2017 11:47	
WG598323-08	STD	01	01/12/2017 12:19	
WG598323-09	STD	01	01/12/2017 12:52	
WG598323-10	SSCV	01	01/12/2017 13:56	

* Sample past 12 hour tune limit



BFB

Login Number: L17040971 Tune ID: WG608938-01
 Instrument: HPMS6 Run Date: 04/05/2017
 Analyst: TMB Run Time: 16:29
 Workgroup: WG608938 File ID: 6M146221
 Cal ID: HPMS6-05-APR-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	17.3	4043	PASS
75.0	95.0	30.0	60.0	46.5	10875	PASS
95.0	95.0	100	100	100	23389	PASS
96.0	95.0	5.00	9.00	7.16	1674	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	76.5	17883	PASS
175	174	5.00	9.00	7.58	1356	PASS
176	174	95.0	101	96.1	17186	PASS
177	176	5.00	9.00	7.35	1263	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG608938-02	STD	01	04/05/2017 17:25	
WG608938-03	STD	01	04/05/2017 17:57	
WG608938-04	STD	01	04/05/2017 18:28	
WG608938-05	STD	01	04/05/2017 19:00	
WG608938-06	STD	01	04/05/2017 19:31	
WG608938-07	STD	01	04/05/2017 20:02	
WG608938-08	STD-CCV	01	04/05/2017 20:34	
WG608938-09	STD	01	04/05/2017 21:06	
WG608938-10	STD	01	04/05/2017 21:37	
WG608938-11	STD	01	04/05/2017 22:09	

* Sample past 12 hour tune limit



BFB

Login Number: L17040971 Tune ID: WG609128-01
 Instrument: HPMS6 Run Date: 04/06/2017
 Analyst: TMB Run Time: 13:59
 Workgroup: WG609128 File ID: 6M146236
 Cal ID: HPMS6-05-APR-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	17.6	6056	PASS
75.0	95.0	30.0	60.0	47.8	16465	PASS
95.0	95.0	100	100	100	34464	PASS
96.0	95.0	5.00	9.00	7.14	2460	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	76.9	26498	PASS
175	174	5.00	9.00	7.37	1953	PASS
176	174	95.0	101	98.9	26205	PASS
177	176	5.00	9.00	6.88	1804	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG608938-12	SSCV	01	04/06/2017 15:57	

* Sample past 12 hour tune limit



BFB

Login Number: L17040971 Tune ID: WG610922-01
 Instrument: HPMS6 Run Date: 04/20/2017
 Analyst: TMB Run Time: 12:18
 Workgroup: WG610922 File ID: 6M146574
 Cal ID: HPMS6-05-APR-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	18.9	6317	PASS
75.0	95.0	30.0	60.0	50.4	16857	PASS
95.0	95.0	100	100	100	33445	PASS
96.0	95.0	5.00	9.00	6.74	2255	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	69.7	23322	PASS
175	174	5.00	9.00	7.24	1689	PASS
176	174	95.0	101	96.1	22404	PASS
177	176	5.00	9.00	6.80	1524	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG610922-02	CCV	01	04/20/2017 13:16	
WG610923-01	BLANK	01	04/20/2017 14:17	
WG610923-02	LCS	01	04/20/2017 14:48	
L17040971-02	TRIP BLANK	01	04/20/2017 15:17	
L17040971-01	LH18/24-SP650-6433	01	04/20/2017 15:47	
WG610923-06	BLANK2	01	04/20/2017 20:23	

* Sample past 12 hour tune limit



Calibration Table Report
 Method: A9FOOWT.M
 Title: A9-FOO Water - IC: 011217 - HPMS6
 Last Calibration: Thu Jan 12 13:53:06 2017
 Curve: WG598323
 Calibration Files

Compound										Avg	%RSD
	5	20	50	100	200	300	400	500			
	6M144708.D	6M144709.D	6M144710.D	6M144711.D	6M144712.D	6M144713.D	6M144714.D	6M144715.D			
I Fluorobenzene	ISTD										
T Acetonitrile	0.021	0.019	0.018	0.017	0.018	0.016	0.017	0.017	0.018	8.729	
T 3-Chloro-1-propene	0.301	0.305	0.307	0.308	0.306	0.295	0.287	0.289	0.300	2.763	
T 2-Chloro-1,3-butadiene	0.348	0.368	0.380	0.385	0.382	0.371	0.361	0.364	0.370	3.335	
T Ethyl Acetate	0.144	0.163	0.169	0.166	0.171	0.152	0.159	0.159	0.160	5.700	
T Methacrylonitrile	0.076	0.087	0.089	0.088	0.089	0.080	0.083	0.083	0.084	5.535	
T Isobutyl Alcohol	0.004	0.006	0.006	0.005	0.005	0.004	0.005	0.006	0.005	13.176	
T 1-Butanol									0.000	0.000	
T Methyl methacrylate	0.146	0.173	0.185	0.185	0.188	0.171	0.177	0.178	0.175	7.640	
T 2-Nitropropane		0.063	0.071	0.071	0.076	0.070	0.075	0.074	0.071	6.228	
I Chlorobenzene-d5	ISTD										
I 1,4-Dichlorobenzene-d4	ISTD										
T Cyclohexanone		0.008	0.009	0.008	0.010	0.009	0.011	0.012	0.009	14.808	

Fri Jan 13 10:37:15 2017

Calibration Table Report
 Method: 8260BWT.M
 Title: 8260B/624_WATER SOP:MSV01 04-05-17 - HPMS6
 Last Calibration: Thu Apr 06 09:55:03 2017
 Curve: WG608938
 Calibration Files

		0.3	0.4	1	2	5	20	50	100	200	300					
		6M146223.D	6M146224.D	6M146225.D	6M146226.D	6M146227.D	6M146228.D	6M146229.D	6M146230.D	6M146231.D	6M146232.D	Avg	%RSD	Linear	Quad	
I	Fluorobenzene	ISTD														
T	Dichlorodifluoromethane			0.381	0.345	0.365	0.434	0.430	0.411	0.412		0.397	8.516			
P	Chloromethane			0.725	0.639	0.561	0.528	0.467	0.463	0.448		0.547	18.885	0.999		
C	Vinyl Chloride	0.564		0.506	0.438	0.420	0.464	0.451	0.364	0.420		0.454	13.323			
T	1,3-Butadiene					0.220	0.212	0.176	0.135	0.148	0.118	0.168	24.710		0.990	
T	Bromomethane			0.176	0.159	0.179	0.196	0.221	0.211	0.228		0.196	13.055			
T	Chloroethane			0.192	0.183	0.199	0.207	0.203	0.189	0.193		0.195	4.273			
T	Trichlorofluoromethane	0.432		0.460	0.431	0.458	0.479	0.482	0.482	0.492		0.465	5.013			
T	Diethyl ether			0.191	0.192	0.193	0.189	0.192	0.197		0.202	0.194	2.274			
T	Isoprene					0.366	0.355	0.386	0.387	0.385		0.414	0.382	5.221		
T	Acrolein				0.021	0.021	0.020	0.021	0.023		0.021	0.021	4.175			
T	1,1,2-Trichloro-1,2,2-Trifluoroet	0.269		0.247	0.261	0.264	0.264	0.265	0.271		0.263	2.932				
T	Acetone					0.057	0.058	0.055	0.053	0.056	0.045	0.054	8.929			
C	1,1-Dichloroethene	0.380	0.369	0.368	0.387	0.390	0.386	0.377	0.392		0.381	2.398				
T	Tert-Butyl Alcohol			0.017	0.018	0.016	0.014	0.018			0.017	0.017	8.130			
T	Dimethyl Sulfide				0.267	0.261	0.276	0.270	0.280	0.281	0.272	2.955				
T	Iodomethane	0.108		0.126	0.150	0.197	0.214	0.251	0.224	0.221	0.186	27.720	0.997			
T	Methyl acetate				0.129	0.125	0.134	0.140	0.141	0.143	0.135	5.216				
T	Methylene Chloride			0.311	0.287	0.287	0.286	0.285	0.274	0.287		0.288	3.813			
T	Carbon Disulfide			0.835	0.817	0.814	0.779	0.841	0.818	0.842	0.816	0.820	2.481			
T	Acrylonitrile			0.058	0.059	0.063	0.063	0.066	0.067		0.060	0.063	5.597			
T	Methyl Tert Butyl Ether			0.650	0.621	0.661	0.659	0.631	0.620	0.582		0.632	4.438			
T	trans-1,2-Dichloroethene	0.269	0.274	0.273	0.272	0.276	0.276	0.276	0.271	0.283		0.274	1.519			
T	n-Hexane				0.313	0.290	0.312	0.311	0.316	0.319	0.310	3.309				
T	Diisopropyl ether	0.719	0.724	0.709	0.699	0.699	0.694	0.699		0.699	0.706	1.627				
T	Vinyl Acetate				0.192	0.169	0.166	0.232	0.223	0.194	0.196	13.694				
P	1,1-Dichloroethane	0.460	0.450	0.445	0.457	0.465	0.452	0.444	0.462		0.454	1.740				
T	Ethyl-Tert-Butyl ether		0.716	0.722	0.718	0.705	0.702	0.724		0.720	0.715	1.185				
T	2-Butanone				0.068	0.068	0.066	0.071	0.069	0.067	0.068	2.393				
T	Propionitrile			0.020	0.022	0.023	0.022	0.023	0.023	0.023	0.022	5.579				
T	2,2-Dichloropropane	0.387	0.403	0.350	0.359	0.297	0.277	0.350	0.342		0.346	12.129				
T	cis-1,2-Dichloroethene	0.303	0.299	0.296	0.301	0.302	0.301	0.298	0.312		0.302	1.628				
C	Chloroform	0.658	0.590	0.542	0.485	0.482	0.482	0.476	0.463	0.481		0.518	12.803			
T	1-Bromopropane			0.041	0.052	0.052	0.056	0.057	0.058	0.053	0.060	0.053	11.075			
T	Bromochloromethane	0.132	0.144	0.150	0.165	0.170	0.168	0.171	0.170		0.159	9.183				
T	Tetrahydrofuran			0.050	0.044	0.045	0.043	0.043	0.045		0.043	0.045	5.367			
S	Dibromofluoromethane			0.245	0.236	0.256	0.262	0.259	0.257	0.262	0.265	0.255	3.868			
T	1,1,1-Trichloroethane	0.405	0.424	0.407	0.410	0.424	0.424	0.425	0.447		0.421	3.239				
T	Cyclohexane			0.387	0.368	0.384	0.366	0.397	0.394	0.411	0.406	0.389	4.204			
T	1,1-Dichloropropene			0.357	0.349	0.355	0.358	0.357	0.352	0.362		0.356	1.233			
T	Tert-Amyl-Methyl ether			0.684	0.674	0.681	0.663	0.669	0.698		0.685	0.679	1.728			
T	Carbon Tetrachloride			0.282	0.274	0.323	0.351	0.366	0.377	0.35	0.33183	12.2386				
S	1,2-Dichloroethane-d4			0.244	0.246	0.257	0.253	0.252	0.254	0.254	0.25153	1.86029				
T	Heptane											0	0			
T	1,2-Dichloroethane	0.327	0.326	0.306	0.328	0.323	0.321	0.32	0.325		0.32202	2.174				
T	Benzene	1.21	1.101	1.077	1.063	1.054	1.025	1.007	1.019		1.06965	6.04095				
T	Trichloroethene	0.288	0.284	0.274	0.29	0.299	0.302	0.292	0.3		0.29115	3.19828				
T	Methylcyclohexane				0.413	0.393	0.422	0.423	0.432	0.44	0.42065	3.83804				
C	1,2-Dichloropropane	0.232	0.251	0.254	0.257	0.263	0.256	0.249	0.258		0.25244	3.71187				
T	1,4-Dioxane				0.002	0.002	0.002	0.002		0.002	0.00184	6.16966				
T	Bromodichloromethane	0.334	0.34	0.341	0.358	0.37	0.369	0.364	0.376		0.35636	4.47459				
T	Dibromomethane	0.122	0.155	0.145	0.155	0.154	0.153	0.153	0.153		0.14868	7.44253				
T	2-Chloroethyl Vinyl Ether			0.076	0.1	0.106	0.106	0.109	0.088	0.107	0.09902	12.5245				
T	4-Methyl-2-Pentanone				0.063	0.064	0.064	0.068	0.065	0.065	0.06495	2.52742				
T	cis-1,3-Dichloropropene	0.346	0.382	0.37	0.401	0.412	0.407	0.409	0.413		0.39243	6.25845				
T	Dimethyl Disulfide				0.227	0.225	0.247	0.252	0.264	0.27	0.24758	7.53484				
I	Chlorobenzene-d5	ISTD														
S	Toluene-d8			1.282	1.288	1.306	1.276	1.265	1.243	1.262	1.283	1.27569	1.48449			
C	Toluene	1.652	1.626	1.556	1.57	1.551	1.537	1.51	1.503		1.56301	3.34424				
T	Ethyl Methacrylate			0.354	0.349	0.379	0.362	0.386	0.4	0.394	0.402	0.37824	5.56152			
T	Paraldehyde											0	0			
T	trans-1,3-Dichloropropene	0.466	0.427	0.489	0.494	0.497	0.503	0.498		0.48194	5.63896					
T	1,1,2-Trichloroethane	0.273	0.296	0.289	0.303	0.3	0.298	0.298	0.3		0.29455	3.27325				
T	2-Hexanone				0.142	0.14	0.14	0.146	0.139	0.141	0.14144	1.87214				
T	1,3-Dichloropropane	0.484	0.508	0.475	0.504	0.5	0.497	0.495	0.494		0.49443	2.17868				
T	Tetrachloroethene	0.355	0.38	0.375	0.383	0.381	0.385	0.382	0.389		0.37875	2.7685				
T	Dibromochloromethane	0.322	0.345	0.344	0.362	0.378	0.381	0.388	0.394		0.36412	6.97018				
T	1,2-Dibromoethane	0.284	0.282	0.277	0.28	0.281	0.286	0.29	0.283		0.28283	1.39806				
T	1-Chlorohexane	0.501	0.501	0.486	0.499	0.469	0.513	0.509	0.521	0.544	0.50473	4.18396				
P	Chlorobenzene	1.095	1.077	1.019	1.044	1.045	1.064	1.071	1.141		1.06977	3.47515				
T	1,1,1,2-Tetrachloroethane	0.348	0.357	0.345	0.371	0.385	0.4	0.413	0.446		0.3831	9.19348				
C	Ethylbenzene	0.6	0.536	0.538	0.559	0.564	0.581	0.595	0.659		0.57912	6.92495				
T	m-,p-Xylene	0.711	0.677	0.667	0.681	0.673	0.697	0.701	0.731		0.69221	3.13862				
T	o-Xylene			0.671	0.642	0.655	0.669	0.678	0.657	0.704	0.66797	2.95161				
T	Styrene	1.073	1.059	1.076	1.12	1.133	1.168	1.147	1.192		1.12136	4.31921				
P	Bromoform		0.2	0.2	0.214	0.226	0.238	0.239	0.237		0.22189	7.90635				
T	Isopropylbenzene	1.776	1.697	1.623	1.674	1.668	1.699	1.625	1.612		1.67159	3.22323				
I																

T	1,2,3-Trichloropropane		0.195	0.177	0.197	0.197	0.19	0.193	0.197		0.19228	3.72212	
T	trans-1,4-Dichloro-2-Butene		0.124	0.117	0.135	0.132	0.142	0.151	0.15	0.155	0.13826	10.0162	
T	n-Propylbenzene	4.071	3.929	3.827	3.847	3.789	3.738	3.585	3.496		3.78518	4.83282	
T	Bromobenzene	0.861	0.852	0.867	0.84	0.843	0.856	0.84	0.822	0.872	0.85035	1.84632	
T	1,3,5-Trimethylbenzene		2.773	2.744	2.708	2.654	2.661	2.647	2.591	2.682	2.68251	2.16658	
T	2-Chlorotoluene		2.733	2.689	2.575	2.498	2.579	2.388	2.346	2.355	2.52034	5.92259	
T	4-Chlorotoluene		2.395	2.337	2.248	2.223	2.051	2.189	2.093	2.284	2.22752	5.21159	
T	a-Methylstyrene					1.445	1.366	1.463	1.473	1.542	1.611	1.48341	5.66686
T	tert-Butylbenzene		0.551	0.564	0.544	0.568	0.565	0.555	0.589		0.56208	2.558	
T	1,2,4-Trimethylbenzene		2.798	2.729	2.745	2.76	2.745	2.714	2.793		2.75494	1.13121	
T	sec-Butylbenzene		3.56	3.327	3.322	3.297	3.276	3.197	3.178		3.30805	3.79322	
T	p-Isopropyltoluene			2.879	2.746	2.749	2.779	2.779	2.76	2.787	2.78269	1.6223	
T	1,3-Dichlorobenzene	1.745	1.595	1.607	1.558	1.601	1.574	1.559	1.608		1.60589	3.7263	
T	1,4-Dichlorobenzene	1.858	1.642	1.613	1.574	1.578	1.594	1.578	1.564	1.615	1.62397	5.60487	
T	n-Butylbenzene			2.643	2.479	2.524	2.512	2.536	2.56	2.533	2.54099	2.02916	
T	1,2-Dichlorobenzene	1.566	1.589	1.537	1.453	1.471	1.497	1.472	1.477	1.484	1.50524	3.15458	
T	1,2-Dibromo-3-Chloropropane				0.103	0.12	0.121	0.119	0.128	0.117	0.11794	7.07341	
T	1,2,4-Trichlorobenzene		1.219	1.11	1.06	1.059	1.082	1.083	1.092	1.105	1.10135	4.63701	
T	Hexachlorobutadiene		0.476	0.446	0.394	0.418	0.403	0.409	0.409	0.41	0.42065	6.42356	
T	Naphthalene		2.283	2.179	2.049	2.212	2.236	2.219	2.289	2.175	2.20527	3.4468	
T	1,2,3-Trichlorobenzene	1.267	1.197	1.116	1.005	0.999	0.994	0.992	1.004	0.995	1.06323	9.83782	

Thu Apr 06 14:39:00 2017

Login Number: L17040971 Run Date: 01/12/2017 Sample ID: WG598323-10
Instrument ID: HPMS6 Run Time: 13:56 Method: 8260B
File ID: 6M144717 Analyst: TMB QC Key: DOD4
ICal Workgroup: WG598323 Cal ID: HPMS6 - 12-JAN-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
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* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds



Login Number: L17040971 Run Date: 04/06/2017 Sample ID: WG608938-12
 Instrument ID: HPMS6 Run Time: 15:57 Method: 8260B
 File ID: 6M146240 Analyst: TMB QC Key: DOD4
 ICal Workgroup: WG608938 Cal ID: HPMS6 - 05-APR-17

Analyte		Expected	Found	Units	RF	%D	UCL	Q
1,1-Dichloroethene	CCC	20.0	20.0	ug/L	0.381	0.100	20	
Chloroform	CCC	20.0	18.5	ug/L	0.479	7.50	20	
Ethylbenzene	CCC	20.0	18.6	ug/L	0.538	7.10	20	
Toluene	CCC	20.0	18.5	ug/L	1.45	7.30	20	
Vinyl Chloride	CCC	20.0	22.0	ug/L	0.499	10.0	20	
1,1,2,2-Tetrachloroethane	SPCC	20.0	19.6	ug/L	0.638	2.00	20	
Chloromethane	SPCC	20.0	22.5	ug/L	0.529	12.3	20	
Bromoform	SPCC	20.0	18.7	ug/L	0.208	6.30	20	
Chlorobenzene	SPCC	20.0	18.3	ug/L	0.981	8.30	20	
1,1-Dichloroethane	SPCC	20.0	19.7	ug/L	0.448	1.50	20	
1,1,1-Trichloroethane		20.0	20.1	ug/L	0.423	0.600	20	
1,1,2-Trichloroethane		20.0	18.9	ug/L	0.278	5.50	20	
1,2-Dichloroethane		20.0	19.5	ug/L	0.314	2.60	20	
Acetone		20.0	19.0	ug/L	0.0513	4.90	20	
Benzene		20.0	18.8	ug/L	1.01	5.90	20	
Carbon Tetrachloride		20.0	20.6	ug/L	0.342	3.10	20	
Methylene Chloride		20.0	19.4	ug/L	0.280	3.00	20	
m-,p-Xylene		40.0	37.4	ug/L	0.646	6.60	20	
o-Xylene		20.0	18.9	ug/L	0.631	5.50	20	
Styrene		20.0	19.3	ug/L	1.08	3.50	20	
Tetrachloroethene		20.0	19.4	ug/L	0.367	3.00	20	
Trichloroethene		20.0	18.6	ug/L	0.271	6.80	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17040971 Run Date: 04/20/2017 Sample ID: WG610922-02
Instrument ID: HPMS6 Run Time: 13:16 Method: 8260B
File ID: 6M146576 Analyst: TMB QC Key: DOD4
Workgroup (AAB#): WG610923 Cal ID: HPMS6 - 05-APR-17
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
1,2-Dichloropropane	CCC	50.0	52.6	ug/L	0.266	5.22	20	
1,1-Dichloroethene	CCC	50.0	52.9	ug/L	0.403	5.79	20	
Chloroform	CCC	50.0	47.1	ug/L	0.487	5.87	20	
Ethylbenzene	CCC	50.0	49.5	ug/L	0.574	0.953	20	
Toluene	CCC	50.0	49.3	ug/L	1.54	1.33	20	
Vinyl Chloride	CCC	50.0	50.7	ug/L	0.460	1.31	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	51.1	ug/L	0.665	2.13	20	
Bromoform	SPCC	50.0	51.0	ug/L	0.226	1.96	20	
Chlorobenzene	SPCC	50.0	49.2	ug/L	1.05	1.54	20	
Chloromethane	SPCC	50.0	52.1	ug/L	0.481	4.13	20	
1,1-Dichloroethane	SPCC	50.0	53.4	ug/L	0.485	6.76	20	
Xylenes		150	152	ug/L	0.687	1.07	20	
1,1,1-Trichloroethane		50.0	51.0	ug/L	0.430	2.08	20	
1,1,2-Trichloroethane		50.0	49.5	ug/L	0.292	0.995	20	
1,2-Dichloroethane		50.0	52.2	ug/L	0.336	4.34	20	
Acetone		50.0	54.6	ug/L	0.0589	9.13	20	
Benzene		50.0	49.4	ug/L	1.06	1.12	20	
Carbon Tetrachloride		50.0	54.6	ug/L	0.362	9.11	20	
Methylene Chloride		50.0	50.1	ug/L	0.289	0.288	20	
m-,p-Xylene		100	101	ug/L	0.700	1.09	20	
o-Xylene		50.0	50.5	ug/L	0.675	1.04	20	
Styrene		50.0	52.7	ug/L	1.18	5.41	20	
Tetrachloroethene		50.0	48.2	ug/L	0.366	3.50	20	
Trichloroethene		50.0	47.7	ug/L	0.278	4.58	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

CCV - Modified 03/05/2008

PDF File ID: 5257080

Report generated 04/24/2017 13:05



Login Number: L17040971
Instrument ID: HPMS6
Workgroup (AAB#): WG610923

ICAL CCV Number: WG608938-08
CAL ID: HPMS6-05-APR-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG608938-08	NA	NA	244954	452398	643185
Upper Limit	NA	NA	489908	904796	1286370
Lower Limit	NA	NA	122477	226199	321593
<u>L17040971-01</u>	1.00	01	203559	400581	565738
<u>L17040971-02</u>	1.00	01	207920	408309	578731
<u>WG610923-01</u>	1.00	01	207149	406452	570924
<u>WG610923-02</u>	1.00	01	219879	418946	585559

IS-1 - 1,4-Dichlorobenzene-d4
IS-2 - Chlorobenzene-d5
IS-3 - Fluorobenzene

Underline = Response outside limits



Microbac Laboratories Inc.
INTERNAL STANDARD RETENTION TIME SUMMARY
(COMPARED TO MIDPOINT OF ICAL)

00854206

Login Number: L17040971
Instrument ID: HPMS6
Workgroup (AAB#): WG610923

ICAL CCV Number: WG608938-08
CAL ID: HPMS6-05-APR-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG608938-08	NA	NA	18.17	15.14	11.26
Upper Limit	NA	NA	18.67	15.64	11.76
Lower Limit	NA	NA	17.67	14.64	10.76
<u>L17040971-01</u>	1.00	01	18.16	15.13	11.25
<u>L17040971-02</u>	1.00	01	18.16	15.13	11.25
<u>WG610923-01</u>	1.00	01	18.16	15.13	11.25
<u>WG610923-02</u>	1.00	01	18.16	15.13	11.25

IS-1 - 1,4-Dichlorobenzene-d4
IS-2 - Chlorobenzene-d5
IS-3 - Fluorobenzene

Underline = Response outside limits



2.2 General Chemistry Data

2.2.1 Method 9056

2.2.1.1 Summary Data

Lab Report #: L17040971

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040971-01	PrePrep Method: N/A	Instrument: IC3
Client ID: LH18/24-SP650-6433	Prep Method: 9056	Prep Date: 04/21/2017 16:25
Matrix: Water	Analytical Method: 9056	Cal Date: 12/01/2016 17:22
Workgroup #: WG611183	Analyst: CAS	Run Date: 04/21/2017 17:46
Collect Date: 04/19/2017 15:00	Dilution: 10	File ID: I3_042117-07
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfate	14808-79-8	44.0		20.0	10.0	5.00
J	Estimated value ; the analyte concentration was greater than the highest standard					

Lab Report #: L17040971

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17040971-01	PrePrep Method: N/A	Instrument: IC3
Client ID: LH18/24-SP650-6433	Prep Method: 9056	Prep Date: 04/21/2017 16:25
Matrix: Water	Analytical Method: 9056	Cal Date: 12/01/2016 17:22
Workgroup #: WG611183	Analyst: CAS	Run Date: 04/21/2017 19:08
Collect Date: 04/19/2017 15:00	Dilution: 100	File ID: I3_042117-11
Sample Tag: DL02	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	906		40.0	20.0	10.0
U	Analyte was not detected. The concentration is below the reported LOD.					

2.2.1.2 QC Summary Data

The concentrations (ppm) of the calibration standards and the resulting area counts are used to determine the equation of a linear or quadratic plot.

The slope and y-intercept of that line are used to calculate the quantity of the analyzed unknown samples.

Amount(ppm) = [(slope)(area count of unknown) + y-intercept](dilution)

(The slope is the amt/area also identified as the CF or calibration factor)

Microbac Laboratories Inc.
Instrument Run Log

Instrument: IC3 Dataset: 120116 IC3 ICAL.SEQ_OL
 Analyst1: CAS Analyst2: NA
 Method: 300/9056 SOP: IC01 Rev: 19

Maintenance Log ID: _____ Syringe Filter Lot#: 160109254
 Eluent ID#: RGT385836

Workgroups: Column 1 ID: AG14A-4MM Column 2 ID: AS14A-4MM
 Analytical WGs: 593355 (LOD/LOQ Waters) 593356 (LOD/LOQ Soils)
 Internal STD: NA Surrogate STD: NA Calibration STD STD77046 01-DEC-2016
 CCV STD: STD77046 LCS STD: STD79166 MS/MSD STD: NA

Comments: System Backpressure: 2166 psi

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	I3_120116-01	ELUENT	1	1		12/01/16 15:00
2	I3_120116-02	DI WATER	1	1		12/01/16 15:20
3	I3_120116-03	WG593545-01 STD	1	1	STD77046	12/01/16 15:40
4	I3_120116-04	WG593545-02 STD	1	1	STD77046	12/01/16 16:01
5	I3_120116-05	WG593545-03 STD	1	1	STD77046	12/01/16 16:21
6	I3_120116-06	WG593545-04 STD	1	1	STD77046	12/01/16 16:41
7	I3_120116-07	WG593545-05 STD	1	1	STD77046	12/01/16 17:02
8	I3_120116-08	WG593545-06 STD	1	1	STD77046	12/01/16 17:22
9	I3_120116-09	WG593545-07 SSCV	1	1	STD79166	12/01/16 17:43
10	I3_120116-10	LCRV @ Lvl 6	1	1	STD79166	12/01/16 18:03
11	I3_120116-11	LCRV @ Lvl 4	1	1	STD79166	12/01/16 18:23
12	I3_120116-12	LCRV @ Lvl 2	1	1	STD79166	12/01/16 18:44
13	I3_120116-13	LCRV @ Lvl 0	1	1		12/01/16 19:04
14	I3_120116-14	WG593357-01 ANION CCV	1	1	STD77046	12/01/16 19:24
15	I3_120116-15	WG593357-02 ANION CCB	1	1		12/01/16 19:45
16	I3_120116-16	WG593355-01 ANION BLANK	1	1		12/01/16 20:05
17	I3_120116-17	WG593355-02 ANION LCS	1	1	STD79166	12/01/16 20:25
18	I3_120116-18	WG593355-03 ANION LCS2	1	1	STD79166	12/01/16 20:46
19	I3_120116-19	L16100002-01 LOD (F,CL,BR,SO4)	1	1		12/01/16 21:06
20	I3_120116-20	L16100002-01 LOD (NO2,NO3)	1	1		12/01/16 21:27
21	I3_120116-21	L16100004-01 LOQ (F,CL,BR,SO4)	1	1		12/01/16 21:47
22	I3_120116-22	L16100004-01 LOQ (NO2,NO3)	1	1		12/01/16 22:07
23	I3_120116-23	L16100004-09 LOQ (F,CL,BR,SO4)	1	1		12/01/16 22:28
24	I3_120116-24	L16100004-09 LOQ (NO2,NO3)	1	1		12/01/16 22:48
25	I3_120116-25	WG593357-03 ANION CCV	1	1	STD77046	12/01/16 23:08
26	I3_120116-26	WG593357-04 ANION CCB	1	1		12/01/16 23:29
27	I3_120116-27	WG593356-01 ANION BLANK-SOIL	7	1		12/01/16 23:49
28	I3_120116-28	WG593356-02 ANION LCS-SOIL	7	1	STD79166	12/02/16 00:09
29	I3_120116-29	WG593356-03 ANION LCS2-SOIL	7	1	STD79166	12/02/16 00:30
30	I3_120116-30	L16100003-01 LOD (F,CL,BR,SO4)	7	1		12/02/16 00:50
31	I3_120116-31	L16100003-01 LOD (NO2,NO3)	7	1		12/02/16 01:11
32	I3_120116-32	L16100005-01 LOQ (F,CL,BR,SO4)	7	1		12/02/16 01:31
33	I3_120116-33	L16100005-01 LOQ (NO2,NO3)	7	1		12/02/16 01:51

Page: 1

Approved: 05-DEC-16




Microbac Laboratories Inc.
Instrument Run Log

Instrument: IC3 Dataset: 120116 IC3 ICAL.SEQ_OL
 Analyst1: CAS Analyst2: NA
 Method: 300/9056 SOP: IC01 Rev: 19

Maintenance Log ID: _____ Syringe Filter Lot#: 160109254
 Eluent ID#: RGT385836

Workgroups: Column 1 ID: AG14A-4MM Column 2 ID: AS14A-4MM
 Analytical WGs: 593355 (LOD/LOQ Waters) 593356 (LOD/LOQ Soils)
 Internal STD: NA Surrogate STD: NA STD77046 01-DEC-2016
 CCV STD: STD77046 LCS STD: STD79166 NA

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
34	I3_120116-34	L16100005-10 LOQ (F,CL,BR,SO4)	7	1		12/02/16 02:12
35	I3_120116-35	L16100005-10 LOQ (NO2,NO3)	7	1		12/02/16 02:32
36	I3_120116-36	WG593357-05 ANION CCV	1	1	STD77046	12/02/16 02:52
37	I3_120116-37	WG593357-06 ANION CCB	1	1		12/02/16 03:13
38	I3_120116-38	END	1	1		12/02/16 03:33

Comments

Seq.	Rerun	Dil.	Reason	Analytes
------	-------	------	--------	----------

Eri C. Zimm



Microbac Laboratories Inc.
Instrument Run Log

Instrument: IC3 _____ Dataset: 042117 IC3.SEQ _____
 Analyst1: CAS _____ Analyst2: NA _____
 Method: 300/9056 _____ SOP: IC01 _____ Rev: 19 _____

Maintenance Log ID: _____ Syringe Filter Lot#: 160804254 _____
 Eluent ID#: RGT39869 _____

Workgroups: Column 1 ID: AG14A-4MM _____ Column 2 ID: AS14A-4MM _____
 Analytical WG611183 (Waters) _____
 Internal STD: NA _____ Surrogate STD: NA _____ Calibration STD STD77046 01-DEC-2016 _____
 CCV STD: STD81395 _____ LCS STD: STD81396 _____ MS/MSD STD: STD81396 _____

Comments: System Backpressure: 2159 psi

Sample L17040971-01 was analyzed at dilutions only due to its pre-run screen result for chloride, which was greater than 200 ppm.

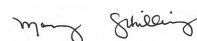
Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	I3_042117-01	ELUENT	1	1		04/21/17 15:44
2	I3_042117-02	DI WATER	1	1		04/21/17 16:04
3	I3_042117-03	WG611184-01 ANION CCV	1	1	STD81395	04/21/17 16:25
4	I3_042117-04	WG611184-02 ANION CCB	1	1		04/21/17 16:45
5	I3_042117-05	WG611183-01 ANION BLANK	1	1		04/21/17 17:05
6	I3_042117-06	WG611183-02 ANION LCS	1	1	STD81396	04/21/17 17:26
7	I3_042117-07	L17040971-01 (CL,SO4) REF 10x	1	10		04/21/17 17:46
8	I3_042117-08	WG611183-04 DUP 0971-01 10x	1	10		04/21/17 18:06
9	I3_042117-09	WG611183-05 MS 0971-01 10x	1	10	STD81396	04/21/17 18:27
10	I3_042117-10	WG611183-06 MSD 0971-01 10x	1	10	STD81396	04/21/17 18:47
11	I3_042117-11	L17040971-01 RR CL 100x	1	100		04/21/17 19:08
12	I3_042117-12	WG611184-03 ANION CCV	1	1	STD81395	04/21/17 19:28
13	I3_042117-13	WG611184-04 ANION CCB	1	1		04/21/17 19:48
14	I3_042117-14	END	1	1		04/21/17 20:09

Comments

Seq.	Rerun	Dil.	Reason	Analytes
9				
			Sample WG611183-05 MS 0971-01 10x had an MS %Rec below the advisory limit for chloride. This was due to the parent sample's initial matrix, which contained an amount of chloride greater than that of the MS spiking solution.	
10				
			Sample WG611183-06 MSD 0971-01 10x had an MSD %Rec below the advisory limit for chloride. This was due to the parent sample's initial matrix, which contained an amount of chloride greater than that of the MSD spiking solution.	

Page: 1

Approved: 24-APR-17




Microbac Laboratories Inc.

Data Checklist

Date: 01-DEC-2016
 Analyst: CAS
 Analyst: NA
 Method: 300/9056
 Instrument: IC3
 Curve Workgroup: WG593545
 Runlog ID: 79020
 Analytical Workgroups: L16100002, L16100003, L16100004, L16100005

ANALYTICAL	
System Performance Check	X
DFTPP (MS)	NA
Endrin/DDT breakdown (8081/MS)	NA
Pentachlorophenol/benzidine tailing (MS)	NA
Eluent check (IC)/system pressure (HPLC)	2166PSI
Window standard (FID)	NA
Initial Calibration	X
Average RF	NA
Linear regression or higher order curve	X
Alternate source standard (ICV) % Difference	X
Continuing Calibration (CCV)	X
% D/% Drift	NA
Minimum response factors (MS)	NA
Continuing calibration blank (CCB) (IC)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	NA
Recoveries	NA
%RPD	NA
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	NA
Surrogate recoveries	NA
Internal standard areas (MS)	NA
Library searches (MS)	NA
Calculations & correct factors	X
Compounds above calibration range	NA
Reruns	NA
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	NA
Check for completeness	X
Primary Reviewer	CAS
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	ECL

Primary Reviewer:
05-DEC-2016



Secondary Reviewer:
05-DEC-2016




Microbac Laboratories Inc.

Data Checklist

Date: 21-APR-2017
 Analyst: CAS
 Analyst: NA
 Method: 300/9056
 Instrument: IC3
 Curve Workgroup: NA
 Runlog ID: 81684
 Analytical Workgroups: L17040971

ANALYTICAL	
System Performance Check	X
DFTPP (MS)	NA
Endrin/DDT breakdown (8081/MS)	NA
Pentachlorophenol/benzidine tailing (MS)	NA
Eluent check (IC)/system pressure (HPLC)	2159 PSI
Window standard (FID)	NA
Initial Calibration	NA
Average RF	NA
Linear regression or higher order curve	NA
Alternate source standard (ICV) % Difference	NA
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (MS)	NA
Continuing calibration blank (CCB) (IC)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	X
Recoveries	X
%RPD	X
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	NA
Surrogate recoveries	NA
Internal standard areas (MS)	NA
Library searches (MS)	NA
Calculations & correct factors	X
Compounds above calibration range	X
Reruns	X
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	X
Check for completeness	X
Primary Reviewer	CAS
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	MES

Primary Reviewer:
24-APR-2017



Secondary Reviewer:
24-APR-2017



CHECKLIST1 - Modified 03/05/2008

Generated: APR-24-2017 10:02:34



Analytical Method: 9056
Login Number: L17040971

AAB#: WG611183

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6433	01	04/19/17					04/21/2017	2.1	2	*	04/21/17	2.2	2	*
LH18/24-SP650-6433	01	04/19/17					04/21/2017	2.1	2	*	04/21/17	2.1	2	*

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17040971
 Blank File ID: I3_042117-05
 Prep Date: 04/21/17 16:25
 Analyzed Date: 04/21/17 17:05
 Analyst: CAS

Work Group: WG611183
 Blank Sample ID: WG611183-01
 Instrument ID: IC3
 Method: 9056

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG611183-02	I3_042117-06	04/21/17 17:26	01
LH18/24-SP650-6433	L17040971-01	I3_042117-07	04/21/17 17:46	DL01
DUP	WG611183-04	I3_042117-08	04/21/17 18:06	DL01
LH18/24-SP650-6433	L17040971-01	I3_042117-11	04/21/17 19:08	DL02

Report Name: BLANK_SUMMARY
 PDF File ID: 5258846
 Report generated 04/24/2017 10:05



Login Number: L17040971 Prep Date: 04/21/17 16:25 Sample ID: WG611183-01
Instrument ID: IC3 Run Date: 04/21/17 17:05 Prep Method: 9056
File ID: I3 042117-05 Analyst: CAS Method: 9056
Workgroup (AAB#): WG611183 Matrix: Water Units: mg/L
Contract #: Cal ID: IC3-01-DEC-16

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Chloride	0.100	0.400	0.100	1	U
Sulfate	0.500	2.00	0.500	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5258847
24-APR-2017 10:05



Login Number: L17040971 Run Date: 04/21/2017 Sample ID: WG611183-02
 Instrument ID: IC3 Run Time: 17:26 Prep Method: 9056
 File ID: I3 042117-06 Analyst: CAS Method: 9056
 Workgroup (AAB#): WG611183 Matrix: Water Units: mg/L
 QC Key: DOD4 Lot#: STD81396 Cal ID: IC3-01-DEC-16

Analytes	Expected	Found	% Rec	LCS Limits	Q
Chloride	8.00	8.05	101	90 - 110	
Sulfate	40.0	40.6	101	90 - 110	

LCS - Modified 03/06/2008
 PDF File ID: 5258848
 Report generated: 04/24/2017 10:05



DUPLICATE (DUP)

Sample Ref: L17040971-01 Cal ID: IC3- Worknum: WG611183
 Instrument ID: IC3 Method: 9056
 Sample ID: WG611183-03 File ID: I3 042117-07 Dil: 10 Matrix: WATER
 Duplicate ID: WG611183-04 File ID: I3 042117-08 Dil: 10 Units: mg/L

Analyte	Sample	Duplicate	RPD	RPD Limit	Q
Chloride	791	791	0.0152	20	
Sulfate	44.0	43.5	1.17	20	

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

WG_DUP_DRYWT - Modified 03/06/2008
 PDF File ID: 5258850
 Report generated 04/24/2017 10:05



Loginnum: L17040971 Cal ID: IC3- Worknum: WG611183
 Instrument ID: IC3 Contract #: _____ Method: 9056
 Parent ID: WG611183-03 File ID: I3 042117-07 Dil: 10 Matrix: WATER
 Sample ID: WG611183-05 MS File ID: I3 042117-09 Dil: 10 Units: mg/L
 Sample ID: WG611183-06 MSD File ID: I3 042117-10 Dil: 10

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Chloride	ND	8.00	749	9360	8.00	750	9370	0.108	90 - 110	20	*
Sulfate	ND	40.0	80.5	201	40.0	80.4	201	0.137	90 - 110	20	*

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Login Number: L17040971 Instrument ID: IC3
Analytical Method: 9056 Initial Calibration Date: 01-DEC-16 17:22
ICAL Workgroup: WG593352 Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
Chloride	5.791	5.91		
Sulfate	7.754	8.18		

R = Correlation coefficient; 0.995 minimum
R² = Coefficient of determination; 0.99 minimum



Login Number: L17040971
 Analytical Method: 9056

Instrument ID: IC3
 Initial Calibration Date: 01-DEC-16 17:22
 Column ID: F

Analyte	WG593352-01			WG593352-02			WG593352-03		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Chloride	0.200	0.034300000 0	5.831	1.00	0.162700000	6.146	4.00	0.663600000	6.028
Sulfate	1.00	0.121500000	8.230	5.00	0.598000000	8.361	20.0	2.485600000	8.046

INT_CAL - Modified 03/06/2008
 PDF File ID: 5258961
 Report generated 04/24/2017 10:05



Login Number: L17040971
 Analytical Method: 9056

Instrument ID: IC3
 Initial Calibration Date: 01-DEC-16 17:22
 Column ID: F

Analyte	WG593352-04			WG593352-05			WG593352-06		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Chloride	8.00	1.36840000	5.846	12.0	2.11410000	5.676	24.0	4.60140000	5.216
Sulfate	40.0	5.18840000	7.710	60.0	8.07990000	7.426	120	17.7738000	6.752

INT_CAL - Modified 03/06/2008
 PDF File ID: 5258961
 Report generated 04/24/2017 10:05



Login Number: L17040971 Run Date: 12/01/2016 Sample ID: WG593352-07
 Instrument ID: IC3 Run Time: 17:43 Method: 9056
 File ID: I3 120116-09 Analyst: CAS QC Key: DOD4
 ICal Workgroup: WG593352 Cal ID: IC3 - 01-DEC-16

Analyte	Expected	Found	Units	RF	%D	UCL	Q
Chloride	8.00	8.01	mg/L	5.85	0.100	10	
Sulfate	40.0	40.2	mg/L	7.71	0.500	10	

* Exceeds %D Limit



Login Number: L17040971 Run Date: 04/21/2017 Sample ID: WG611184-02
Instrument ID: IC3 Run Time: 16:45 Method: 9056
File ID: I3 042117-04 Analyst: CAS Units: mg/L
Workgroup (AAB#): WG611183 Cal ID: IC3 - 01-DEC-16
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Chloride	0.100	0.400	0.100	U
Sulfate	0.500	2.00	0.500	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17040971 Run Date: 04/21/2017 Sample ID: WG611184-04
Instrument ID: IC3 Run Time: 19:48 Method: 9056
File ID: I3 042117-13 Analyst: CAS Units: mg/L
Workgroup (AAB#): WG611183 Cal ID: IC3 - 01-DEC-16
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Chloride	0.100	0.400	0.100	U
Sulfate	0.500	2.00	0.500	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 5258852
Report generated 04/24/2017 10:06



Login Number: L17040971 Run Date: 04/21/2017 Sample ID: WG611184-01
Instrument ID: IC3 Run Time: 16:25 Method: 9056
File ID: I3 042117-03 Analyst: CAS QC Key: DOD4
Workgroup (AAB#): WG611183 Cal ID: IC3 - 01-DEC-16
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Chloride	8.00	8.04	mg/L	5.83	0.475	10	
Sulfate	40.0	40.4	mg/L	7.67	0.965	10	

* Exceeds %D Criteria



Login Number: L17040971 Run Date: 04/21/2017 Sample ID: WG611184-03
Instrument ID: IC3 Run Time: 19:28 Method: 9056
File ID: I3 042117-12 Analyst: CAS QC Key: DOD4
Workgroup (AAB#): WG611183 Cal ID: IC3 - 01-DEC-16
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Chloride	8.00	8.03	mg/L	5.84	0.325	10	
Sulfate	40.0	40.3	mg/L	7.69	0.773	10	

* Exceeds %D Criteria



3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
April 25, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
OJE - OMOYEMWEN J. ENGLISH	PDM - PIERCE D. MORRIS
PIT - MICROBAC WARRENDALE	REK - BOB E. KYER
RLB - BOB BUCHANAN	RNP - RICK N. PETTY
SAV - SARAH A. VANDENBERG	SCA - SUEELLEN C. ADAMS
SCB - SARAH C. BOGOLIN	SCJ - SUE ELLEN C. JOHNSON
SDC - SHALYN D. CONLEY	TB - TODD BOYLE
TMB - TIFFANY M. BAILEY	TMM - TAMMY M. MORRIS
VC - VICKI COLLIER	WTD - WADE T. DELONG
XXX - UNAVAILABLE OR SUBCONTRACT	

List of Valid Qualifiers

April 25, 2017

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample receipt exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample receipt exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentatively identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound



List of Valid Qualifiers

April 25, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample receipt exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below



CHAIN OF CUSTODY

Name Of Lab Shipping To: MICROBAC (740) 373-4071 ATTN: STEPHANIE MOSSBURG

Project: AECOM LONGHORN ARMY AMMIN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS		Project No.: 60256135.GWTPPT HRUMAR16	
Job: GROUNDWATER TREATMENT PLANT BI-WEEKLY SAMPLES			
Prepared By: Scott Beesinger		P.O Number	
Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD
LH18/24-SP650-6433	Water	04/19/17 / 15:00	3
LH18/24-SP650-6433	Water	04/19/17 / 15:00	1
Trip Blank	Water	04/19/17	2
No. OF CONTAINERS: 3 VOC: 3 CHLORIDE SULFATE: 1 HCL: 2			
Analyses			
Remarks (Preservatives, etc.)		Lab I.D.#	
HCL		HCL	
NONE		NONE	
HCL		HCL	

Microbac OVD
 Received: 04/20/2017 09:43
 By: BRENDA GREENHALT
 221000099744

Brenda Greenhalt

EMAIL RESULTS TO info.mlab@microbac.com

Additional Remarks: STANDARD TAT ON ALL PARAMETERS.			
Reinquished By: <i>Scott Beesinger</i>	Date 04/19/17	Time 13:30	Received By:
Date	Time	Date	Time
Relinquished By:	Date	Time	Received By:
Date	Time	Date	Time

For Lab Use Only Received At Lab By:	Date	Time	Atbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition
Remarks									

COOLER TEMP >6° C LOG

Cooler ID 9744

SAMPLE ID	Bottle 1 °C	Bottle 2 °C	Bottle 3 °C	Bottle 4 °C	Bottle 5 °C	Bottle 6 °C

BIG 4/20/17

pH Lot # HC693124

SAMPLE ID	Bottle 1	Bottle 2	Bottle 3	Bottle 4	Bottle 5	Bottle 6

PRESERVATIVE
EXCEPTIONS

NONE

AS NOTED

BIG 4/20/17

Document Control # 1957
Last 10-07-2016

Issued to: Document Master File

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17040971

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 01-MAY-2017

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17040971-01	896669	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	20-APR-2017 13:09	BRG		
2	ANALYZ	V1	ORG4	20-APR-2017 13:56	TMB	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	20-APR-2017 13:09	BRG		
2	ANALYZ	V1	ORG4	20-APR-2017 13:56	TMB	BRG	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	20-APR-2017 13:09	BRG		
2	ANALYZ	V1	ORG4	20-APR-2017 13:56	TMB	BRG	

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17040971-01	896670	9056

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	20-APR-2017 13:09	BRG		
2	PREP	W1	SEM	21-APR-2017 10:37	CAS	BRG	

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17040971-02	896671	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	20-APR-2017 13:09	BRG		
2	ANALYZ	V1	ORG4	20-APR-2017 13:56	TMB	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	20-APR-2017 13:09	BRG		
2	ANALYZ	V1	ORG4	20-APR-2017 13:56	TMB	BRG	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login



NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
 Total Halide by Bomb Combustion (TX)
 Particle Sizing - 200 Mesh (PS200)
 Specific Gravity/Density (SPGRAV)
 Total Residual Chlorine (CL-TRL)
 Total Volatile Solids (all forms) (TVS)
 Total Coliform Bacteria (all methods)
 Fecal Coliform Bacteria (all methods)
 Sulfite (SO₃)
 Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS

Nitrogen, Ammonia by Method 350.1
 Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
 Phenolics, Total by Method 420.1
 ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
 Acetic acid
 Butyric acid
 Lactic acid
 Propionic acid
 Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
 1-Methylnaphthalene
 1,4-Dioxane
 Atrazine
 Benzaldehyde
 Biphenyl
 Caprolactam
 Hexamethylphosphoramide (HMPA)
 Pentachlorobenzene
 Pentachloroethane

NELAP Accreditation by Laboratory SOP**NONPOTABLE WATER**OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALSOVD MSS01/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP**SOLID AND HAZARDOUS CHEMICALS**OVD MSV01/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)



April 13, 2017

Mr. Adriane Steed
Microbac Laboratories, Inc.
158 Starlite Drive
Marietta, Ohio 45750

Re: Perchlorate-Steed
Work Order: 420114

Dear Mr. Steed:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 07, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4778.

Sincerely,

Hope Taylor
Project Manager

Purchase Order: SIGNED QUOTE
Enclosures



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Case Narrative

**Receipt Narrative
for
Microbac Laboratories
SDG: 420114**

April 13, 2017

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on April 07, 2017 for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

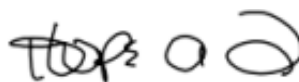
Sample Identification: The laboratory received the following sample:

<u>Laboratory ID</u>	<u>Client ID</u>
420114001	LH18/24-SP650-6430-Grab

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Perchlorates by LCMSMS.



Hope Taylor
Project Manager

Chain of Custody and Supporting Documentation

420114

CHAIN OF CUSTODY

Name Of Lab Shipping To: GEL Laboratories (843) 556-8171 ATTN: HOPE TAYLOR Page 1 of 1

Project: AECOM LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS		Project No. 60256135.GWTPT HRUMAR16	
Job: GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES			
Prepared By: Scott Beesinger		P.O. Number	
Field Sample I.D. LH18/24-SP650-6430-Grab		Sample Matrix Water	Date / Time 04/06/17 / 15:00
MS / MSD 1		No. OF CONTAINERS 1	
Analyses PERCHLORATE		[Empty grid for analysis results]	
Remarks (Preservatives, etc.)		Lab I.D.#	

Additional Remarks: STANDARD TAT Send results to Linda Raabe at linda.raabe@aecom.com or call at 210-253-7518

Relinquished By: <i>Scott Beesinger</i>	Date 04/06/17	Time 15:30	Received By: <i>Zoua</i>	Date 4/7/17	Time 9:35
Relinquished By: <i>Zoua</i>	Date 4/6/17	Time 9:35	Relinquished By:	Date	Time

For Lab Use Only

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

Laboratory Certifications

List of current GEL Certifications as of 13 April 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
Microbac Laboratories (MBAC)
SDG #: 420114**

Method/Analysis Information

Procedure: **Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)**

Analytical Method: SW846 6850 Modified

Prep Method: SW846 6850 Modified

Analytical Batch Number: 1655560

Prep Batch Number: 1655559

Sample Analysis

Sample ID	Client ID
420114001	420114001 (LH18/24-SP650-6430-Grab)
1203766634	Interference Check Sample (ICS)
1203766630	Method Blank (MB)
1203766631	Laboratory Control Sample (LCS)
1203766632	420114001(LH18/24-SP650-6430-Grab) Matrix Spike (MS)
1203766633	420114001(LH18/24-SP650-6430-Grab) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-067 REV# 14.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG. Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

ICV Requirements

All associated initial calibration verification standard(s) (ICV) met the acceptance criteria.

CCB Requirements

All continuing calibration blanks (CCB) bracketing the analyses associated with this batch were within acceptance criteria.

CCV Requirements

All continuing calibration checks (CCV) requirements were met by all bracketing CCV standards.

Low Level Standard (CRI) Requirements

All low level calibration verification (CRI) requirements were met by all bracketing CRI standards.

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Interference Check Sample (ICS)

The ICS spike recoveries met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 420114001 (LH18/24-SP650-6430-Grab) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPDs between the MS and MSD met the acceptance limits.

Internal Standard Area Acceptance

The internal standard areas were within the required acceptance criteria for all samples and QC.

Retention Time

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard. The presence of Perchlorate was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by DOD QSM 5.0, has been used. In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

Technical Information**Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Manual Integrations

Manual integrations were not required for any data file associated with this SDG.

Method Comments

The samples in this SDG were not originally analyzed using EPA Method 314.0.

Additional Comments

Comments pertaining to Perchlorate-101 and/or the Perchlorate Isotope Ratio are applicable only when the client requests Perchlorate-101 and/or the Perchlorate Isotope Ratio be reported. Due to software constraints, Perchlorate, Perchlorate-101 and/or the Perchlorate Isotope Ratio may appear on raw data and comments referring to them may appear on certain Forms whether or not the client has requested one or all of them be reported. Due to software limitations, all initial calibration blanks must be designated as IPB001 in order for the forms to be correct. The retention time marker, Perchlorate-O (18), is added to all samples, instrument blanks, and standards Prior to injection. It is used to verify the retention time of Perchlorate and Perchlorate-101 and to insure an accurate injection occurred. Due to various anions affecting the recovery of Perchlorate-O (18) and not Perchlorate and Perchlorate-101, the calibration curves of Perchlorate and Perchlorate-101 are internally corrected using Perchlorate-O (18).

Perchlorate Isotope Ratio

The Perchlorate isotope ratio met acceptance criteria for all samples and QC samples. Please see the isotope ratio criteria in the Miscellaneous Section.

System Configuration

The laboratory utilizes a Waters LC 2795 liquid chromatography instrument for Perchlorate analysis. It is coupled with a Micromass Quattro Ultima Mass Spectrometer/Mass Spectrometer. It is designated as LCMSMS #2. It is fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis. The laboratory may also utilize an Agilent 1100 liquid chromatography instrument for Perchlorate analysis. It is coupled with an Applied Biosystems 4000 Mass Spectrometer/Mass Spectrometer, designated as LCMSMS #3 or LCMSMS #4. It is also fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An

electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Chromatographic Columns

The LC-MS/MS Perchlorate analysis was performed on a Quatro Ultima LC/MS/MS.

Chromatographic separation of Perchlorate is accomplished through analysis on the following anion column:

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Qualifier Definition Report
for**

MBAC001 Microbac Laboratories

Client SDG: 420114 GEL Work Order: 420114

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: **Name:** Michael Penny**Date:** 17 APR 2017**Title:** Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1655559Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6430-GrabDate Received: 07-APR-17GEL Job No (SDG): 420114GEL Sample ID: 420114001Date Filtered: 12-APR-17Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	12-APR-17 20:23	per0412016a
	Perchlorate-O(18)			0.508	ug/L		1	12-APR-17 20:23	per0412016a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quality Control Summary

Perchlorate Laboratory Control Sample

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No. (SDG): 420114

Extract Batch Code: 1655559

Date Filtered: 12-APR-17

Matrix: WATER

Sample ID: 1203766631

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.199	ug/L	100		85 - 115
Perchlorate-O(18)		.516	ug/L			-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Interference Check Sample

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No. (SDG): 420114Extract Batch Code: 1655559Date Filtered: 12-APR-17Matrix: WATERSample ID: 1203766634

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.197	ug/L	98		70 - 130
Perchlorate-O(18)		.552	ug/L			

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Spike/Spike Duplicate Summary

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No (SDG): 420114Extract Batch Code: 1655559Date Extracted: 12-APR-17GEL MS/PS ID: 1203766632Client ID: LH18/24-SP650-6430-GrabGEL MSD/PSD ID: 1203766633QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	0.0132	ug/L	0.215	101	.209	98	3	30	75 - 125
Perchlorate-O(18)	0	0.508	ug/L	0.508		.502		1		-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate RT And Area Summary

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420114Lab Code: GELHPLC Column: Dionex IonPac AG16Instrument ID: LCMSMS2

Sample ID	Datafile	Run Date	Area	RT	RT CLO4	RRT	Q 0.98-1.02
MidLevel Standard Area	per0412006a	12-APR-17	15760				
Lower Area Limit			7880				
Upper Area Limit			23640				
1203766630	per0412013a	12-APR-17 19:41	16663	7.87	7.92268	1.007	
1203766631	per0412014a	12-APR-17 19:55	16769.6	7.84	7.89517	1.007	
1203766634	per0412015a	12-APR-17 20:09	17939.9	6.9	6.92968	1.004	
420114001	per0412016a	12-APR-17 20:23	16524.2	7.84	7.86752	1.004	
1203766632	per0412017a	12-APR-17 20:37	16517.6	8.03	8.06067	1.004	
1203766633	per0412018a	12-APR-17 20:51	16334	8.5	8.502	1	

Sample Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 165559Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6430-GrabDate Received: 07-APR-17GEL Job No (SDG): 420114GEL Sample ID: 420114001Date Filtered: 12-APR-17Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	12-APR-17 20:23	per0412016a
	Perchlorate-O(18)			0.508	ug/L		1	12-APR-17 20:23	per0412016a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

Page 16 of 31

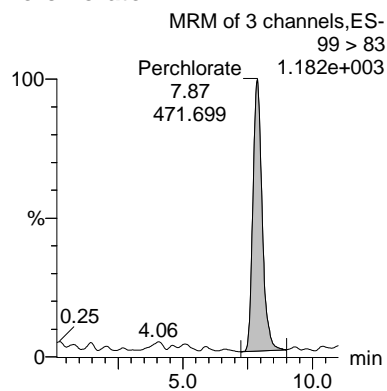
Dataset: C:\MassLynx\Perchlorate.PRO\per041217a.qld
Last Altered: Thursday, April 13, 2017 8:47:38 AM Eastern Daylight Time
Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

GL
04/13/2017

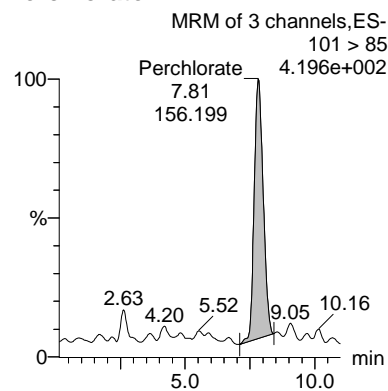
04/13/2017

Name: per0412016a
Date: 12-Apr-2017
Time: 20:23:32
ID: 420114001
Vial: 1:3,D

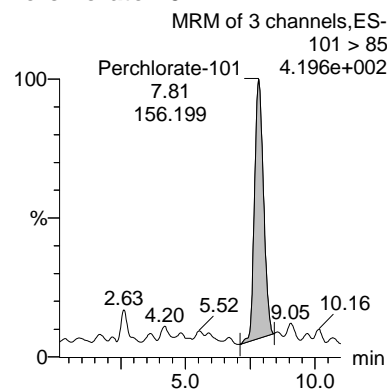
Perchlorate



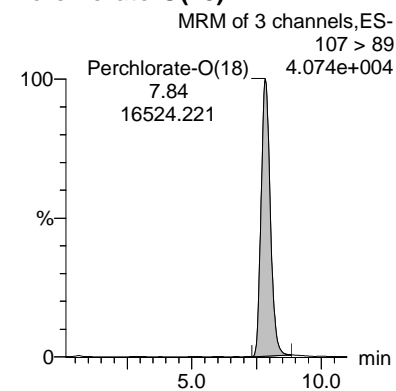
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
420114001	Perchlorate	99 > 83	7.87	471.699	0.014	bb			0.0132			102.990 3.02
420114001	Perchlorate-101	101 > 85	7.81	156.199	0.005	bb			0.0135			26.446
420114001	Perchlorate-O(18)	107 > 89	7.84	16524.221	16524.221	bb			0.5083	101.67	1.67	3942.6...

Standards

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 420114

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 12-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate

Coefficient of Determination: .

Calibration Curve: 1.08333

Response Type: Internal Standard

Curve Type: RF

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 420114

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 12-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate-101

Coefficient of Determination: .

Calibration Curve: .35

Response Type: Internal Standard

Curve Type: RF

Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

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Dataset: C:\MassLynx\Perchlorate.PRO\per041217a.qld

GL
04/13/2017GEL
04/13/2017

Last Altered: Thursday, April 13, 2017 8:47:38 AM Eastern Daylight Time

Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

Method: C:\MassLynx\Perchlorate.PRO\MethDB\per041217a.mdb 13 Apr 2017 08:46:56**Calibration: C:\MassLynx\Perchlorate.PRO\CurveDB\per041217a.cdb 13 Apr 2017 08:47:37**

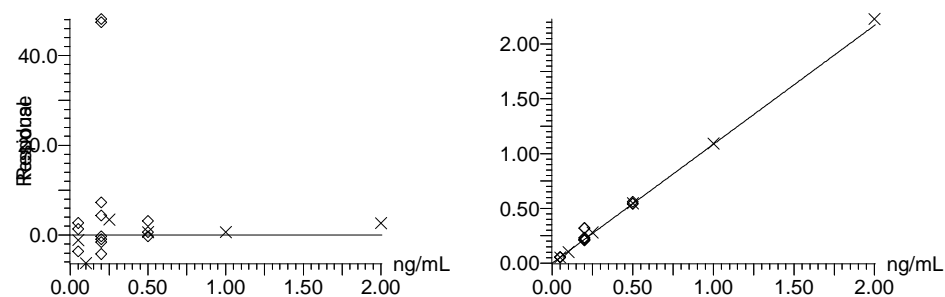
Compound name: Perchlorate

Response Factor: 1.08451

RRF SD: 0.0376344, % Relative SD: 3.47018

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



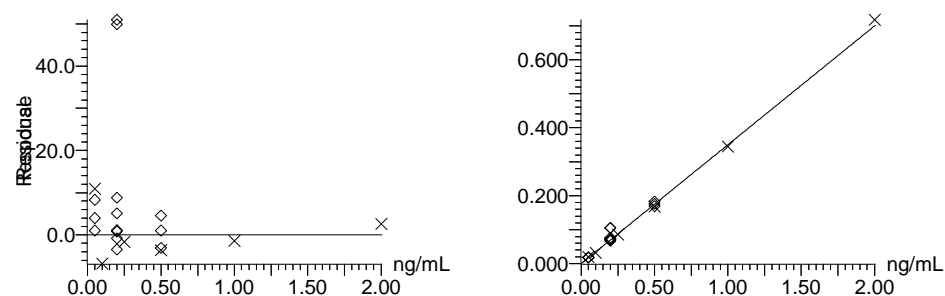
Compound name: Perchlorate-101

Response Factor: 0.349764

RRF SD: 0.0215476, % Relative SD: 6.16061

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per041217a.qld

Last Altered: Thursday, April 13, 2017 8:47:38 AM Eastern Daylight Time

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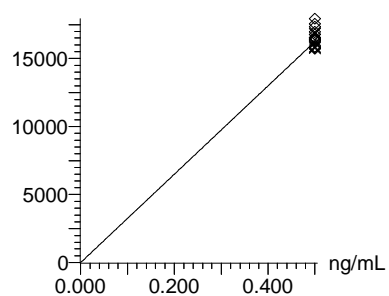
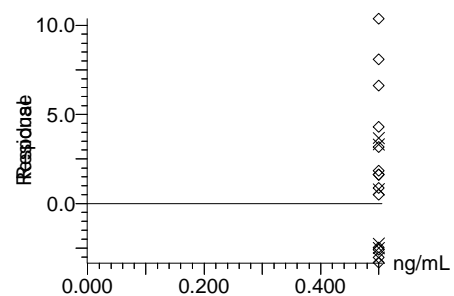
Compound name: Perchlorate-O(18)

Response Factor: 32506.5

RRF SD: 982.652, % Relative SD: 3.02294

Response type: External Std, Area

Curve type: RF



Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

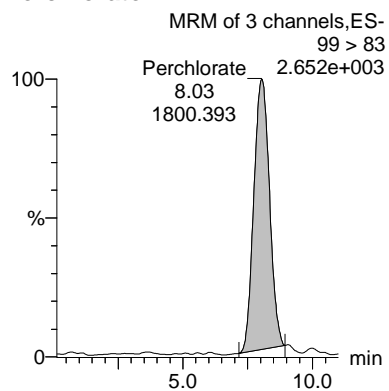
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 04/13/2017

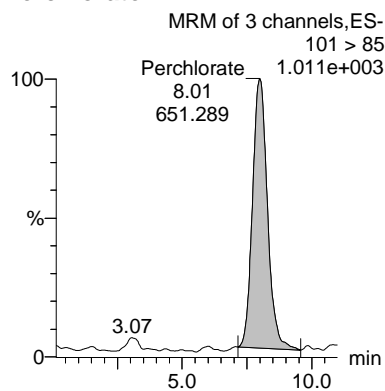
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Vial: 1:1,B

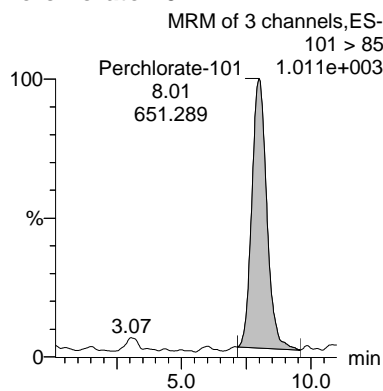
Perchlorate



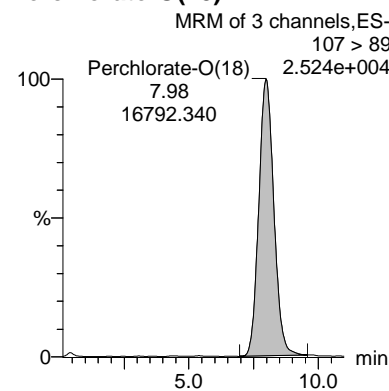
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
WCL170403-01	Perchlorate	99 > 83	8.03	1800.393	0.054	bb			0.0494	98.86	-1.14	98.144 2.76
WCL170403-01	Perchlorate-101	101 > 85	8.01	651.289	0.019	bb			0.0554	110.89	10.89	41.561
WCL170403-01	Perchlorate-O(18)	107 > 89	7.98	16792.340	16792.340	bb			0.5166	103.32	3.32	1644.4...

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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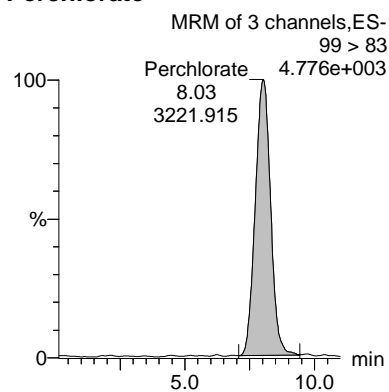
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04/13/2017

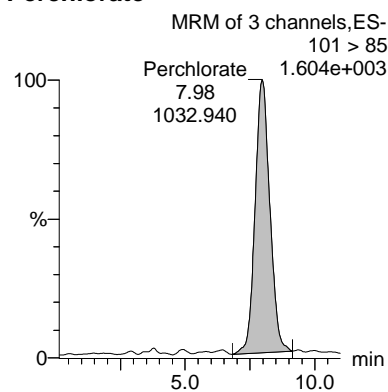
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04/13/2017

Name: per0412004a
Date: 12-Apr-2017
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Vial: 1:1,C

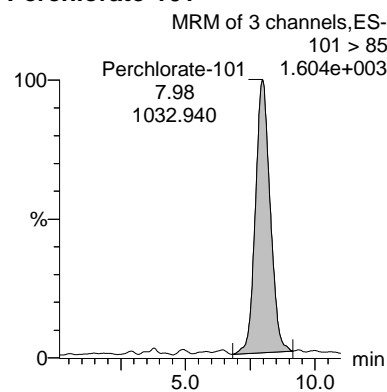
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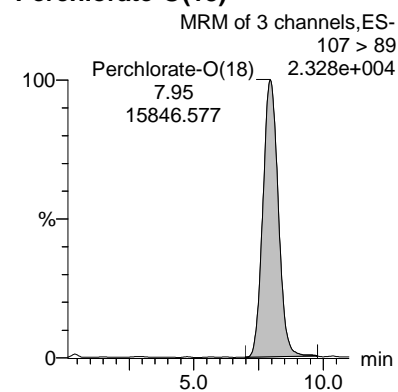
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-02	Perchlorate	99 > 83	8.03	3221.915	0.102	bb			0.0937	93.74	-6.26	122.105	3.12
WCL170403-02	Perchlorate-101	101 > 85	7.98	1032.940	0.033	bb			0.0932	93.18	-6.82	63.787	
WCL170403-02	Perchlorate-O(18)	107 > 89	7.95	15846.577	15846.577	bb			0.4875	97.50	-2.50	335.097	

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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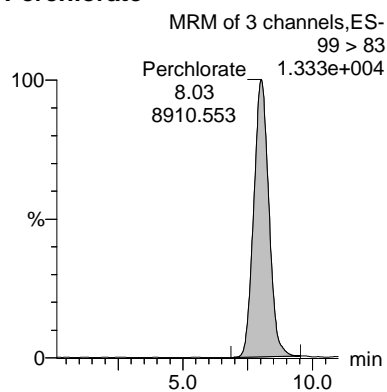
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04/13/2017

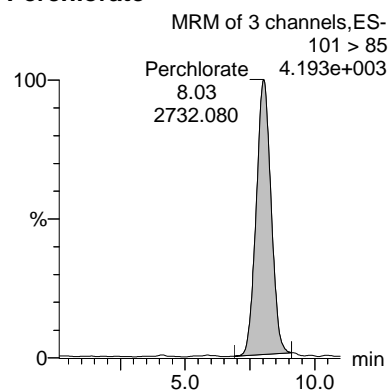
04/13/2017

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Time: 17:50:03
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Vial: 1:1,D

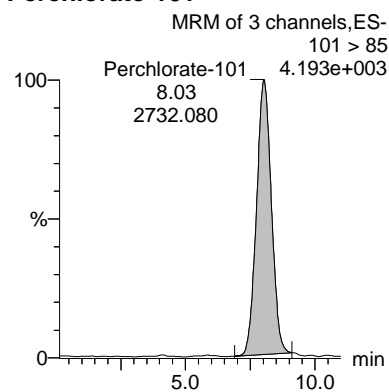
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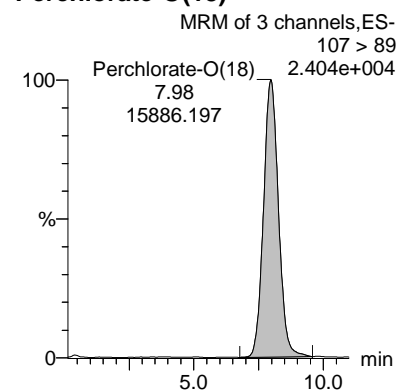
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-03	Perchlorate	99 > 83	8.03	8910.553	0.280	bb			0.2586	103.44	3.44	1634.8...	3.26
WCL170403-03	Perchlorate-101	101 > 85	8.03	2732.080	0.086	bb			0.2458	98.34	-1.66	98.365	
WCL170403-03	Perchlorate-O(18)	107 > 89	7.98	15886.197	15886.197	bb			0.4887	97.74	-2.26	639.327	

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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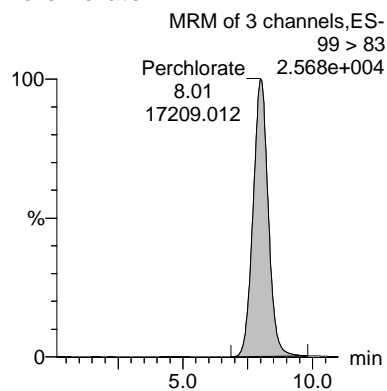
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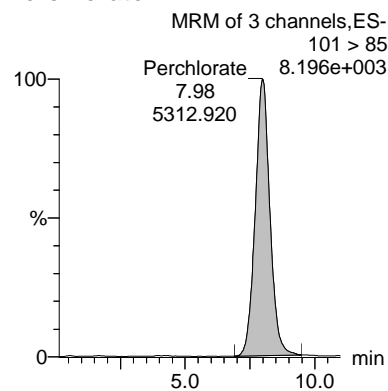
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04/13/2017

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Vial: 1:1,E

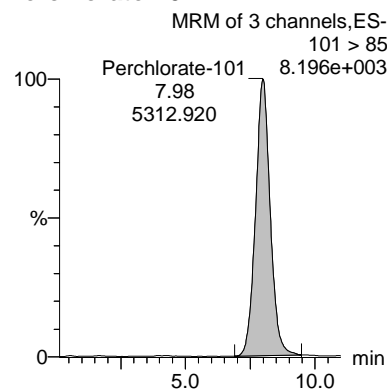
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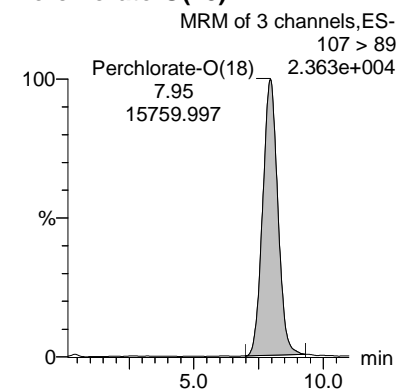
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Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-04	Perchlorate	99 > 83	8.01	17209.012	0.546	bb			0.5034	100.69	0.69	2844.6...	3.24
WCL170403-04	Perchlorate-101	101 > 85	7.98	5312.920	0.169	bb			0.4819	96.38	-3.62	860.177	
WCL170403-04	Perchlorate-O(18)	107 > 89	7.95	15759.997	15759.997	bb			0.4848	96.97	-3.03	1806.9...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

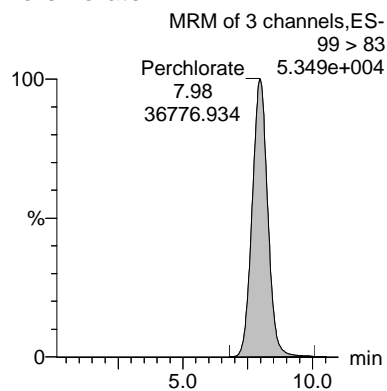
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GL
 04/13/2017

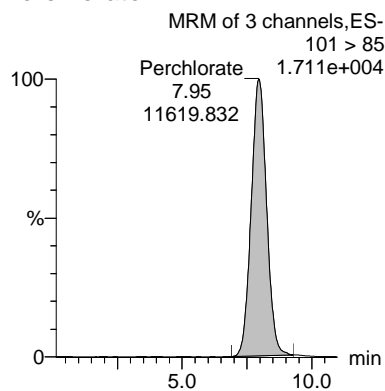
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 04/13/2017

Name: per0412007a
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 Vial: 1:1,F

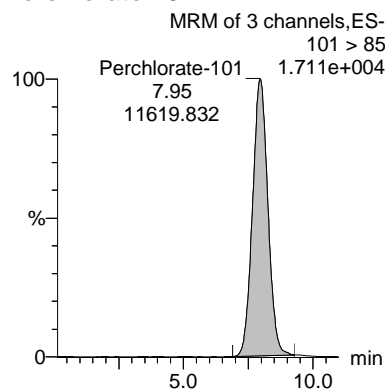
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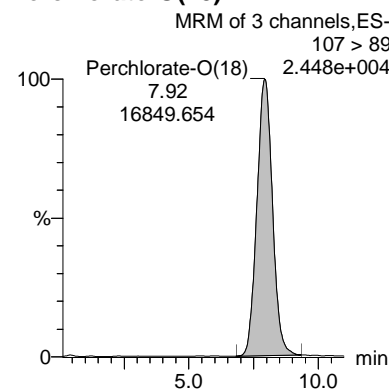
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-05	Perchlorate	99 > 83	7.98	36776.934	1.091	bb			1.0063	100.63	0.63	4695.8...	3.17
WCL170403-05	Perchlorate-101	101 > 85	7.95	11619.832	0.345	bb			0.9858	98.58	-1.42	825.848	
WCL170403-05	Perchlorate-O(18)	107 > 89	7.92	16849.654	16849.654	bb			0.5183	103.67	3.67	1415.7...	

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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Dataset: C:\MassLynx\Perchlorate.PRO\per041217a.qld

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04/13/2017GL
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Last Altered: Thursday, April 13, 2017 8:47:38 AM Eastern Daylight Time

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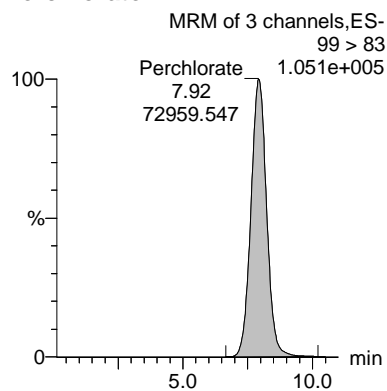
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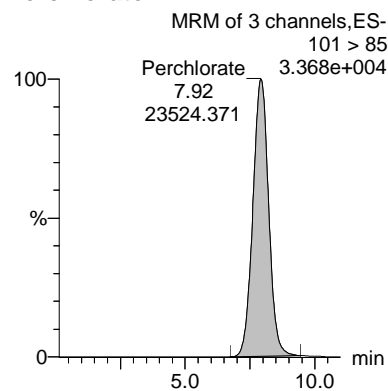
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Vial: 1:2,A

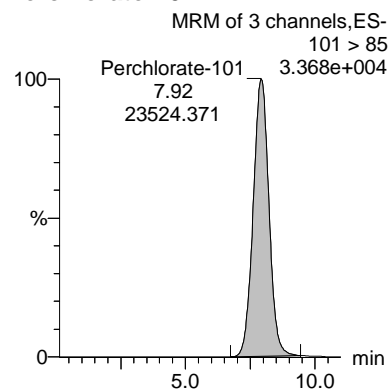
Perchlorate



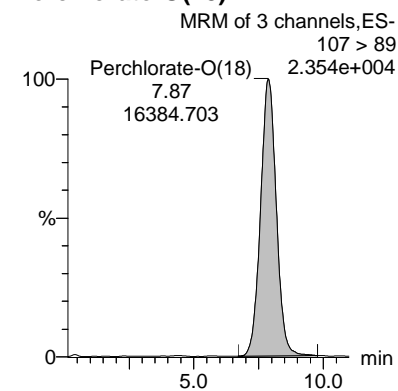
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-06	Perchlorate	99 > 83	7.92	72959.547	2.226	bb			2.0530	102.65	2.65	7406.5...	3.10
WCL170403-06	Perchlorate-101	101 > 85	7.92	23524.371	0.718	bb			2.0525	102.62	2.62	2265.3...	
WCL170403-06	Perchlorate-O(18)	107 > 89	7.87	16384.703	16384.703	bb			0.5040	100.81	0.81	1028.3...	

Perchlorate Initial Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420114Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.52	103.17	12-APR-17 18:59	per0412010a
Perchlorate Isotope Ratio		3.06		12-APR-17 18:59	per0412010a
Perchlorate-101	.5	.52	104.58	12-APR-17 18:59	per0412010a

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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Dataset: C:\MassLynx\Perchlorate.PRO\per041217a.qld

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04/13/2017GL
04/13/2017

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Name: per0412010a

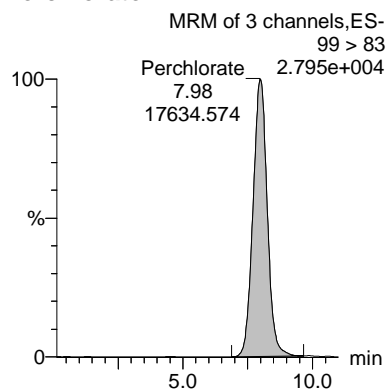
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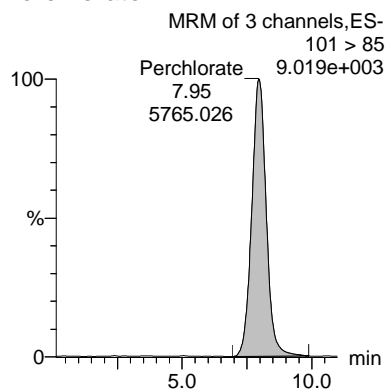
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Vial: 1:2,B

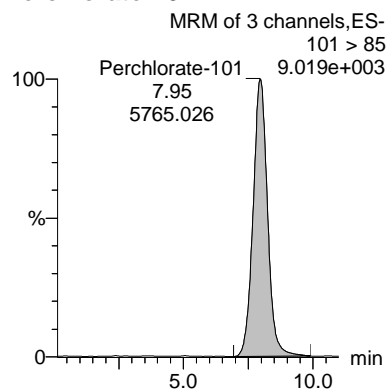
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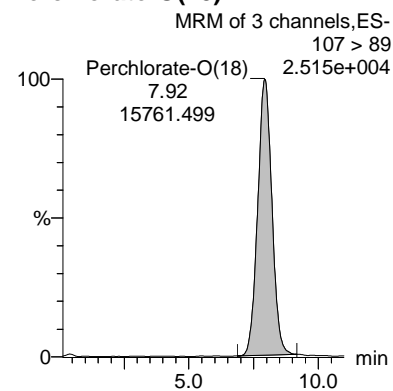
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-07ICV	Perchlorate	99 > 83	7.98	17634.574	0.559	bb			0.5158	103.17	3.17	2315.9...	3.06
WCL170403-07ICV	Perchlorate-101	101 > 85	7.95	5765.026	0.183	bb			0.5229	104.58	4.58	760.075	
WCL170403-07ICV	Perchlorate-O(18)	107 > 89	7.92	15761.499	15761.499	bb			0.4849	96.97	-3.03	2337.9...	

Perchlorate Continuing Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420114Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.5	99.72	12-APR-17 22:01	per0412023a
Perchlorate Isotope Ratio		3.06		12-APR-17 22:01	per0412023a
Perchlorate-101	.5	.51	101.04	12-APR-17 22:01	per0412023a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

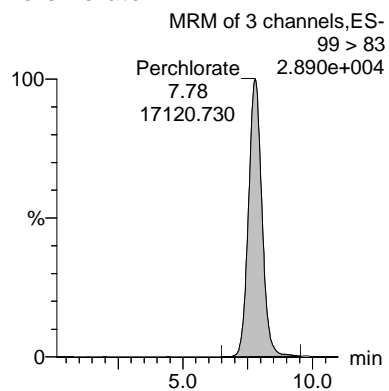
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 04/13/2017

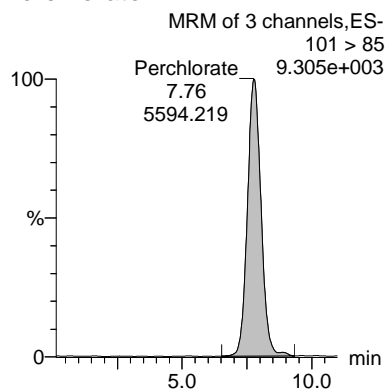
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 04/13/2017

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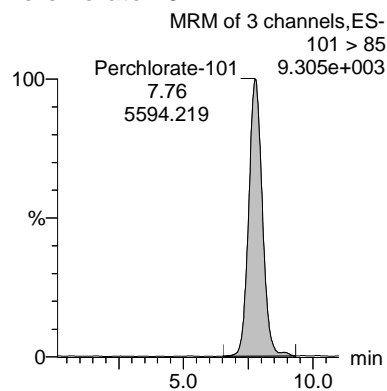
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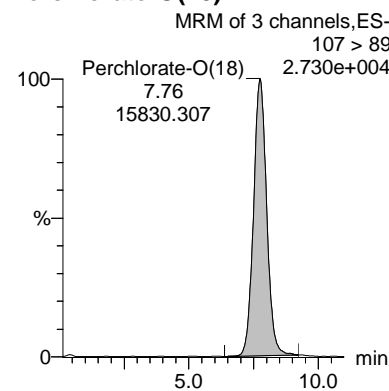
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-07CCV	Perchlorate	99 > 83	7.78	17120.730	0.541	bb			0.4986	99.72	-0.28	1407.8...	3.06
WCL170403-07CCV	Perchlorate-101	101 > 85	7.76	5594.219	0.177	bb			0.5052	101.04	1.04	632.772	
WCL170403-07CCV	Perchlorate-O(18)	107 > 89	7.76	15830.307	15830.307	bb			0.4870	97.40	-2.60	942.917	

Perchlorate MDL Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420114Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.05	.05	101.31	12-APR-17 19:27	per0412012a
Perchlorate Isotope Ratio		2.9		12-APR-17 19:27	per0412012a
Perchlorate-101	.05	.05	108.34	12-APR-17 19:27	per0412012a
Perchlorate	.05	.05	102.71	12-APR-17 22:29	per0412025a
Perchlorate Isotope Ratio		3.15		12-APR-17 22:29	per0412025a
Perchlorate-101	.05	.05	101.06	12-APR-17 22:29	per0412025a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

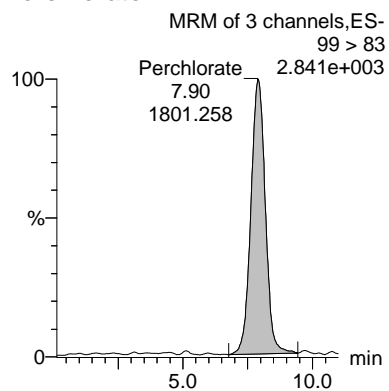
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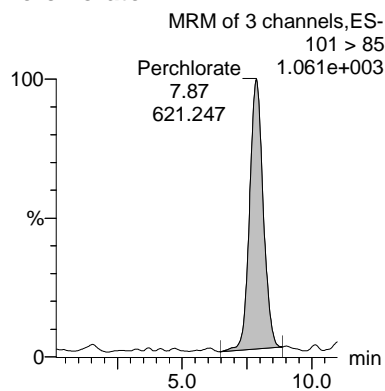
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Name: per0412012a
Date: 12-Apr-2017
Time: 19:27:40
ID: WCL170403-08CRI
Vial: 1:2,C

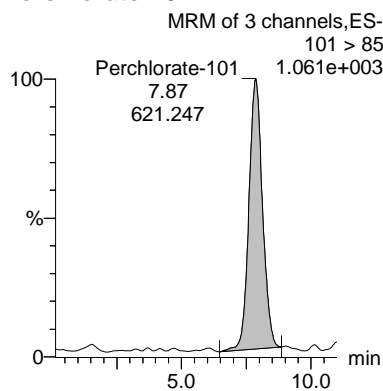
Perchlorate



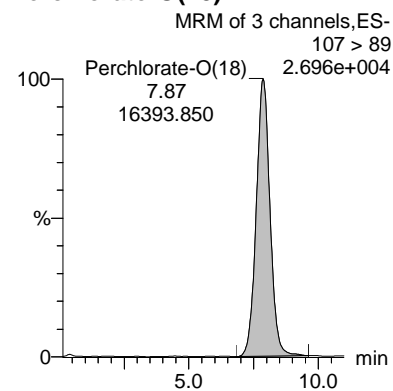
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-08CRI	Perchlorate	99 > 83	7.90	1801.258	0.055	bb			0.0507	101.31	1.31	175.899	2.90
WCL170403-08CRI	Perchlorate-101	101 > 85	7.87	621.247	0.019	bb			0.0542	108.34	8.34	29.917	
WCL170403-08CRI	Perchlorate-O(18)	107 > 89	7.87	16393.850	16393.850	bb			0.5043	100.87	0.87	738.217	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

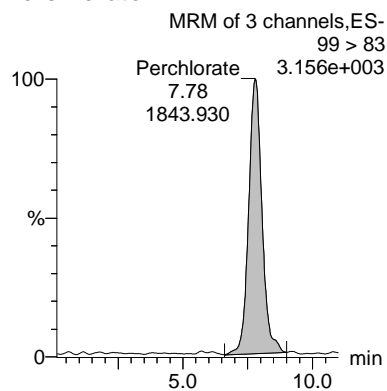
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Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

GL
 04/13/2017

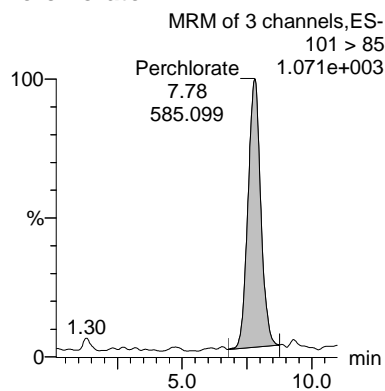
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 04/13/2017

Name: per0412025a
Date: 12-Apr-2017
Time: 22:29:09
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Vial: 1:2,C

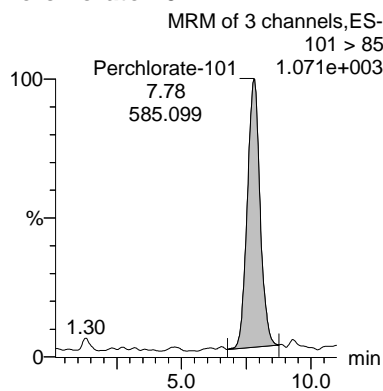
Perchlorate



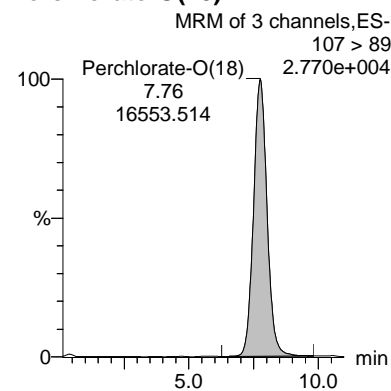
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170403-08CRI	Perchlorate	99 > 83	7.78	1843.930	0.056	bb			0.0514	102.71	2.71	337.709	3.15
WCL170403-08CRI	Perchlorate-101	101 > 85	7.78	585.099	0.018	bb			0.0505	101.06	1.06	167.369	
WCL170403-08CRI	Perchlorate-O(18)	107 > 89	7.76	16553.514	16553.514	bb			0.5092	101.85	1.85	1705.4...	

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample No.

MBLab Code: GELDate Received: 12-APR-17Instrument: LCMSMSGEL Job No (SDG): 420114Method: EPA 6850 ModifiedGEL Sample ID: 1203766630Matrix: WATERDate Filtered: 12-APR-17Extraction Batch ID: 1655559Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	12-APR-17 19:41	per0412013a
	Perchlorate-O(18)			0.513	ug/L		1	12-APR-17 19:41	per0412013a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

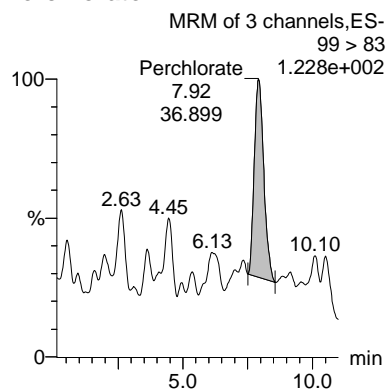
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Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

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 04/13/2017

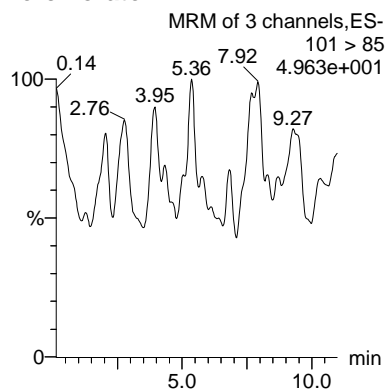
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 04/13/2017

Name: per0412013a
Date: 12-Apr-2017
Time: 19:41:39
ID: 1203766630
Vial: 1:3,A

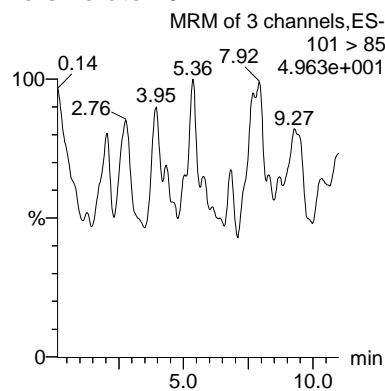
Perchlorate



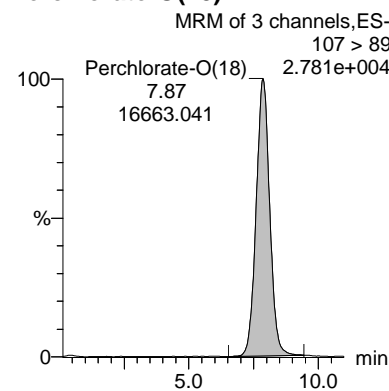
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
1203766630	Perchlorate	99 > 83	7.92	36.899	0.001	bb			0.0010			6.870 0.00
1203766630	Perchlorate-101	101 > 85										
1203766630	Perchlorate-O(18)	107 > 89	7.87	16663.041	16663.041	bb			0.5126	102.52	2.52	1326.1...

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655559

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LCS

Date Received: 12-APR-17

GEL Job No (SDG): 420114

GEL Sample ID: 1203766631

Date Filtered: 12-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.199	ug/L	J	1	12-APR-17 19:55	per0412014a
	Perchlorate-O(18)			0.516	ug/L		1	12-APR-17 19:55	per0412014a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

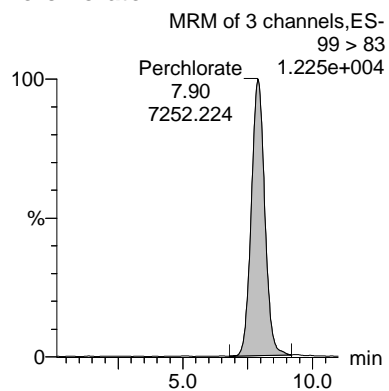
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Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

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 04/13/2017

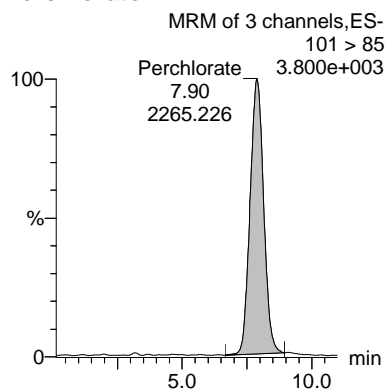
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 04/13/2017

Name: per0412014a
Date: 12-Apr-2017
Time: 19:55:37
ID: 1203766631
Vial: 1:3,B

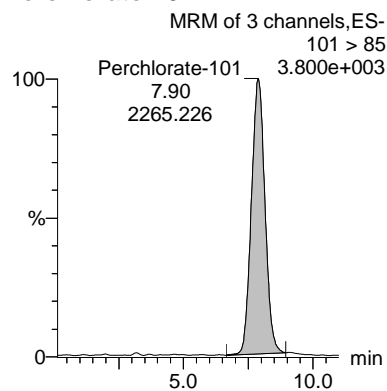
Perchlorate



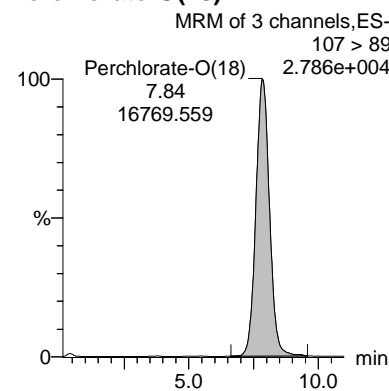
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203766631	Perchlorate	99 > 83	7.90	7252.224	0.216	bb			0.1994	99.69	-0.31	1534.3...	3.20
1203766631	Perchlorate-101	101 > 85	7.90	2265.226	0.068	bb			0.1931	96.55	-3.45	695.798	
1203766631	Perchlorate-O(18)	107 > 89	7.84	16769.559	16769.559	bb			0.5159	103.18	3.18	736.325	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655559

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 420114

GEL Sample ID: 1203766634

Date Filtered: 12-APR-17

Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.197	ug/L	J	1	12-APR-17 20:09	per0412015a
	Perchlorate-O(18)			0.552	ug/L		1	12-APR-17 20:09	per0412015a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

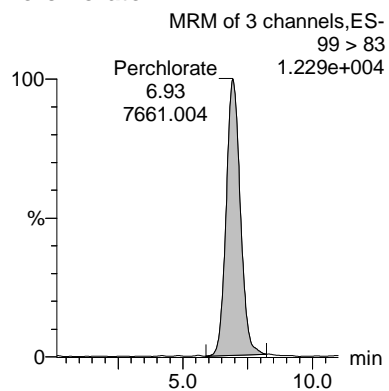
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Last Altered: Thursday, April 13, 2017 8:47:38 AM Eastern Daylight Time
Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

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 04/13/2017

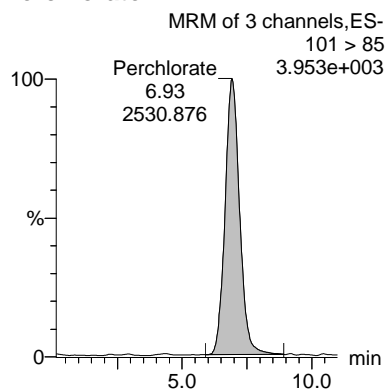
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 04/13/2017

Name: per0412015a
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ID: 1203766634
Vial: 1:3,C

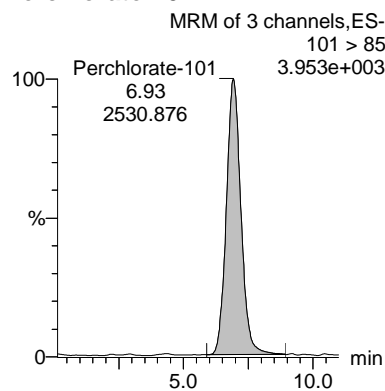
Perchlorate



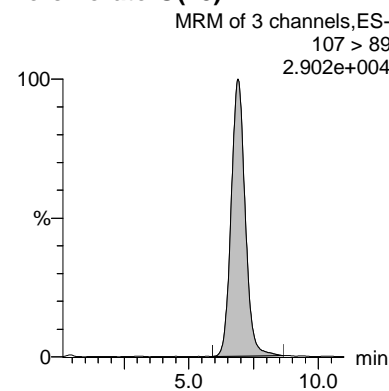
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203766634	Perchlorate	99 > 83	6.93	7661.004	0.214	bb			0.1969	98.44	-1.56	1486.6...	3.03
1203766634	Perchlorate-101	101 > 85	6.93	2530.876	0.071	bb			0.2017	100.84	0.84	442.526	
1203766634	Perchlorate-O(18)	107 > 89	6.90	17939.865	17939.865	bb			0.5519	110.38	10.38	1848.3...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1655559Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6430-GrabMSDate Received: 07-APR-17GEL Job No (SDG): 420114GEL Sample ID: 1203766632Date Filtered: 12-APR-17Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.215	ug/L		1	12-APR-17 20:37	per0412017a
	Perchlorate-O(18)			0.508	ug/L		1	12-APR-17 20:37	per0412017a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =
Instrument Value X $\frac{\text{Concentrated Extract Volume}}{\text{Aliquot}}$ X $\frac{1}{\% \text{Solids}}$

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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Dataset: C:\MassLynx\Perchlorate.PRO\per041217a.qld

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04/13/2017

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04/13/2017

Last Altered: Thursday, April 13, 2017 8:47:38 AM Eastern Daylight Time
Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

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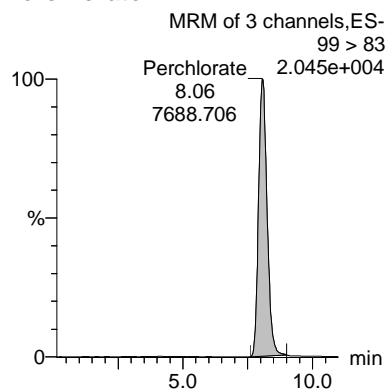
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Time: 20:37:29

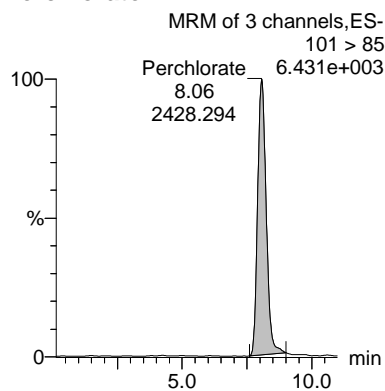
ID: 1203766632

Vial: 1:3,E

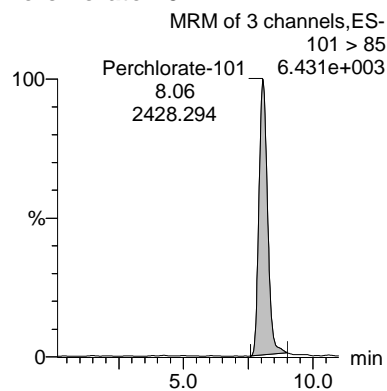
Perchlorate



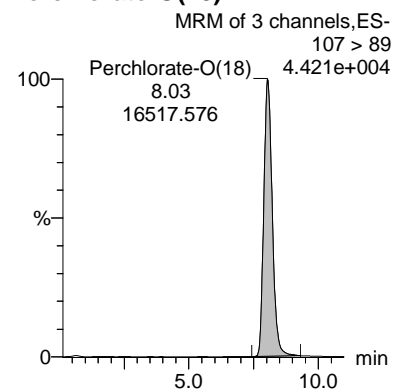
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203766632	Perchlorate	99 > 83	8.06	7688.706	0.233	bb			0.2146	107.30	7.30	1032.7...	3.17
1203766632	Perchlorate-101	101 > 85	8.06	2428.294	0.074	bb			0.2102	105.08	5.08	981.735	
1203766632	Perchlorate-O(18)	107 > 89	8.03	16517.576	16517.576	bb			0.5081	101.63	1.63	2637.3...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1655559

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6430-GrabMSD

Date Received: 07-APR-17

GEL Job No (SDG): 420114

GEL Sample ID: 1203766633

Date Filtered: 12-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.209	ug/L		1	12-APR-17 20:51	per0412018a
	Perchlorate-O(18)			0.502	ug/L		1	12-APR-17 20:51	per0412018a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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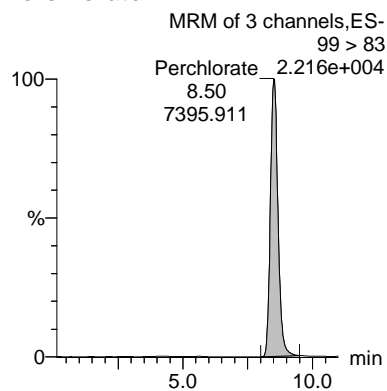
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Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

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04/13/2017

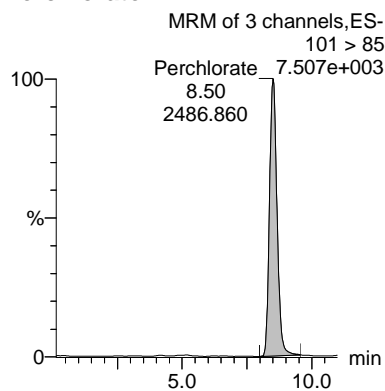
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04/13/2017

Name: per0412018a
Date: 12-Apr-2017
Time: 20:51:26
ID: 1203766633
Vial: 1:3,F

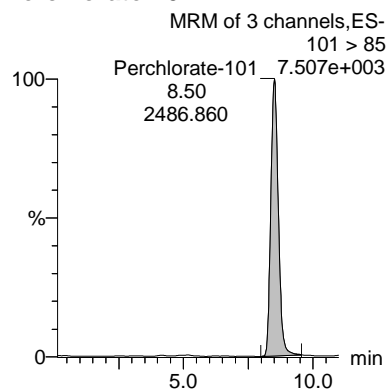
Perchlorate



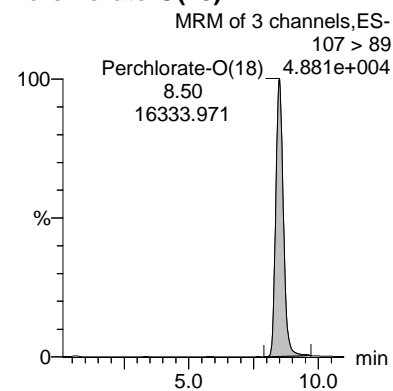
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203766633	Perchlorate	99 > 83	8.50	7395.911	0.226	bb			0.2088	104.38	4.38	1367.5...	2.97
1203766633	Perchlorate-101	101 > 85	8.50	2486.860	0.076	bb			0.2176	108.82	8.82	230.836	
1203766633	Perchlorate-O(18)	107 > 89	8.50	16333.971	16333.971	bb			0.5025	100.50	0.50	1275.7...	

Perchlorate Initial Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420114Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	12-APR-17	per0412001a	IPB001
Perchlorate-101	0.00	0	NA	12-APR-17	per0412001a	IPB001
Perchlorate	0.00	0	NA	12-APR-17	per0412002a	IPB001
Perchlorate-101	0.00	0	NA	12-APR-17	per0412002a	IPB001

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per041217a.qld
Last Altered: Thursday, April 13, 2017 8:47:38 AM Eastern Daylight Time
Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

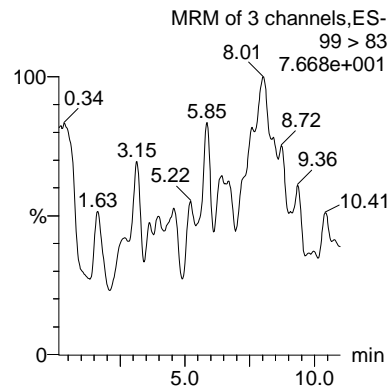
GL
 04/13/2017

[Signature]
 04/13/2017

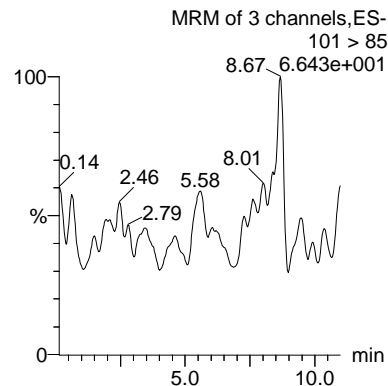
Method: C:\MassLynx\Perchlorate.PRO\MethDB\per041217a.mdb 13 Apr 2017 08:46:56
Calibration: C:\MassLynx\Perchlorate.PRO\CurveDB\per041217a.cdb 13 Apr 2017 08:47:37

Name: per0412001a
Date: 12-Apr-2017
Time: 16:54:09
ID: IPB001
Vial: 1:1,A

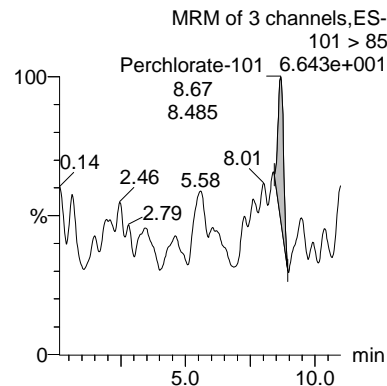
Perchlorate



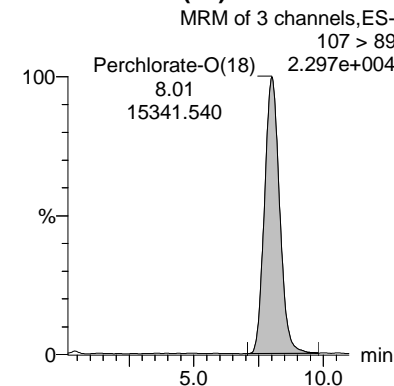
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83										0.00
IPB001	Perchlorate-101	101 > 85	8.67	8.485	0.000	bb			0.0008			5.697
IPB001	Perchlorate-O(18)	107 > 89	8.01	15341.540	15341.540	bb			0.4720	94.39	-5.61	867.898

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

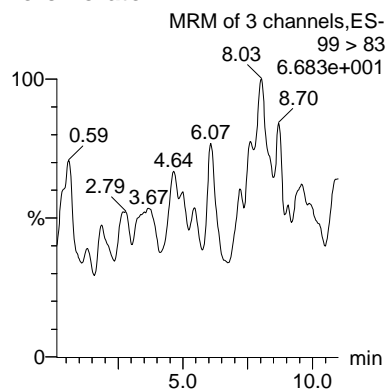
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Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

GL
 04/13/2017

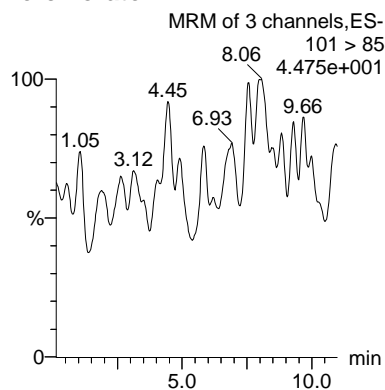
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Name: per0412002a
Date: 12-Apr-2017
Time: 17:08:09
ID: IPB001
Vial: 1:1,A

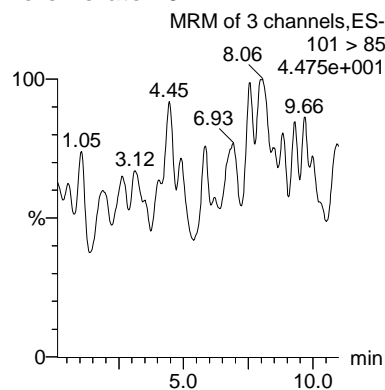
Perchlorate



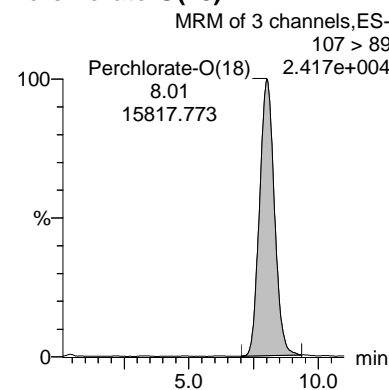
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83										0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	8.01	15817.773	15817.773	bb			0.4866	97.32	-2.68	1236.0...

Perchlorate Continuing Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 420114Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	12-APR-17	per0412009a	IPB002
Perchlorate-101	0.00	0	NA	12-APR-17	per0412009a	IPB002
Perchlorate	0.00	0	NA	12-APR-17	per0412011a	IPB003
Perchlorate-101	0.00	0	NA	12-APR-17	per0412011a	IPB003
Perchlorate	0.00	0	NA	12-APR-17	per0412019a	IPB004
Perchlorate-101	0.00	0	NA	12-APR-17	per0412019a	IPB004
Perchlorate	0.00	0	NA	12-APR-17	per0412024a	IPB005
Perchlorate-101	0.00	0	NA	12-APR-17	per0412024a	IPB005

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

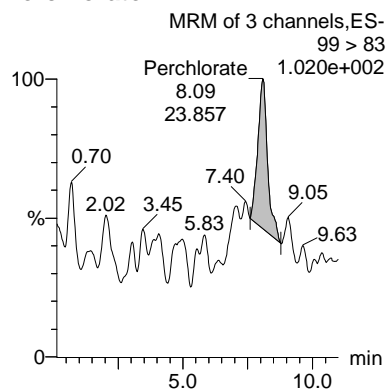
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Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

GL
 04/13/2017

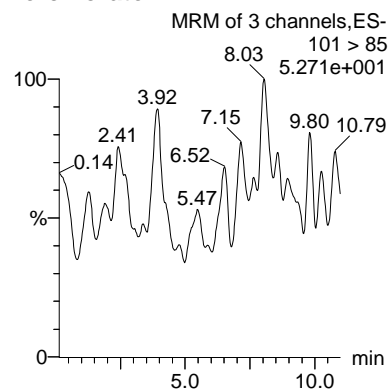
[Signature]
 04/13/2017

Name: per0412009a
Date: 12-Apr-2017
Time: 18:45:49
ID: IPB002
Vial: 1:1,A

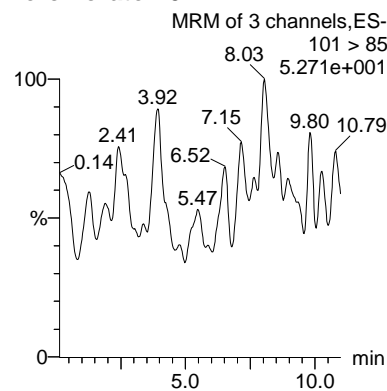
Perchlorate



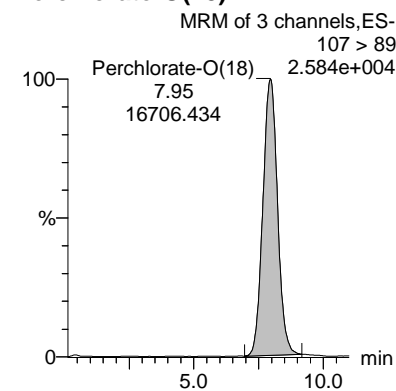
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB002	Perchlorate	99 > 83	8.09	23.857	0.001	bb			0.0007			7.999 0.00
IPB002	Perchlorate-101	101 > 85										
IPB002	Perchlorate-O(18)	107 > 89	7.95	16706.434	16706.434	bb			0.5139	102.79	2.79	1823.6...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

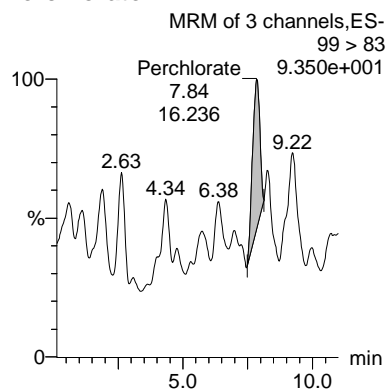
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Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

GL
 04/13/2017

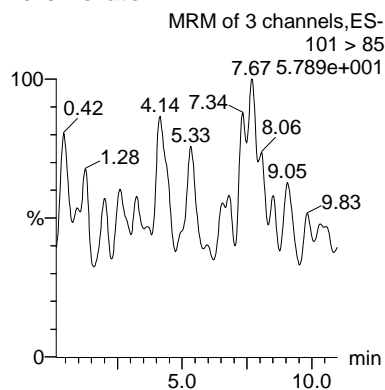
[Signature]
 04/13/2017

Name: per0412011a
Date: 12-Apr-2017
Time: 19:13:43
ID: IPB003
Vial: 1:1,A

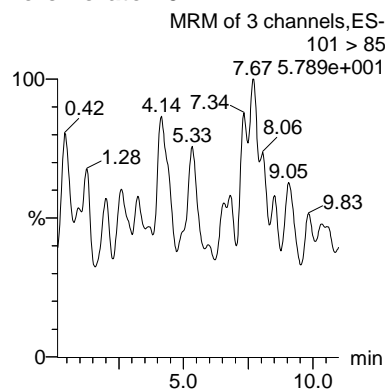
Perchlorate



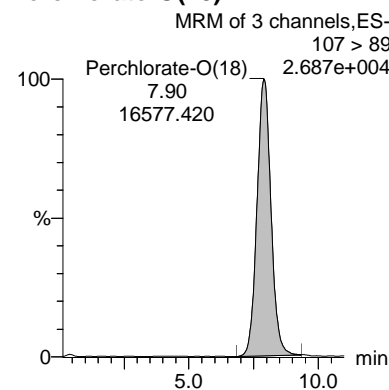
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
IPB003	Perchlorate	99 > 83	7.84	16.236	0.000	bb			0.0005			4.796	0.00
IPB003	Perchlorate-101	101 > 85											
IPB003	Perchlorate-O(18)	107 > 89	7.90	16577.420	16577.420	bb			0.5100	101.99	1.99	952.743	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

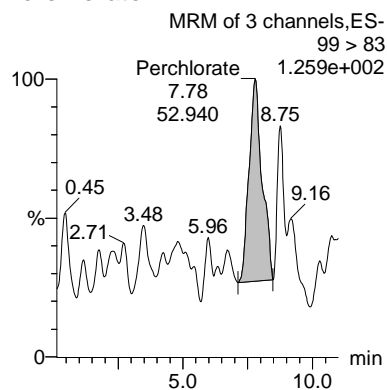
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Printed: Thursday, April 13, 2017 9:07:31 AM Eastern Daylight Time

GL
 04/13/2017

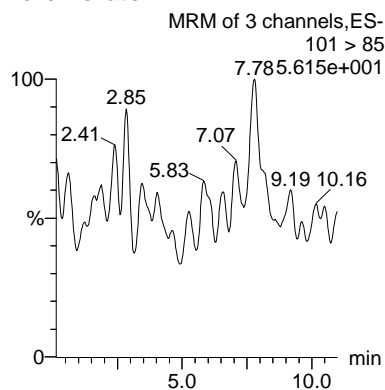
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 04/13/2017

Name: per0412019a
Date: 12-Apr-2017
Time: 21:05:22
ID: IPB004
Vial: 1:1,A

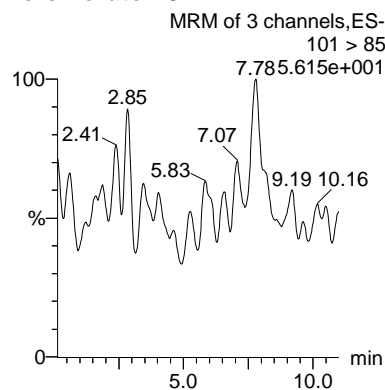
Perchlorate



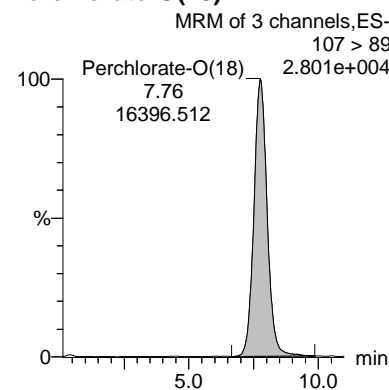
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB004	Perchlorate	99 > 83	7.78	52.940	0.002	bb			0.0015			7.520 0.00
IPB004	Perchlorate-101	101 > 85										
IPB004	Perchlorate-O(18)	107 > 89	7.76	16396.512	16396.512	bb			0.5044	100.88	0.88	1755.2...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

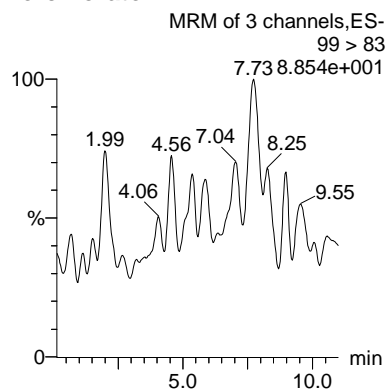
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GL
 04/13/2017

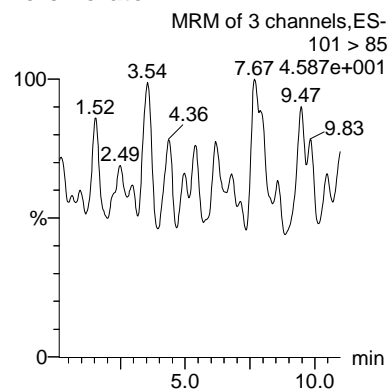
[Signature]
 04/13/2017

Name: per0412024a
Date: 12-Apr-2017
Time: 22:15:12
ID: IPB005
Vial: 1:1,A

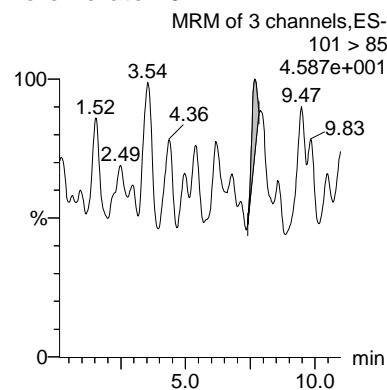
Perchlorate



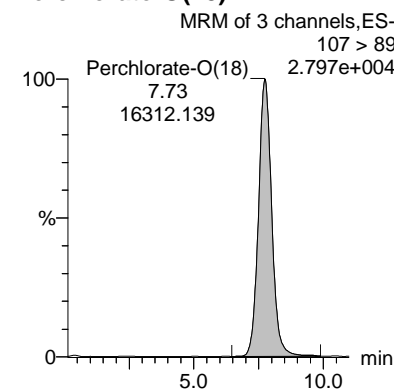
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB005	Perchlorate	99 > 83										0.00
IPB005	Perchlorate-101	101 > 85	7.67	2.927	0.000	bb			0.0003			4.483
IPB005	Perchlorate-O(18)	107 > 89	7.73	16312.139	16312.139	bb			0.5018	100.36	0.36	2117.9...

Miscellaneous

Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)

Batch ID: 165559 Verified by: _____
 Analyst: Grace Cappelmann
 Method: SW846 6850 Modified

Lab SOP: GL-OA-E-067 REV# 14
 Instrument: LCMSMS Manual Instrument

Sample ID	Prep Date	Initial Volume (mL)	Final Volume (mL)	Prepped Factor (mL/mL)
1203766630 MB	12-APR-2017 12:50:00	10	10	1
1203766631 LCS	12-APR-2017 12:50:00	10	10	1
1203766634 ICS	12-APR-2017 12:50:00	10	10	1
420114001	12-APR-2017 12:50:00	10	10	1
1203766632 MS (420114001)	12-APR-2017 12:50:00	10	10	1
1203766633 MSD (420114001)	12-APR-2017 12:50:00	10	10	1

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
ICS	1203766634	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	De-salting cartridge: 161107-2.5-Ba/Ag/H
LCS	1203766631	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MS	1203766632	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MSD	1203766633	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
RGNT	All	TYPE I Water for HPLC	2457559	10	mL	
RGNT	All	500 ppm Carbonate, Bicarbonate, Chloride, Sulfate	2463729	10	mL	

GEL ORGANIC RUN LOG

INSTRUMENT ID: LC-MS/MS#2

Date: 04/12/17

Method: EPA 6850-Modified

Extr. Injection Volume: 20uL

Int. Std.: UCL161103-01

Sequence Number: per041217a

Mobile Phase Lot#: 2536603, 2457559

SOP: GL-OA-E-067

Initial Calibration Date: 04/12/17

Standard-Samp Reagent Lot#.: 2457559

Alt Check Std. ID: WCL170403-07

DataFile	Sample	Analyst	Injection Date	Batch	SDG	Dilution	Client	Comments	QC_Flag
per0412001a	IPB001	GXC1	4/12/2017 16:54			1		USE	B
per0412002a	IPB001	GXC1	4/12/2017 17:08			1		USE	B
per0412003a	WCLICAL-01	GXC1	4/12/2017 17:22			1		USE	I
per0412004a	WCLICAL-02	GXC1	4/12/2017 17:36			1		USE	I
per0412005a	WCLICAL-03	GXC1	4/12/2017 17:50			1		USE	I
per0412006a	WCLICAL-04	GXC1	4/12/2017 18:04			1		USE	I
per0412007a	WCLICAL-05	GXC1	4/12/2017 18:17			1		USE	I
per0412008a	WCLICAL-06	GXC1	4/12/2017 18:31			1		USE	I
per0412009a	IPB002	GXC1	4/12/2017 18:45			1		USE	B
per0412010a	WCLICV	GXC1	4/12/2017 18:59			1		USE	C
per0412011a	IPB003	GXC1	4/12/2017 19:13			1		USE	B
per0412012a	WCLCRI	GXC1	4/12/2017 19:27			1		USE	C
per0412013a	1203766630	GXC1	4/12/2017 19:41	1655560	420114	1	MBAC	USE	S
per0412014a	1203766631	GXC1	4/12/2017 19:55	1655560	420114	1	MBAC	USE	S
per0412015a	1203766634	GXC1	4/12/2017 20:09	1655560	420114	1	MBAC	USE	S
per0412016a	420114001	GXC1	4/12/2017 20:23	1655560	420114	1	MBAC	USE	S
per0412017a	1203766632	GXC1	4/12/2017 20:37	1655560	420114	1	MBAC	USE	S
per0412018a	1203766633	GXC1	4/12/2017 20:51	1655560	420114	1	MBAC	USE	S
per0412019a	IPB004	GXC1	4/12/2017 21:05			1		USE	B
per0412020a	1203765872	GXC1	4/12/2017 21:19	1655229	2017-1258	1	ARSL	USE	S
per0412021a	1203765873	GXC1	4/12/2017 21:33	1655229	2017-1258	1	ARSL	USE	S
per0412022a	1203765876	GXC1	4/12/2017 21:47	1655229	2017-1258	1	ARSL	USE	S
per0412023a	WCLCCV	GXC1	4/12/2017 22:01			1		USE	C
per0412024a	IPB005	GXC1	4/12/2017 22:15			1		USE	B
per0412025a	WCLCRI	GXC1	4/12/2017 22:29			1		USE	C
per0412026a	419375001	GXC1	4/12/2017 22:43	1655229	2017-1258	1	ARSL	USE	S
per0412027a	1203765874	GXC1	4/12/2017 22:57	1655229	2017-1258	1	ARSL	USE	S
per0412028a	1203765875	GXC1	4/12/2017 23:11	1655229	2017-1258	1	ARSL	USE	S
per0412029a	WCLCCV	GXC1	4/12/2017 23:24			1		USE	C

per0412030a	IPB006	GXC1	4/12/2017 23:38	1	USE	B
per0412031a	WCLCRI	GXC1	4/12/2017 23:52	1	USE	C

Isotope Ratio Criteria

Isotope Ratio $^{35}\text{Cl}/^{37}\text{Cl}$

2.31-3.85

Tune Criteria

The tuning solution is introduced directly into the mass spectrometer using the ESI interface in the positive ion mode. The mass range scanned is 20 to 1100 amu using at least six scans. The observed mass for the target compound in the daily calibration standards must be within 0.2 amu of the expected value. If it is greater than 0.2 amu, then a mass calibration is performed and the instrument is re-calibrated.



April 20, 2017

Mr. Adriane Steed
Microbac Laboratories, Inc.
158 Starlite Drive
Marietta, Ohio 45750

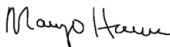
Re: Perchlorate-Steed
Work Order: 421097

Dear Mr. Steed:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 20, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4778.

Sincerely,


Margo Herron for
Hope Taylor
Project Manager

Purchase Order: SIGNED QUOTE
Enclosures

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Case Narrative

**Receipt Narrative
for
Microbac Laboratories
SDG: 421097**

April 20, 2017

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on April 20, 2017 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

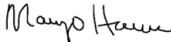
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
421097001	LH18/24-SP650-6433
421097002	LH18/24-SP140-7433

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Perchlorates by LCMSMS.


Margo Herron for
Hope Taylor
Project Manager

Chain of Custody and Supporting Documentation

421097

CHAIN OF CUSTODY

Name Of Lab Shipping To: GEL Laboratories (843) 556-8171 ATTN: HOPE TAYLOR

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

Project No.
60256135.GWTP
HRUMAR16

Job:
GROUNDWATER TREATMENT PLANT
BI-WEEKLY SAMPLES

Prepared By:
Scott Beesinger

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	NO. OF CONTAINERS	Analyses										Remarks (Preservatives, etc.)	Lab I.D.#		
LH18/24-SP650-6433	Water	04/19/17 / 15:00		1													PERCHLORATE	NONE
LH18/24-SP140-7433	Water	04/19/17 / 15:00		1														NONE

Additional Remarks: 24 HR. TAT on both Samples

EMAIL RESULTS TO inda.raabe@aecom.com

Relinquished By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
<i>Scott Beesinger</i>	04/19/17	13:30	<i>[Signature]</i>	4/20/17	9:30			

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

Laboratory Certifications

List of current GEL Certifications as of 20 April 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
Microbac Laboratories (MBAC)
SDG #: 421097**

Method/Analysis Information

Procedure: **Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)**

Analytical Method: SW846 6850 Modified

Prep Method: SW846 6850 Modified

Analytical Batch Number: 1657660

Prep Batch Number: 1657659

Sample Analysis

Sample ID	Client ID
421097001	421097001 (LH18/24-SP650-6433)
421097002	421097002 (LH18/24-SP140-7433)
1203771533	Interference Check Sample (ICS)
1203771529	Method Blank (MB)
1203771530	Laboratory Control Sample (LCS)
1203771531	420730001(LH18/24-SP650-6432-Grab) Matrix Spike (MS)
1203771532	420730001(LH18/24-SP650-6432-Grab) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-067 REV# 14.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG. Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

ICV Requirements

All associated initial calibration verification standard(s) (ICV) met the acceptance criteria.

CCB Requirements

All continuing calibration blanks (CCB) bracketing the analyses associated with this batch were within acceptance criteria.

CCV Requirements

All continuing calibration checks (CCV) requirements were met by all bracketing CCV standards.

Low Level Standard (CRI) Requirements

All low level calibration verification (CRI) requirements were met by all bracketing CRI standards.

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Interference Check Sample (ICS)

The ICS spike recoveries met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 420730001 (LH18/24-SP650-6432-Grab) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPDs between the MS and MSD met the acceptance limits.

Internal Standard Area Acceptance

The internal standard areas were within the required acceptance criteria for all samples and QC.

Retention Time

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard. The presence of Perchlorate was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by DOD QSM 5.0, has been used. In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

Technical Information**Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as

days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

Sample 421097002 (LH18/24-SP140-7433) was diluted to bring the over range concentration within the calibration range.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Manual Integrations

Manual integrations were not required for any data file associated with this SDG.

Method Comments

The samples in this SDG were not originally analyzed using EPA Method 314.0.

Additional Comments

Comments pertaining to Perchlorate-101 and/or the Perchlorate Isotope Ratio are applicable only when the client requests Perchlorate-101 and/or the Perchlorate Isotope Ratio be reported. Due to software constraints, Perchlorate, Perchlorate-101 and/or the Perchlorate Isotope Ratio may appear on raw data and comments referring to them may appear on certain Forms whether or not the client has requested one or all of them be reported. Due to software limitations, all initial calibration blanks must be designated as IPB001 in order for the forms to be correct. The retention time marker, Perchlorate-O (18), is added to all samples, instrument blanks, and standards Prior to injection. It is used to verify the retention time of Perchlorate and Perchlorate-101 and to insure an accurate injection occurred. Due to various anions affecting the recovery of Perchlorate-O (18) and not Perchlorate and Perchlorate-101, the calibration curves of Perchlorate and Perchlorate-101 are internally corrected using Perchlorate-O (18).

Perchlorate Isotope Ratio

The Perchlorate isotope ratio met acceptance criteria for all samples and QC samples. Please see the isotope ratio criteria in the Miscellaneous Section.

System Configuration

The laboratory utilizes a Waters LC 2795 liquid chromatography instrument for Perchlorate analysis. It is coupled with a Micromass Quattro Ultima Mass Spectrometer/Mass Spectrometer. It is designated as LCMSMS #2. It is fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis. The laboratory may also utilize an Agilent 1100 liquid chromatography instrument for Perchlorate analysis. It is coupled with an Applied Biosystems 4000 Mass Spectrometer/Mass Spectrometer, designated as LCMSMS #3 or LCMSMS #4. It is also fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Chromatographic Columns

The LC-MS/MS Perchlorate analysis was performed on a Quatro Ultima LC/MS/MS.

Chromatographic separation of Perchlorate is accomplished through analysis on the following anion column:

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Qualifier Definition Report
for**

MBAC001 Microbac Laboratories

Client SDG: 421097 GEL Work Order: 421097

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- J Value is estimated
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: **Name:** Michael Penny**Date:** 21 APR 2017**Title:** Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6433

Date Received: 20-APR-17

GEL Job No (SDG): 421097

GEL Sample ID: 421097001

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	20-APR-17 18:51	per0420019a
	Perchlorate-O(18)			0.484	ug/L		1	20-APR-17 18:51	per0420019a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample No.

LH18/24-SP140-7433Lab Code: GELDate Received: 20-APR-17Instrument: LCMSMSGEL Job No (SDG): 421097Method: SW846 6850 ModifiedGEL Sample ID: 421097002Matrix: WATERDate Filtered: 20-APR-17Extraction Batch ID: 1657659Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	500	2000	8930	ug/L		10000	20-APR-17 19:02	per0420020a
	Perchlorate-O(18)			4740	ug/L		10000	20-APR-17 19:02	per0420020a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quality Control Summary

Perchlorate Laboratory Control Sample

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No. (SDG): 421097

Extract Batch Code: 1657659

Date Filtered: 20-APR-17

Matrix: WATER

Sample ID: 1203771530

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.194	ug/L	97		85 - 115
Perchlorate-O(18)		.487	ug/L			-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Interference Check Sample

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No. (SDG): 421097Extract Batch Code: 1657659Date Filtered: 20-APR-17Matrix: WATERSample ID: 1203771533

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.199	ug/L	99		70 - 130
Perchlorate-O(18)		.512	ug/L			

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Spike/Spike Duplicate Summary

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No (SDG): 421097Extract Batch Code: 1657659Date Extracted: 20-APR-17GEL MS/PS ID: 1203771531Client ID: LH18/24-SP650-6432-GrabGEL MSD/PSD ID: 1203771532QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	0.0136	ug/L	0.206	96	.21	98	2	30	75 - 125
Perchlorate-O(18)	0	0.487	ug/L	0.485		.479		1		-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate RT And Area Summary

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421097Lab Code: GELHPLC Column: Dionex IonPac AG16Instrument ID: LCMSMS2

Sample ID	Datafile	Run Date	Area	RT	RT CLO4	RRT	Q 0.98-1.02
MidLevel Standard Area	per0420006a	20-APR-17	22576.4				
Lower Area Limit			11288.2				
Upper Area Limit			33864.6				
1203771529	per0420013a	20-APR-17 17:45	21004.2	5.3			
1203771530	per0420014a	20-APR-17 17:56	21537.5	5.3	5.32985	1.006	
1203771533	per0420015a	20-APR-17 18:07	22641.5	5.16	5.21952	1.012	
1203771531	per0420017a	20-APR-17 18:29	21469.6	5.08	5.10918	1.006	
1203771532	per0420018a	20-APR-17 18:40	21191.1	5.08	5.10918	1.006	
421097001	per0420019a	20-APR-17 18:51	21428.3	5.05	5.05402	1.001	
421097002	per0420020a	20-APR-17 19:02	20982.6	5.25	5.27468	1.005	

Sample Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Client Sample No.

LH18/24-SP650-6433Lab Code: GELDate Received: 20-APR-17Instrument: LCMSMSGEL Job No (SDG): 421097Method: SW846 6850 ModifiedGEL Sample ID: 421097001Matrix: WATERDate Filtered: 20-APR-17Extraction Batch ID: 1657659Injection Volume (uL): 20Extraction Type: Filter/DAISample Volume/Weight: 10.0 mL

%Solids: .

Concentrated Extract Volume: 10.0

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	20-APR-17 18:51	per0420019a
	Perchlorate-O(18)			0.484	ug/L		1	20-APR-17 18:51	per0420019a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4

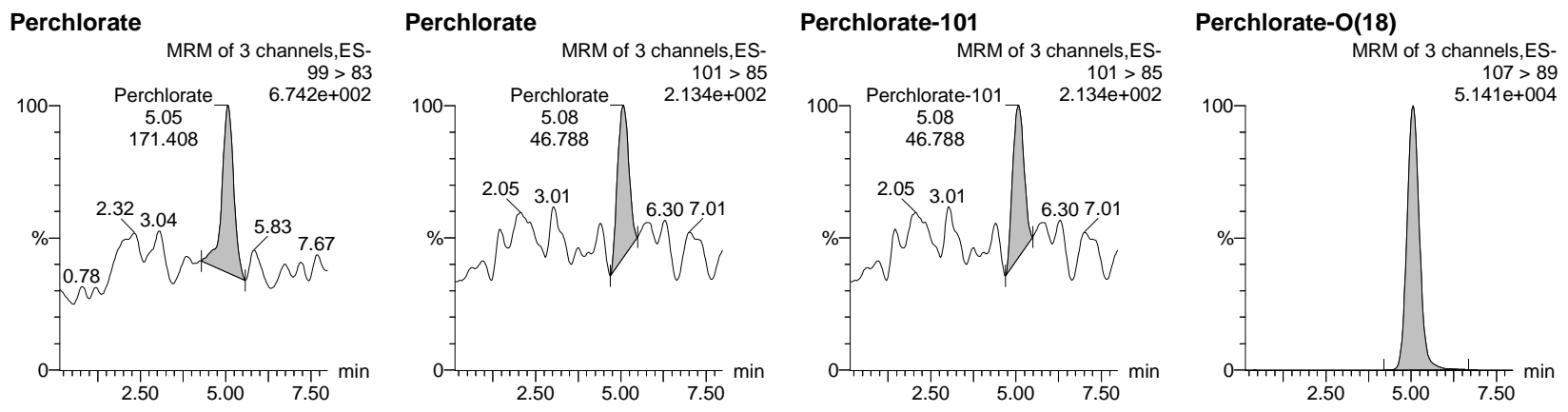
The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld
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 Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

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Name: per0420019a
 Date: 20-Apr-2017
 Time: 18:51:27
 ID: 421097001
 Vial: 1:4,A



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
421097001	Perchlorate	99 > 83	5.05	171.408	0.004	bb			0.0035			9.003 3.66
421097001	Perchlorate-101	101 > 85	5.08	46.788	0.001	bb			0.0030			7.994
421097001	Perchlorate-O(18)	107 > 89	5.05	21428.281	21428.281	bb			0.4844	96.89	-3.11	4484.1...

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP140-7433

Date Received: 20-APR-17

GEL Job No (SDG): 421097

GEL Sample ID: 421097002

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	500	2000	8930	ug/L		10000	20-APR-17 19:02	per0420020a
	Perchlorate-O(18)			4740	ug/L		10000	20-APR-17 19:02	per0420020a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

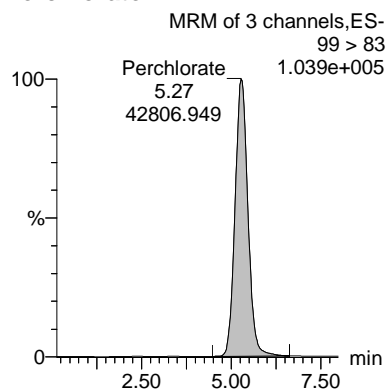
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Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

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 04/21/2017

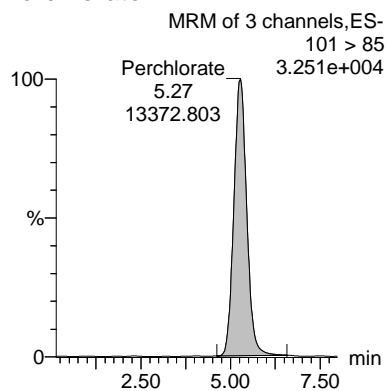
MA
 04/21/2017

Name: per0420020a
Date: 20-Apr-2017
Time: 19:02:26
ID: 421097002
Vial: 1:4,B

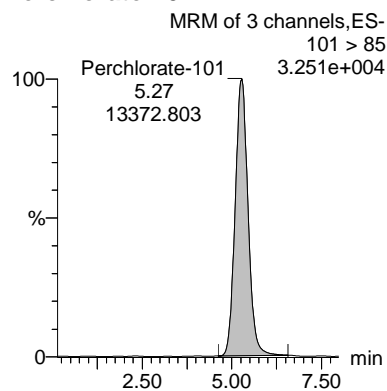
Perchlorate



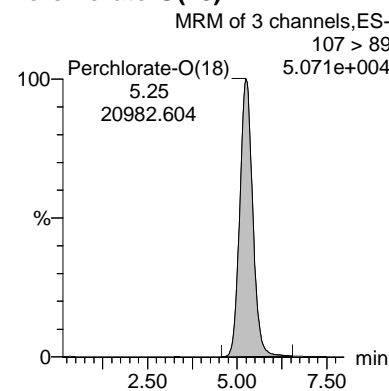
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
421097002	Perchlorate	99 > 83	5.27	42806.949	1.020	bb			0.8925			4275.5... 3.20
421097002	Perchlorate-101	101 > 85	5.27	13372.803	0.319	bb			0.8862			1196.1...
421097002	Perchlorate-O(18)	107 > 89	5.25	20982.604	20982.604	bb			0.4744	94.87	-5.13	5287.7...

Standards

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 421097

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 20-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate

Coefficient of Determination: .

Calibration Curve: 1.14167

Response Type: Internal Standard

Curve Type: RF

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 421097

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 20-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate-101

Coefficient of Determination: .

Calibration Curve: .36167

Response Type: Internal Standard

Curve Type: RF

Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld

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Last Altered: Friday, April 21, 2017 8:45:46 AM Eastern Daylight Time

Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

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Calibration: C:\MassLynx\Perchlorate.PRO\CurveDB\per042017a.cdb 21 Apr 2017 08:45:45

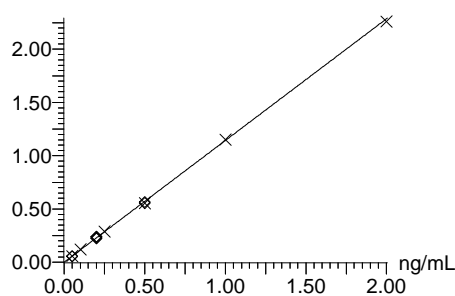
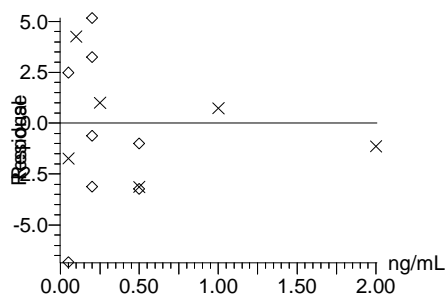
Compound name: Perchlorate

Response Factor: 1.14289

RRF SD: 0.0296455, % Relative SD: 2.59391

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



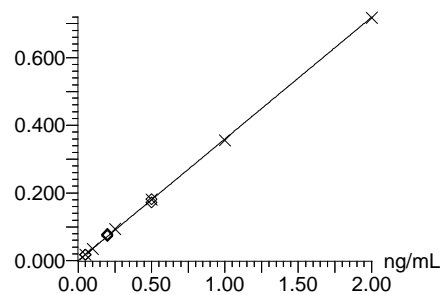
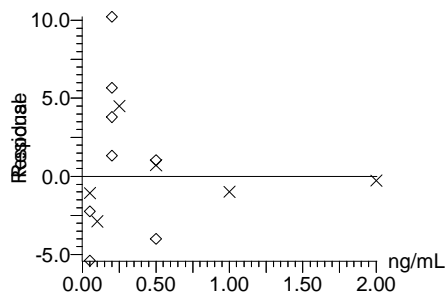
Compound name: Perchlorate-101

Response Factor: 0.359566

RRF SD: 0.00899148, % Relative SD: 2.50064

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Page 2 of 2

Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld

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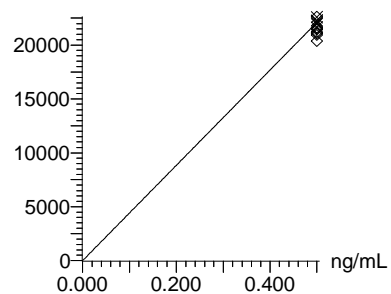
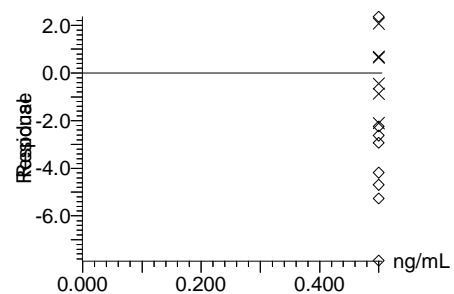
Compound name: Perchlorate-O(18)

Response Factor: 44234.1

RRF SD: 643.87, % Relative SD: 1.45559

Response type: External Std, Area

Curve type: RF



Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

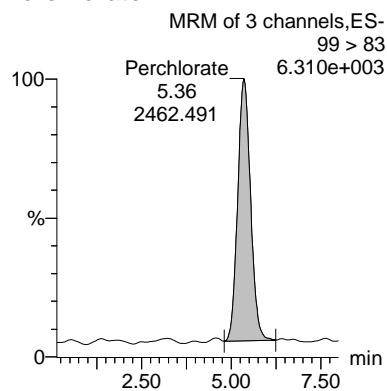
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 04/21/2017

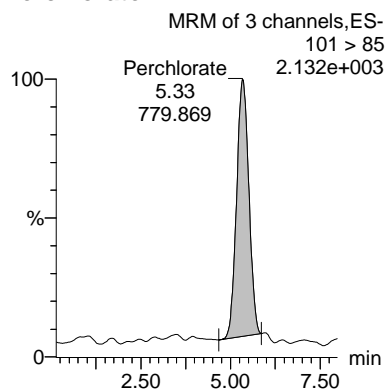
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 04/21/2017

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Time: 15:56:09
ID: WCL170417-01
Vial: 1:1,B

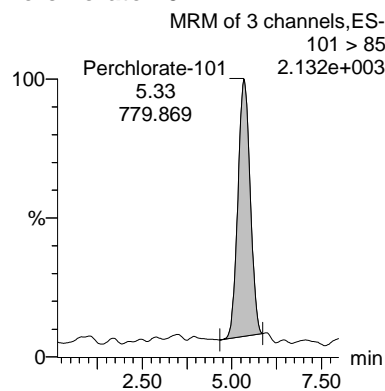
Perchlorate



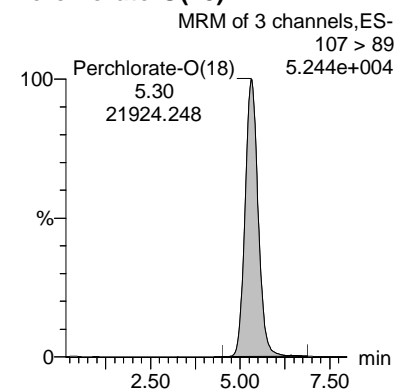
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-01	Perchlorate	99 > 83	5.36	2462.491	0.056	bb			0.0491	98.28	-1.72	109.147	3.16
WCL170417-01	Perchlorate-101	101 > 85	5.33	779.869	0.018	bb			0.0495	98.93	-1.07	77.284	
WCL170417-01	Perchlorate-O(18)	107 > 89	5.30	21924.248	21924.248	bb			0.4956	99.13	-0.87	3548.7...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

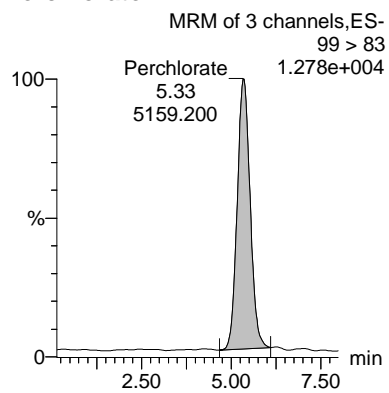
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GL
 04/21/2017

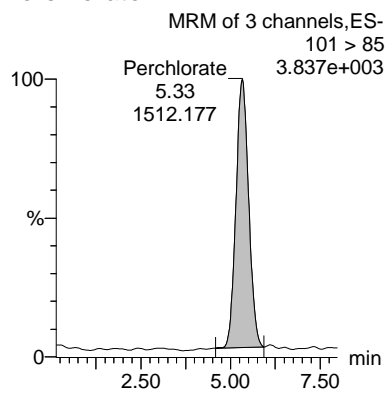
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 04/21/2017

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Vial: 1:1,C

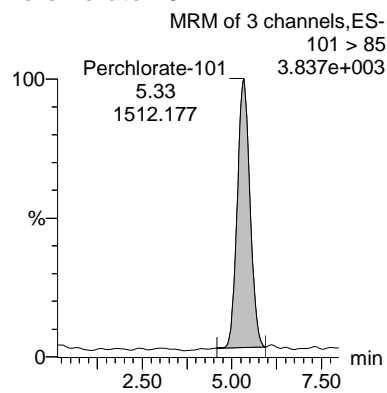
Perchlorate



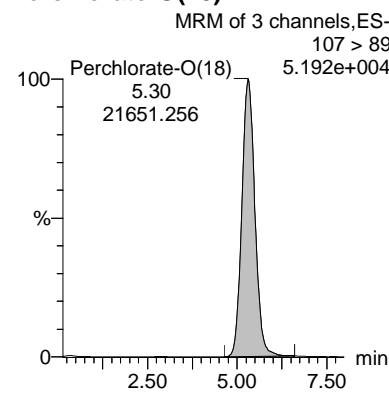
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-02	Perchlorate	99 > 83	5.33	5159.200	0.119	bb			0.1042	104.25	4.25	540.709	3.41
WCL170417-02	Perchlorate-101	101 > 85	5.33	1512.177	0.035	bb			0.0971	97.12	-2.88	122.779	
WCL170417-02	Perchlorate-O(18)	107 > 89	5.30	21651.256	21651.256	bb			0.4895	97.89	-2.11	2515.8...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

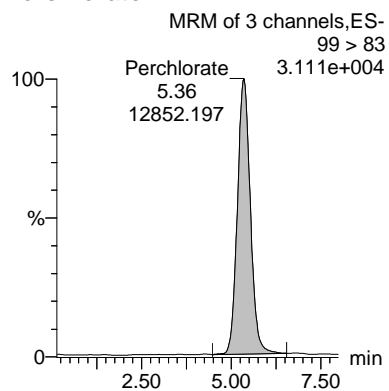
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 04/21/2017

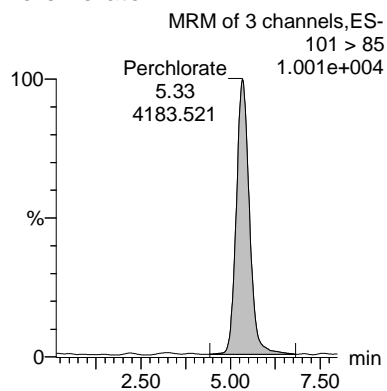
MA
 04/21/2017

Name: per0420005a
Date: 20-Apr-2017
Time: 16:18:04
ID: WCL170417-03
Vial: 1:1,D

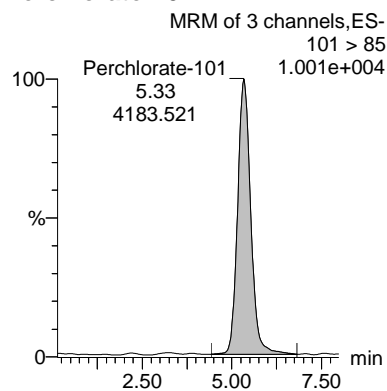
Perchlorate



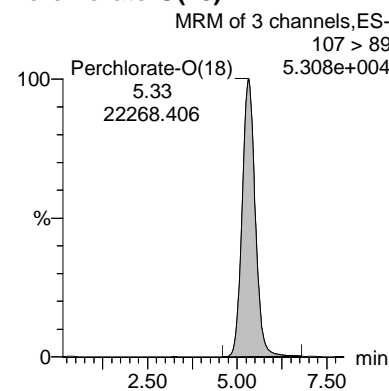
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-03	Perchlorate	99 > 83	5.36	12852.197	0.289	bb			0.2525	101.00	1.00	661.296	3.07
WCL170417-03	Perchlorate-101	101 > 85	5.33	4183.521	0.094	bb			0.2612	104.50	4.50	351.387	
WCL170417-03	Perchlorate-O(18)	107 > 89	5.33	22268.406	22268.406	bb			0.5034	100.68	0.68	1472.3...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

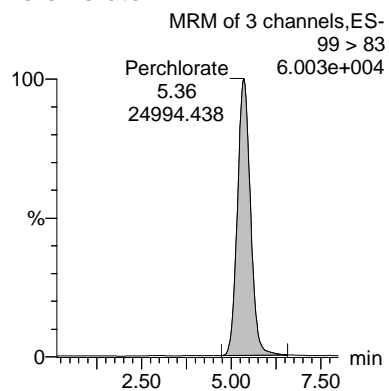
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Last Altered: Friday, April 21, 2017 8:45:46 AM Eastern Daylight Time
Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

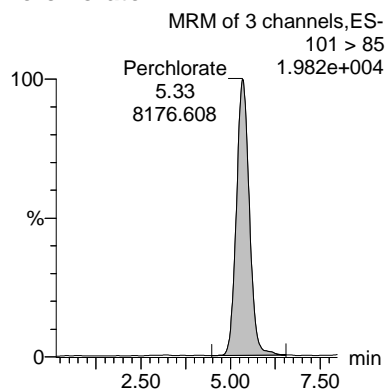
MA
 04/21/2017

Name: per0420006a
Date: 20-Apr-2017
Time: 16:29:00
ID: WCL170417-04
Vial: 1:1,E

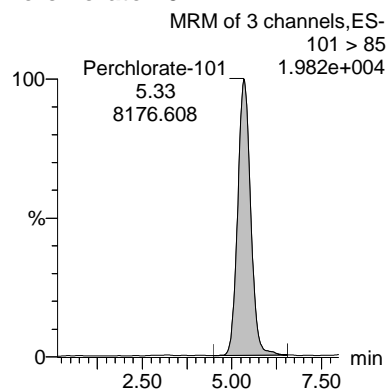
Perchlorate



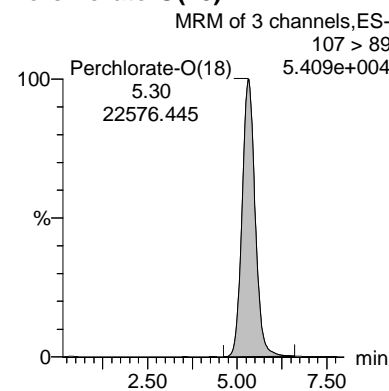
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-04	Perchlorate	99 > 83	5.36	24994.438	0.554	bb			0.4843	96.87	-3.13	1614.8...	3.06
WCL170417-04	Perchlorate-101	101 > 85	5.33	8176.608	0.181	bb			0.5036	100.73	0.73	1249.2...	
WCL170417-04	Perchlorate-O(18)	107 > 89	5.30	22576.445	22576.445	bb			0.5104	102.08	2.08	2590.2...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

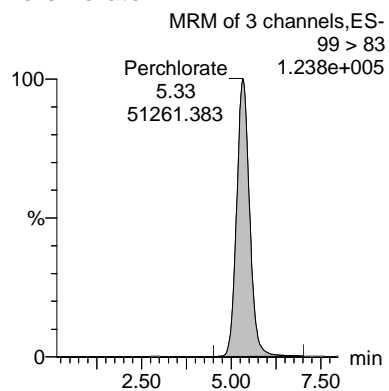
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GL
 04/21/2017

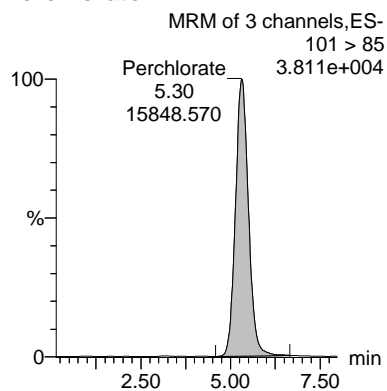
MA
 04/21/2017

Name: per0420007a
Date: 20-Apr-2017
Time: 16:39:55
ID: WCL170417-05
Vial: 1:1,F

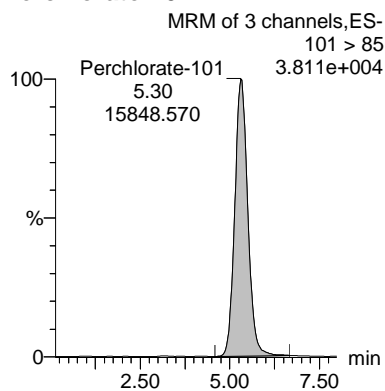
Perchlorate



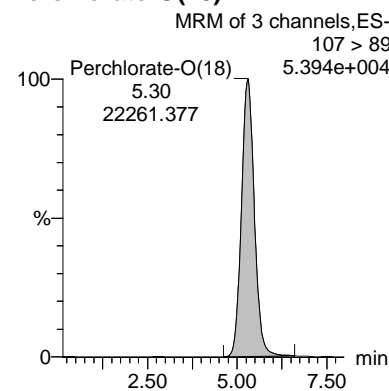
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-05	Perchlorate	99 > 83	5.33	51261.383	1.151	bb			1.0074	100.74	0.74	2490.8...	3.23
WCL170417-05	Perchlorate-101	101 > 85	5.30	15848.570	0.356	bb			0.9900	99.00	-1.00	1716.0...	
WCL170417-05	Perchlorate-O(18)	107 > 89	5.30	22261.377	22261.377	bb			0.5033	100.65	0.65	1840.5...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

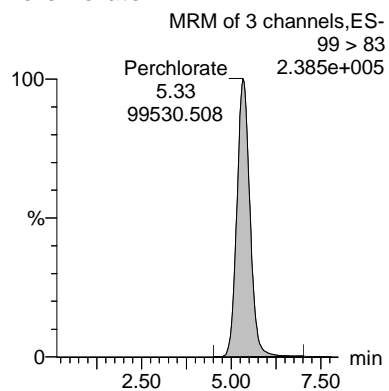
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Last Altered: Friday, April 21, 2017 8:45:46 AM Eastern Daylight Time
Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

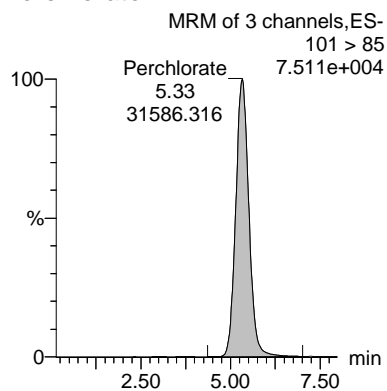
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 04/21/2017

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Date: 20-Apr-2017
Time: 16:50:52
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Vial: 1:2,A

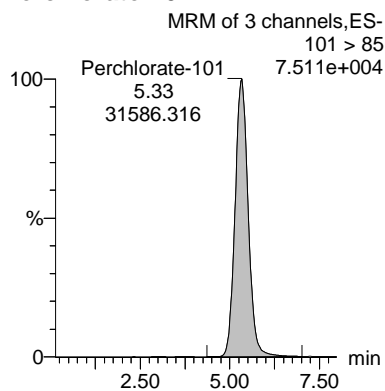
Perchlorate



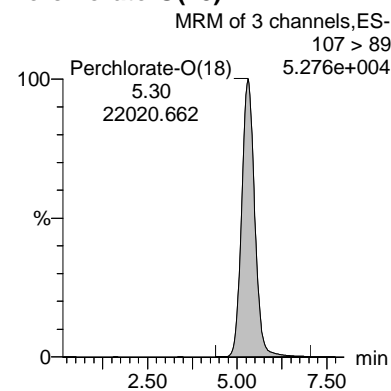
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-06	Perchlorate	99 > 83	5.33	99530.508	2.260	bb			1.9774	98.87	-1.13	5033.6...	3.15
WCL170417-06	Perchlorate-101	101 > 85	5.33	31586.316	0.717	bb			1.9946	99.73	-0.27	5008.5...	
WCL170417-06	Perchlorate-O(18)	107 > 89	5.30	22020.662	22020.662	bb			0.4978	99.56	-0.44	1880.1...	

Perchlorate Initial Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421097Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.48	96.78	20-APR-17 17:12	per0420010a
Perchlorate Isotope Ratio		3.04		20-APR-17 17:12	per0420010a
Perchlorate-101	.5	.51	101.04	20-APR-17 17:12	per0420010a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

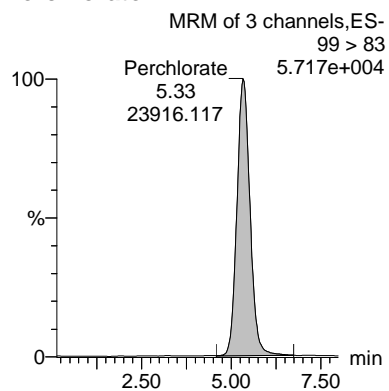
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 04/21/2017

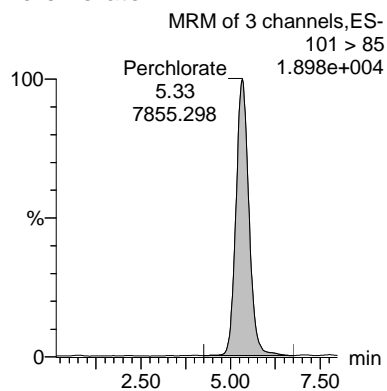
MA
 04/21/2017

Name: per0420010a
Date: 20-Apr-2017
Time: 17:12:46
ID: WCL170417-07ICV
Vial: 1:2,B

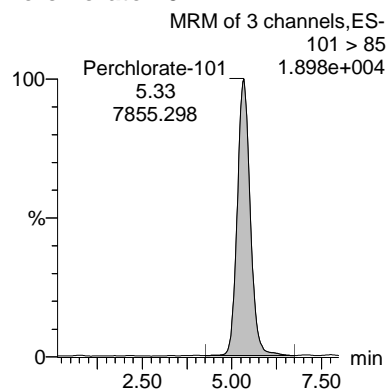
Perchlorate



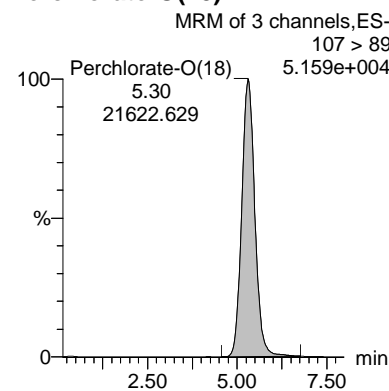
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-07ICV	Perchlorate	99 > 83	5.33	23916.117	0.553	bb			0.4839	96.78	-3.22	939.890	3.04
WCL170417-07ICV	Perchlorate-101	101 > 85	5.33	7855.298	0.182	bb			0.5052	101.04	1.04	598.217	
WCL170417-07ICV	Perchlorate-O(18)	107 > 89	5.30	21622.629	21622.629	bb			0.4888	97.76	-2.24	6519.1...	

Perchlorate Continuing Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421097Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.5	99.01	20-APR-17 19:24	per0420022a
Perchlorate Isotope Ratio		3.28		20-APR-17 19:24	per0420022a
Perchlorate-101	.5	.48	96.01	20-APR-17 19:24	per0420022a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

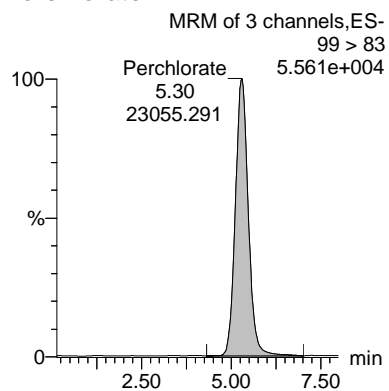
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Printed: Friday, April 21, 2017 10:06:43 AM Eastern Daylight Time

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 04/21/2017

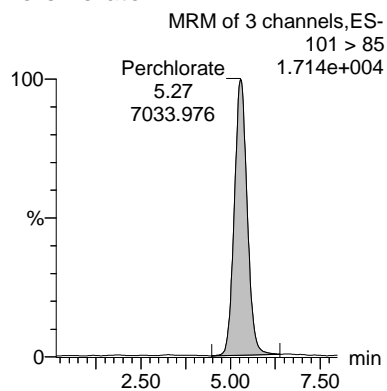
MA
 04/21/2017

Name: per0420022a
Date: 20-Apr-2017
Time: 19:24:22
ID: WCL170417-07CCV
Vial: 1:2,B

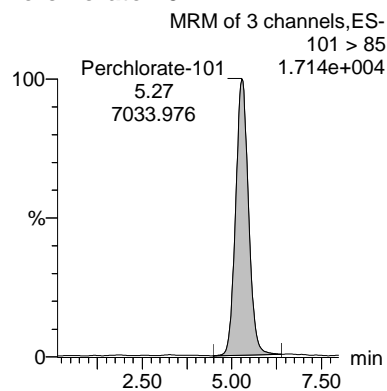
Perchlorate



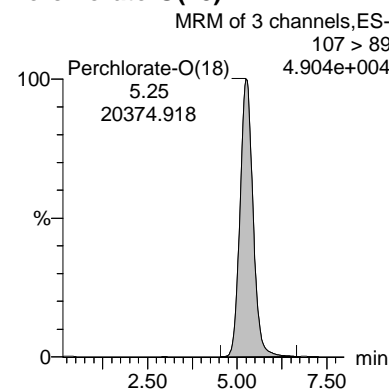
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-07CCV	Perchlorate	99 > 83	5.30	23055.291	0.566	bb			0.4950	99.01	-0.99	1302.3...	3.28
WCL170417-07CCV	Perchlorate-101	101 > 85	5.27	7033.976	0.173	bb			0.4801	96.01	-3.99	712.454	
WCL170417-07CCV	Perchlorate-O(18)	107 > 89	5.25	20374.918	20374.918	bb			0.4606	92.12	-7.88	3530.2...	

Perchlorate MDL Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421097Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.05	.05	93.17	20-APR-17 17:34	per0420012a
Perchlorate Isotope Ratio		3.03		20-APR-17 17:34	per0420012a
Perchlorate-101	.05	.05	97.76	20-APR-17 17:34	per0420012a
Perchlorate	.05	.05	102.49	20-APR-17 19:46	per0420024a
Perchlorate Isotope Ratio		3.44		20-APR-17 19:46	per0420024a
Perchlorate-101	.05	.05	94.6	20-APR-17 19:46	per0420024a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

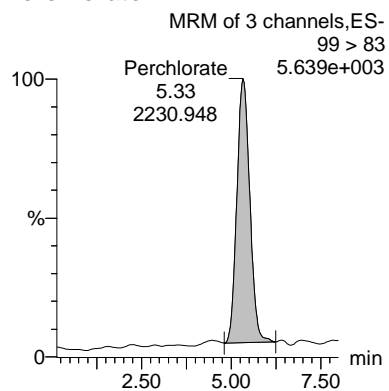
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GL
 04/21/2017

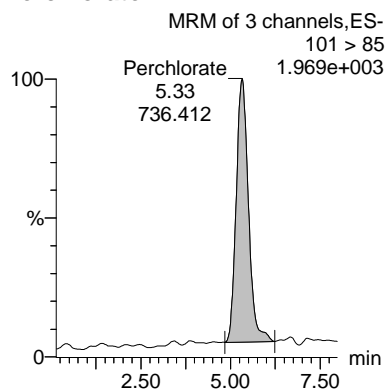
MA
 04/21/2017

Name: per0420012a
Date: 20-Apr-2017
Time: 17:34:42
ID: WCL170417-08CRI
Vial: 1:2,C

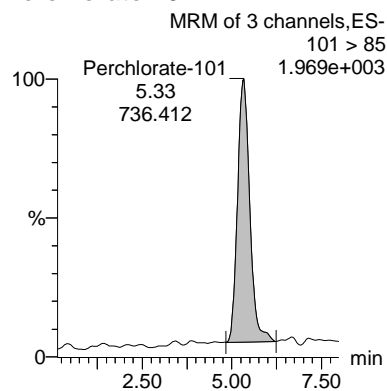
Perchlorate



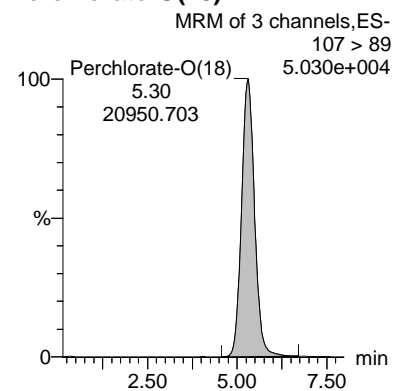
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-08CRI	Perchlorate	99 > 83	5.33	2230.948	0.053	bb			0.0466	93.17	-6.83	131.953	3.03
WCL170417-08CRI	Perchlorate-101	101 > 85	5.33	736.412	0.018	bb			0.0489	97.76	-2.24	110.318	
WCL170417-08CRI	Perchlorate-O(18)	107 > 89	5.30	20950.703	20950.703	bb			0.4736	94.73	-5.27	6290.0...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

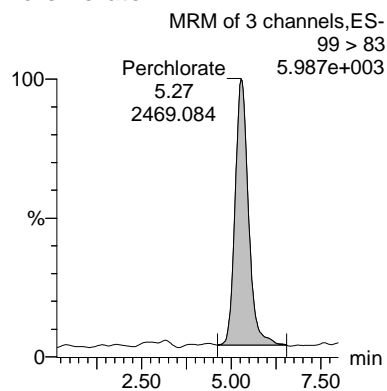
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GL
 04/21/2017

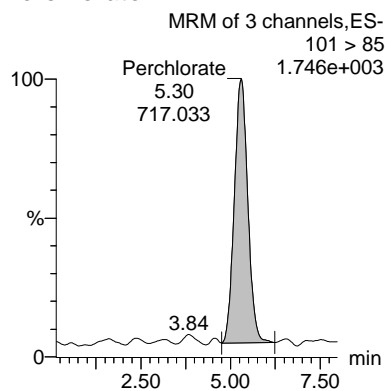
MA
 04/21/2017

Name: per0420024a
Date: 20-Apr-2017
Time: 19:46:17
ID: WCL170417-08CRI
Vial: 1:2,C

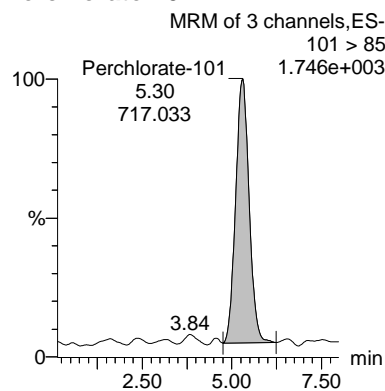
Perchlorate



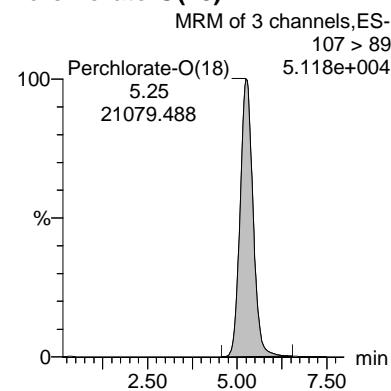
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-08CRI	Perchlorate	99 > 83	5.27	2469.084	0.059	bb			0.0512	102.49	2.49	194.530	3.44
WCL170417-08CRI	Perchlorate-101	101 > 85	5.30	717.033	0.017	bb			0.0473	94.60	-5.40	78.829	
WCL170417-08CRI	Perchlorate-O(18)	107 > 89	5.25	21079.488	21079.488	bb			0.4765	95.31	-4.69	2376.4...	

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

MB

Date Received: 20-APR-17

GEL Job No (SDG): 421097

GEL Sample ID: 1203771529

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	20-APR-17 17:45	per0420013a
	Perchlorate-O(18)			0.475	ug/L		1	20-APR-17 17:45	per0420013a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

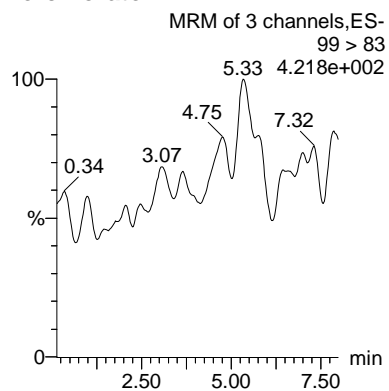
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GL
 04/21/2017

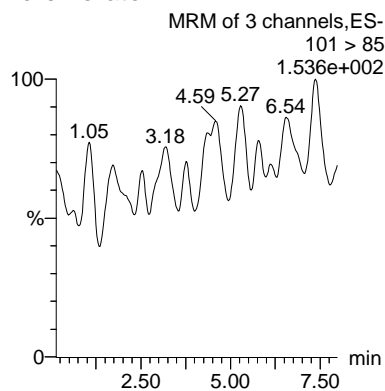
MA
 04/21/2017

Name: per0420013a
Date: 20-Apr-2017
Time: 17:45:41
ID: 1203771529
Vial: 1:3,A

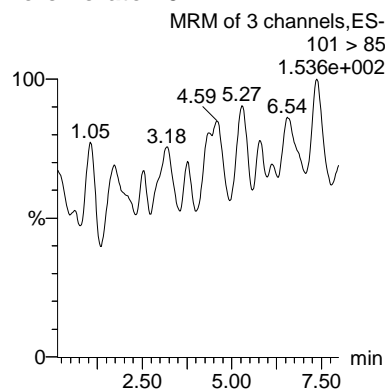
Perchlorate



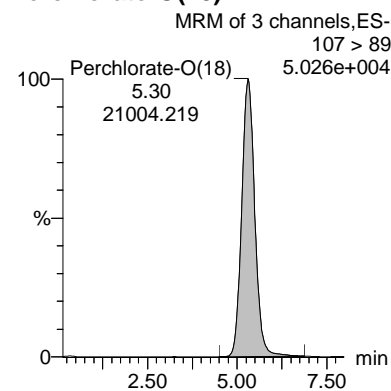
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
1203771529	Perchlorate	99 > 83										0.00
1203771529	Perchlorate-101	101 > 85										
1203771529	Perchlorate-O(18)	107 > 89	5.30	21004.219	21004.219	bb			0.4748	94.97	-5.03	4315.3...

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LCS

Date Received: 20-APR-17

GEL Job No (SDG): 421097

GEL Sample ID: 1203771530

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.194	ug/L	J	1	20-APR-17 17:56	per0420014a
	Perchlorate-O(18)			0.487	ug/L		1	20-APR-17 17:56	per0420014a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

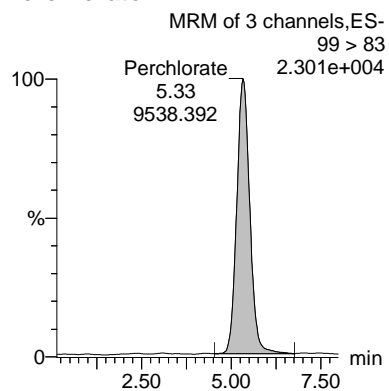
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Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

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 04/21/2017

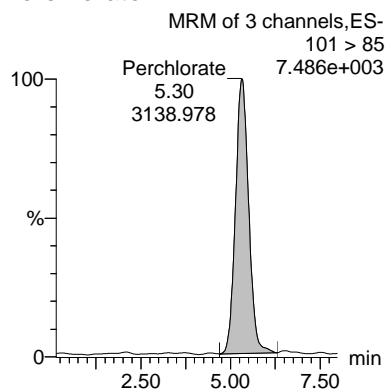
MA
 04/21/2017

Name: per0420014a
Date: 20-Apr-2017
Time: 17:56:39
ID: 1203771530
Vial: 1:3,B

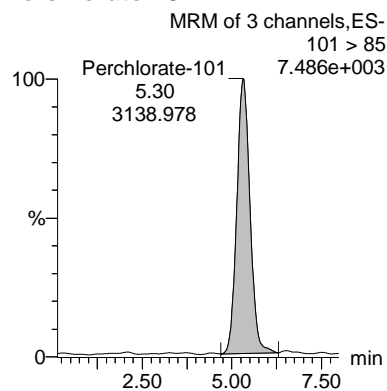
Perchlorate



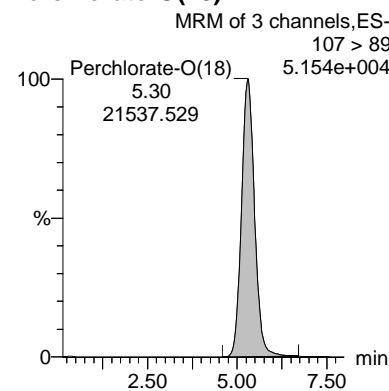
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203771530	Perchlorate	99 > 83	5.33	9538.392	0.221	bb			0.1938	96.88	-3.12	895.674	3.04
1203771530	Perchlorate-101	101 > 85	5.30	3138.978	0.073	bb			0.2027	101.33	1.33	312.496	
1203771530	Perchlorate-O(18)	107 > 89	5.30	21537.529	21537.529	bb			0.4869	97.38	-2.62	3209.6...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 421097

GEL Sample ID: 1203771533

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.199	ug/L	J	1	20-APR-17 18:07	per0420015a
	Perchlorate-O(18)			0.512	ug/L		1	20-APR-17 18:07	per0420015a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

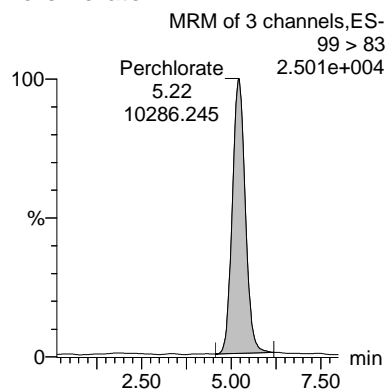
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Last Altered: Friday, April 21, 2017 8:45:46 AM Eastern Daylight Time
Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

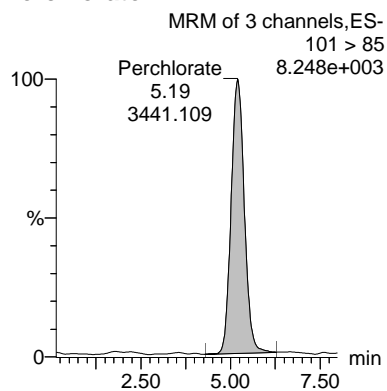
MA
 04/21/2017

Name: per0420015a
Date: 20-Apr-2017
Time: 18:07:37
ID: 1203771533
Vial: 1:3,C

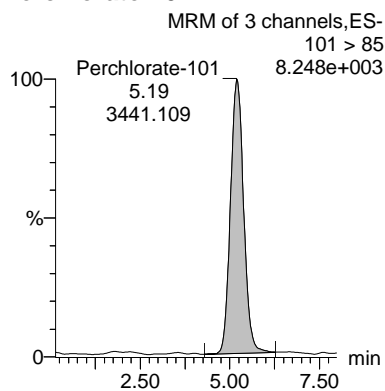
Perchlorate



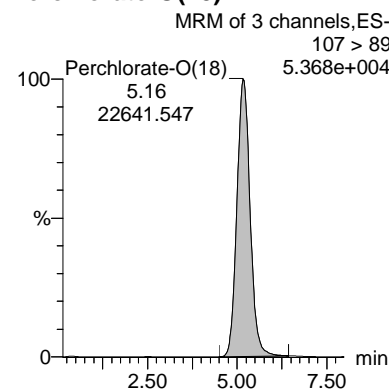
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203771533	Perchlorate	99 > 83	5.22	10286.245	0.227	bb			0.1988	99.38	-0.62	488.550	2.99
1203771533	Perchlorate-101	101 > 85	5.19	3441.109	0.076	bb			0.2113	105.67	5.67	355.887	
1203771533	Perchlorate-O(18)	107 > 89	5.16	22641.547	22641.547	bb			0.5119	102.37	2.37	2967.9...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1657659

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6432-GrabMS

Date Received: 14-APR-17

GEL Job No (SDG): 421097

GEL Sample ID: 1203771531

Date Filtered: 20-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.206	ug/L		1	20-APR-17 18:29	per0420017a
	Perchlorate-O(18)			0.485	ug/L		1	20-APR-17 18:29	per0420017a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

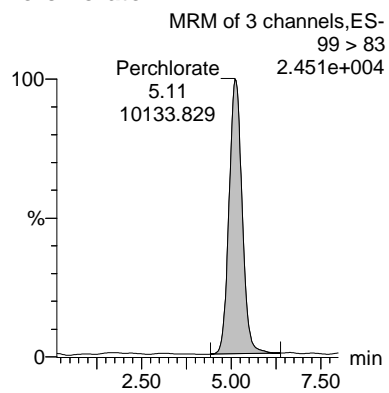
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 04/21/2017

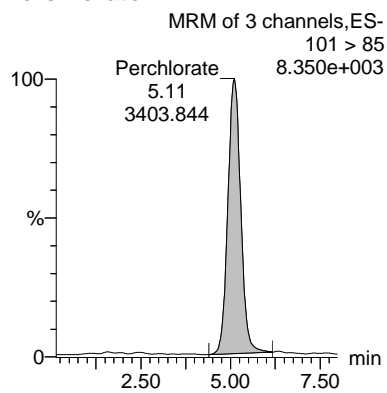
MA
 04/21/2017

Name: per0420017a
Date: 20-Apr-2017
Time: 18:29:32
ID: 1203771531
Vial: 1:3,E

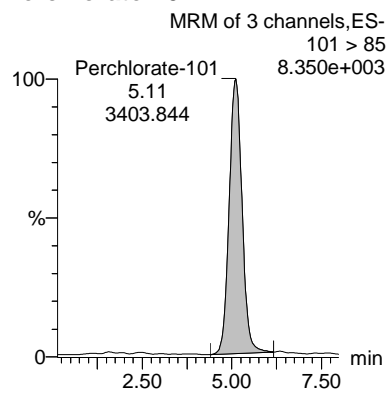
Perchlorate



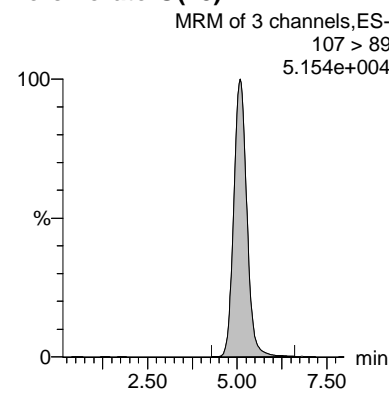
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203771531	Perchlorate	99 > 83	5.11	10133.829	0.236	bb			0.2065	103.25	3.25	462.253	2.98
1203771531	Perchlorate-101	101 > 85	5.11	3403.844	0.079	bb			0.2205	110.23	10.23	875.622	
1203771531	Perchlorate-O(18)	107 > 89	5.08	21469.563	21469.563	bb			0.4854	97.07	-2.93	3600.4...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1657659Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6432-GrabMSDDate Received: 14-APR-17GEL Job No (SDG): 421097GEL Sample ID: 1203771532Date Filtered: 20-APR-17Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.210	ug/L		1	20-APR-17 18:40	per0420018a
	Perchlorate-O(18)			0.479	ug/L		1	20-APR-17 18:40	per0420018a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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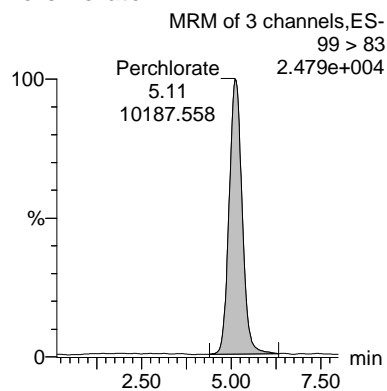
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Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

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04/21/2017

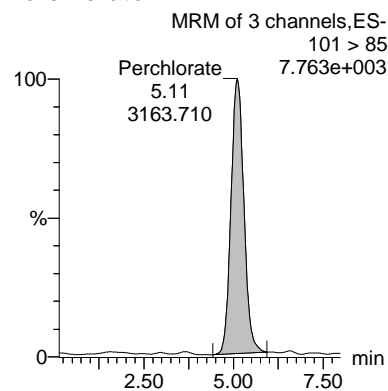
MA
04/21/2017

Name: per0420018a
Date: 20-Apr-2017
Time: 18:40:30
ID: 1203771532
Vial: 1:3,F

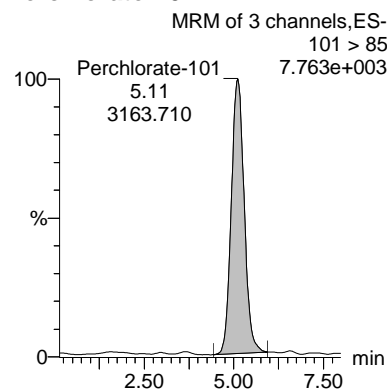
Perchlorate



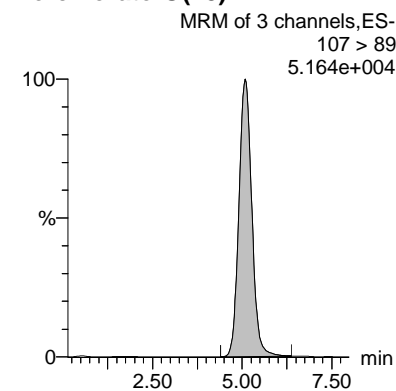
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203771532	Perchlorate	99 > 83	5.11	10187.558	0.240	bb			0.2103	105.16	5.16	496.444	3.22
1203771532	Perchlorate-101	101 > 85	5.11	3163.710	0.075	bb			0.2076	103.80	3.80	269.187	
1203771532	Perchlorate-O(18)	107 > 89	5.08	21191.072	21191.072	bb			0.4791	95.81	-4.19	3939.6...	

Perchlorate Initial Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421097Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	20-APR-17	per0420001a	IPB001
Perchlorate-101	0.00	0	NA	20-APR-17	per0420001a	IPB001
Perchlorate	0.00	0	NA	20-APR-17	per0420002a	IPB001
Perchlorate-101	0.00	0	NA	20-APR-17	per0420002a	IPB001

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per042017a.qld
 Last Altered: Friday, April 21, 2017 8:45:46 AM Eastern Daylight Time
 Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

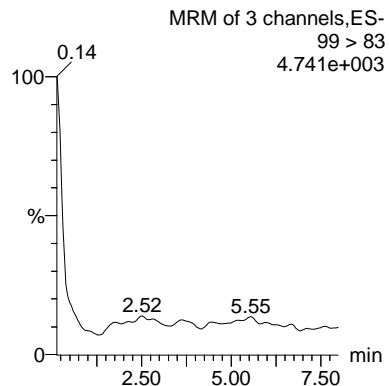
GL
 04/21/2017

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 04/21/2017

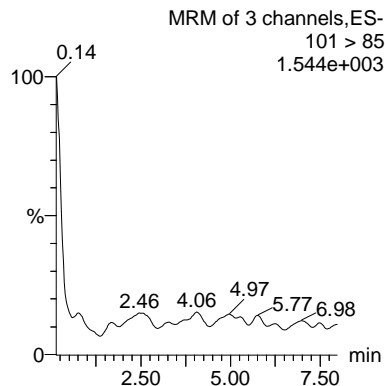
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 Calibration: C:\MassLynx\Perchlorate.PRO\CurveDB\per042017a.cdb 21 Apr 2017 08:45:45

Name: per0420001a
 Date: 20-Apr-2017
 Time: 15:34:11
 ID: IPB001
 Vial: 1:1,A

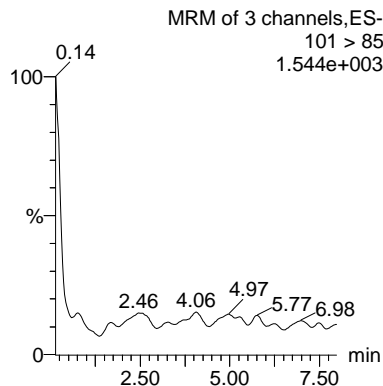
Perchlorate



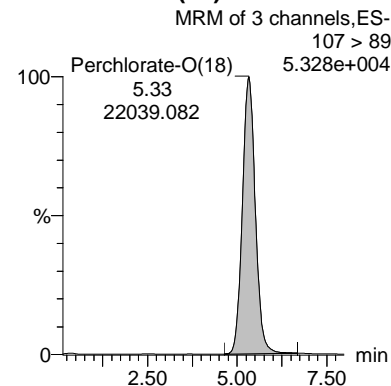
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83										0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	5.33	22039.082	22039.082	bb			0.4982	99.65	-0.35	2779.8...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

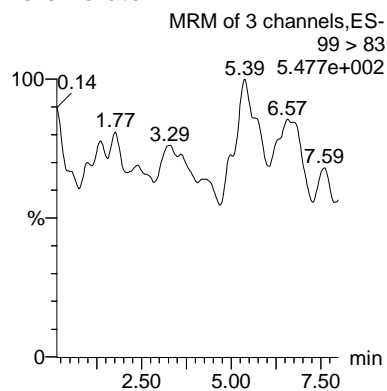
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 04/21/2017

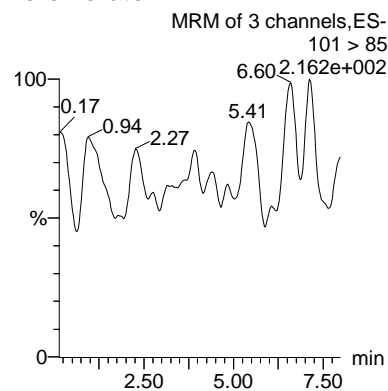
MA
 04/21/2017

Name: per0420002a
 Date: 20-Apr-2017
 Time: 15:45:12
 ID: IPB001
 Vial: 1:1,A

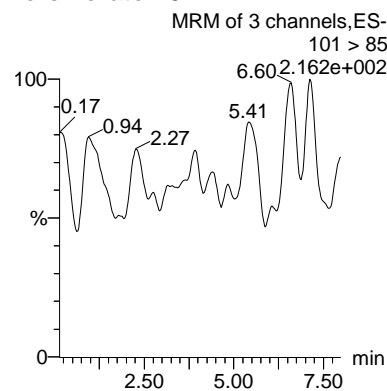
Perchlorate



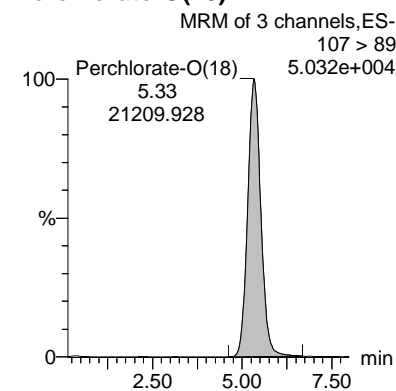
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83										0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	5.33	21209.928	21209.928	bb			0.4795	95.90	-4.10	2997.9...

Perchlorate Continuing Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421097Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	20-APR-17	per0420009a	IPB002
Perchlorate-101	0.00	0	NA	20-APR-17	per0420009a	IPB002
Perchlorate	0.00	0	NA	20-APR-17	per0420011a	IPB003
Perchlorate-101	0.00	0	NA	20-APR-17	per0420011a	IPB003
Perchlorate	0.00	0	NA	20-APR-17	per0420021a	IPB004
Perchlorate-101	0.00	0	NA	20-APR-17	per0420021a	IPB004
Perchlorate	0.00	0	NA	20-APR-17	per0420023a	IPB005
Perchlorate-101	0.00	0	NA	20-APR-17	per0420023a	IPB005

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

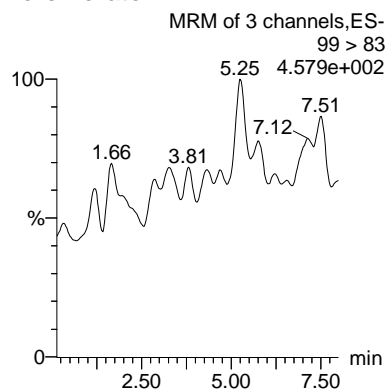
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Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

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 04/21/2017

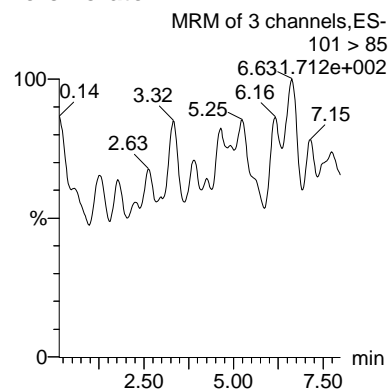
MA
 04/21/2017

Name: per0420009a
Date: 20-Apr-2017
Time: 17:01:49
ID: IPB002
Vial: 1:1,A

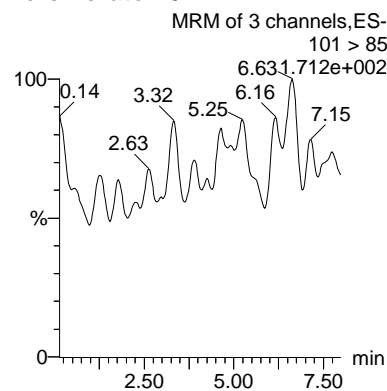
Perchlorate



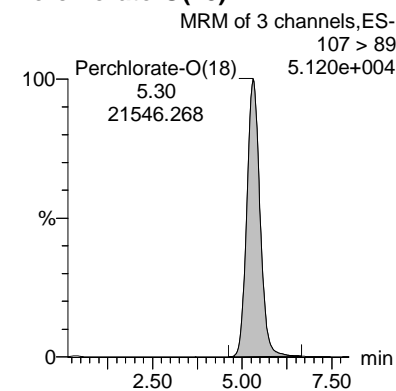
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB002	Perchlorate	99 > 83										0.00
IPB002	Perchlorate-101	101 > 85										
IPB002	Perchlorate-O(18)	107 > 89	5.30	21546.268	21546.268	bb			0.4871	97.42	-2.58	1685.9...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

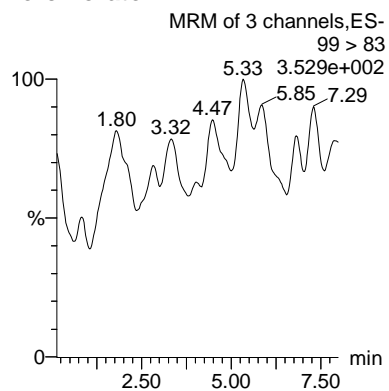
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Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

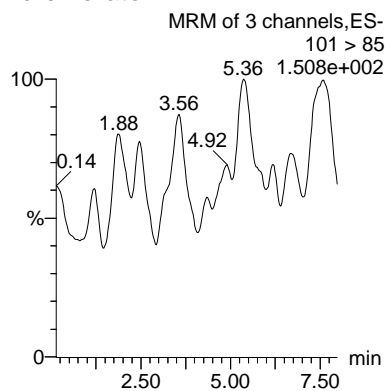
MA
 04/21/2017

Name: per0420011a
Date: 20-Apr-2017
Time: 17:23:45
ID: IPB003
Vial: 1:1,A

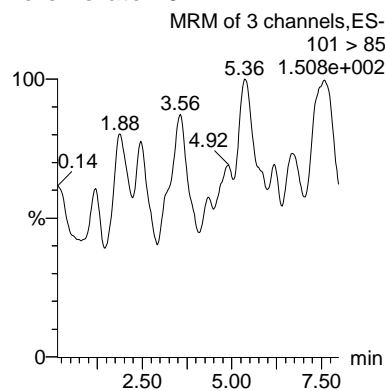
Perchlorate



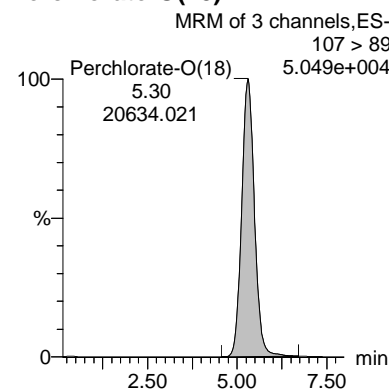
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB003	Perchlorate	99 > 83										0.00
IPB003	Perchlorate-101	101 > 85										
IPB003	Perchlorate-O(18)	107 > 89	5.30	20634.021	20634.021	bb			0.4665	93.29	-6.71	4230.1...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

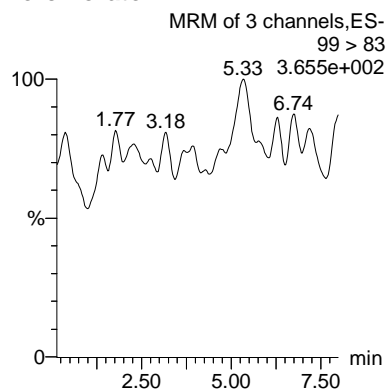
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Printed: Friday, April 21, 2017 10:06:43 AM Eastern Daylight Time

GL
 04/21/2017

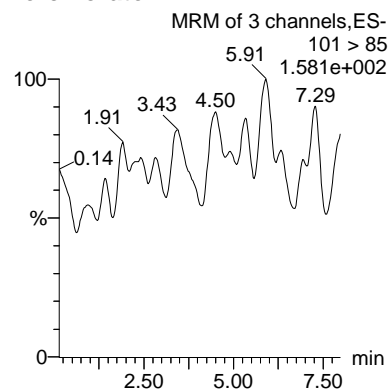
MA
 04/21/2017

Name: per0420021a
Date: 20-Apr-2017
Time: 19:13:24
ID: IPB004
Vial: 1:1,A

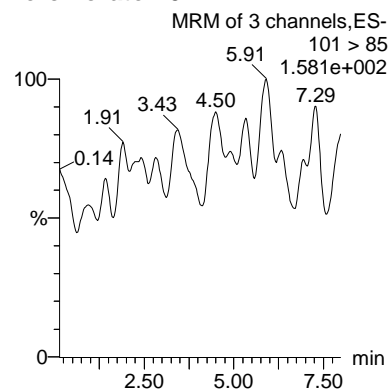
Perchlorate



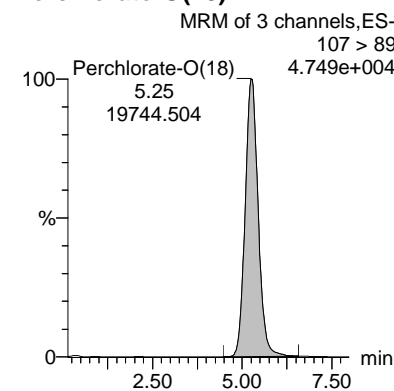
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB004	Perchlorate	99 > 83										0.00
IPB004	Perchlorate-101	101 > 85										
IPB004	Perchlorate-O(18)	107 > 89	5.25	19744.504	19744.504	bb			0.4464	89.27	-10.73	2646.5...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

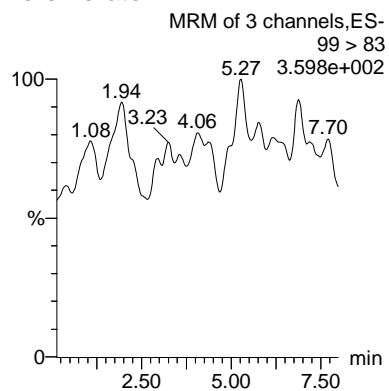
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 Printed: Friday, April 21, 2017 10:09:54 AM Eastern Daylight Time

GL
 04/21/2017

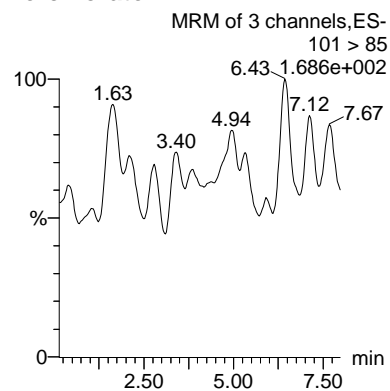
MA
 04/21/2017

Name: per0420023a
Date: 20-Apr-2017
Time: 19:35:19
ID: IPB005
Vial: 1:1,A

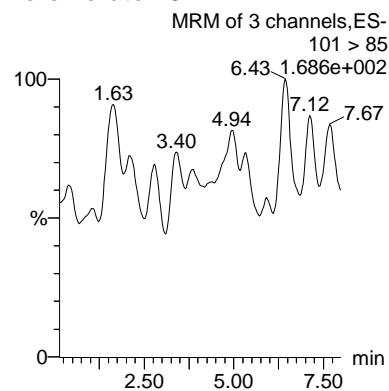
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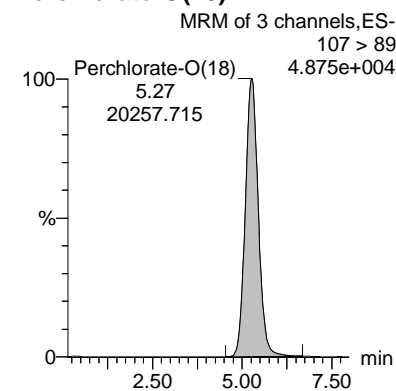
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB005	Perchlorate	99 > 83										0.00
IPB005	Perchlorate-101	101 > 85										
IPB005	Perchlorate-O(18)	107 > 89	5.27	20257.715	20257.715	bb			0.4580	91.59	-8.41	4181.6...

Miscellaneous

Prep Logbook

Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)

Batch ID: 1657659 Verified by: _____
 Analyst: Grace Cappelmann
 Method: SW846 6850 Modified

Lab SOP: GL-OA-E-067 REV# 14
 Instrument: LCMSMS Manual Instrument

Sample ID	Prep Date	Initial Volume (mL)	Final Volume (mL)	Prepped Factor (mL/mL)
1203771529 MB	20-APR-2017 11:30:00	10	10	1
1203771530 LCS	20-APR-2017 11:30:00	10	10	1
1203771533 ICS	20-APR-2017 11:30:00	10	10	1
420730001	20-APR-2017 11:30:00	10	10	1
1203771531 MS (420730001)	20-APR-2017 11:30:00	10	10	1
1203771532 MSD (420730001)	20-APR-2017 11:30:00	10	10	1
421097001	20-APR-2017 11:30:00	10	10	1
421097002	20-APR-2017 11:30:00	10	10	1

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
ICS	1203771533	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	De-salting cartridge: 170221-2.5-Ba/Ag/H
LCS	1203771530	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MS	1203771531	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
MSD	1203771532	10 ug/L ICV/CCV Second Source	UCL161229-01.1	.2	mL	
RGNT	All	TYPE 1 Water for HPLC	2457559	10	mL	
RGNT	All	500 ppm Carbonate, Bicarbonate, Chloride, Sulfate	2463729	10	mL	

GEL ORGANIC RUN LOG

INSTRUMENT ID: LC-MS/MS#2

Date: 04/20/17

Method: EPA 6850-Modified

Extr. Injection Volume: 20uL

Int. Std.: UCL161103-01

Sequence Number: per042017a

Mobile Phase Lot#: 2536603, 2457559

SOP: GL-OA-E-067

Initial Calibration Date: 04/20/17

Standard-Samp Reagent Lot#.: 2457559

Alt Check Std. ID: WCL170417-07

DataFile	Sample	Analyst	Injection Date	Batch	SDG	Dilution	Client	Comments	QC_Flag
per0420001a	IPB001	GXC1	4/20/2017 15:34			1		USE	B
per0420002a	IPB001	GXC1	4/20/2017 15:45			1		USE	B
per0420003a	WCLICAL-01	GXC1	4/20/2017 15:56			1		USE	I
per0420004a	WCLICAL-02	GXC1	4/20/2017 16:07			1		USE	I
per0420005a	WCLICAL-03	GXC1	4/20/2017 16:18			1		USE	I
per0420006a	WCLICAL-04	GXC1	4/20/2017 16:29			1		USE	I
per0420007a	WCLICAL-05	GXC1	4/20/2017 16:39			1		USE	I
per0420008a	WCLICAL-06	GXC1	4/20/2017 16:50			1		USE	I
per0420009a	IPB002	GXC1	4/20/2017 17:01			1		USE	B
per0420010a	WCLICV	GXC1	4/20/2017 17:12			1		USE	C
per0420011a	IPB003	GXC1	4/20/2017 17:23			1		USE	B
per0420012a	WCLCRI	GXC1	4/20/2017 17:34			1		USE	C
per0420013a	1203771529	GXC1	4/20/2017 17:45	1657660	Various	1	MBAC	USE	S
per0420014a	1203771530	GXC1	4/20/2017 17:56	1657660	Various	1	MBAC	USE	S
per0420015a	1203771533	GXC1	4/20/2017 18:07	1657660	Various	1	MBAC	USE	S
per0420016a	420730001	GXC1	4/20/2017 18:18	1657660	420730	1	MBAC	USE	S
per0420017a	1203771531	GXC1	4/20/2017 18:29	1657660	420730	1	MBAC	USE	S
per0420018a	1203771532	GXC1	4/20/2017 18:40	1657660	420730	1	MBAC	USE	S
per0420019a	421097001	GXC1	4/20/2017 18:51	1657660	421097	1	MBAC	USE	S
per0420020a	421097002	GXC1	4/20/2017 19:02	1657660	421097	10000	MBAC	USE	S
per0420021a	IPB004	GXC1	4/20/2017 19:13			1		USE	B
per0420022a	WCLCCV	GXC1	4/20/2017 19:24			1		USE	C
per0420023a	IPB005	GXC1	4/20/2017 19:35			1		USE	B
per0420024a	WCLCRI	GXC1	4/20/2017 19:46			1		USE	C

Isotope Ratio Criteria

Isotope Ratio $^{35}\text{Cl}/^{37}\text{Cl}$

2.31-3.85

Tune Criteria

The tuning solution is introduced directly into the mass spectrometer using the ESI interface in the positive ion mode. The mass range scanned is 20 to 1100 amu using at least six scans. The observed mass for the target compound in the daily calibration standards must be within 0.2 amu of the expected value. If it is greater than 0.2 amu, then a mass calibration is performed and the instrument is re-calibrated.



Laboratory Report Number: L17041032

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on April 27 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com

Lab Report #: L17041032

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
0019553	I	2.0		J4616882185	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

**Lab Report #:** L17041032**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP650-6434-GRAB	L17041032-01	04/20/2017 15:00	04/21/2017 09:43



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	NH3
Prep Batch Number(s):	WG611571	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-26 20:34:06



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	NH3
Prep Batch Number(s):	WG611571	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	NH3
Prep Batch Number(s):	WG611571	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	NH3
Prep Batch Number(s):	WG611571	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	NH3
Prep Batch Number(s):	WG611571	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	NH3
Prep Batch Number(s):	WG611571	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611168	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-26 20:33:17



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611168	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611168	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611168	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611168	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611168	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611142	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-04-26 20:34:36



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611142	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611142	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611142	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611142	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

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The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

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Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041032
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611142	Reviewer Name:	Deanna Hesson
LRC Date:	2017-04-26 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

Lab Report #: L17041032
 Lab Project #: 2551.096
 Project Name: Longhorn Army Ammunition
 Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041032-01	PrePrep Method: N/A	Instrument: SMARTCHEM2
Client ID: LH18/24-SP650-6434-GRAB	Prep Method: 350.1	Prep Date: N/A
Matrix: Water	Analytical Method: 350.1	Cal Date: 04/26/2017 09:59
Workgroup #: WG611571	Analyst: TMM	Run Date: 04/26/2017 10:46
Collect Date: 04/20/2017 15:00	Dilution: 10	File ID: S2170426001.059
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrogen, Ammonia	7664-41-7	20.7		2.00	1.00	0.500

Certificate of Analysis

Sample #: L17041032-01	PrePrep Method: N/A	Instrument: UV-2600
Client ID: LH18/24-SP650-6434-GRAB	Prep Method: 365.2	Prep Date: N/A
Matrix: Water	Analytical Method: 365.2	Cal Date: 03/09/2017 11:25
Workgroup #: WG611168	Analyst: ADG	Run Date: 04/21/2017 15:35
Collect Date: 04/20/2017 15:00	Dilution: 5	File ID: 00.1704211535-06
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Orthophosphate	14265-44-2	3.32		0.500	0.250	0.125

Certificate of Analysis

Sample #: L17041032-01	PrePrep Method: N/A	Instrument: TOC-VWP
Client ID: LH18/24-SP650-6434-GRAB	Prep Method: 415.1	Prep Date: N/A
Matrix: Water	Analytical Method: 415.1	Cal Date: 02/10/2017 10:25
Workgroup #: WG611142	Analyst: EPT	Run Date: 04/22/2017 10:28
Collect Date: 04/20/2017 15:00	Dilution: 10	File ID: TC04212017.062
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	178		20.0	10.0	5.00

2.1 General Chemistry Data

2.1.1 Ammonia Data

2.1.1.1 Summary Data

Lab Report #: L17041032

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041032-01	PrePrep Method: N/A	Instrument: SMARTCHEM2
Client ID: LH18/24-SP650-6434-GRAB	Prep Method: 350.1	Prep Date: N/A
Matrix: Water	Analytical Method: 350.1	Cal Date: 04/26/2017 09:59
Workgroup #: WG611571	Analyst: TMM	Run Date: 04/26/2017 10:46
Collect Date: 04/20/2017 15:00	Dilution: 10	File ID: S2170426001.059
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrogen, Ammonia	7664-41-7	20.7		2.00	1.00	0.500

2.1.1.2 QC Summary Data

Example Ammonia Calculations

$$(\text{absorbance} - \text{intercept}) / (\text{slope} * \text{dilution}) = \text{mg/L}$$

where:

absorbance = reading from the spectrophotometer

intercept = calculated from calibration standard absorbencies

slope = calculated from calibration standard absorbencies

dilution = dilution of the distillate in decimal form (ex. 1/5 dilution = 0.2)

Microbac Laboratories Inc.

Data Checklist

Date: 26-APR-2017
 Analyst: TMM
 Analyst: NA
 Method: NH3
 Instrument: SC2
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG611571

Calibration/Linearity	4/26/17
Second Source Check	
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	X
QC Violation Sheet	X
Case Narratives	
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	TMM
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
26-APR-2017

Jammy Morris

Secondary Reviewer:
27-APR-2017

Denna Johnson



Analytical Method: 350.1
Login Number: L17041032

AAB#: WG611571

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6434-GRAB	01	04/20/17					04/26/2017	5.8	28		04/26/17	5.8	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17041032
 Blank File ID: S2170426001.060
 Prep Date: 04/26/17 10:47
 Analyzed Date: 04/26/17 10:47
 Analyst: TMM

Work Group: WG611571
 Blank Sample ID: WG611571-01
 Instrument ID: SMARTCHEM2
 Method: 350.1

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG611571-02	S2170426001.012	04/26/17 10:04	01
DUP	WG611571-04	S2170426001.037	04/26/17 10:26	01
LH18/24-SP650-6434-GRAB	L17041032-01	S2170426001.059	04/26/17 10:46	DL01

Report Name: BLANK_SUMMARY
 PDF File ID: 5266021
 Report generated 04/27/2017 12:58



Login Number: L17041032 Prep Date: 04/26/17 10:47 Sample ID: WG611571-01
Instrument ID: SMARTCHEM2 Run Date: 04/26/17 10:47 Prep Method: 350.1
File ID: S2170426001.060 Analyst: TMM Method: 350.1
Workgroup (AAB#): WG611571 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: SMARTC-26-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Nitrogen, Ammonia	0.0500	0.200	0.0500	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5266022
27-APR-2017 12:58



Login Number: L17041032 Run Date: 04/26/2017 Sample ID: WG611571-02
Instrument ID: SMARTCHEM2 Run Time: 10:04 Prep Method: 350.1
File ID: S2170426001.012 Analyst: TMM Method: 350.1
Workgroup (AAB#): WG611571 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD80299 Cal ID: SMARTC-26-APR-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Nitrogen, Ammonia	2.00	2.02	101	90 - 110	

LCS - Modified 03/06/2008
PDF File ID: 5266023
Report generated: 04/27/2017 12:58



2.1 General Chemistry Data

2.1.2 Orthophosphate Data

2.1.2.1 Summary Data

Lab Report #: L17041032

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041032-01	PrePrep Method: N/A	Instrument: UV-2600
Client ID: LH18/24-SP650-6434-GRAB	Prep Method: 365.2	Prep Date: N/A
Matrix: Water	Analytical Method: 365.2	Cal Date: 03/09/2017 11:25
Workgroup #: WG611168	Analyst: ADG	Run Date: 04/21/2017 15:35
Collect Date: 04/20/2017 15:00	Dilution: 5	File ID: 00.1704211535-06
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Orthophosphate	14265-44-2	3.32		0.500	0.250	0.125

2.1.2.2 QC Summary Data

Example Calculations for Visible Spectrophotometric Methods

Linear Calibration Model

Step 1 - Retrieve Curve Data from ICAL

m = slope of the linear equation
 b = intercept from the linear equation
 y = instrument response as absorbance or OD
 x = concentration of analyte (mg/L)
 $y = mx + b$

Step 2: Calculate the instrument concentration, x

Where:

$$x = (y - b)/m$$

Step 3: Solve for analyte concentration in sample, Cx

$$Cx = (x) (D)$$

Example Calculation (LCS):

Value of m from plot:	7.809
Value of b from plot:	0.0004135
Absorbance of unknown from quantitation report (y):	0.31
Calculated concentration (x):	0.03964483
Dilution factor (D):	1.00
Concentration of analyte in sample, Cy:	0.0396 mg/L

SmartChem Autoanalyzer - Quadratic Calibration for Chloride and Sulfate

Step 1 - Retrieve Curve Data from Smartchem ICAL

A, B, C = constants from the ICAL quadratic regression

x = instrument response as absorbance or OD

y = concentration of analyte (mg/L)

Step 2: Calculate the instrument concentration, y

Where:

$$y = Ax^2 + Bx + C$$

Step 3: Solve for analyte concentration in sample, Cy

$$Cy = (y) (D)$$

Example Calculation (LCS):

Value of A from plot:	101.2796
Value of B from plot:	318.9056
Value of C from plot:	-2.2712
Absorbance of unknown from quantitation report (x):	0.1583
Calculated concentration (y):	50.7495108
Dilution factor (D):	1.00
Concentration of analyte in sample, Cy:	50.75 mg/L

Microbac Laboratories Inc.

Data Checklist

Date: 21-APR-2017
 Analyst: ADG
 Analyst: NA
 Method: PO4
 Instrument: UV-2600
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG611168

Calibration/Linearity	04/21/17
Second Source Check	
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	X
QC Violation Sheet	X
Case Narratives	X
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	ADG
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
24-APR-2017

April Greene

Secondary Reviewer:
25-APR-2017

Dennis Johnson



Analytical Method: 365.2
Login Number: L17041032

AAB#: WG611168

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6434-GRAB	01	04/20/17					04/21/2017	1	2		04/21/17	1	2	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17041032 Work Group: WG611168
 Blank File ID: 00.1704211535-03 Blank Sample ID: WG611168-01
 Prep Date: 04/21/17 15:35 Instrument ID: UV-2600
 Analyzed Date: 04/21/17 15:35 Method: 365.2
 Analyst: ADG

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG611168-02	00.1704211535-04	04/21/17 15:35	
LCS2	WG611168-03	00.1704211535-05	04/21/17 15:35	
LH18/24-SP650-6434-GRAB	L17041032-01	00.1704211535-06	04/21/17 15:35	
DUP	WG611168-05	00.1704211535-07	04/21/17 15:35	

Report Name: BLANK_SUMMARY
 PDF File ID: 5259914
 Report generated 04/24/2017 14:26



Login Number: L17041032 Prep Date: 04/21/17 15:35 Sample ID: WG611168-01
Instrument ID: UV-2600 Run Date: 04/21/17 15:35 Prep Method: 365.2
File ID: 00.1704211535-03 Analyst: ADG Method: 365.2
Workgroup (AAB#): WG611168 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: UV-260-12-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Orthophosphate	0.0250	0.100	0.0250	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5259915
24-APR-2017 14:26



Login Number: L17041032 Analyst: ADG Prep Method: 365.2
 Instrument ID: UV-2600 Matrix: Water Method: 365.2
 Workgroup (AAB#): WG611168 Units: mg/L
 QC Key: DOD4 Lot #: STD81455
 Sample ID: WG611168-02 LCS File ID: 00.1704211535-04 Run Date: 04/21/2017 15:35
 Sample ID: WG611168-03 LCS2 File ID: 00.1704211535-05 Run Date: 04/21/2017 15:35

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Orthophosphate	1.00	0.994	99.4	1.00	0.996	99.6	0.161	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5259916
 Report generated: 04/24/2017 14:26



2.1.2.3 Raw Data

Curves

Parameter: PO4

Spectrophotometer: UV-2600

Calibration (Curve) standard stock: std 79640

Concentration: 1000 mg/L

Recipe for preparation of curve standards found in:

SOP: std 80857 Revision: 17 Page: 89

Second Source Stock: std 80857 (concentration: 4000)

Daily Preparation: std 80857
10 mL / 100
concentration = 1.0

Calibration Standards (mg/L)	Volume (mL)	Cell Size (cm)	Wavelength (nm)	Absorbance
1.0	50	1 cm	880	0.632
0.7				0.438
0.5				0.317
0.2				0.129
0.1				0.067
0.05				0.039
0.00			319/100 mg	0.013 0.001
2nd Source 1.0				0.633

Analyst: April Greene

Date/Time: 3/9/17 1125

DCN#124440



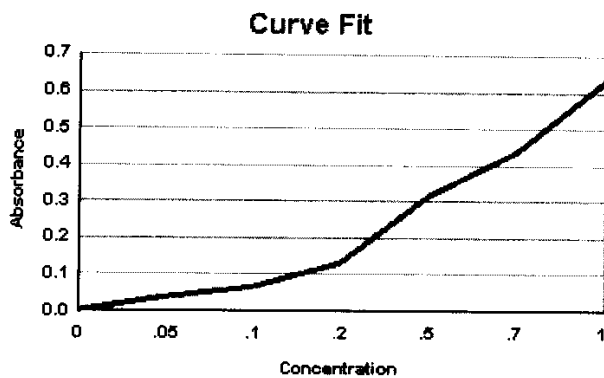
Microbac Laboratories Inc.
INITIAL CALIBRATION

Workgroup: WG605651
Analytical Method: 300
Instrument ID: UV-2600

Analyst: ADG
Initial Calibration Date: 03/09/2017

Analyte: ORTHOPHOSPHATE
Number of Points: 7
Slope: 0.625674
Y-Intercept: 0.00393300
Coef. Of Correlation (R^2): 0.999869
Coef. Of Correlation (R): 0.999935

Concentration X	Absorbance Y	X ²	X * Y	Y-Fitted (mX^2+B)
0.00	0.00100	0.00	0.00	0.00393300
0.0500	0.0390	0.00250	0.00195	0.0352167
0.100	0.0670	0.0100	0.00670	0.0665004
0.200	0.129	0.0400	0.0258	0.129068
0.500	0.317	0.250	0.159	0.316770
0.700	0.438	0.490	0.307	0.441905
1.00	0.632	1.00	0.632	0.629607



WG_ICAL_CAL_WET - Modified 03/06/2008
Report generated 03/09/2017 11:49



Microbac Laboratories Inc.
ALTERNATE SOURCE REPORT

00854429

Workgroup #: WG605651
File ID: 00.1703091125-08
CCV ID: WG605651-08
Units: mg/L
Analyte: ORTHOPHOSPHATE

Instrument ID: UV-2600
Run Date: 03/09/2017
Run Time: 11:25
Analyst: ADG
Cal ID: UV-260 - 09-MAR-17 11:25:07

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	1	1.01	0.633	1.0	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_SSCV - Modified 03/06/2008
Report generated 03/09/2017 11:50



WORKGROUP: WG611168

Orthophosphate (orthophosphate1)

EPA 365.2 / SM4500-P E

SOP K3653 Rev. 7

Color Reagent Chemicals

39479

39475

38724

COA 18278

CCV: 81450

LCS: 81455

Spike: 81455

Daily Dilution: 5(5)/50

Daily Dilution: 10(10)/50

Daily Dilution: 2(10)/50

Daily Dilution: =0.0

Daily Dilution: =0.5

Daily Dilution: 0.4

Spectrophotometer: UV-2000 Curve ID: 31917

SAMPLE	VOLUME	PH < 8.2	DILUTION	ABSORBANCE @ 880 nm
CCV: mg/L	50	/		0.328
BLK/CCB:	50	/		0.000
LCS: ppm	50	/		0.026
LCSD: ppm	50	/		0.027
103201	50	/	15	0.420
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
	50			
DUP: 103201	50	/	15	0.416
MS: () 103201	50	/	15	0.420
MSD: ()	50			
CCV: ()	50	/		0.325
CCB:	50	/		0.001

Analyst: April Green

Date / Time: 4/21/17 / 1535

DCN#125362



Microbac Laboratories Inc.
SAMPLE REPORT

Workgroup: WG611168
Analyte: ORTHOPHOSPHATE

Analyst: ADG
Date: 04/21/2017

Sample ID	I Vol	F Vol	Response	Slope	Y Intercept	Anal. Conc.	Rep. Conc.	Dil	Units
WG611168-01	50	50	0	0.6257	0.003933	-0.0062860	-0.0062860	1	mg/L
WG611168-02	50	50	0.626	0.6257	0.003933	0.99423	0.99423	1	mg/L
WG611168-03	50	50	0.627	0.6257	0.003933	0.99583	0.99583	1	mg/L
L17041032-01	50	50	0.420	0.6257	0.003933	0.66499	3.3249	5	mg/L
WG611168-04	50	50	0.420	0.6257	0.003933	0.66499	3.3249	5	mg/L
WG611168-05	50	50	0.416	0.6257	0.003933	0.65860	3.2930	5	mg/L
WG611168-06	50	50	0.420	0.6257	0.003933	0.66499	3.3249	5	mg/L

UV_SAMPLE_REPORT - Modified 03/06/2008

Report generated 04/24/2017 09:05



Workgroup #: WG611259 Instrument ID: UV-2600
File ID: 00.1704211535-01 Run Date: 04/21/2017
CCV ID: WG611259-01 Run Time: 15:35
Units: mg/L Analyst: ADG
Analyte: ORTHOPHOSPHATE Cal ID: UV-260 - 12-APR-17

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	.5	0.518	0.656	3.6	

* Exceeds %D Limit

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/24/2017 09:04



Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00854433

Workgroup #: WG611259
File ID: 00.1704211535-09
CCV ID: WG611259-03
Units: mg/L
Analyte: ORTHOPHOSPHATE

Instrument ID: UV-2600
Run Date: 04/21/2017
Run Time: 15:35
Analyst: ADG
Cal ID: UV-260 - 12-APR-17

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	.5	0.513	0.650	2.6	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/24/2017 09:04



2.1 General Chemistry Data

2.1.3 Total Organic Carbon Data

2.1.3.1 Summary Data

Lab Report #: L17041032

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041032-01	PrePrep Method: N/A	Instrument: TOC-VWP
Client ID: LH18/24-SP650-6434-GRAB	Prep Method: 415.1	Prep Date: N/A
Matrix: Water	Analytical Method: 415.1	Cal Date: 02/10/2017 10:25
Workgroup #: WG611142	Analyst: EPT	Run Date: 04/22/2017 10:28
Collect Date: 04/20/2017 15:00	Dilution: 10	File ID: TC04212017.062
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	178		20.0	10.0	5.00

2.1.3.2 QC Summary Data

**Total Organic Carbon Example Calculations
(Direct Readout Parameter)**

$$(\text{Readout})/(\text{dilution}) = \text{mg/L}$$

where:

Readout = direct readout from the instrument

dilution = dilution in decimal form (ex. 1/5 dilution = 0.2)

Microbac Laboratories Inc.

Data Checklist

Date: 21-APR-2017
 Analyst: EPT
 Analyst: NA
 Method: TOC
 Instrument: TOC-VWP
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG611142 WG611139

Calibration/Linearity	2/10/17
Second Source Check	
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	
QC Violation Sheet	
Case Narratives	
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	
Primary Reviewer	EPT
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
25-APR-2017

Edham Tidd

Secondary Reviewer:
26-APR-2017

Drenna Johnson



Analytical Method: 415.1
Login Number: L17041032

AAB#: WG611142

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6434-GRAB	01	04/20/17					04/22/2017	1.8	28		04/22/17	1.8	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17041032 Work Group: WG611142
 Blank File ID: TC04212017.033 Blank Sample ID: WG611142-01
 Prep Date: 04/22/17 01:13 Instrument ID: TOC-VWP
 Analyzed Date: 04/22/17 01:13 Method: 415.1
 Analyst: EPT

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG611142-02	TC04212017.034	04/22/17 01:32	01
LCS2	WG611142-03	TC04212017.035	04/22/17 01:53	01
DUP	WG611142-05	TC04212017.056	04/22/17 08:24	01
LH18/24-SP650-6434-GRAB	L17041032-01	TC04212017.062	04/22/17 10:28	DL01

Report Name: BLANK_SUMMARY
 PDF File ID: 5262166
 Report generated 04/25/2017 13:34



Login Number: L17041032 Prep Date: 04/22/17 01:13 Sample ID: WG611142-01
 Instrument ID: TOC-VWP Run Date: 04/22/17 01:13 Prep Method: 415.1
 File ID: TC04212017.033 Analyst: EPT Method: 415.1
 Workgroup (AAB#): WG611142 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: TOC-VW-10-FEB-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Total Organic Carbon	0.500	2.00	0.500	1	U

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5262167
 25-APR-2017 13:34



Login Number: L17041032 Analyst: EPT Prep Method: 415.1
 Instrument ID: TOC-VWP Matrix: Water Method: 415.1
 Workgroup (AAB#): WG611142 Units: mg/L
 QC Key: DOD4 Lot #: STD80787
 Sample ID: WG611142-02 LCS File ID: TC04212017.034 Run Date: 04/22/2017 01:32
 Sample ID: WG611142-03 LCS2 File ID: TC04212017.035 Run Date: 04/22/2017 01:53

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Total Organic Carbon	25.0	24.9	99.7	25.0	25.3	101	1.63	85 - 115	15	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5262168
 Report generated: 04/25/2017 13:34



2.1.3.3 Raw Data

Curve

~~WG 602411~~
~~WG 602476~~ *dm/1/13/17*
 WG 602481

Total Organic Carbon

MAKE DAILY

CCV (TOC): _____ LCS (TOC): _____
 (5/200)(1000) = 25mg/L (5/200)(1000) = 25mg/L

CCV (TIC): _____ MS (TOC): _____
 (5/200)(1000) = 25mg/L _____

Calibration Curve Date: _____ Reagent: RET 35944
RET 37673

SM5310-C : Matrix 2 WG _____
 EPA 415.1/9060A(mod): Matrix 1 WG _____ SOP: K 4151 Rev. 18 *dm/1/13/17*
 Instrument: Shimadza TOC-VWP/ASI

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> drain reservoir filled | <input checked="" type="checkbox"/> DAILY CHECK | <input checked="" type="checkbox"/> sufficient acid waste container |
| <input checked="" type="checkbox"/> ASI water bottle full | <input checked="" type="checkbox"/> 3 rd bottle full | |
| <input checked="" type="checkbox"/> dilution water bottle full | <input checked="" type="checkbox"/> sufficient gas | |
| | <input checked="" type="checkbox"/> sufficient persulfate | |

Position	Sample ID	Dilution	Position	Sample ID	Dilution	Position	Sample ID	Dilution
1	TC Curve		26	TC Curve		51		
2	TC ICV		27	Std 79318		52	See SOP	
3	TIC Curve		28			53	for point	
4	TIC ICV		29	TIC Curve		54	preparation	
5			30	Std 80415		55		
6			31			56		
7			32			57		
8			33	TOC (TC)		58		
9			34	ICV		59		
10			35	Std 77870		60	5/200 (1000) = 25	
11			36			61		
12			37	TIC ICV		62		
13			38	Std 80416		63		
14			39			64		
15			40			65		
16			41			66		
17			42			67		
18			43			68		
19	all points		44	analyzed in duplicate		69		
20			45			70		
21			46			71		
22			47			72		
23			48			73		
24			49			74		
25			50			75		

Analyst: David Merckel Date/Time: 2/10/17

DCN#123915



C:\TOC3201\Data\CURVES-02-10-2017.t32

	Analysis	Sample Name	Result	Status	Date / Time	Vial
1	TC	TCCURVE		Complete	2/10/2017 10:29:51 A	0, 1, 2, 3, 4, 5
2	TC	TOC ICV	TC:23.90mg/L	Complete	2/10/2017 10:47:48 A	6
3	IC	TICCURVE		Complete	2/10/2017 3:55:41 PM	0, 1, 2, 3, 4, 5
4	IC	TIC CURVE	IC:24.27mg/L	Complete	2/10/2017 4:12:07 PM	6
5	TC		TC:0.000mg/L	Complete	2/10/2017 4:31:41 PM	7
6	IC	TOC/TIC	IC:8.571mg/L	Complete	2/10/2017 4:42:05 PM	7
7	TC	TOC/TIC	TC:32.10mg/L	Complete	2/10/2017 5:01:02 PM	7

2/13/2017 7:01:58 AM

1/1

2/12/2017 11:18:36 AM

CURVES-02-10-2017.i32

Instr. Information

System
DetectorTOCVW ASI
Wet Chemical

Cal. Curve

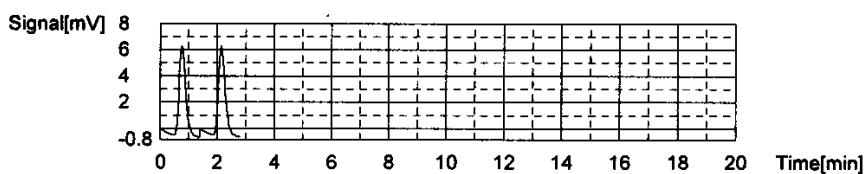
Sample Name: TCCURVE
 Sample ID: Untitled
 Cal. Curve: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
 Status: Completed

Type	Anal.
Standard	TC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.83	500uL	1	*****		2/10/2017 9:36:31 AM
2	10.82	500uL	1	*****		2/10/2017 9:40:05 AM

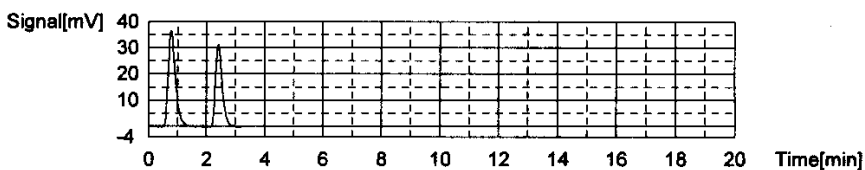
Acid Add. 0.000%
 Mean Area 10.82



Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	64.31	500uL	1	*****		2/10/2017 9:45:28 AM
2	51.52	500uL	1	*****		2/10/2017 9:49:19 AM

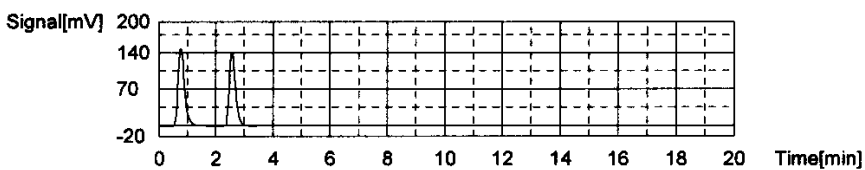
Acid Add. 0.000%
 Mean Area 57.92



Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	238.4	500uL	1	*****		2/10/2017 9:55:04 AM
2	216.3	500uL	1	*****		2/10/2017 9:58:58 AM

Acid Add. 0.000%
 Mean Area 227.4

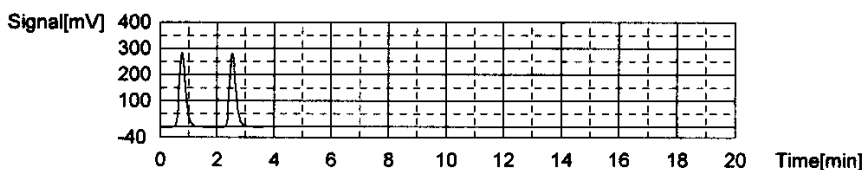


Conc: 10.00mg/L

1/6

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	442.5	500uL	1	*****		2/10/2017 10:04:41 AM
2	437.9	500uL	1	*****		2/10/2017 10:08:48 AM

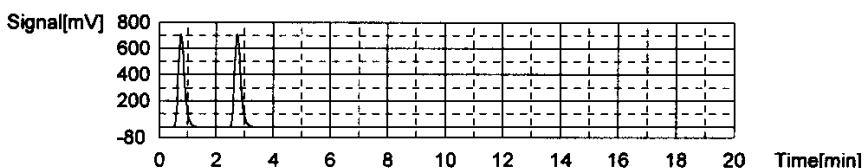
Acid Add. 0.000%
 Mean Area 440.2



Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1091	500uL	1	*****		2/10/2017 10:14:47 AM
2	1092	500uL	1	*****		2/10/2017 10:19:05 AM

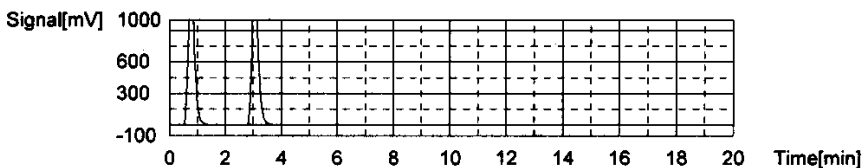
Acid Add. 0.000%
 Mean Area 1092



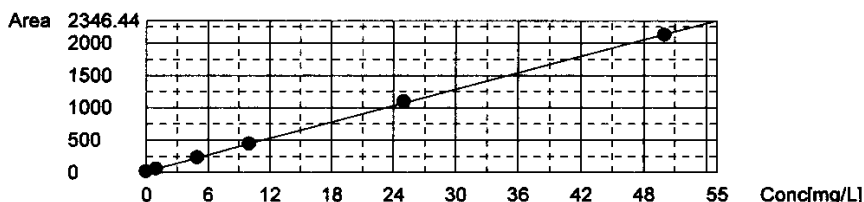
Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	2132	500uL	1	*H*****		2/10/2017 10:25:19 AM
2	2118	500uL	1	*H*****		2/10/2017 10:29:51 AM

Acid Add. 0.000%
 Mean Area 2125



Slope: 42.33
 Intercept 16.87
 r^2 0.999887
 Zero Shift No



Sample

Sample Name: TOC ICV
 Sample ID: Untitled
 Origin: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
 Status: Completed
 Chk. Result:

Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:23.90mg/L

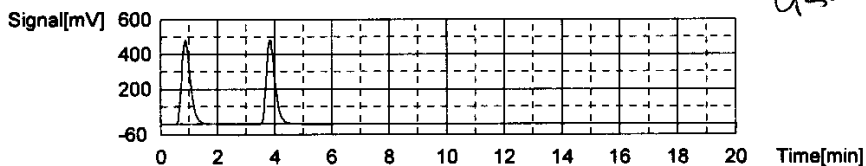
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1029	23.91mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	2/10/2017 10:42:11 AM
2	1028	23.89mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	2/10/2017 10:47:48 AM

95.6%

Mean Area 1029
Mean Conc. 23.90mg/L



Cal. Curve

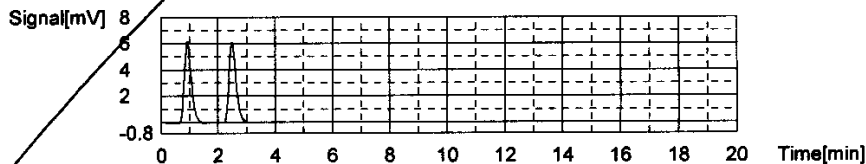
Sample Name: TICCURVE
Sample ID: Untitled
Cal. Curve: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
Status: Completed

Type	Anal.
Standard	TC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.59	500uL	1	*****		2/10/2017 2:49:09 PM
2	10.43	500uL	1	*****		2/10/2017 2:53:06 PM

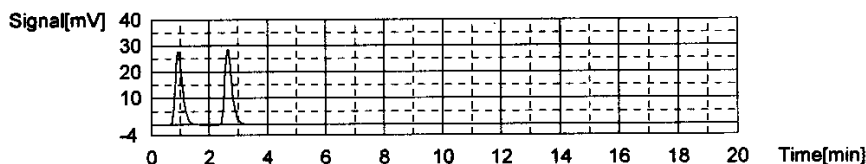
Acid Add. 3.000%
Mean Area 10.51



Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	48.13	500uL	1	*****		2/10/2017 3:00:24 PM
2	49.13	500uL	1	*****		2/10/2017 3:04:41 PM

Acid Add. 3.000%
Mean Area 48.63

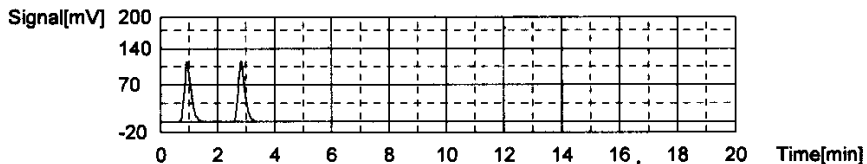


Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	189.0	500uL	1	*****		2/10/2017 3:12:24 PM
2	190.1	500uL	1	*****		2/10/2017 3:16:55 PM

*dcn
3/23/17*

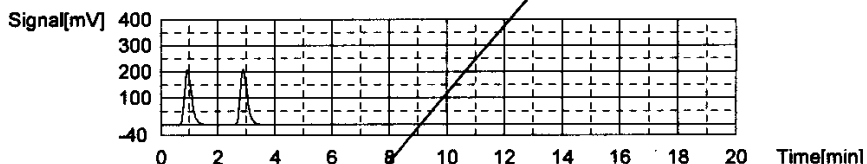
Acid Add. 3.000%
Mean Area 189.6



Conc: 10.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	360.6	500uL	1	*****		2/10/2017 3:24:47 PM
2	362.2	500uL	1	*****		2/10/2017 3:29:24 PM

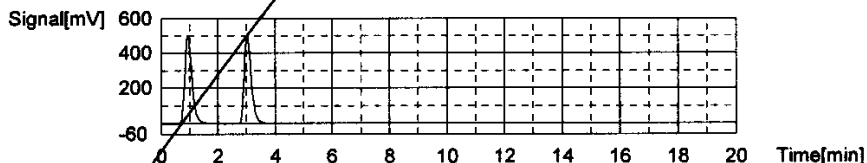
Acid Add. 3.000%
Mean Area 361.4



Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	859.3	500uL	1	*****		2/10/2017 3:37:23 PM
2	856.9	500uL	1	*****		2/10/2017 3:42:16 PM

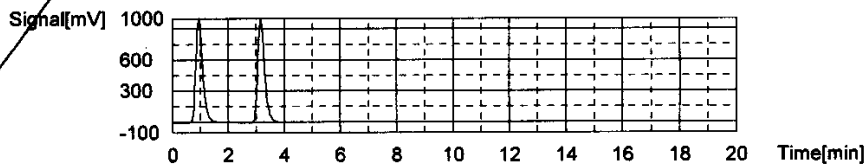
Acid Add. 3.000%
Mean Area 858.1



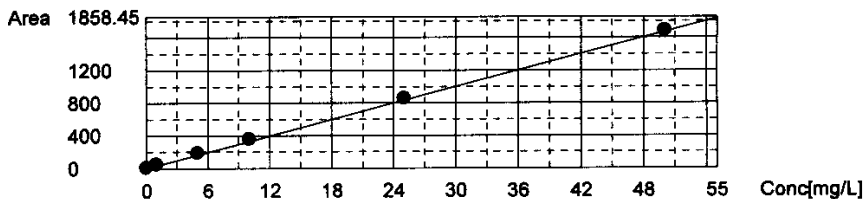
Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1690	500uL	1	*****		2/10/2017 3:50:31 PM
2	1689	500uL	1	*****		2/10/2017 3:55:41 PM

Acid Add. 3.000%
Mean Area 1690



Slope: 33.49
Intercept: 0.000
r^2: 0.999919
Zero Shift: Yes



Sample

dcm

See following pages for curve, slope, intercept
and zero shift unchecked

TOC-V Cal Curve Information
TICCURVE-02-10-2017.2017_02_10_14_45_10.cal

Date of Creation 2:10:17 PM 2/10/2017
User
System TOCVW ASI

Cal. Curve

Sample Name: TICCURVE
Sample ID: Untitled
Cal. Curve: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
Status Completed
Comment:

Type	Anal.
Standard	IC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.59	500uL	1	*****		2/10/2017 2:49:09 PM
2	10.43	500uL	1	*****		2/10/2017 2:53:06 PM

Acid Add. 3.000%
Mean Area 10.51
SD Area 0.1131
CV Area 1.08%
Vial 0

Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	48.13	500uL	1	*****		2/10/2017 3:00:24 PM
2	49.13	500uL	1	*****		2/10/2017 3:04:41 PM

Acid Add. 3.000%
Mean Area 48.63
SD Area 0.7071
CV Area 1.45%
Vial 1

Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	189.0	500uL	1	*****		2/10/2017 3:12:24 PM
2	190.1	500uL	1	*****		2/10/2017 3:16:55 PM

Acid Add. 3.000%
Mean Area 189.6
SD Area 0.7778
CV Area 0.41%
Vial 2

Conc: 10.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	360.6	500uL	1	*****		2/10/2017 3:24:47 PM
2	362.2	500uL	1	*****		2/10/2017 3:29:24 PM

Acid Add. 3.000%
 Mean Area 361.4
 SD Area 1.131
 CV Area 0.31%
 Vial 3

Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	859.3	500uL	1	*****		2/10/2017 3:37:23 PM
2	856.9	500uL	1	*****		2/10/2017 3:42:16 PM

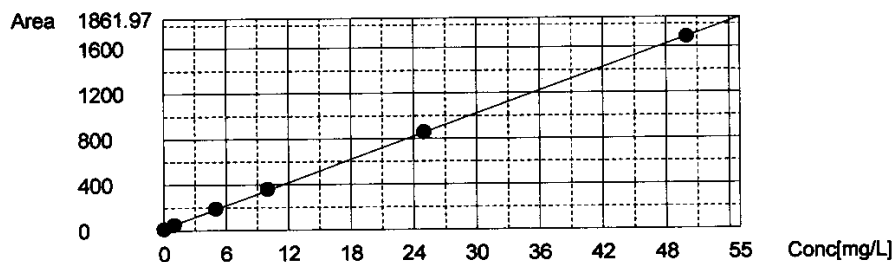
Acid Add. 3.000%
 Mean Area 858.1
 SD Area 1.697
 CV Area 0.20%
 Vial 4

Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1690	500uL	1	*****		2/10/2017 3:50:31 PM
2	1689	500uL	1	*****		2/10/2017 3:55:41 PM

Acid Add. 3.000%
 Mean Area 1690
 SD Area 0.7071
 CV Area 0.04%
 Vial 5

Slope: 33.49
 Intercept 18.41
 r^2 0.999919
 Zero Shift No



Sample Name: TIC CURVE
 Sample ID: Untitled
 Origin: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
 Status: Completed
 Chk. Result:

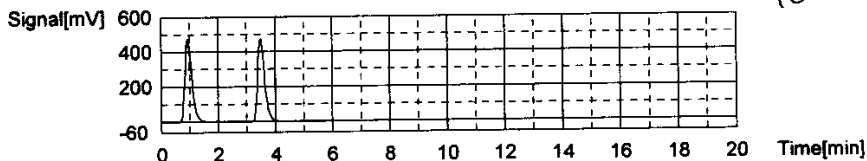
Type	Anal.	Dil.	Result
Unknown	IC	1.000	IC:24.27mg/L

1. Det

Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	810.5	24.20mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	2/10/2017 4:08:15 PM
2	814.6	24.33mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	2/10/2017 4:12:07 PM

Mean Area 812.5
 Mean Conc. 24.27mg/L



Sample

Sample Name: Untitled
 Sample ID: TCCURVE-02-10-2017.2017_02_10_14_14_25.cal
 Origin: Completed
 Status: Completed
 Chk. Result:

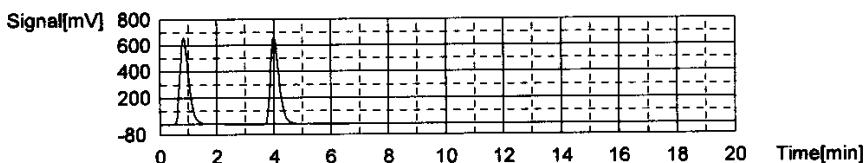
Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:0.000mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1406	0.000mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_14_14	2/10/2017 4:25:42 PM
2	1411	0.000mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_14_14	2/10/2017 4:31:41 PM

Mean Area 1409
 Mean Conc. 0.000mg/L



Sample

Sample Name: TOC/TIC
 Sample ID: Untitled
 Origin: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
 Status: Completed
 Chk. Result:

2/12/2017 11:18:36 AM

CURVES-02-10-2017.132

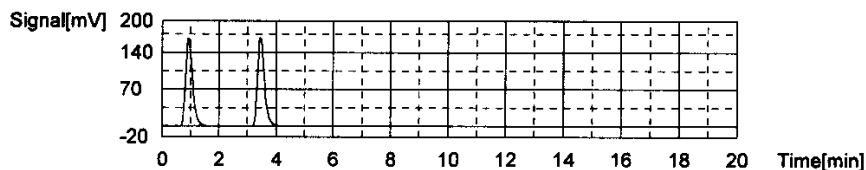
Type	Anal.	Dil.	Result
Unknown	IC	1.000	IC:8.571mg/L

1. Det

Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	286.8	8.565mg/L	500ul	1		TICCURVE-02-10-2017.2017_02_10_14_45	12/10/2017 4:37:09 PM
2	287.2	8.577mg/L	500ul	1		TICCURVE-02-10-2017.2017_02_10_14_45	12/10/2017 4:42:05 PM

Mean Area 287.0
Mean Conc. 8.571mg/L



Sample

Sample Name: TOC/TIC
Sample ID: Untitled
Origin: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
Status: Completed
Chk. Result

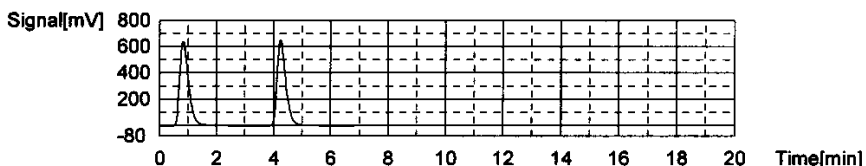
Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:32.10mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1378	32.16mg/L	500ul	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	12/10/2017 4:55:07 PM
2	1373	32.04mg/L	500ul	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	12/10/2017 5:01:02 PM

Mean Area 1376
Mean Conc. 32.10mg/L



WORKGROUP WG61139

WG61142

Total Organic Carbon

MAKE DAILY

CCV (TOC): Std 80787
 $(5/200)(1000) = 25\text{mg/L}$

LCS (TOC): Std 80787
 $(5/200)(1000) = 25\text{mg/L}$

CCV (TIC): Std 80416
 $(5/200)(1000) = 25\text{mg/L}$

MS (TOC): Std 80787
 $.4(1000)/40 = 10$

Calibration Curve Date: 2/10/17

Reagent: 39685
39216

SM5310-C : Matrix 2 WG 61139

EPA 415.1/9060A(mod): Matrix 1 WG _____

SOP: K 4151 Rev. 19

WG 61142 Instrument: Shimadza TOC-VWP/ASI

- drain reservoir filled
- ASI water bottle full
- dilution water bottle full
- 3rd bottle full
- sufficient gas
- sufficient persulfate
- sufficient acid waste container

Position	Sample ID	Dilution
1	TIC	
2	TOC/TIC	
3	CCV	
4	BK	
5	LCS	
6	LCS DVP	
7	04-0924-01	
8	-02	
9	-03	
10	-04	
11	-05	
12	-06	
13	-07	
14	CCV	
15	CCB	
16	04-0925-01	
17	-02	
18	-03	
19	-04	
20	04-0956-01	1/10,000
21	04-0995-01	
22	-03	
23	-05	
24	-07	
25	-09	

Position	Sample ID	Dilution
26	CCV	
27	CCB	
28	04-0995-11	
29	-13	
30	-15	
31	DVP 924-01	
32	MS 924-02	
33	BK	
34	LCS	
35	LCS DVP	
36	04-0959-01	1/10
37	-02	
38	CCV	
39	CCB	
40	04-0959-03	
41	-04	
42	04-0993-01	
43	-03	
44	-05	
45	-07	
46	-09	
47	-11	
48	04-0995-17	
49	-19	
50	CCV	

Position	Sample ID	Dilution
51	CCB	
52	04-0995-21	
53	-24	
54	-26	
55	04-1032-01	1/3
56	DVP 995-26	
57	MS 995-26	
58	CCV	
59	CCB	
60	04-0925-03	1/2
61	04-0956-01	1/5000
62	04-1032-01	1/10
63	CCV	
64	CCB	
65		
66		
67		
68		
69		
70		
71		
72		
73		
74		
75		

Analyst: Edu Tadd

Date/Time: 4-21-17 1420

DCN#125357



	Analysis	Sample Name	Result	Status	Date / Time	Vial
1	TOC	TIC	TOC:1.573mg/L TC:25.99mg/L IC:24.42mg/L	Complete	4/21/2017 2:23:29 PM	1
2	TOC	TOC/TIC	TOC:26.15mg/L TC:34.12mg/L IC:7.973mg/L	Complete	4/21/2017 2:36:07 PM	2
3	TOC	CCV	!!Error!! TOC:23.20mg/L TC:22.87mg/L IC:-0.3284mg/L	Complete	4/21/2017 3:00:56 PM	3
4	TOC	WG611139-01 BLK	!!Error!! TOC:0.1824mg/L TC:-0.1158mg/L IC:-0.2981mg/L	Complete	4/21/2017 3:17:28 PM	0
5	TOC	WG611139-02 LCS	!!Error!! TOC:24.84mg/L TC:24.48mg/L IC:-0.3575mg/L	Complete	4/21/2017 3:38:28 PM	5
6	TOC	WG611139-03 LCSDUP	!!Error!! TOC:24.73mg/L TC:24.37mg/L IC:-0.3516mg/L	Complete	4/21/2017 3:59:19 PM	6
7	TOC	L17040924-01	TOC:14.21mg/L TC:30.67mg/L IC:16.46mg/L	Complete	4/21/2017 4:42:39 PM	7
8	TOC	L17040924-02	TOC:7.181mg/L TC:31.78mg/L IC:24.60mg/L	Complete	4/21/2017 5:05:01 PM	8
9	TOC	L17040924-03	TOC:11.56mg/L TC:28.44mg/L IC:16.88mg/L	Complete	4/21/2017 5:27:06 PM	9
10	TOC	L17040924-04	TOC:13.74mg/L TC:31.00mg/L IC:17.27mg/L	Complete	4/21/2017 5:50:24 PM	10
11	TOC	L17040924-05	TOC:9.528mg/L TC:34.39mg/L IC:24.86mg/L	Complete	4/21/2017 6:13:26 PM	11
12	TOC	L17040924-06	TOC:3.219mg/L TC:6.411mg/L IC:3.192mg/L	Complete	4/21/2017 6:34:35 PM	12
13	TOC	L17040924-07	TOC:3.665mg/L TC:7.182mg/L IC:3.517mg/L	Complete	4/21/2017 6:56:03 PM	13
14	TOC	CCV	!!Error!! TOC:24.07mg/L TC:23.77mg/L IC:-0.3022mg/L	Complete	4/21/2017 7:08:09 PM	14
15	TOC	CCB	!!Error!! TOC:0.1229mg/L TC:-0.1755mg/L IC:-0.2984mg/L	Complete	4/21/2017 7:17:04 PM	0
16	TOC	L17040925-01	TOC:6.891mg/L TC:8.233mg/L IC:1.343mg/L	Complete	4/21/2017 7:39:54 PM	16
17	TOC	L17040925-02	TOC:14.81mg/L TC:39.90mg/L IC:25.09mg/L	Complete	4/21/2017 8:02:42 PM	17
18	TOC		TOC:15.56mg/L TC:51.40mg/L IC:35.84mg/L	Complete	4/21/2017 8:26:32 PM	18
19	TOC	L17040925-04	TOC:4.863mg/L TC:12.57mg/L IC:7.704mg/L	Complete	4/21/2017 8:48:26 PM	19
20	TOC		TOC:9.487mg/L TC:9.489mg/L IC:0.00196mg/L	Complete	4/21/2017 9:08:26 PM	20
21	TOC	L17040995-01	TOC:2.909mg/L TC:22.82mg/L IC:19.91mg/L	Complete	4/21/2017 9:30:14 PM	21
22	TOC	L17040995-03	TOC:2.156mg/L TC:14.36mg/L IC:12.20mg/L	Complete	4/21/2017 9:51:31 PM	22
23	TOC	L17040995-05	TOC:2.330mg/L TC:22.85mg/L IC:20.52mg/L	Complete	4/21/2017 10:13:26 PM	23
24	TOC	L17040995-07	TOC:3.516mg/L TC:34.14mg/L IC:30.63mg/L	Complete	4/21/2017 10:36:21 PM	24
25	TOC	L17040995-09	TOC:3.206mg/L TC:15.97mg/L IC:12.76mg/L	Complete	4/21/2017 10:58:40 PM	25
26	TOC	CCV	!!Error!! TOC:24.08mg/L TC:23.82mg/L IC:-0.2608mg/L	Complete	4/21/2017 11:10:51 PM	26
27	TOC	CCB	!!Error!! TOC:0.1104mg/L TC:-0.1729mg/L IC:-0.2834mg/L	Complete	4/21/2017 11:19:42 PM	0
28	TOC	L17040995-11	TOC:2.917mg/L TC:13.46mg/L IC:10.54mg/L	Complete	4/21/2017 11:41:41 PM	28
29	TOC	L17040995-13	TOC:2.099mg/L TC:10.19mg/L IC:8.091mg/L	Complete	4/22/2017 12:02:39 AM	29
30	TOC	L17040995-15	TOC:1.735mg/L TC:8.587mg/L IC:6.852mg/L	Complete	4/22/2017 12:23:41 AM	30
31	TOC	WG611139-06 DUP	TOC:13.74mg/L TC:18.93mg/L IC:5.197mg/L	Complete	4/22/2017 12:45:42 AM	31
32	TOC	WG611139-07 MS	TOC:16.23mg/L TC:24.08mg/L IC:7.846mg/L	Complete	4/22/2017 1:08:13 AM	32
33	TOC	WG611142-01 BLK	!!Error!! TOC:0.1085mg/L TC:-0.1634mg/L IC:-0.2719mg/L	Complete	4/22/2017 1:24:37 AM	0
34	TOC	WG611142-02 LCS	!!Error!! TOC:24.92mg/L TC:24.60mg/L IC:-0.3249mg/L	Complete	4/22/2017 1:45:21 AM	34
35	TOC	WG611142-03 LCSDUP	!!Error!! TOC:25.33mg/L TC:25.00mg/L IC:-0.3266mg/L	Complete	4/22/2017 2:06:16 AM	35
36	TOC	L17040959-01	TOC:4.196mg/L TC:7.091mg/L IC:2.895mg/L	Complete	4/22/2017 2:27:41 AM	36
37	TOC	L17040959-02	TOC:7.893mg/L TC:37.98mg/L IC:30.09mg/L	Complete	4/22/2017 2:50:07 AM	37
38	TOC	CCV	!!Error!! TOC:24.32mg/L TC:24.13mg/L IC:-0.1969mg/L	Complete	4/22/2017 3:02:22 AM	38
39	TOC	CCB	!!Error!! TOC:0.1037mg/L TC:-0.1674mg/L IC:-0.2711mg/L	Complete	4/22/2017 3:11:16 AM	0
40	TOC	L17040959-03	TOC:7.088mg/L TC:13.80mg/L IC:6.714mg/L	Complete	4/22/2017 3:32:43 AM	40
41	TOC	L17040959-04	TOC:3.290mg/L TC:6.401mg/L IC:3.111mg/L	Complete	4/22/2017 3:53:15 AM	41
42	TOC	L17040993-01	TOC:1.360mg/L TC:1.635mg/L IC:0.2746mg/L	Complete	4/22/2017 4:13:19 AM	42
43	TOC	L17040993-03	TOC:1.432mg/L TC:1.623mg/L IC:0.1910mg/L	Complete	4/22/2017 4:33:23 AM	43
44	TOC	L17040993-05	TOC:1.021mg/L TC:1.729mg/L IC:0.7072mg/L	Complete	4/22/2017 4:53:14 AM	44
45	TOC	L17040993-07	TOC:1.202mg/L TC:1.730mg/L IC:0.5273mg/L	Complete	4/22/2017 5:13:06 AM	45
46	TOC	L17040993-09	TOC:0.9935mg/L TC:2.580mg/L IC:1.586mg/L	Complete	4/22/2017 5:32:57 AM	46
47	TOC	L17040993-11	TOC:0.9794mg/L TC:1.816mg/L IC:0.8365mg/L	Complete	4/22/2017 5:52:53 AM	47
48	TOC	L17040995-17	TOC:1.868mg/L TC:5.581mg/L IC:3.713mg/L	Complete	4/22/2017 6:13:18 AM	48
49	TOC	L17040995-19	TOC:1.382mg/L TC:2.934mg/L IC:1.552mg/L	Complete	4/22/2017 6:33:23 AM	49
50	TOC	CCV	!!Error!! TOC:23.70mg/L TC:23.39mg/L IC:-0.3109mg/L	Complete	4/22/2017 6:45:30 AM	50
51	TOC	CCB	!!Error!! TOC:0.1188mg/L TC:-0.1703mg/L IC:-0.2891mg/L	Complete	4/22/2017 6:54:21 AM	0
52	TOC	L17040995-21	TOC:1.215mg/L TC:2.479mg/L IC:1.264mg/L	Complete	4/22/2017 7:14:21 AM	52
53	TOC	L17040995-24	TOC:1.247mg/L TC:1.538mg/L IC:0.2910mg/L	Complete	4/22/2017 7:34:05 AM	53
54	TOC	L17040995-26	TOC:1.217mg/L TC:1.626mg/L IC:0.4085mg/L	Complete	4/22/2017 7:53:57 AM	54
55	TOC		TOC:56.28mg/L TC:56.79mg/L IC:0.5116mg/L	Complete	4/22/2017 8:17:42 AM	55
56	TOC	WG611142-05 DUP	TOC:1.286mg/L TC:1.977mg/L IC:0.6917mg/L	Complete	4/22/2017 8:37:35 AM	56
57	TOC	WG611142-06 MS	TOC:11.20mg/L TC:11.67mg/L IC:0.4654mg/L	Complete	4/22/2017 8:57:58 AM	57
58	TOC	CCV	!!Error!! TOC:24.58mg/L TC:24.27mg/L IC:-0.3128mg/L	Complete	4/22/2017 9:10:04 AM	58
59	TOC	CCB	!!Error!! TOC:0.1141mg/L TC:-0.1738mg/L IC:-0.2878mg/L	Complete	4/22/2017 9:18:59 AM	0
60	TOC	L17040925-03 (2)	TOC:8.274mg/L TC:25.39mg/L IC:17.12mg/L	Complete	4/22/2017 10:00:44 AM	60
61	TOC	L17040956-01 (5000)	!!Error!! TOC:18.03mg/L TC:18.01mg/L IC:-0.02791mg/L	Complete	4/22/2017 10:20:56 AM	61
62	TOC	L17041032-01 (10)	TOC:17.76mg/L TC:19.93mg/L IC:2.176mg/L	Complete	4/22/2017 10:42:01 AM	62
63	TOC	CCV	!!Error!! TOC:24.12mg/L TC:23.77mg/L IC:-0.3446mg/L	Complete	4/22/2017 10:54:10 AM	63
64	TOC	CCB	!!Error!! TOC:0.1186mg/L TC:-0.1742mg/L IC:-0.2927mg/L	Complete	4/22/2017 11:03:06 AM	0

4/24/2017 8:19:28 AM

1/1

4/24/2017 8:19:32 AM

04-21-2017-EPT-TOC.t32

Instr. Information

System TOCVW ASI
 Detector Wet Chemical

Sample

Sample Name: TIC
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

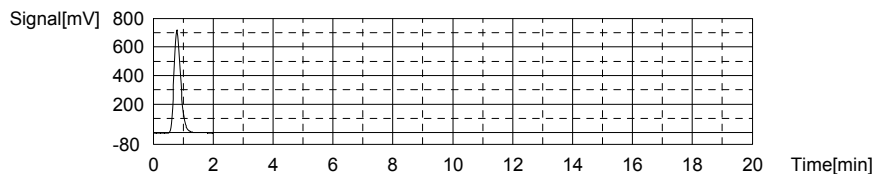
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.573mg/L TC:25.99mg/L IC:24.42mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1117	25.99mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 2:18:25 PM

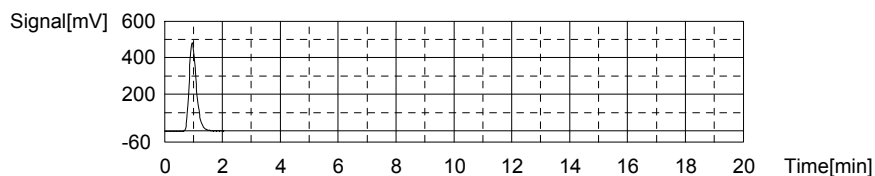
Mean Area 1117
 Mean Conc. 25.99mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	836.1	24.42mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 2:23:29 PM

Mean Area 836.1
 Mean Conc. 24.42mg/L



Sample

Sample Name: TOC/TIC
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:26.15mg/L TC:34.12mg/L IC:7.973mg/L

1. Det

Anal.: TC

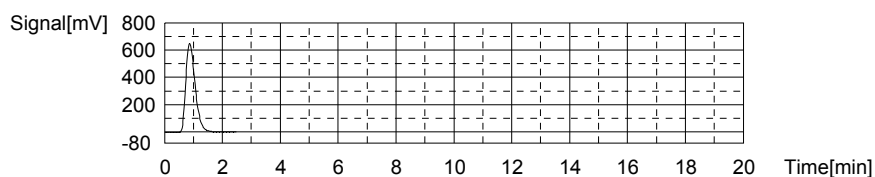
1/45

4/24/2017 8:19:32 AM

04-21-2017-EPT-TOC.t32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1461	34.12mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 2:31:23 PM

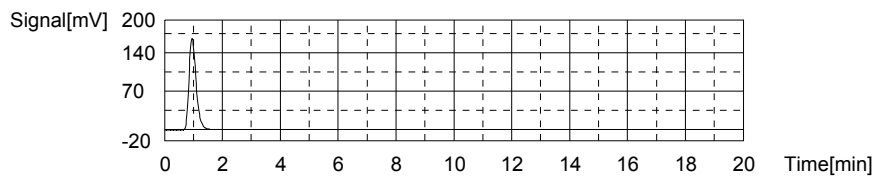
Mean Area 1461
Mean Conc. 34.12mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	285.4	7.973mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 2:36:07 PM

Mean Area 285.4
Mean Conc. 7.973mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

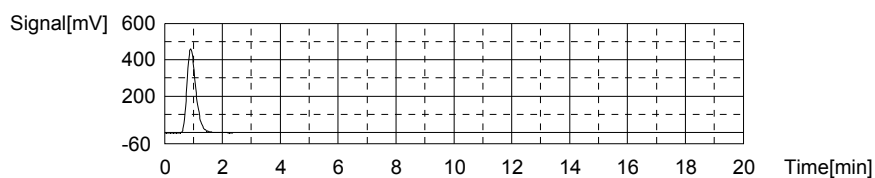
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:23.20mg/L TC:22.87mg/L IC:-0.3284mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	984.9	22.87mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 2:56:33 PM

Mean Area 984.9
Mean Conc. 22.87mg/L



Anal.: IC

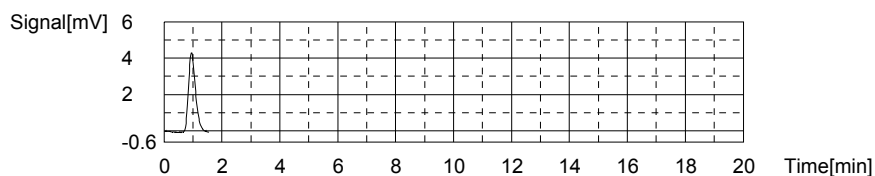
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.417	-0.3284mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 3:00:56 PM

2/45

4/24/2017 8:19:32 AM

04-21-2017-EPT-TOC.t32

Mean Area 7.417
Mean Conc. -0.3284mg/L



Sample

Sample Name: WG611139-01 BLK
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

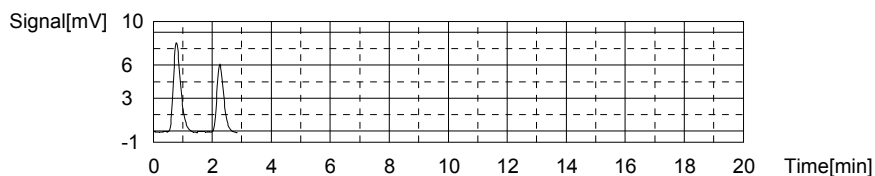
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1824mg/L TC:-0.1158mg/L IC:-0.2981mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	14.02	-0.06722mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 3:06:04 PM
2	9.911	-0.1643mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 3:09:35 PM

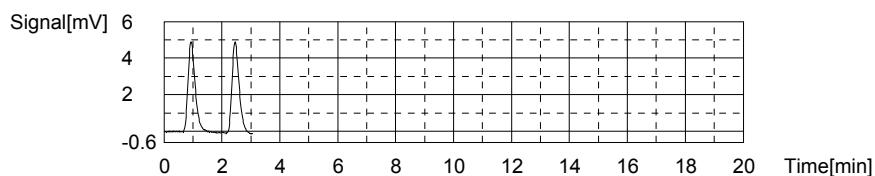
Mean Area 11.97
Mean Conc. -0.1158mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.338	-0.3009mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 3:13:27 PM
2	8.524	-0.2954mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 3:17:28 PM

Mean Area 8.431
Mean Conc. -0.2981mg/L



Sample

Sample Name: WG611139-02 LCS
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

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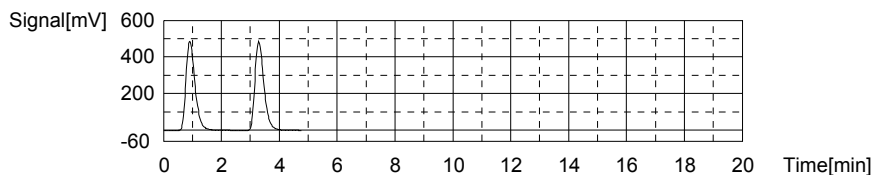
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.84mg/L TC:24.48mg/L IC:-0.3575mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1056	24.55mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 3:25:17 PM
2	1050	24.41mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 3:29:57 PM

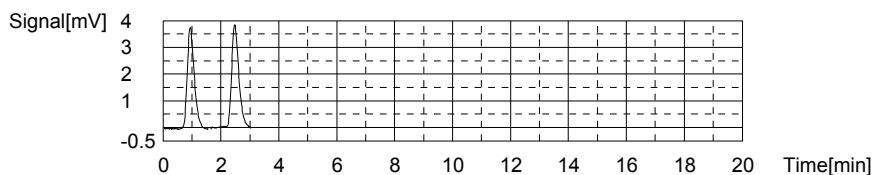
Mean Area 1053
Mean Conc. 24.48mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	6.389	-0.3591mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 3:34:18 PM
2	6.497	-0.3559mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 3:38:28 PM

Mean Area 6.443
Mean Conc. -0.3575mg/L



Sample

Sample Name: WG611139-03 LCS DUP
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

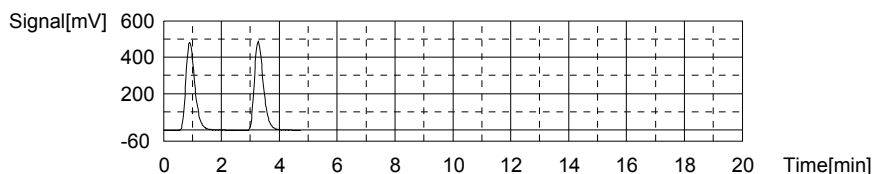
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.73mg/L TC:24.37mg/L IC:-0.3516mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1038	24.13mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 3:46:16 PM
2	1059	24.62mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 3:50:54 PM

Mean Area 1049
Mean Conc. 24.37mg/L



Anal.: IC

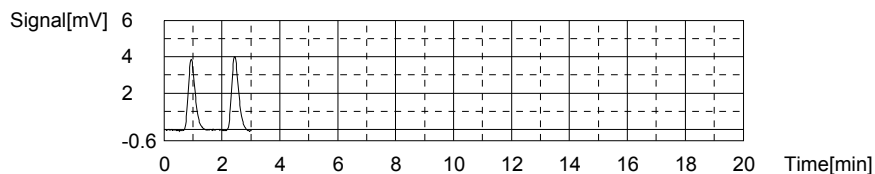
4/45

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No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	6.472	-0.3566mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 3:55:12 PM
2	6.812	-0.3465mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 3:59:19 PM

Mean Area 6.642
Mean Conc. -0.3516mg/L



Sample

Sample Name: L17040924-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

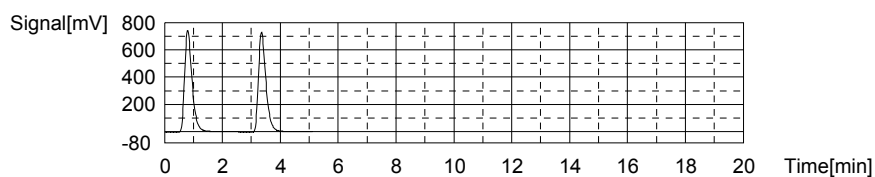
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:14.21mg/L TC:30.67mg/L IC:16.46mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1320	30.79mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/21/2017 4:28:01 PM
2	1310	30.55mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/21/2017 4:33:00 PM

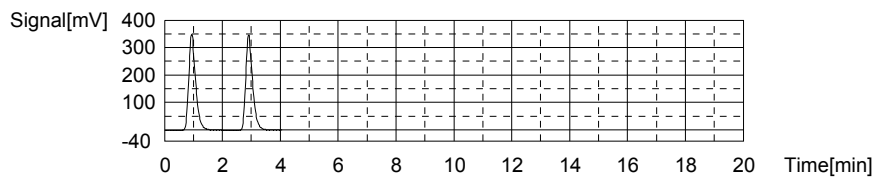
Mean Area 1315
Mean Conc. 30.67mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	570.8	16.50mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 4:37:54 PM
2	568.1	16.42mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 4:42:39 PM

Mean Area 569.5
Mean Conc. 16.46mg/L



Sample

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Sample Name: L17040924-02
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

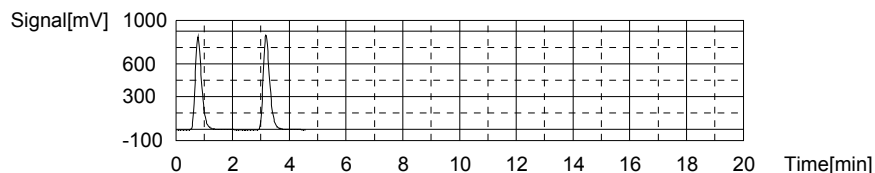
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:7.181mg/L TC:31.78mg/L IC:24.60mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1345	31.38mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 4:50:40 PM
2	1379	32.18mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 4:55:07 PM

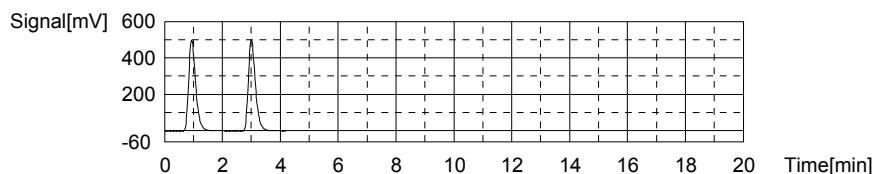
Mean Area 1362
 Mean Conc. 31.78mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	838.9	24.50mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 5:00:11 PM
2	845.4	24.70mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 5:05:01 PM

Mean Area 842.2
 Mean Conc. 24.60mg/L



Sample

Sample Name: L17040924-03
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:11.56mg/L TC:28.44mg/L IC:16.88mg/L

1. Det

Anal.: TC

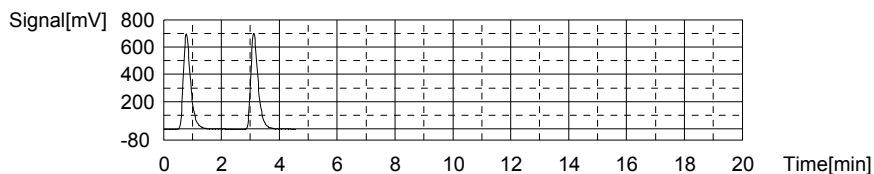
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1212	28.24mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 5:12:48 PM
2	1229	28.64mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 5:17:20 PM

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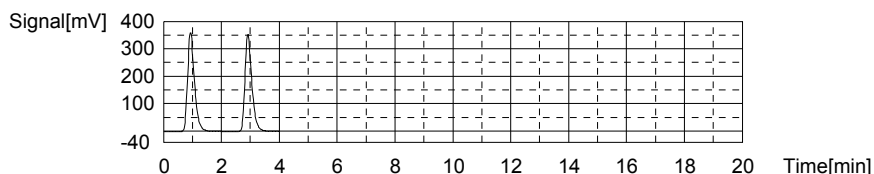
Mean Area 1221
Mean Conc. 28.44mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	587.6	17.00mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 5:22:19 PM
2	579.6	16.76mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 5:27:06 PM

Mean Area 583.6
Mean Conc. 16.88mg/L



Sample

Sample Name: L17040924-04
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

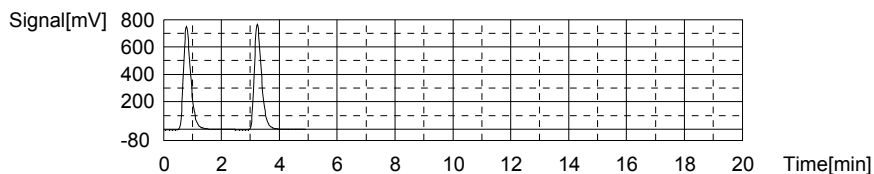
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:13.74mg/L TC:31.00mg/L IC:17.27mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1318	30.74mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32	5/4/21/2017 5:34:59 PM
2	1340	31.26mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32	5/4/21/2017 5:40:37 PM

Mean Area 1329
Mean Conc. 31.00mg/L



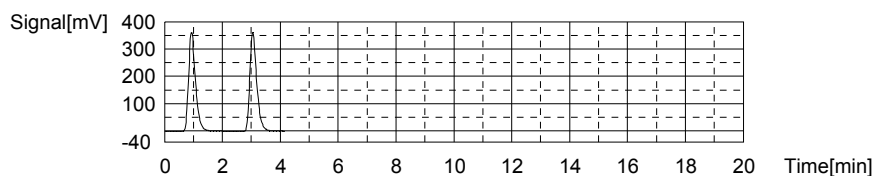
Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	595.4	17.23mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 5:45:40 PM
2	597.7	17.30mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 5:50:24 PM

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Mean Area 596.5
Mean Conc. 17.27mg/L



Sample

Sample Name: L17040924-05
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

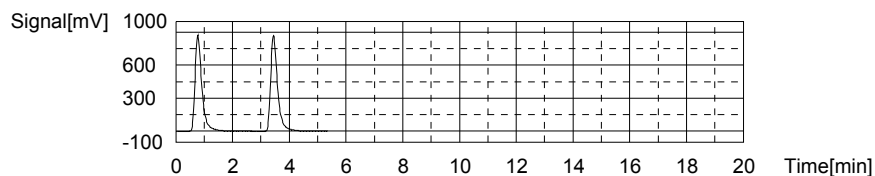
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:9.528mg/L TC:34.39mg/L IC:24.86mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1464	34.19mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 5:58:31 PM
2	1481	34.59mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 6:03:37 PM

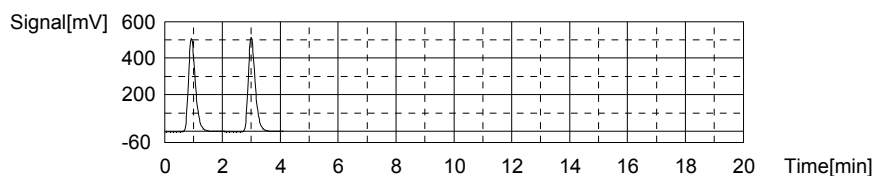
Mean Area 1473
Mean Conc. 34.39mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	847.2	24.75mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 6:08:38 PM
2	854.8	24.98mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 6:13:26 PM

Mean Area 851.0
Mean Conc. 24.86mg/L



Sample

Sample Name: L17040924-06
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

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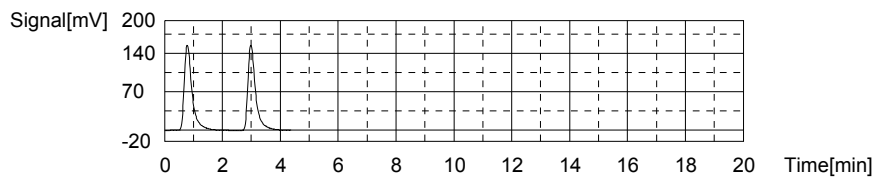
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.219mg/L TC:6.411mg/L IC:3.192mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	290.3	6.460mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 6:21:05 PM
2	286.1	6.361mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 6:25:32 PM

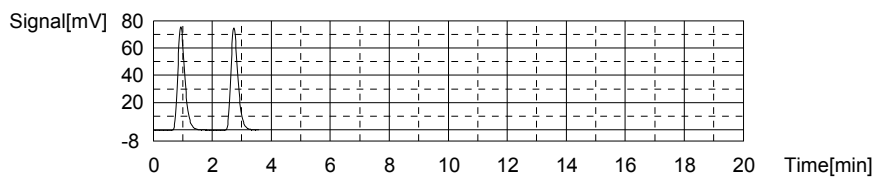
Mean Area 288.2
Mean Conc. 6.411mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	126.2	3.219mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 6:30:10 PM
2	124.4	3.165mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 6:34:35 PM

Mean Area 125.3
Mean Conc. 3.192mg/L



Sample

Sample Name: L17040924-07
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

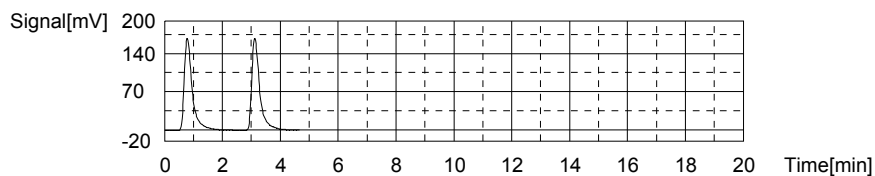
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.665mg/L TC:7.182mg/L IC:3.517mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	321.6	7.200mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 6:42:21 PM
2	320.1	7.164mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 6:46:57 PM

Mean Area 320.9
Mean Conc. 7.182mg/L



Anal.: IC

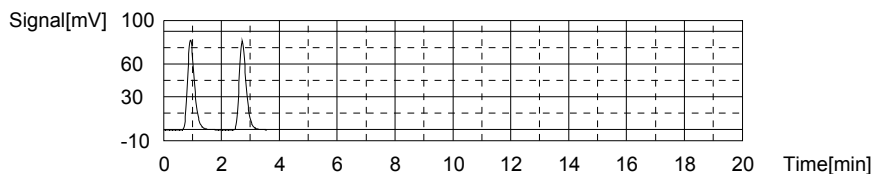
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No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	136.5	3.526mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	4/21/2017 6:51:38 PM
2	135.9	3.509mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	4/21/2017 6:56:03 PM

Mean Area 136.2
Mean Conc. 3.517mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

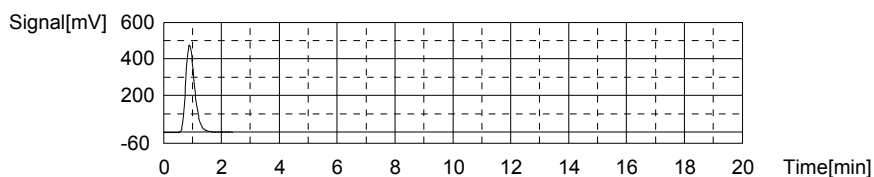
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.07mg/L TC:23.77mg/L IC:-0.3022mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1023	23.77mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 7:03:51 PM

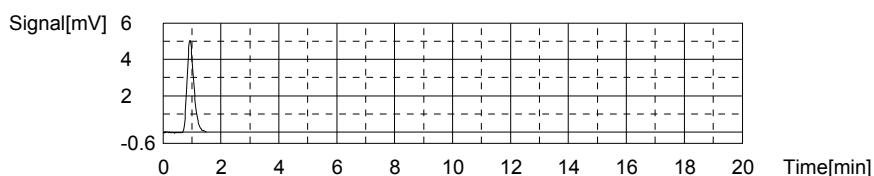
Mean Area 1023
Mean Conc. 23.77mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.295	-0.3022mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	4/21/2017 7:08:09 PM

Mean Area 8.295
Mean Conc. -0.3022mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

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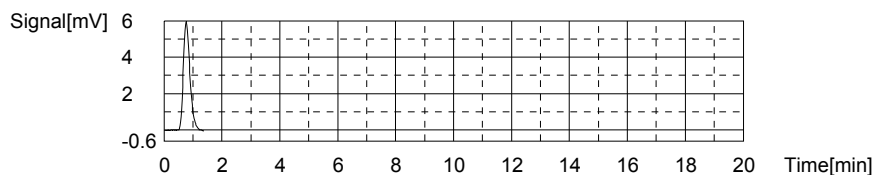
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1229mg/L TC:-0.1755mg/L IC:-0.2984mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.436	-0.1755mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 7:13:10 PM

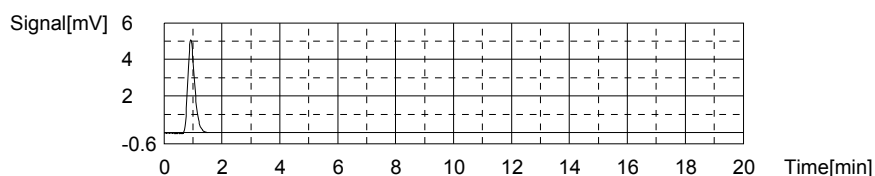
Mean Area 9.436
Mean Conc. -0.1755mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.421	-0.2984mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 7:17:04 PM

Mean Area 8.421
Mean Conc. -0.2984mg/L



Sample

Sample Name: L17040925-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

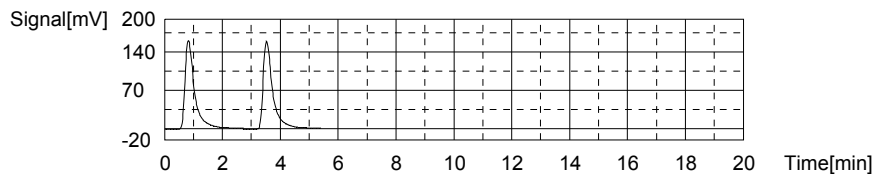
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:6.891mg/L TC:8.233mg/L IC:1.343mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	365.5	8.237mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 7:25:12 PM
2	365.2	8.230mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 7:31:05 PM

Mean Area 365.4
Mean Conc. 8.233mg/L



Anal.: IC

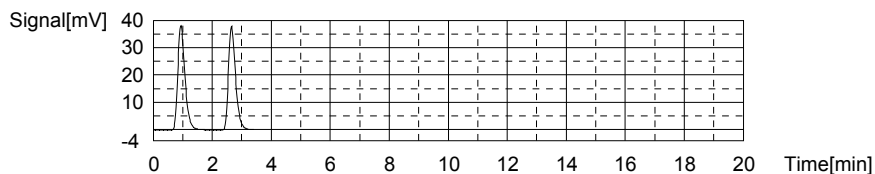
11/45

4/24/2017 8:19:32 AM

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No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	63.92	1.359mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 7:35:37 PM
2	62.85	1.327mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 7:39:54 PM

Mean Area 63.39
Mean Conc. 1.343mg/L



Sample

Sample Name: L17040925-02
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

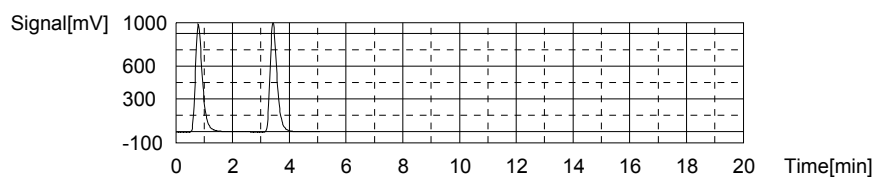
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:14.81mg/L TC:39.90mg/L IC:25.09mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1702	39.81mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/21/2017 7:47:58 PM
2	1709	39.98mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/21/2017 7:52:52 PM

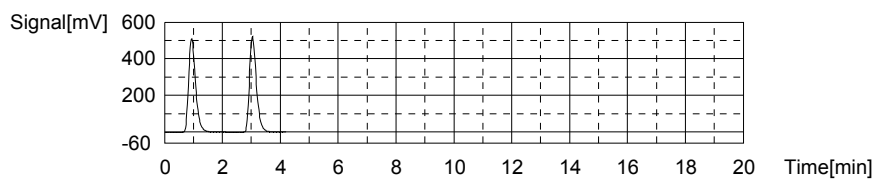
Mean Area 1706
Mean Conc. 39.90mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	851.3	24.87mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 7:57:54 PM
2	865.8	25.31mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 8:02:42 PM

Mean Area 858.6
Mean Conc. 25.09mg/L



Sample

12/45

4/24/2017 8:19:32 AM

04-21-2017-EPT-TOC.t32

Sample Name:
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

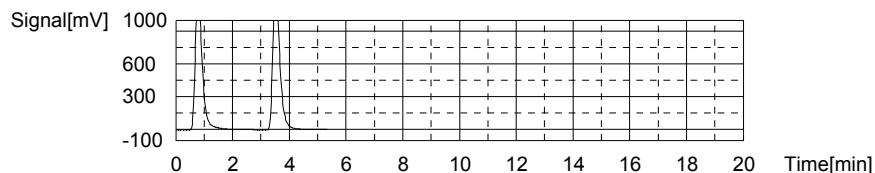
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:15.56mg/L TC:51.40mg/L IC:35.84mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	2146	50.30mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 8:10:53 PM
2	2239	52.50mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 8:16:35 PM

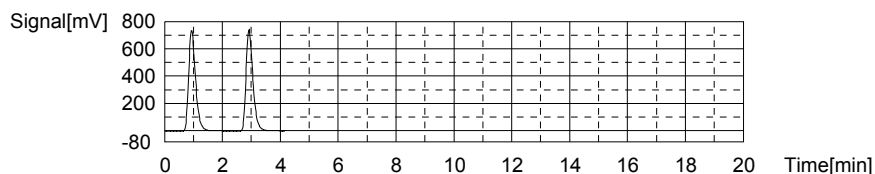
Mean Area 2193
 Mean Conc. 51.40mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1211	35.61mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 8:21:32 PM
2	1226	36.06mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 8:26:32 PM

Mean Area 1219
 Mean Conc. 35.84mg/L



Sample

Sample Name: L17040925-04
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:4.863mg/L TC:12.57mg/L IC:7.704mg/L

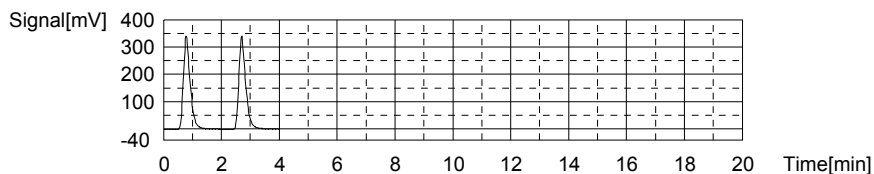
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	542.9	12.43mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 8:33:54 PM
2	554.7	12.71mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 8:39:06 PM

13/45

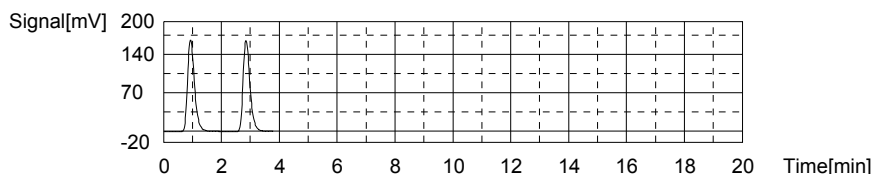
Mean Area 548.8
Mean Conc. 12.57mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	276.9	7.719mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 8:43:56 PM
2	275.9	7.689mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 8:48:26 PM

Mean Area 276.4
Mean Conc. 7.704mg/L



Sample

Sample Name:
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

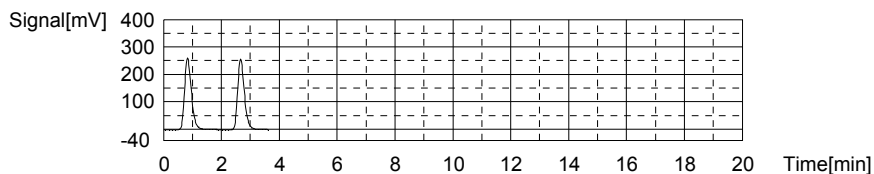
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:9.487mg/L TC:9.489mg/L IC:0.00196mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	423.6	9.610mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32	5/4/21/2017 8:55:43 PM
2	413.4	9.369mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32	5/4/21/2017 8:59:48 PM

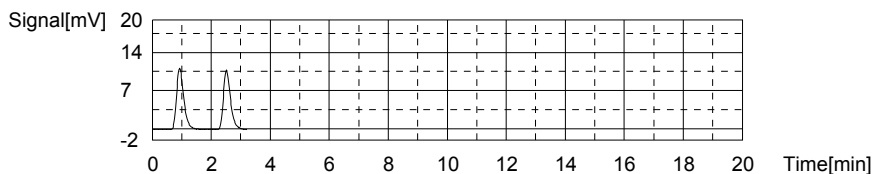
Mean Area 418.5
Mean Conc. 9.489mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	18.75	0.01002mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 9:04:13 PM
2	18.21	-0.00611mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 9:08:26 PM

Mean Area 18.48
Mean Conc. 0.00196mg/L



Sample

Sample Name: L17040995-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

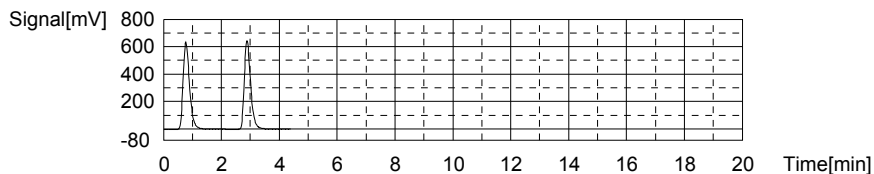
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.909mg/L TC:22.82mg/L IC:19.91mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	977.4	22.69mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 9:16:00 PM
2	988.3	22.95mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 9:20:33 PM

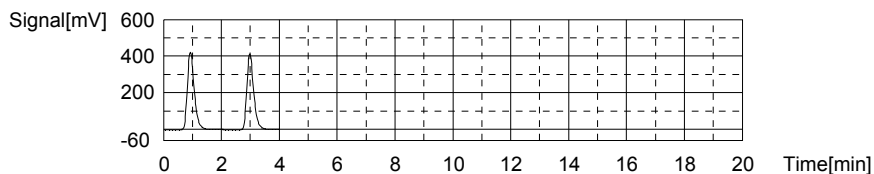
Mean Area 982.9
Mean Conc. 22.82mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	695.7	20.23mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 9:25:33 PM
2	674.8	19.60mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 9:30:14 PM

Mean Area 685.3
Mean Conc. 19.91mg/L



Sample

Sample Name: L17040995-03
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

4/24/2017 8:19:32 AM

04-21-2017-EPT-TOC.t32

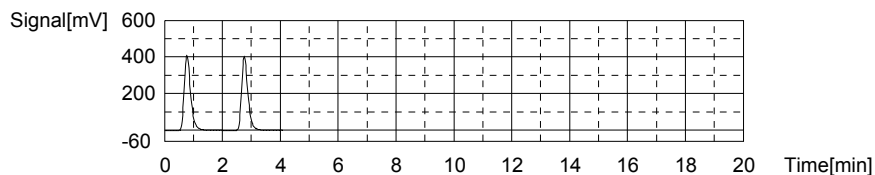
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.156mg/L TC:14.36mg/L IC:12.20mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	630.7	14.50mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 9:37:39 PM
2	618.2	14.21mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 9:42:03 PM

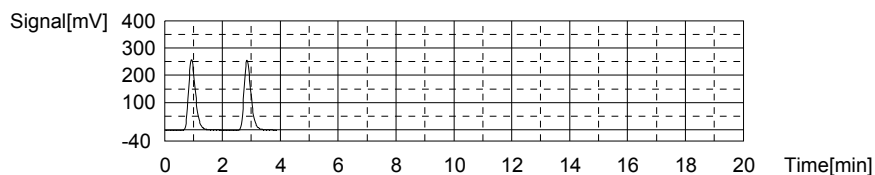
Mean Area 624.5
Mean Conc. 14.36mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	429.0	12.26mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 9:46:51 PM
2	424.8	12.14mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 9:51:31 PM

Mean Area 426.9
Mean Conc. 12.20mg/L



Sample

Sample Name: L17040995-05
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status Completed
Chk. Result

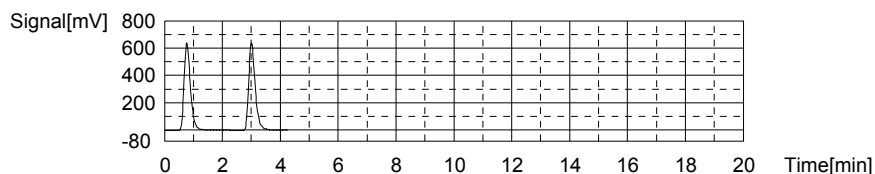
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.330mg/L TC:22.85mg/L IC:20.52mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	971.5	22.55mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 9:59:12 PM
2	996.1	23.14mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 10:03:40 PM

Mean Area 983.8
Mean Conc. 22.85mg/L



Anal.: IC

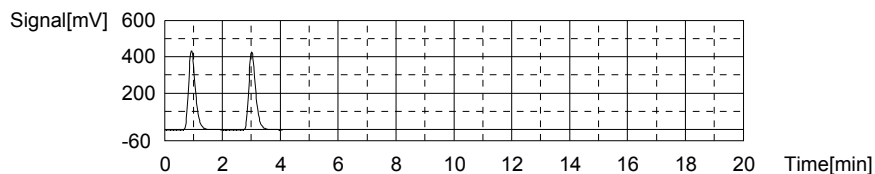
16/45

4/24/2017 8:19:32 AM

04-21-2017-EPT-TOC.t32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	711.6	20.70mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 10:08:43 PM
2	699.2	20.33mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 10:13:26 PM

Mean Area 705.4
Mean Conc. 20.52mg/L



Sample

Sample Name: L17040995-07
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

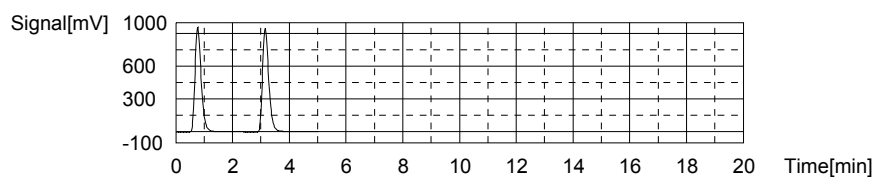
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.516mg/L TC:34.14mg/L IC:30.63mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1463	34.17mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/21/2017 10:21:16 PM
2	1461	34.12mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/21/2017 10:26:17 PM

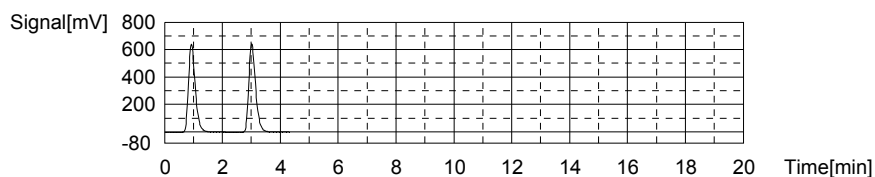
Mean Area 1462
Mean Conc. 34.14mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1036	30.39mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 10:31:21 PM
2	1052	30.87mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 10:36:21 PM

Mean Area 1044
Mean Conc. 30.63mg/L



Sample

17/45

4/24/2017 8:19:32 AM

04-21-2017-EPT-TOC.t32

Sample Name: L17040995-09
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

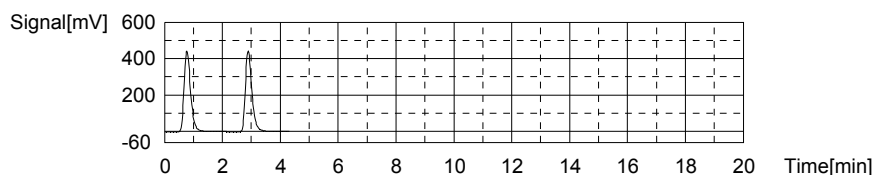
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.206mg/L TC:15.97mg/L IC:12.76mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	689.9	15.90mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 10:43:55 PM
2	695.4	16.03mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 10:49:13 PM

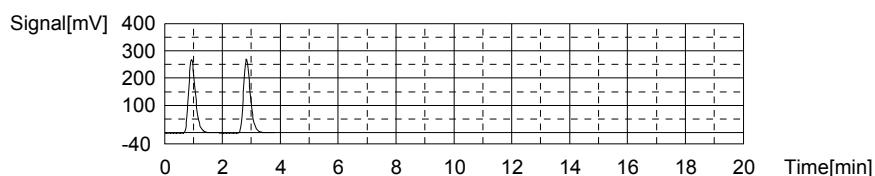
Mean Area 692.6
 Mean Conc. 15.97mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	444.0	12.71mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 10:54:02 PM
2	447.4	12.81mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 10:58:40 PM

Mean Area 445.7
 Mean Conc. 12.76mg/L



Sample

Sample Name: CCV
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.08mg/L TC:23.82mg/L IC:-0.2608mg/L

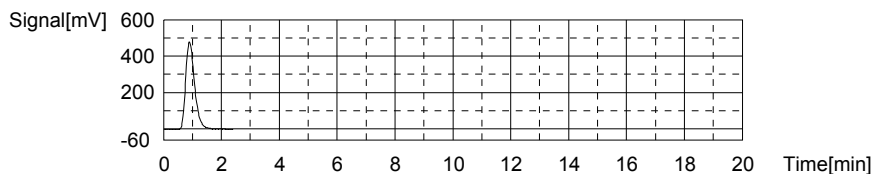
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1025	23.82mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 11:06:31 PM

18/45

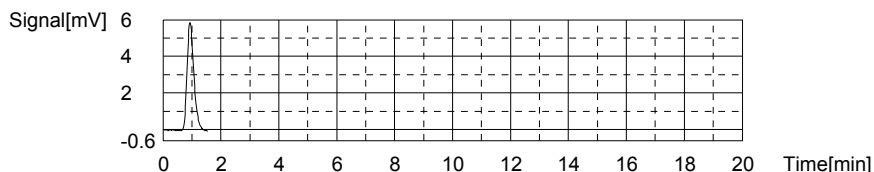
Mean Area 1025
Mean Conc. 23.82mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.680	-0.2608mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 11:10:51 PM

Mean Area 9.680
Mean Conc. -0.2608mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result:

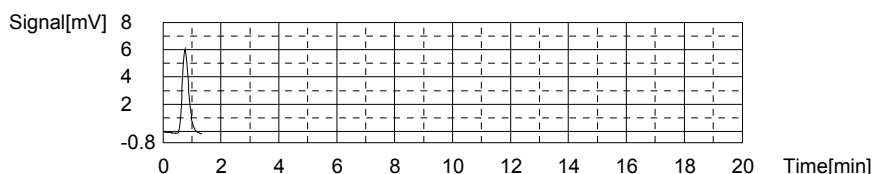
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1104mg/L TC:-0.1729mg/L IC:-0.2834mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.546	-0.1729mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/21/2017 11:15:50 PM

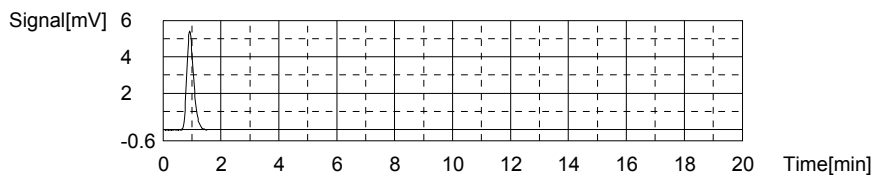
Mean Area 9.546
Mean Conc. -0.1729mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.926	-0.2834mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 11:19:42 PM

Mean Area 8.926
Mean Conc. -0.2834mg/L



4/24/2017 8:19:32 AM

04-21-2017-EPT-TOC.t32

Sample

Sample Name: L17040995-11
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

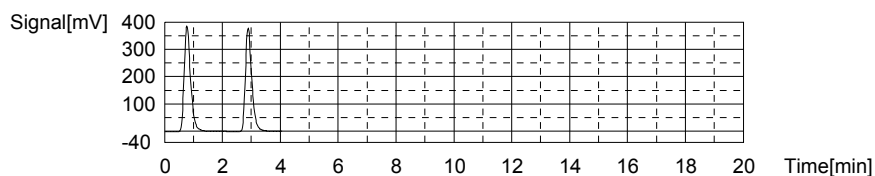
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.917mg/L TC:13.46mg/L IC:10.54mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	593.3	13.62mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 11:27:17 PM
2	579.8	13.30mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 11:32:22 PM

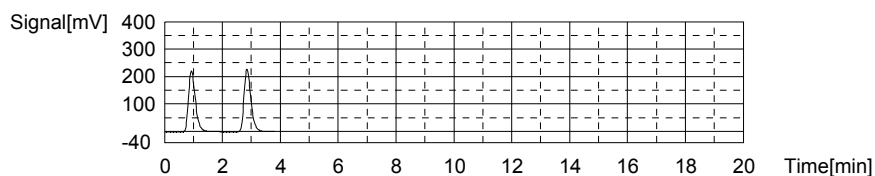
Mean Area 586.6
 Mean Conc. 13.46mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	363.9	10.32mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 11:37:09 PM
2	379.0	10.77mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/21/2017 11:41:41 PM

Mean Area 371.5
 Mean Conc. 10.54mg/L



Sample

Sample Name: L17040995-13
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.099mg/L TC:10.19mg/L IC:8.091mg/L

1. Det

Anal.: TC

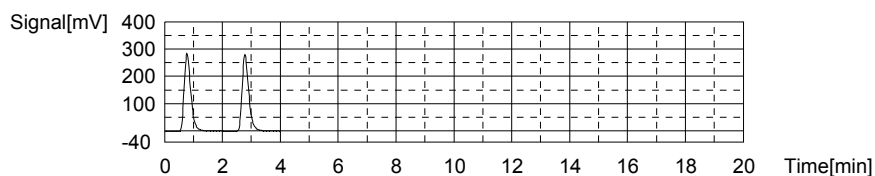
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	447.9	10.18mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 11:49:09 PM
2	448.4	10.20mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/21/2017 11:53:24 PM

20/45

4/24/2017 8:19:32 AM

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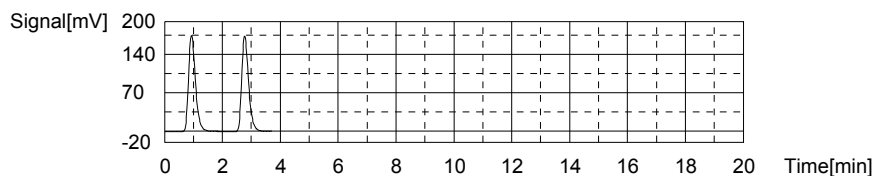
Mean Area 448.2
Mean Conc. 10.19mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	290.1	8.113mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/21/2017 11:58:06 PM
2	288.6	8.069mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 12:02:39 AM

Mean Area 289.4
Mean Conc. 8.091mg/L



Sample

Sample Name: L17040995-15
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

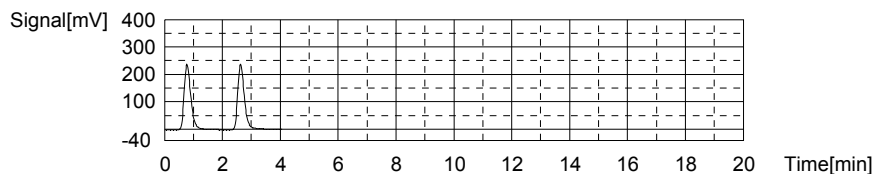
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.735mg/L TC:8.587mg/L IC:6.852mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	377.9	8.530mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 12:09:58 AM
2	382.7	8.643mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 12:14:27 AM

Mean Area 380.3
Mean Conc. 8.587mg/L

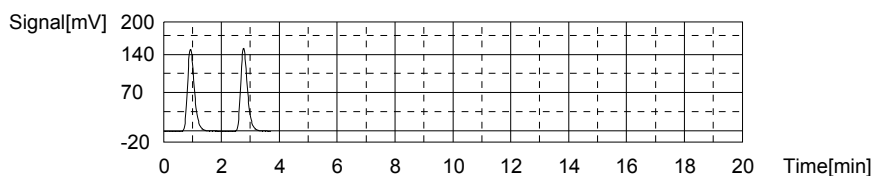


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	247.1	6.829mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 12:19:09 AM
2	248.6	6.874mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 12:23:41 AM

21/45

Mean Area 247.9
Mean Conc. 6.852mg/L



Sample

Sample Name: WG611139-06 DUP
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

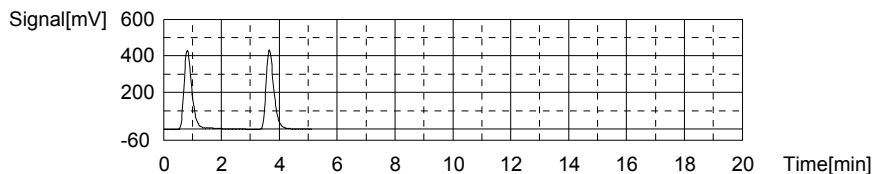
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:13.74mg/L TC:18.93mg/L IC:5.197mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	824.8	19.09mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 12:31:59 AM
2	811.6	18.78mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 12:36:33 AM

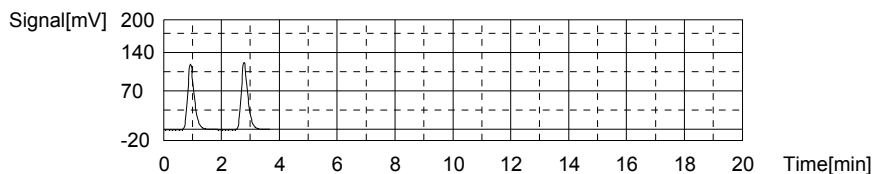
Mean Area 818.2
Mean Conc. 18.93mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	188.8	5.088mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 12:41:14 AM
2	196.1	5.306mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 12:45:42 AM

Mean Area 192.5
Mean Conc. 5.197mg/L



Sample

Sample Name: WG611139-07 MS
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

4/24/2017 8:19:32 AM

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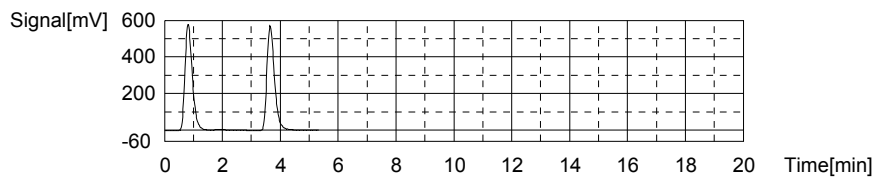
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:16.23mg/L TC:24.08mg/L IC:7.846mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1032	23.98mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 12:54:09 AM
2	1040	24.17mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 12:58:55 AM

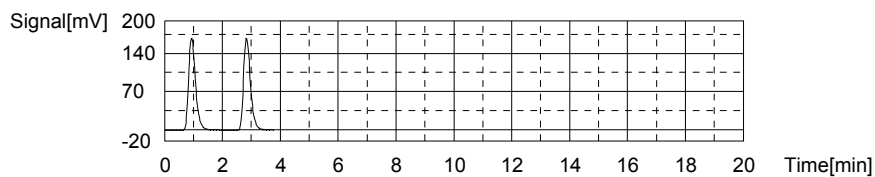
Mean Area 1036
Mean Conc. 24.08mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	280.3	7.821mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 1:03:41 AM
2	282.0	7.872mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 1:08:13 AM

Mean Area 281.1
Mean Conc. 7.846mg/L



Sample

Sample Name: WG611142-01 BLK
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

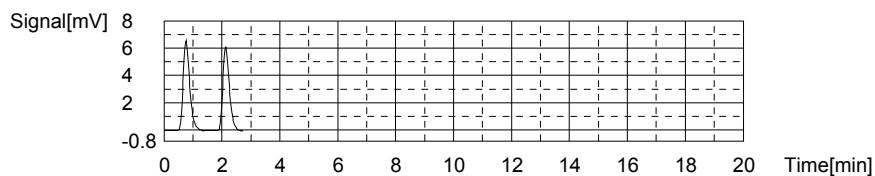
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1085mg/L TC:-0.1634mg/L IC:-0.2719mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.34	-0.1542mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 1:13:14 AM
2	9.558	-0.1726mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 1:16:44 AM

Mean Area 9.949
Mean Conc. -0.1634mg/L



Anal.: IC

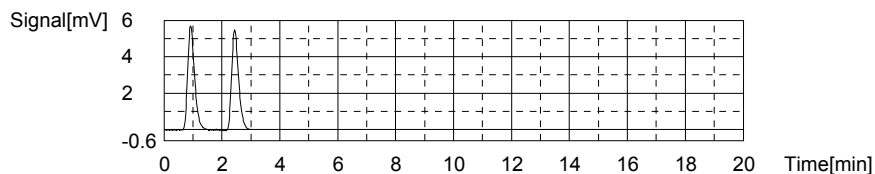
23/45

4/24/2017 8:19:32 AM

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No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.503	-0.2661mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 1:20:39 AM
2	9.116	-0.2777mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 1:24:37 AM

Mean Area 9.309
Mean Conc. -0.2719mg/L



Sample

Sample Name: WG611142-02 LCS
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

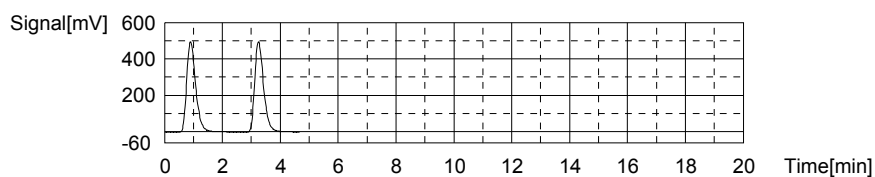
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.92mg/L TC:24.60mg/L IC:-0.3249mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1064	24.74mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 1:32:26 AM
2	1052	24.46mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 1:37:01 AM

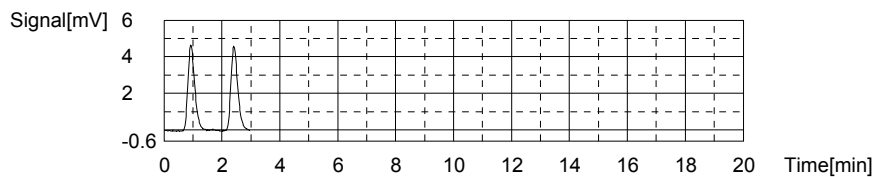
Mean Area 1058
Mean Conc. 24.60mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.638	-0.3218mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 1:41:19 AM
2	7.435	-0.3279mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 1:45:21 AM

Mean Area 7.537
Mean Conc. -0.3249mg/L



Sample

24/45

4/24/2017 8:19:32 AM

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Sample Name: WG611142-03 LCS DUP
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result:

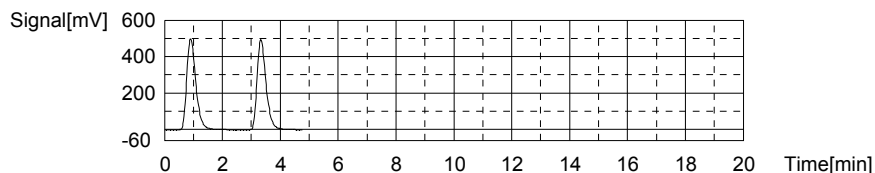
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:25.33mg/L TC:25.00mg/L IC:-0.3266mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1089	25.33mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 1:53:15 AM
2	1061	24.67mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 1:57:51 AM

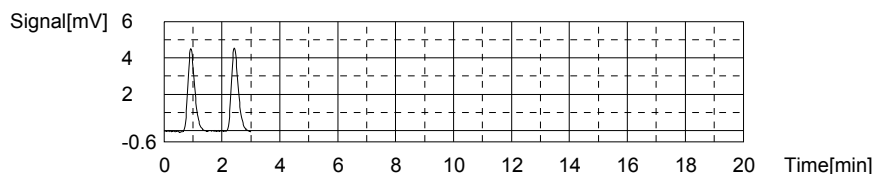
Mean Area 1075
 Mean Conc. 25.00mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.456	-0.3273mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 2:02:10 AM
2	7.500	-0.3259mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 2:06:16 AM

Mean Area 7.478
 Mean Conc. -0.3266mg/L



Sample

Sample Name: L17040959-01
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result:

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:4.196mg/L TC:7.091mg/L IC:2.895mg/L

1. Det

Anal.: TC

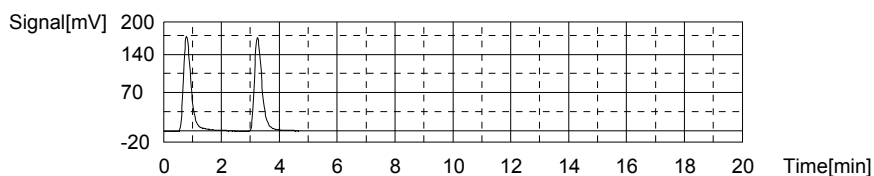
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	319.9	7.160mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 2:14:11 AM
2	314.1	7.023mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 2:18:48 AM

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4/24/2017 8:19:32 AM

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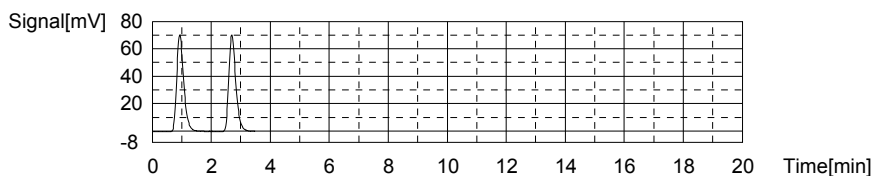
Mean Area 317.0
Mean Conc. 7.091mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	115.5	2.899mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 2:23:23 AM
2	115.2	2.890mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 2:27:41 AM

Mean Area 115.3
Mean Conc. 2.895mg/L



Sample

Sample Name: L17040959-02
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

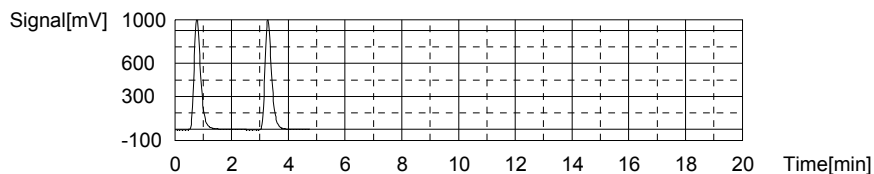
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:7.893mg/L TC:37.98mg/L IC:30.09mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1646	38.49mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 2:35:39 AM
2	1603	37.47mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 2:40:17 AM

Mean Area 1625
Mean Conc. 37.98mg/L



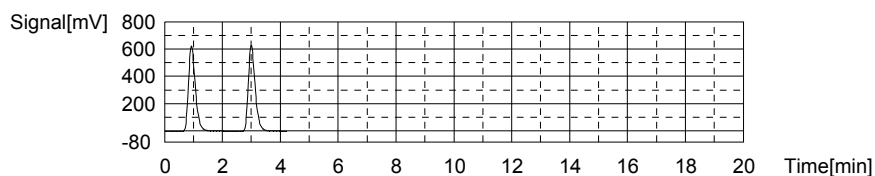
Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1022	29.97mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 2:45:16 AM
2	1030	30.21mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 2:50:07 AM

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Mean Area 1026
Mean Conc. 30.09mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

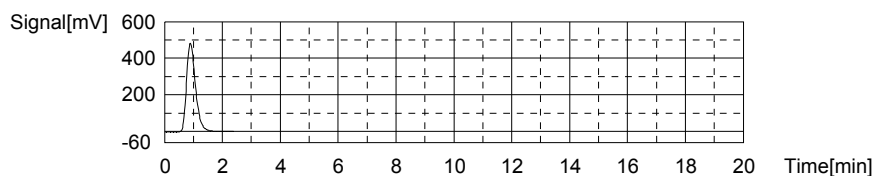
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.32mg/L TC:24.13mg/L IC:-0.1969mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1038	24.13mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 2:57:58 AM

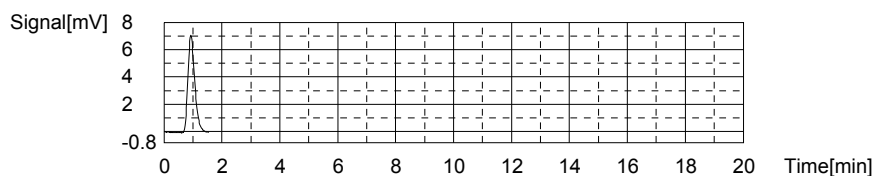
Mean Area 1038
Mean Conc. 24.13mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	11.82	-0.1969mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	14/22/2017 3:02:22 AM

Mean Area 11.82
Mean Conc. -0.1969mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1037mg/L TC:-0.1674mg/L IC:-0.2711mg/L

27/45

4/24/2017 8:19:32 AM

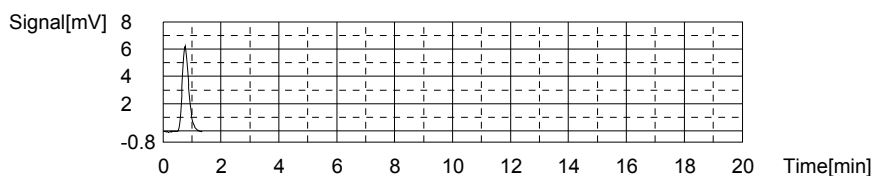
04-21-2017-EPT-TOC.t32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.781	-0.1674mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 3:07:22 AM

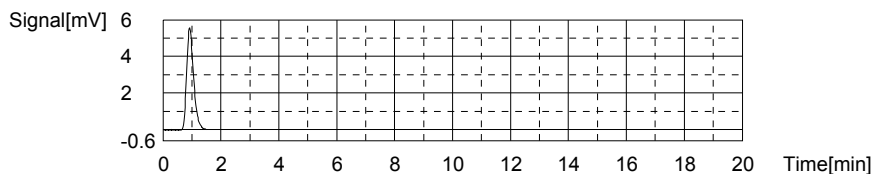
Mean Area 9.781
Mean Conc. -0.1674mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.337	-0.2711mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 3:11:16 AM

Mean Area 9.337
Mean Conc. -0.2711mg/L



Sample

Sample Name: L17040959-03
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

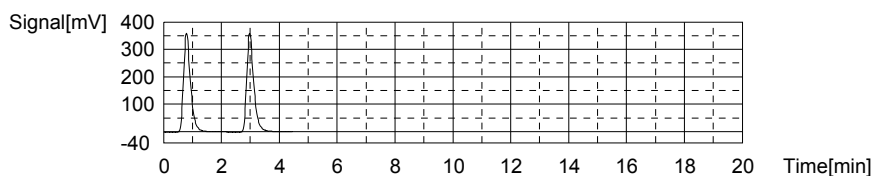
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:7.088mg/L TC:13.80mg/L IC:6.714mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	597.8	13.73mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 3:18:56 AM
2	604.3	13.88mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 3:23:29 AM

Mean Area 601.1
Mean Conc. 13.80mg/L



Anal.: IC

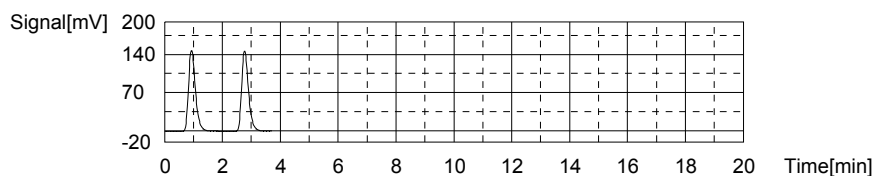
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	244.3	6.746mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 3:28:13 AM
2	242.2	6.683mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 3:32:43 AM

28/45

4/24/2017 8:19:32 AM

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Mean Area 243.3
Mean Conc. 6.714mg/L



Sample

Sample Name: L17040959-04
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

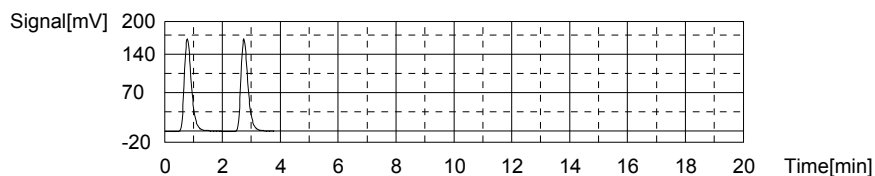
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.290mg/L TC:6.401mg/L IC:3.111mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	288.4	6.415mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 3:40:08 AM
2	287.2	6.387mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 3:44:15 AM

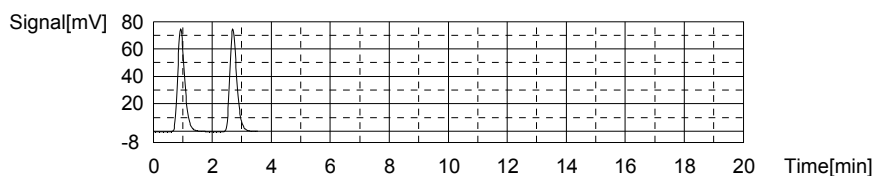
Mean Area 287.8
Mean Conc. 6.401mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	122.5	3.108mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 3:48:52 AM
2	122.7	3.114mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 3:53:15 AM

Mean Area 122.6
Mean Conc. 3.111mg/L



Sample

Sample Name: L17040993-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

29/45

4/24/2017 8:19:32 AM

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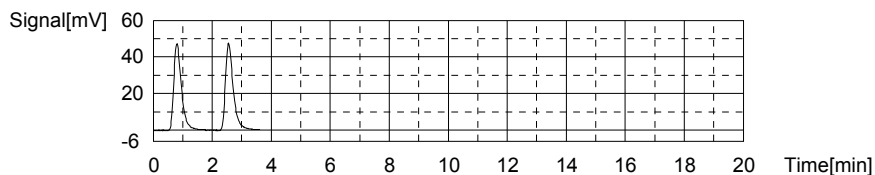
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.360mg/L TC:1.635mg/L IC:0.2746mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	84.80	1.605mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 4:00:28 AM
2	87.30	1.664mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 4:04:35 AM

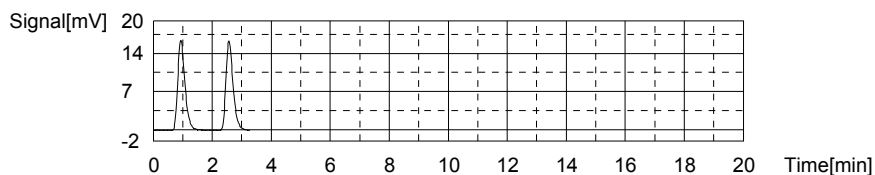
Mean Area 86.05
Mean Conc. 1.635mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	27.70	0.2773mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 4:09:02 AM
2	27.52	0.2719mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 4:13:19 AM

Mean Area 27.61
Mean Conc. 0.2746mg/L



Sample

Sample Name: L17040993-03
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result: Completed

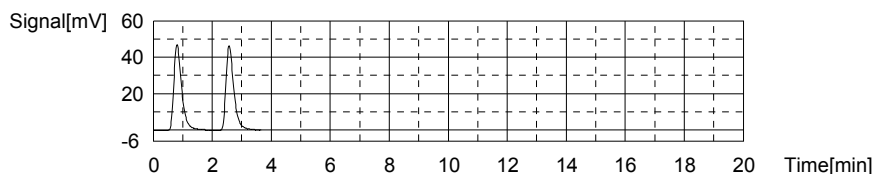
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.432mg/L TC:1.623mg/L IC:0.1910mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	85.29	1.617mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 4:20:33 AM
2	85.82	1.629mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 4:24:43 AM

Mean Area 85.56
Mean Conc. 1.623mg/L



Anal.: IC

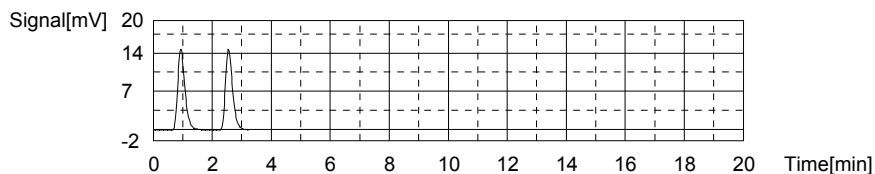
30/45

4/24/2017 8:19:32 AM

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No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	24.71	0.1880mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 4:29:08 AM
2	24.91	0.1940mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 4:33:23 AM

Mean Area 24.81
Mean Conc. 0.1910mg/L



Sample

Sample Name: L17040993-05
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

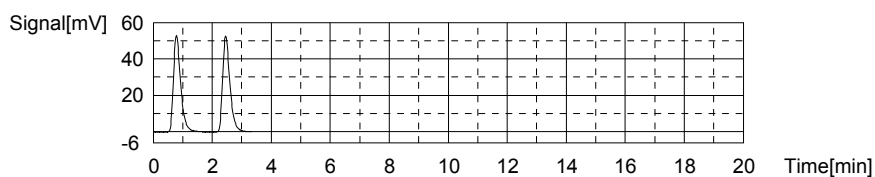
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.021mg/L TC:1.729mg/L IC:0.7072mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	89.48	1.716mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 4:40:31 AM
2	90.58	1.742mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 4:44:32 AM

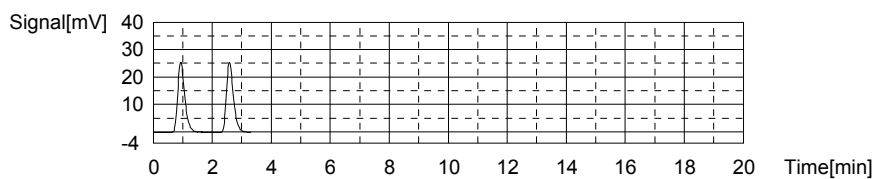
Mean Area 90.03
Mean Conc. 1.729mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	42.09	0.7070mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 4:49:00 AM
2	42.10	0.7073mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 4:53:14 AM

Mean Area 42.09
Mean Conc. 0.7072mg/L



Sample

31/45

4/24/2017 8:19:32 AM

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Sample Name: L17040993-07
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

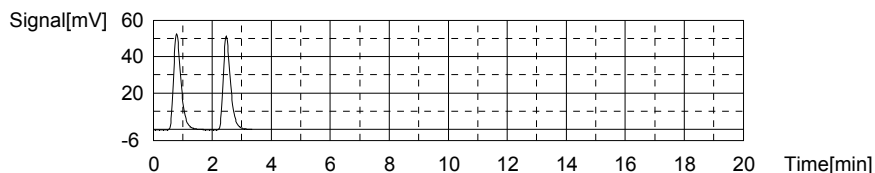
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.202mg/L TC:1.730mg/L IC:0.5273mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	91.83	1.771mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 5:00:23 AM
2	88.32	1.688mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 5:04:20 AM

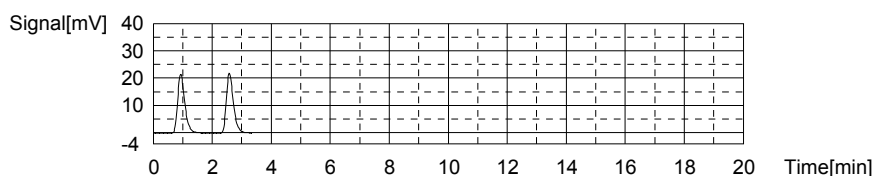
Mean Area 90.08
 Mean Conc. 1.730mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	35.84	0.5204mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 5:08:47 AM
2	36.30	0.5341mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 5:13:06 AM

Mean Area 36.07
 Mean Conc. 0.5273mg/L



Sample

Sample Name: L17040993-09
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:0.9935mg/L TC:2.580mg/L IC:1.586mg/L

1. Det

Anal.: TC

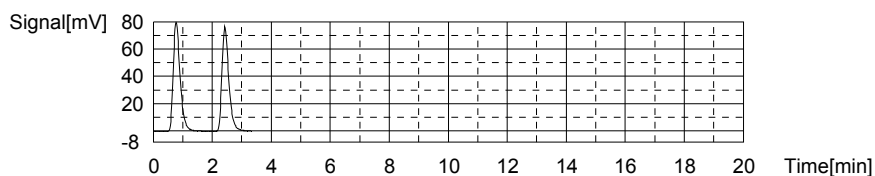
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	128.6	2.640mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 5:20:13 AM
2	123.5	2.519mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 5:24:10 AM

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4/24/2017 8:19:32 AM

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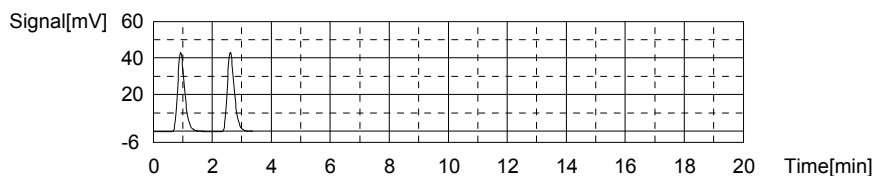
Mean Area 126.1
Mean Conc. 2.580mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	71.37	1.581mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 5:28:41 AM
2	71.69	1.591mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 5:32:57 AM

Mean Area 71.53
Mean Conc. 1.586mg/L



Sample

Sample Name: L17040993-11
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

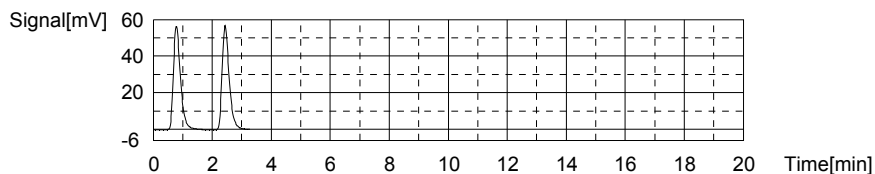
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:0.9794mg/L TC:1.816mg/L IC:0.8365mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	93.31	1.806mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 5:40:15 AM
2	94.14	1.826mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 5:44:09 AM

Mean Area 93.72
Mean Conc. 1.816mg/L



Anal.: IC

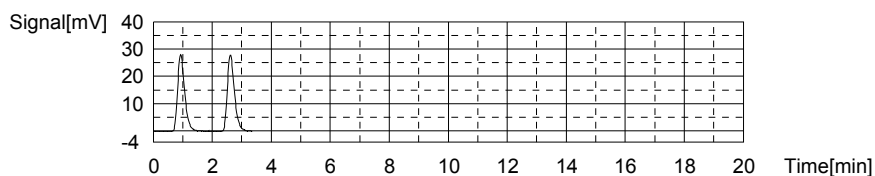
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	46.29	0.8325mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 5:48:37 AM
2	46.56	0.8405mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 5:52:53 AM

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4/24/2017 8:19:32 AM

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Mean Area 46.42
Mean Conc. 0.8365mg/L



Sample

Sample Name: L17040995-17
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

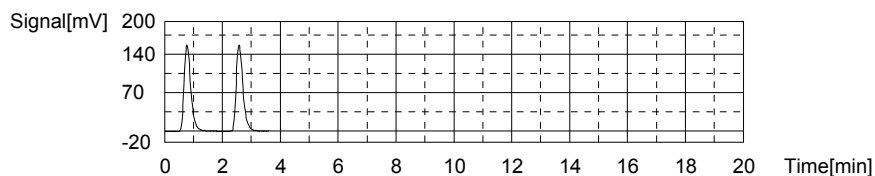
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.868mg/L TC:5.581mg/L IC:3.713mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	251.7	5.548mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 6:00:11 AM
2	254.5	5.614mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 6:04:18 AM

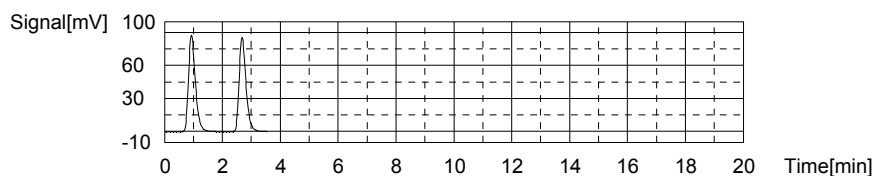
Mean Area 253.1
Mean Conc. 5.581mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	144.0	3.750mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 6:08:51 AM
2	141.5	3.676mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 6:13:18 AM

Mean Area 142.8
Mean Conc. 3.713mg/L



Sample

Sample Name: L17040995-19
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

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4/24/2017 8:19:32 AM

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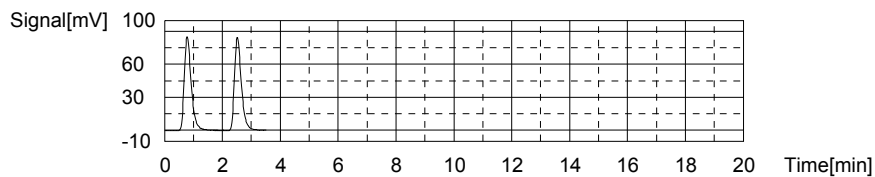
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.382mg/L TC:2.934mg/L IC:1.552mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	141.3	2.940mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 6:20:31 AM
2	140.8	2.928mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 6:24:34 AM

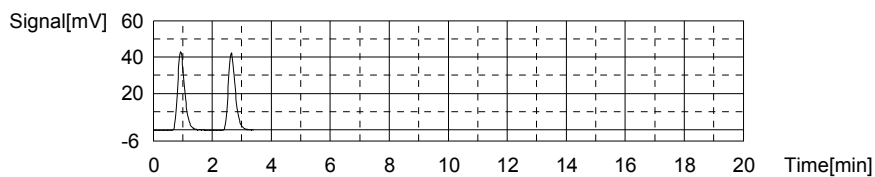
Mean Area 141.1
Mean Conc. 2.934mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	71.00	1.570mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 6:29:06 AM
2	69.80	1.535mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 6:33:23 AM

Mean Area 70.40
Mean Conc. 1.552mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

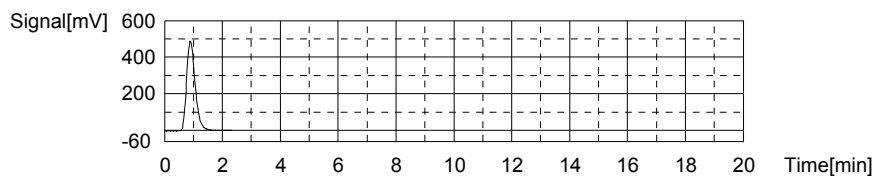
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:23.70mg/L TC:23.39mg/L IC:-0.3109mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1007	23.39mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 6:41:11 AM

Mean Area 1007
Mean Conc. 23.39mg/L



Anal.: IC

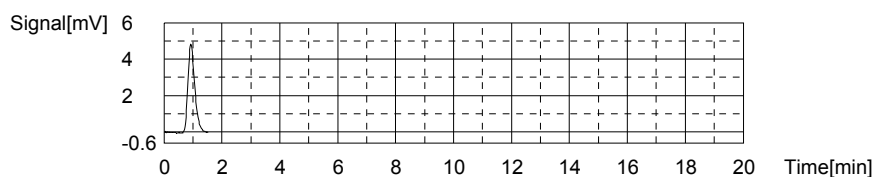
35/45

4/24/2017 8:19:32 AM

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No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.005	-0.3109mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 6:45:30 AM

Mean Area 8.005
Mean Conc. -0.3109mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

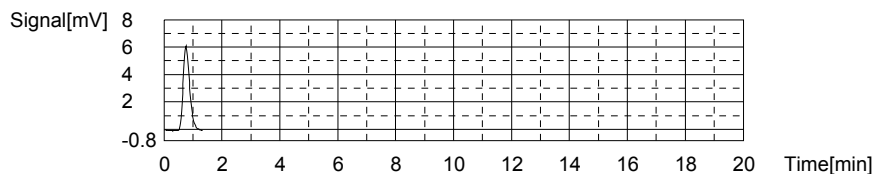
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1188mg/L TC:-0.1703mg/L IC:-0.2891mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.657	-0.1703mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 6:50:28 AM

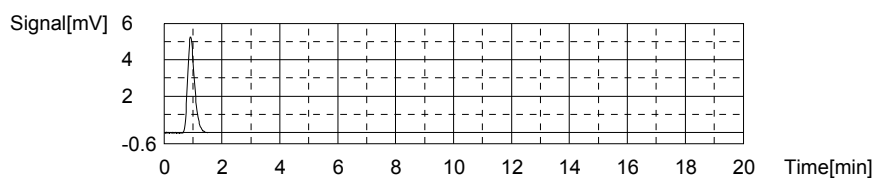
Mean Area 9.657
Mean Conc. -0.1703mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.733	-0.2891mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 6:54:21 AM

Mean Area 8.733
Mean Conc. -0.2891mg/L



Sample

Sample Name: L17040995-21
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

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4/24/2017 8:19:32 AM

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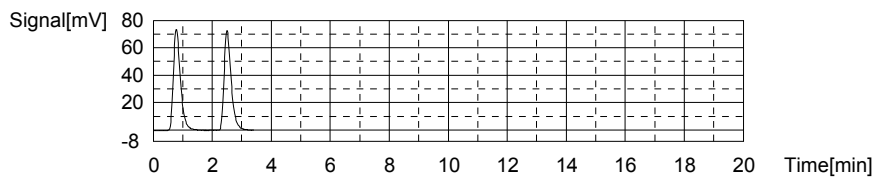
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.215mg/L TC:2.479mg/L IC:1.264mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	122.3	2.491mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 7:01:34 AM
2	121.3	2.467mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 7:05:32 AM

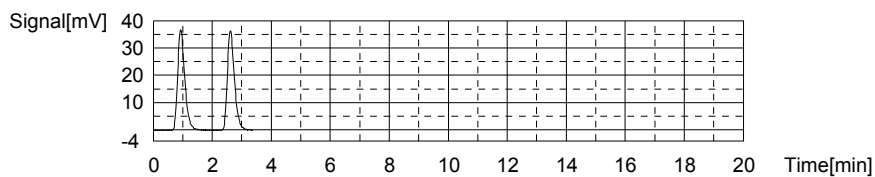
Mean Area 121.8
Mean Conc. 2.479mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	61.17	1.277mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 7:10:03 AM
2	60.33	1.252mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 7:14:21 AM

Mean Area 60.75
Mean Conc. 1.264mg/L



Sample

Sample Name: L17040995-24
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status Completed
Chk. Result

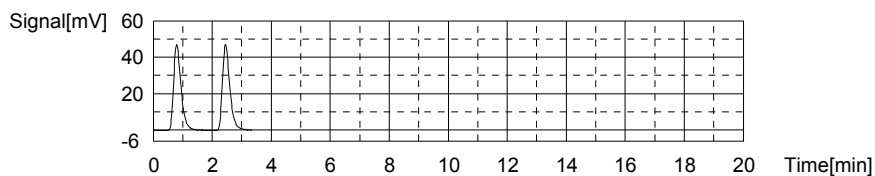
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.247mg/L TC:1.538mg/L IC:0.2910mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	81.69	1.532mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 7:21:29 AM
2	82.22	1.544mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 7:25:26 AM

Mean Area 81.95
Mean Conc. 1.538mg/L



Anal.: IC

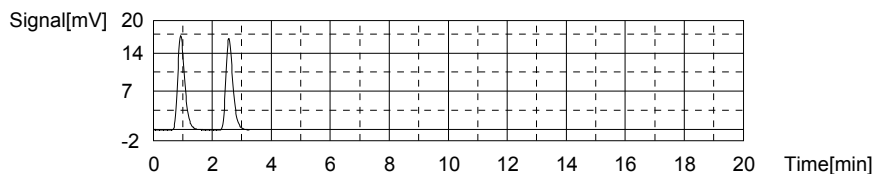
37/45

4/24/2017 8:19:32 AM

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No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	28.55	0.3027mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 7:29:53 AM
2	27.77	0.2794mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 7:34:05 AM

Mean Area 28.16
Mean Conc. 0.2910mg/L



Sample

Sample Name: L17040995-26
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

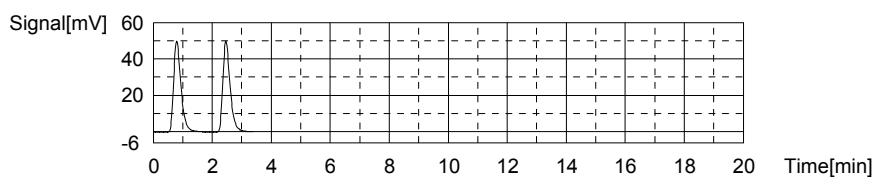
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.217mg/L TC:1.626mg/L IC:0.4085mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	85.62	1.624mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 7:41:14 AM
2	85.71	1.627mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 7:45:14 AM

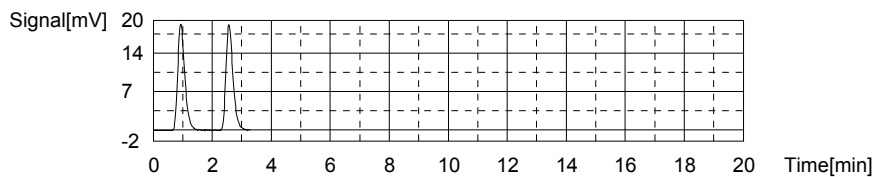
Mean Area 85.67
Mean Conc. 1.626mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	32.23	0.4126mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 7:49:42 AM
2	31.96	0.4045mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 7:53:57 AM

Mean Area 32.09
Mean Conc. 0.4085mg/L



Sample

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4/24/2017 8:19:32 AM

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Sample Name:
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

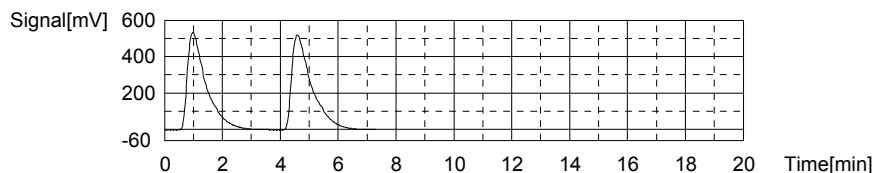
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:56.28mg/L TC:56.79mg/L IC:0.5116mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	2382	55.88mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 8:03:02 AM
2	2459	57.70mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 8:09:00 AM

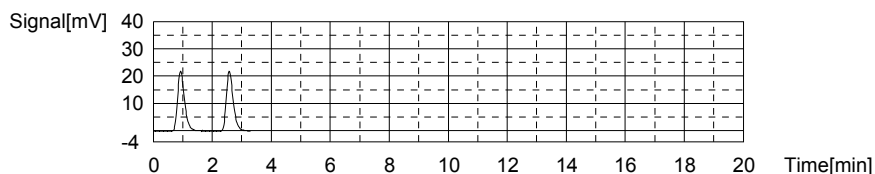
Mean Area 2421
 Mean Conc. 56.79mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	35.63	0.5141mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 8:13:29 AM
2	35.46	0.5090mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 8:17:42 AM

Mean Area 35.55
 Mean Conc. 0.5116mg/L



Sample

Sample Name: WG61142-05 DUP
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017A.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.286mg/L TC:1.977mg/L IC:0.6917mg/L

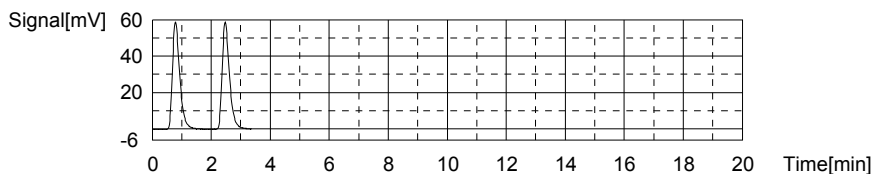
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	100.6	1.978mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 8:24:52 AM
2	100.5	1.976mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 8:28:50 AM

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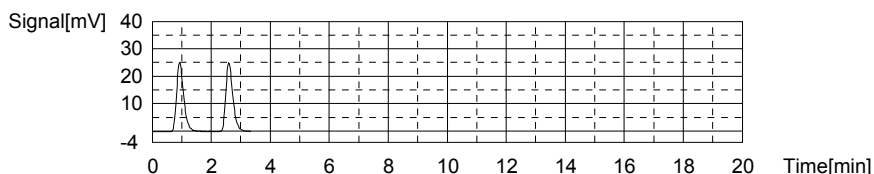
Mean Area 100.6
Mean Conc. 1.977mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	41.67	0.6945mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 8:33:17 AM
2	41.48	0.6888mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 8:37:35 AM

Mean Area 41.58
Mean Conc. 0.6917mg/L



Sample

Sample Name: WG611142-06 MS
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

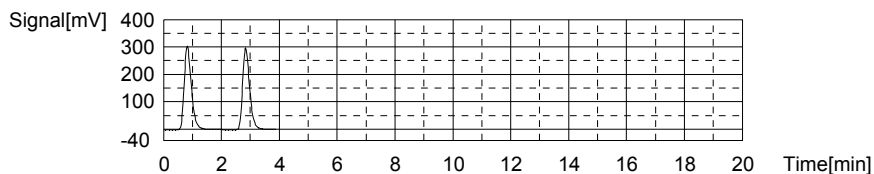
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:11.20mg/L TC:11.67mg/L IC:0.4654mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	518.9	11.86mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 8:45:06 AM
2	502.5	11.47mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 8:49:15 AM

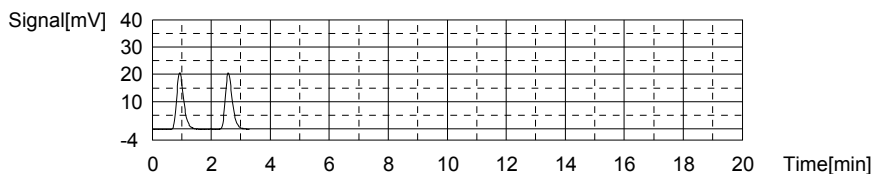
Mean Area 510.7
Mean Conc. 11.67mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	34.16	0.4702mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 8:53:44 AM
2	33.84	0.4607mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 8:57:58 AM

Mean Area 34.00
 Mean Conc. 0.4654mg/L



Sample

Sample Name: CCV
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

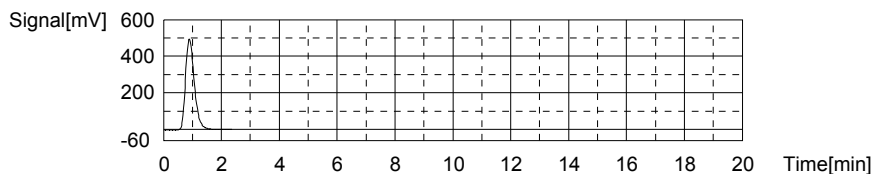
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.58mg/L TC:24.27mg/L IC:-0.3128mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1044	24.27mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 9:05:48 AM

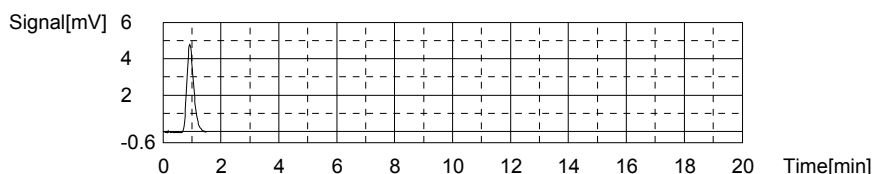
Mean Area 1044
 Mean Conc. 24.27mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	7.941	-0.3128mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	14/22/2017 9:10:04 AM

Mean Area 7.941
 Mean Conc. -0.3128mg/L



Sample

Sample Name: CCB
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1141mg/L TC:-0.1738mg/L IC:-0.2878mg/L

4/24/2017 8:19:32 AM

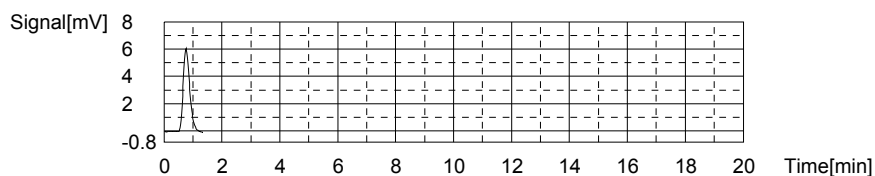
04-21-2017-EPT-TOC.t32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.511	-0.1738mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 9:15:03 AM

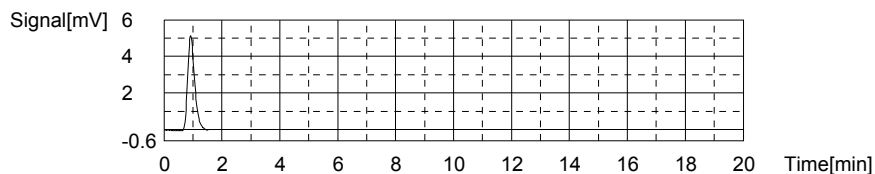
Mean Area 9.511
Mean Conc. -0.1738mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.776	-0.2878mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 9:18:59 AM

Mean Area 8.776
Mean Conc. -0.2878mg/L



Sample

Sample Name: L17040925-03 (2)
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

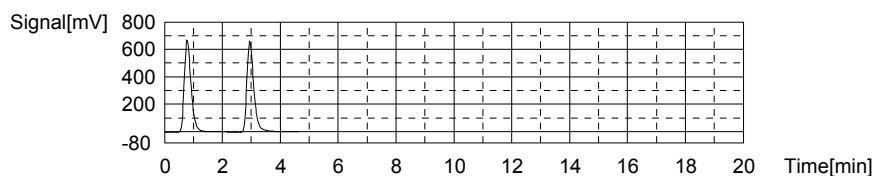
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:8.274mg/L TC:25.39mg/L IC:17.12mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1082	25.17mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 9:46:33 AM
2	1101	25.61mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 9:51:18 AM

Mean Area 1092
Mean Conc. 25.39mg/L

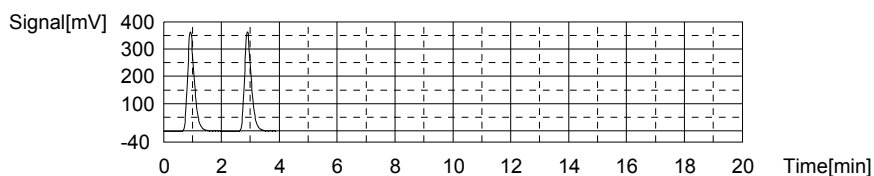


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	589.5	17.05mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 9:56:09 AM
2	593.6	17.18mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 10:00:44 AM

42/45

Mean Area 591.5
Mean Conc. 17.12mg/L



Sample

Sample Name: L17040956-01 (5000)
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

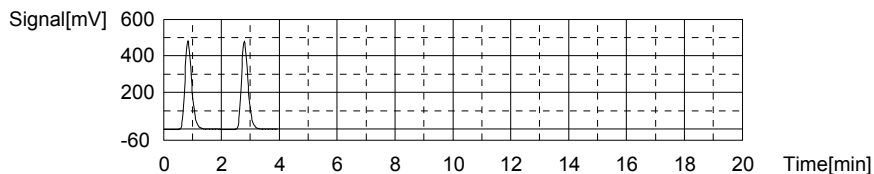
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:18.03mg/L TC:18.01mg/L IC:-0.02791mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	783.3	18.11mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 10:08:10 AM
2	774.7	17.91mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 10:12:26 AM

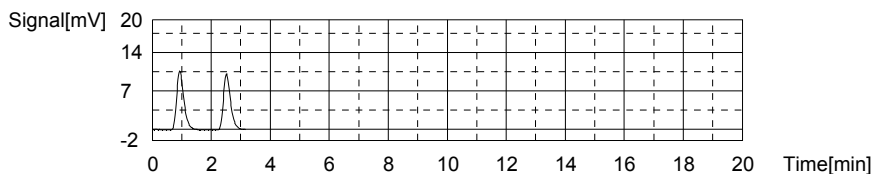
Mean Area 779.0
Mean Conc. 18.01mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	17.96	-0.01357mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 10:16:49 AM
2	17.00	-0.04224mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 10:20:56 AM

Mean Area 17.48
Mean Conc. -0.02791mg/L



Sample

Sample Name: L17041032-01 (10)
Sample ID: <Untitled>
Origin: TOC-02-10-2017A.met
Status: Completed
Chk. Result

4/24/2017 8:19:32 AM

04-21-2017-EPT-TOC.t32

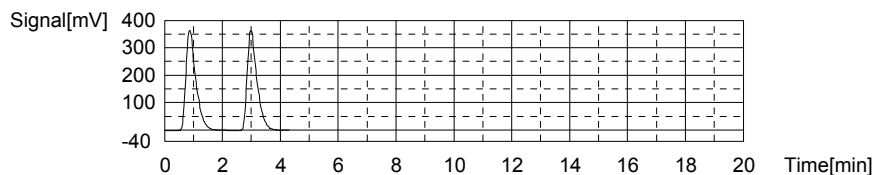
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:17.76mg/L TC:19.93mg/L IC:2.176mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	864.5	20.03mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 10:28:34 AM
2	856.5	19.84mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 10:33:08 AM

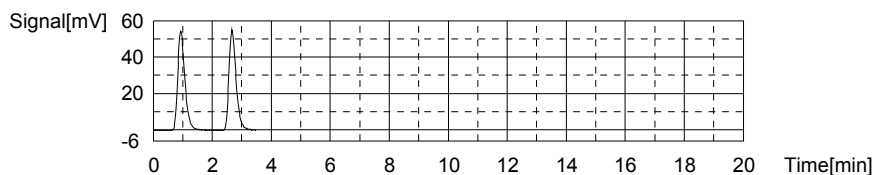
Mean Area 860.5
Mean Conc. 19.93mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	90.93	2.166mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 10:37:41 AM
2	91.65	2.187mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_14	4/22/2017 10:42:01 AM

Mean Area 91.29
Mean Conc. 2.176mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

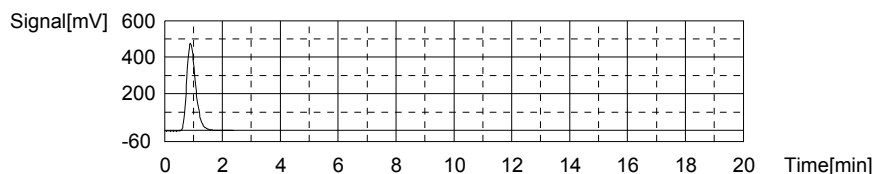
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.12mg/L TC:23.77mg/L IC:-0.3446mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1023	23.77mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	4/22/2017 10:49:53 AM

Mean Area 1023
Mean Conc. 23.77mg/L



Anal.: IC

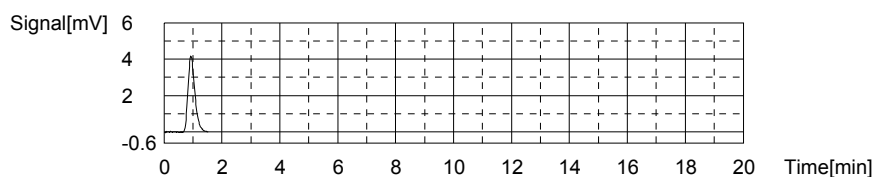
44/45

4/24/2017 8:19:32 AM

04-21-2017-EPT-TOC.t32

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	6.876	-0.3446mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 10:54:10 AM

Mean Area 6.876
Mean Conc. -0.3446mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result:

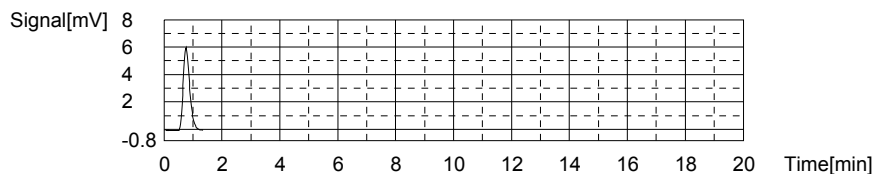
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1186mg/L TC:-0.1742mg/L IC:-0.2927mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.494	-0.1742mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_54	14/22/2017 10:59:09 AM

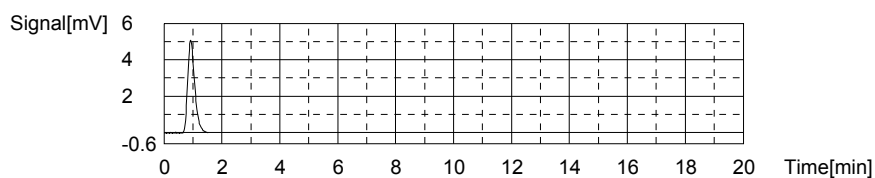
Mean Area 9.494
Mean Conc. -0.1742mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.613	-0.2927mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	14/22/2017 11:03:06 AM

Mean Area 8.613
Mean Conc. -0.2927mg/L



45/45

3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
April 27, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
OJE - OMOYEMWEN J. ENGLISH	PDM - PIERCE D. MORRIS
PIT - MICROBAC WARRENDALE	REK - BOB E. KYER
RLB - BOB BUCHANAN	RNP - RICK N. PETTY
SAV - SARAH A. VANDENBERG	SCA - SUEELLEN C. ADAMS
SCB - SARAH C. BOGOLIN	SCJ - SUE ELLEN C. JOHNSON
SDC - SHALYN D. CONLEY	TB - TODD BOYLE
TMB - TIFFANY M. BAILEY	TMM - TAMMY M. MORRIS
VC - VICKI COLLIER	WTD - WADE T. DELONG
XXX - UNAVAILABLE OR SUBCONTRACT	

List of Valid Qualifiers

April 27, 2017

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample receipt exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample receipt exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentatively identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound



List of Valid Qualifiers

April 27, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample receipt exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below



CHAIN OF CUSTODY

Name Of Lab Shipping To: **MICROBAC (740) 373-4071 ATTN: STEPHANIE MOSSBURG**

Project: AECOM LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS		Project No.: 60256135.GWTPT HRUMAR16	
Job: GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES			
Prepared By: Scott Beesinger		P.O. Number	
Field Sample I.D. LH18/24-SP650-6434-Grab LH18/24-SP650-6434-Grab	Sample Matrix Water Water	Date / Time 04/20/17 / 15:00 04/20/17 / 15:00	MS / MSD 2 1
Analyses AMMONIA-N ORTHO-PHOSPHATE TOTAL ORGANIC CARBON		X X X	Remarks (Preservatives, etc.) H2SO4 NONE
			Lab I.D.#

Additional Remarks: Standard TAT on all parameters Send results to Linda Raabe at linda.raabe@aecom.com or call at 210-253-7518

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
<i>Scott Beesinger</i>	04/20/17	15:30									

Received At Lab By:		Date		Time		Airbill No.		Temp of Container		Seal No.		Condition	
Remarks: Microbac OVD Received: 04/21/2017 09:43 BY: BRENDA GREGORY 221000099803												221000099803	

Brenda Gregory

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17041032

Account: 2551

Project: 2551.096

Samples: 1

Due Date: 02-MAY-2017

Samplenum **Container ID** **Products**
L17041032-01 897128 PO4

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	21-APR-2017 09:59	BRG		
2	ANALYZ	W1	WET	21-APR-2017 10:04	EPT	BRG	
3	STORE	WET	A1	25-APR-2017 07:32	AZH	ADG	

Samplenum **Container ID** **Products**
L17041032-01 897129 TOC

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	21-APR-2017 09:59	BRG		<2
2	ANALYZ	W1	WET	21-APR-2017 14:01	EPT	BRG	
3	STORE	WET	A1	25-APR-2017 15:49	BRG	EPT	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	21-APR-2017 09:59	BRG		<2

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login



NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
 Total Halide by Bomb Combustion (TX)
 Particle Sizing - 200 Mesh (PS200)
 Specific Gravity/Density (SPGRAV)
 Total Residual Chlorine (CL-TRL)
 Total Volatile Solids (all forms) (TVS)
 Total Coliform Bacteria (all methods)
 Fecal Coliform Bacteria (all methods)
 Sulfite (SO₃)
 Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS

Nitrogen, Ammonia by Method 350.1
 Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
 Phenolics, Total by Method 420.1
 ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
 Acetic acid
 Butyric acid
 Lactic acid
 Propionic acid
 Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
 1-Methylnaphthalene
 1,4-Dioxane
 Atrazine
 Benzaldehyde
 Biphenyl
 Caprolactam
 Hexamethylphosphoramide (HMPA)
 Pentachlorobenzene
 Pentachloroethane

NELAP Accreditation by Laboratory SOP**NONPOTABLE WATER**OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALSOVD MSS01/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP**SOLID AND HAZARDOUS CHEMICALS**OVD MSV01/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)



May 04, 2017

Mr. Adriane Steed
Microbac Laboratories, Inc.
158 Starlite Drive
Marietta, Ohio 45750

Re: Perchlorate-Steed
Work Order: 421250

Dear Mr. Steed:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 21, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4778.

Sincerely,

Hope Taylor
Project Manager

Purchase Order: SIGNED QUOTE
Enclosures

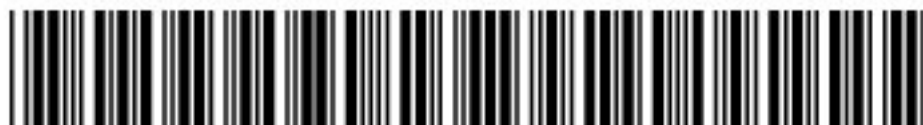


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Case Narrative

**Receipt Narrative
for
Microbac Laboratories
SDG: 421250**

May 04, 2017

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The sample arrived at GEL Laboratories LLC, Charleston, South Carolina on April 21, 2017 for analysis. The sample was delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

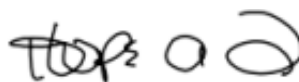
Sample Identification: The laboratory received the following sample:

<u>Laboratory ID</u>	<u>Client ID</u>
421250001	LH18/24-SP650-6434-Grab

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Perchlorates by LCMSMS.



Hope Taylor
Project Manager

Chain of Custody and Supporting Documentation

Laboratory Certifications

List of current GEL Certifications as of 04 May 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-22
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Perchlorates by LCMSMS Analysis

Case Narrative

**Perchlorates by LCMSMS
Technical Case Narrative
Microbac Laboratories (MBAC)
SDG #: 421250**

Method/Analysis Information

Procedure: **Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)**

Analytical Method: SW846 6850 Modified

Prep Method: SW846 6850 Modified

Analytical Batch Number: 1659584

Prep Batch Number: 1659583

Sample Analysis

Sample ID	Client ID
421250001	421250001 (LH18/24-SP650-6434-Grab)
1203776252	Interference Check Sample (ICS)
1203776248	Method Blank (MB)
1203776249	Laboratory Control Sample (LCS)
1203776250	421250001(LH18/24-SP650-6434-Grab) Matrix Spike (MS)
1203776251	421250001(LH18/24-SP650-6434-Grab) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-067 REV# 14.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG. Due to software constraints, all Initial Calibration Blanks must be designated as IPB001.

ICV Requirements

All associated initial calibration verification standard(s) (ICV) met the acceptance criteria.

CCB Requirements

All continuing calibration blanks (CCB) bracketing the analyses associated with this batch were within acceptance criteria.

CCV Requirements

All continuing calibration checks (CCV) requirements were met by all bracketing CCV standards.

Low Level Standard (CRI) Requirements

All low level calibration verification (CRI) requirements were met by all bracketing CRI standards.

Quality Control (QC) Information**Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

Interference Check Sample (ICS)

The ICS spike recoveries met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 421250001 (LH18/24-SP650-6434-Grab) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPDs between the MS and MSD met the acceptance limits.

Internal Standard Area Acceptance

The internal standard areas were within the required acceptance criteria for all samples and QC.

Retention Time

During the analysis of Perchlorate by LC/MS/MS, retention time shifts are commonly observed. These retention time shifts, which are caused by fouling of the column by the sample matrices, are problematic when the retention time is used as one of the criterion for confirmation. To overcome this problem, a known amount of O(18) labeled Perchlorate was added to each sample as a retention time standard. The presence of Perchlorate was confirmed by the relative retention time (RRT) of the Perchlorate peak and the O(18) standard. A RRT window of 0.98 to 1.02, as required by DOD QSM 5.0, has been used. In addition to the isotopic ratio, the presence of Perchlorate in the samples associated with this data package have been confirmed using the relative retention criteria stated above, not the absolute retention time.

Technical Information**Holding Time Specifications**

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A data exception report (DER) was not generated for this SDG.

Manual Integrations

Manual integrations were not required for any data file associated with this SDG.

Method Comments

The samples in this SDG were not originally analyzed using EPA Method 314.0.

Additional Comments

Comments pertaining to Perchlorate-101 and/or the Perchlorate Isotope Ratio are applicable only when the client requests Perchlorate-101 and/or the Perchlorate Isotope Ratio be reported. Due to software constraints, Perchlorate, Perchlorate-101 and/or the Perchlorate Isotope Ratio may appear on raw data and comments referring to them may appear on certain Forms whether or not the client has requested one or all of them be reported. Due to software limitations, all initial calibration blanks must be designated as IPB001 in order for the forms to be correct. The retention time marker, Perchlorate-O (18), is added to all samples, instrument blanks, and standards Prior to injection. It is used to verify the retention time of Perchlorate and Perchlorate-101 and to insure an accurate injection occurred. Due to various anions affecting the recovery of Perchlorate-O (18) and not Perchlorate and Perchlorate-101, the calibration curves of Perchlorate and Perchlorate-101 are internally corrected using Perchlorate-O (18).

Perchlorate Isotope Ratio

The Perchlorate isotope ratio met acceptance criteria for all samples and QC samples. Please see the isotope ratio criteria in the Miscellaneous Section.

System Configuration

The laboratory utilizes a Waters LC 2795 liquid chromatography instrument for Perchlorate analysis. It is coupled with a Micromass Quattro Ultima Mass Spectrometer/Mass Spectrometer. It is designated as LCMSMS #2. It is fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis. The laboratory may also utilize an Agilent 1100 liquid chromatography instrument for Perchlorate analysis. It is coupled with an Applied Biosystems 4000 Mass Spectrometer/Mass Spectrometer, designated as LCMSMS #3 or LCMSMS #4. It is also fitted with an electrospray probe that is operated in the negative electrospray ionization mode for Perchlorate analysis.

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An

electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Chromatographic Columns

The LC-MS/MS Perchlorate analysis was performed on a Quatro Ultima LC/MS/MS.

Chromatographic separation of Perchlorate is accomplished through analysis on the following anion column:

Dionex: IonPac AG-16 2 x 50 mm.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Qualifier Definition Report
for**

MBAC001 Microbac Laboratories

Client SDG: 421250 GEL Work Order: 421250

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: **Name:** Michael Penny**Date:** 01 MAY 2017**Title:** Group Leader

Sample Data Summary

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLCLab Code: GELInstrument: LCMSMSMethod: SW846 6850 ModifiedMatrix: WATERExtraction Batch ID: 1659583Extraction Type: Filter/DAISample Volume/Weight: 10.0 mLConcentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6434-GrabDate Received: 21-APR-17GEL Job No (SDG): 421250GEL Sample ID: 421250001Date Filtered: 27-APR-17Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	27-APR-17 17:18	per0427016a
	Perchlorate-O(18)			0.447	ug/L		1	27-APR-17 17:18	per0427016a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quality Control Summary

Perchlorate Laboratory Control Sample

Lab Name: General Engineering Laboratories

Lab Code: GEL

GEL Job No. (SDG): 421250

Extract Batch Code: 1659583

Date Filtered: 27-APR-17

Matrix: WATER

Sample ID: 1203776249

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.204	ug/L	102		85 - 115
Perchlorate-O(18)		.452	ug/L			-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Interference Check Sample

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No. (SDG): 421250Extract Batch Code: 1659583Date Filtered: 27-APR-17Matrix: WATERSample ID: 1203776252

Analyte^	True	Found	Units	%Rec	Q	Control Limits
Perchlorate	0.200	.203	ug/L	101		70 - 130
Perchlorate-O(18)		.486	ug/L			

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate Spike/Spike Duplicate Summary

Lab Name: General Engineering LaboratoriesLab Code: GELGEL Job No (SDG): 421250Extract Batch Code: 1659583Date Extracted: 27-APR-17GEL MS/PS ID: 1203776250Client ID: LH18/24-SP650-6434-GrabGEL MSD/PSD ID: 1203776251QC Type: MS

Compound^	Spike Added	Sample Conc	Units	MS Conc	MS Rec #	MSD Conc	MSD Rec #	RPD #	RPD Limit	Recovery Limit
Perchlorate	0.200	0.00442	ug/L	0.206	101	.207	102	1	30	75 - 125
Perchlorate-O(18)	0	0.447	ug/L	0.467		.484		4		-

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

Perchlorate RT And Area Summary

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421250Lab Code: GELHPLC Column: Dionex IonPac AG16Instrument ID: LCMSMS2

Sample ID	Datafile	Run Date	Area	RT	RT CLO4	RRT	Q 0.98-1.02
MidLevel Standard Area	per0427006a	27-APR-17	17242.3				
Lower Area Limit			8621.15				
Upper Area Limit			25863.45				
1203776248	per0427013a	27-APR-17 16:45	16313.8	4.72	4.72302	1.001	
1203776249	per0427014a	27-APR-17 16:56	15891	4.72	4.75067	1.006	
1203776252	per0427015a	27-APR-17 17:07	17085	4.59	4.61268	1.005	
421250001	per0427016a	27-APR-17 17:18	15716.5	4.61	4.6955	1.019	
1203776250	per0427017a	27-APR-17 17:29	16416.8	4.7	4.72302	1.005	
1203776251	per0427018a	27-APR-17 17:40	17009.3	4.64	4.6955	1.012	

Sample Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1659583

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6434-Grab

Date Received: 21-APR-17

GEL Job No (SDG): 421250

GEL Sample ID: 421250001

Date Filtered: 27-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	27-APR-17 17:18	per0427016a
	Perchlorate-O(18)			0.447	ug/L		1	27-APR-17 17:18	per0427016a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

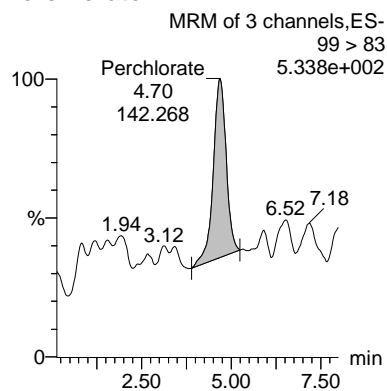
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GL
 04/28/2017

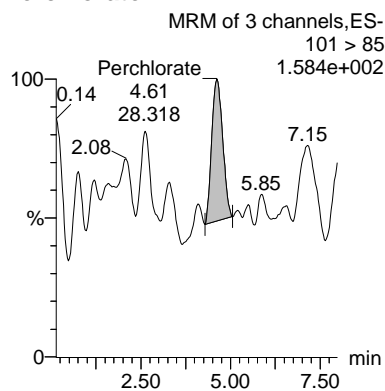
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 05/01/2017

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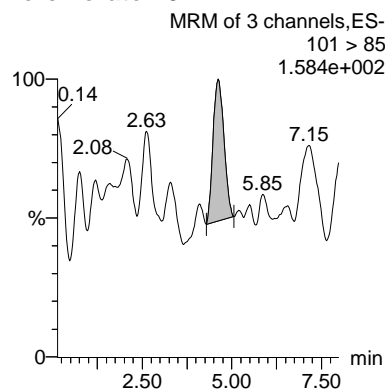
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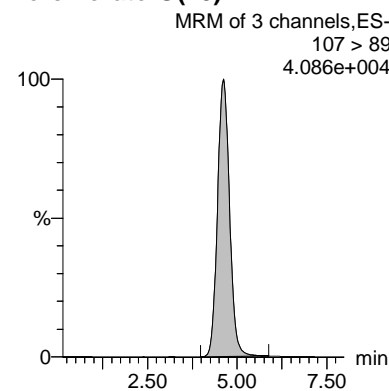
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
421250001	Perchlorate	99 > 83	4.70	142.268	0.005	bb			0.0044			9.092 5.02
421250001	Perchlorate-101	101 > 85	4.61	28.318	0.001	bb			0.0026			4.337
421250001	Perchlorate-O(18)	107 > 89	4.61	15716.480	15716.480	bb			0.4470	89.41	-10.59	3995.3...

Standards

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 421250

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 27-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate

Coefficient of Determination: .

Calibration Curve: 1.025

Response Type: Internal Standard

Curve Type: RF

Perchlorate Initial Calibration

Lab Name: General Engineering Laboratories

GEL Job No.(SDG): 421250

Lab Code: GEL

Instrument ID: LCMSMS2

Date Analyzed: 27-APR-17

HPLC Column: Dionex IonPac AG16

Calibration Level	1	2	3	4	5	6
Cal Concentration (ug/L)	0.05	0.1	0.25	0.50	1.0	2.0

Parmname Perchlorate-101

Coefficient of Determination: .

Calibration Curve: .34667

Response Type: Internal Standard

Curve Type: RF

Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Page 1 of 2

Dataset: C:\MassLynx\Perchlorate.PRO\per042717a.qld

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05/01/2017MA
05/01/2017

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Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

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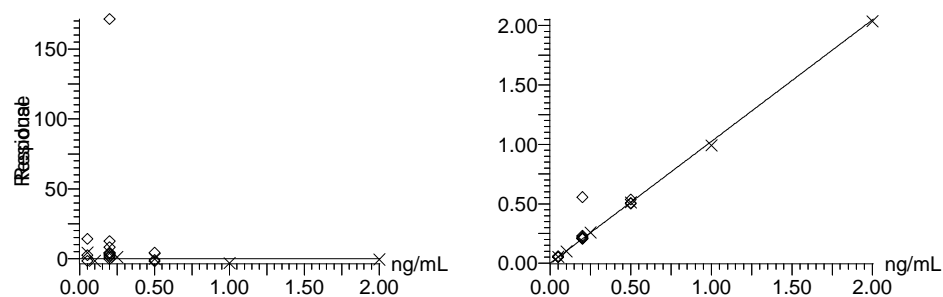
Compound name: Perchlorate

Response Factor: 1.02436

RRF SD: 0.0269122, % Relative SD: 2.62722

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



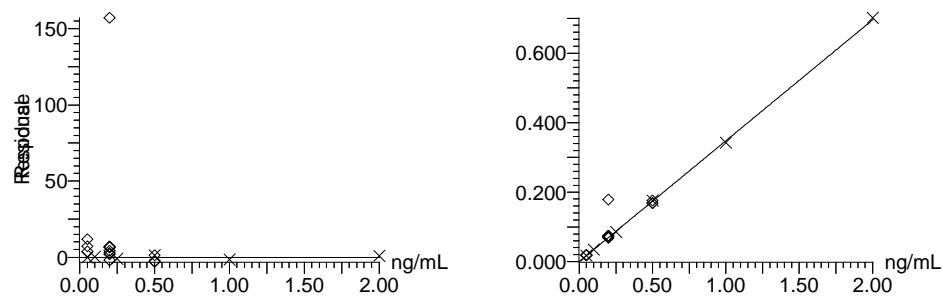
Compound name: Perchlorate-101

Response Factor: 0.347934

RRF SD: 0.00385818, % Relative SD: 1.10888

Response type: Internal Std (Ref 3), Area * (IS Conc. / IS Area)

Curve type: RF



Quantify Calibration Report MassLynx 4.0 SP4

The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per042717a.qld

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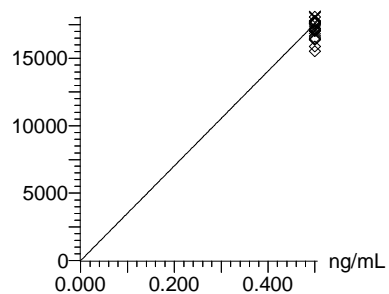
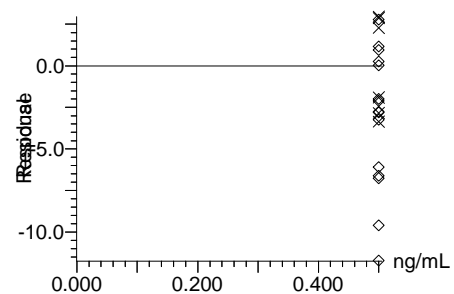
Compound name: Perchlorate-O(18)

Response Factor: 35157.1

RRF SD: 1056.96, % Relative SD: 3.0064

Response type: External Std, Area

Curve type: RF



Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

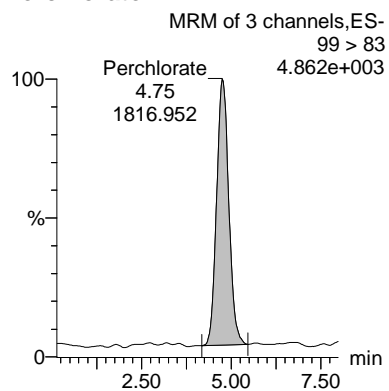
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GL
 04/28/2017

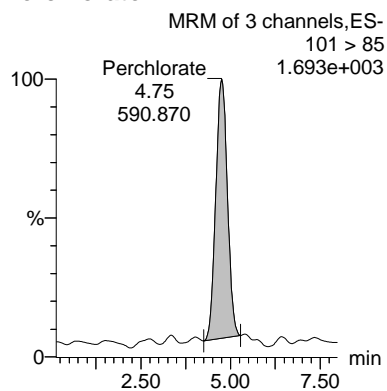
MA
 05/01/2017

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Date: 27-Apr-2017
Time: 14:56:21
ID: WCL170417-01
Vial: 1:1,B

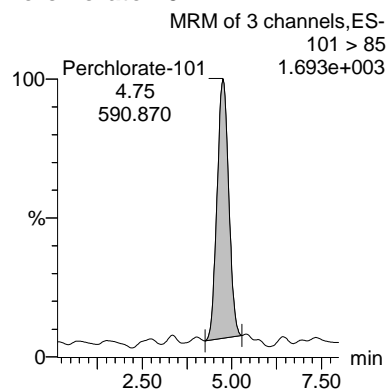
Perchlorate



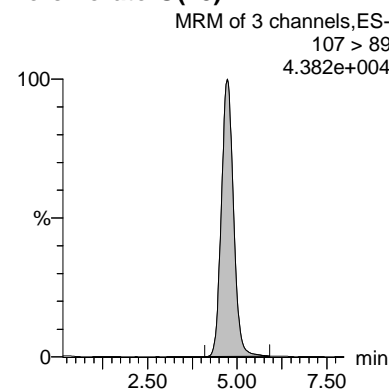
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-01	Perchlorate	99 > 83	4.75	1816.952	0.053	bb			0.0522	104.41	4.41	156.239	3.08
WCL170417-01	Perchlorate-101	101 > 85	4.75	590.870	0.017	bb			0.0500	99.97	-0.03	64.032	
WCL170417-01	Perchlorate-O(18)	107 > 89	4.72	16988.082	16988.082	bb			0.4832	96.64	-3.36	2477.8...	

Quantify Sample Report MassLynx 4.0 SP4
The GEL Group, LLC Analyst: Grace L. Cappelmann

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Dataset: C:\MassLynx\Perchlorate.PRO\per042717a.qld

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04/28/2017MA
05/01/2017

Last Altered: Friday, April 28, 2017 8:42:13 AM Eastern Daylight Time

Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

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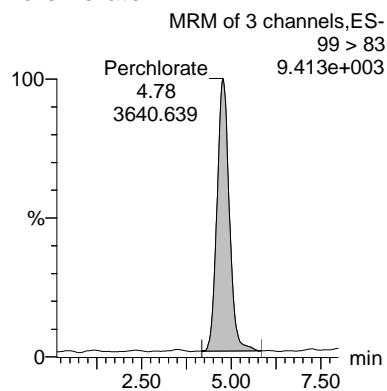
Date: 27-Apr-2017

Time: 15:07:18

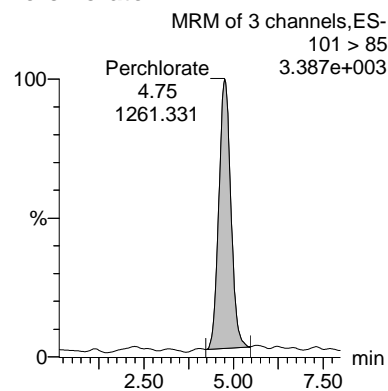
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Vial: 1:1,C

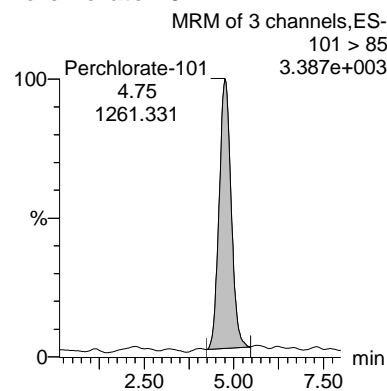
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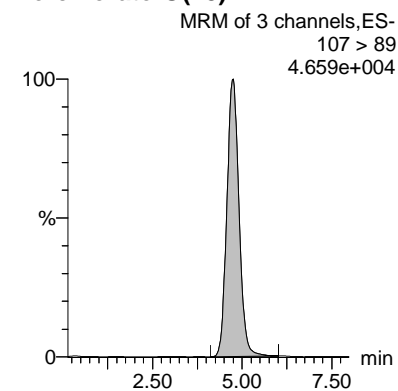
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-02	Perchlorate	99 > 83	4.78	3640.639	0.101	bb			0.0983	98.27	-1.73	231.251	2.89
WCL170417-02	Perchlorate-101	101 > 85	4.75	1261.331	0.035	bb			0.1002	100.24	0.24	243.244	
WCL170417-02	Perchlorate-O(18)	107 > 89	4.75	18082.920	18082.920	bb			0.5143	102.87	2.87	1629.1...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

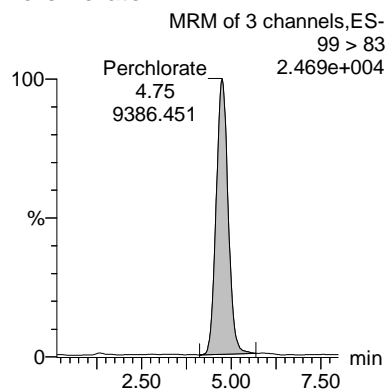
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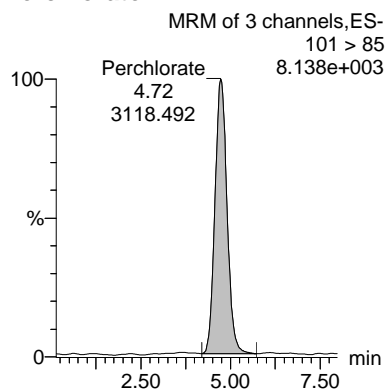
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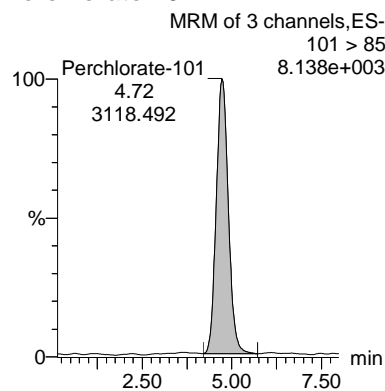
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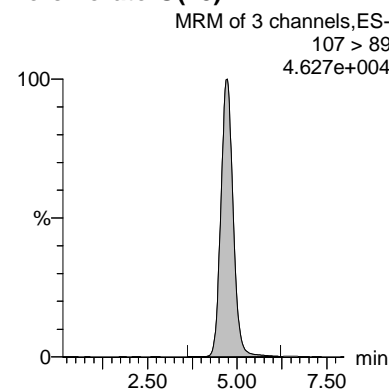
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-03	Perchlorate	99 > 83	4.75	9386.451	0.259	bb			0.2531	101.26	1.26	1363.3...	3.01
WCL170417-03	Perchlorate-101	101 > 85	4.72	3118.492	0.086	bb			0.2476	99.04	-0.96	414.145	
WCL170417-03	Perchlorate-O(18)	107 > 89	4.72	18099.107	18099.107	bb			0.5148	102.96	2.96	3240.4...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

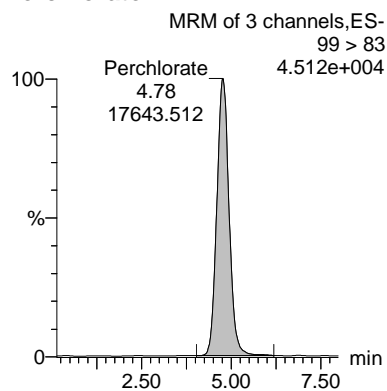
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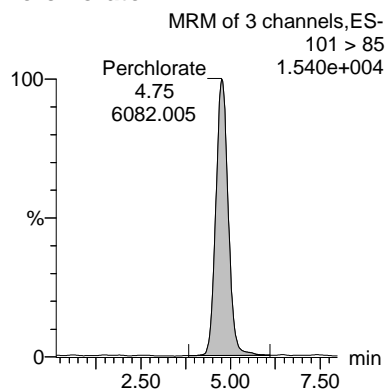
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Vial: 1:1,E

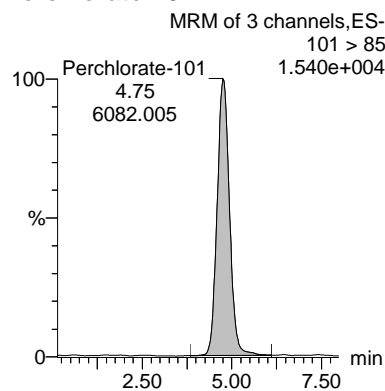
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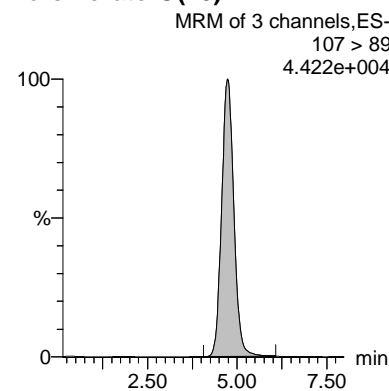
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-04	Perchlorate	99 > 83	4.78	17643.512	0.512	bb			0.4995	99.89	-0.11	1240.3...	2.90
WCL170417-04	Perchlorate-101	101 > 85	4.75	6082.005	0.176	bb			0.5069	101.38	1.38	543.620	
WCL170417-04	Perchlorate-O(18)	107 > 89	4.72	17242.307	17242.307	bb			0.4904	98.09	-1.91	5402.5...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

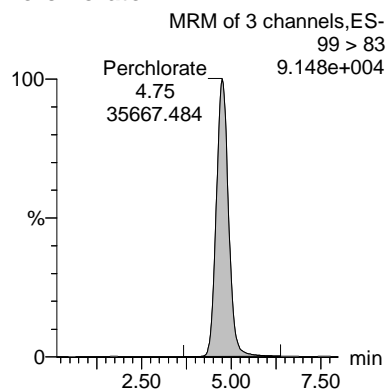
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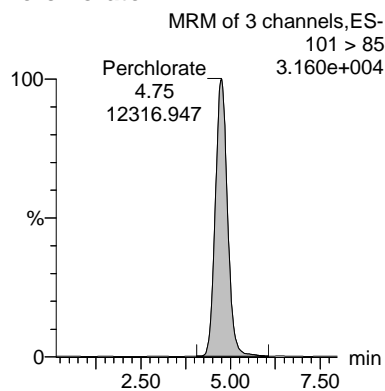
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Vial: 1:1,F

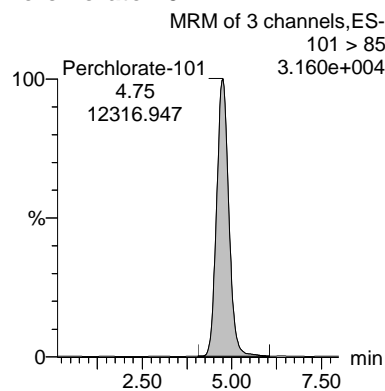
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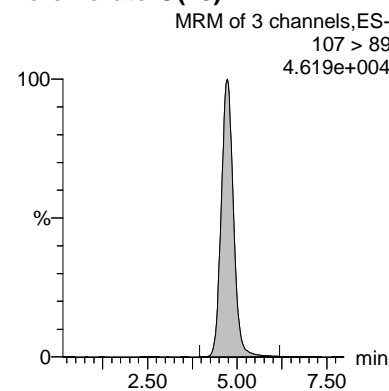
Perchlorate



Perchlorate-101



Perchlorate-O(18)



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WCL170417-05	Perchlorate	99 > 83	4.75	35667.484	0.992	bb			0.9683	96.83	-3.17	2023.5...	2.90
WCL170417-05	Perchlorate-101	101 > 85	4.75	12316.947	0.343	bb			0.9845	98.45	-1.55	925.144	
WCL170417-05	Perchlorate-O(18)	107 > 89	4.72	17979.217	17979.217	bb			0.5114	102.28	2.28	4374.7...	

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

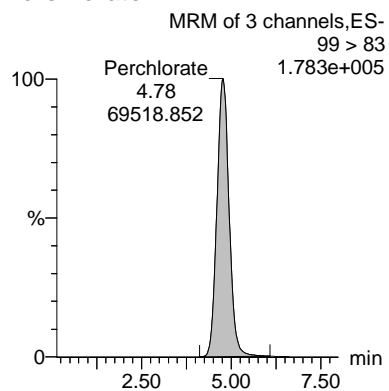
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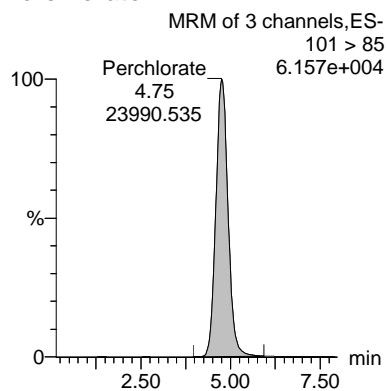
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 05/01/2017

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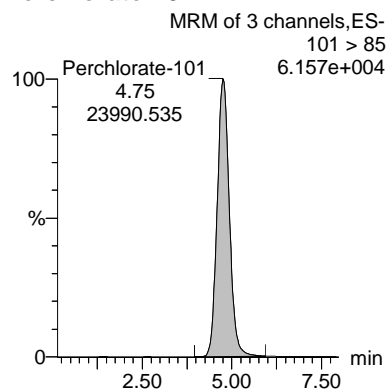
Perchlorate



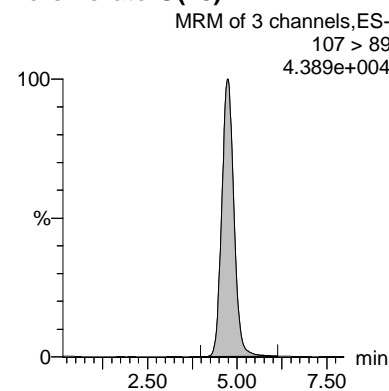
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-06	Perchlorate	99 > 83	4.78	69518.852	2.035	bb			1.9867	99.34	-0.66	5881.4...	2.90
WCL170417-06	Perchlorate-101	101 > 85	4.75	23990.535	0.702	bb			2.0185	100.93	0.93	3145.7...	
WCL170417-06	Perchlorate-O(18)	107 > 89	4.72	17079.705	17079.705	bb			0.4858	97.16	-2.84	2657.3...	

Perchlorate Initial Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421250Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.49	98.91	27-APR-17 16:13	per0427010a
Perchlorate Isotope Ratio		2.88		27-APR-17 16:13	per0427010a
Perchlorate-101	.5	.51	101.26	27-APR-17 16:13	per0427010a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

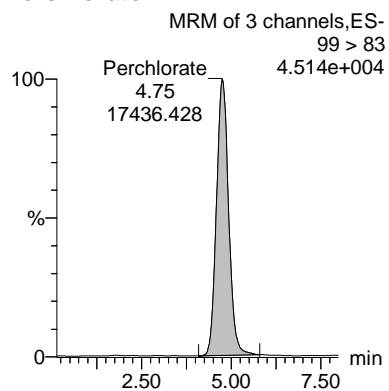
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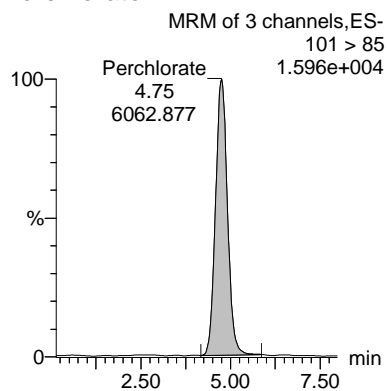
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 05/01/2017

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Date: 27-Apr-2017
Time: 16:13:02
ID: WCL170417-07ICV
Vial: 1:2,B

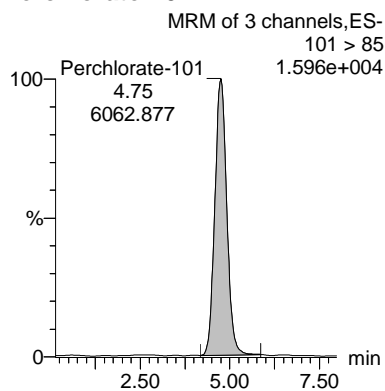
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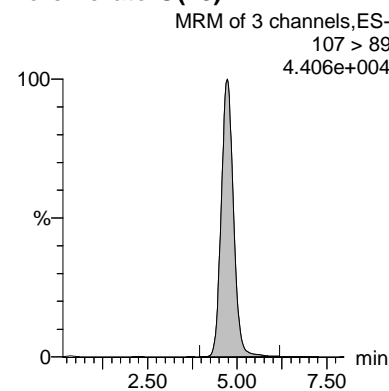
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-07ICV	Perchlorate	99 > 83	4.75	17436.428	0.507	bb			0.4946	98.91	-1.09	2339.7...	2.88
WCL170417-07ICV	Perchlorate-101	101 > 85	4.75	6062.877	0.176	bb			0.5063	101.26	1.26	1009.0...	
WCL170417-07ICV	Perchlorate-O(18)	107 > 89	4.72	17209.250	17209.250	bb			0.4895	97.90	-2.10	2319.6...	

Perchlorate Continuing Calibration Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421250Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.5	.49	98.17	27-APR-17 18:35	per0427023a
Perchlorate Isotope Ratio		2.98		27-APR-17 18:35	per0427023a
Perchlorate-101	.5	.49	97.12	27-APR-17 18:35	per0427023a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

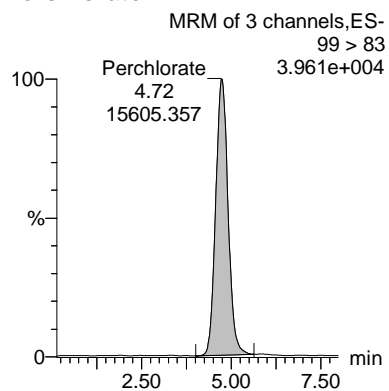
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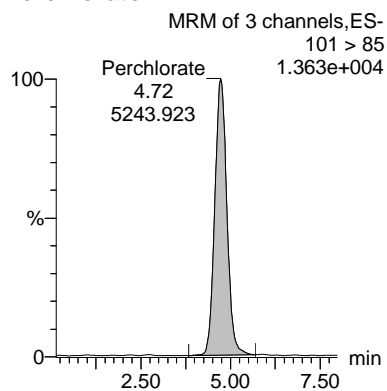
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 05/01/2017

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Vial: 1:2,B

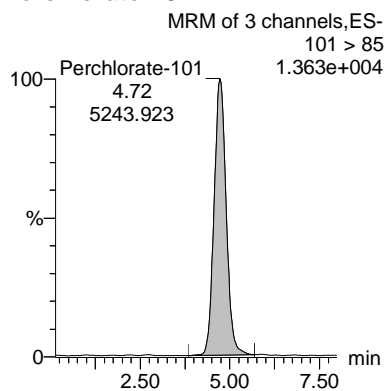
Perchlorate



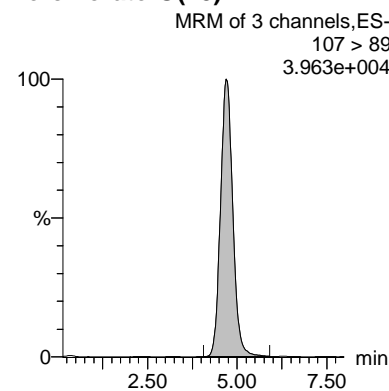
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-07CCV	Perchlorate	99 > 83	4.72	15605.357	0.503	bb			0.4909	98.17	-1.83	842.642	2.98
WCL170417-07CCV	Perchlorate-101	101 > 85	4.72	5243.923	0.169	bb			0.4856	97.12	-2.88	561.338	
WCL170417-07CCV	Perchlorate-O(18)	107 > 89	4.70	15518.127	15518.127	bb			0.4414	88.28	-11.72	3926.7...	

Perchlorate MDL Verification

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421250Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id
Perchlorate	.05	.05	102.39	27-APR-17 16:34	per0427012a
Perchlorate Isotope Ratio		2.69		27-APR-17 16:34	per0427012a
Perchlorate-101	.05	.06	111.93	27-APR-17 16:34	per0427012a
Perchlorate	.05	.05	98.34	27-APR-17 18:57	per0427025a
Perchlorate Isotope Ratio		2.79		27-APR-17 18:57	per0427025a
Perchlorate-101	.05	.05	103.88	27-APR-17 18:57	per0427025a

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

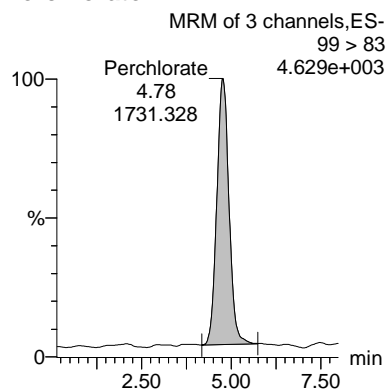
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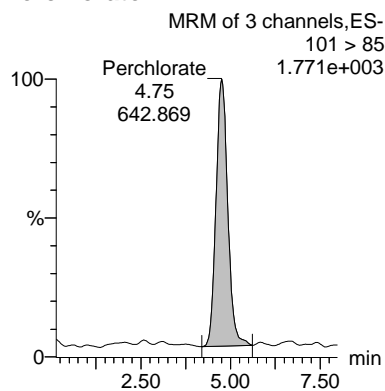
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Vial: 1:2,C

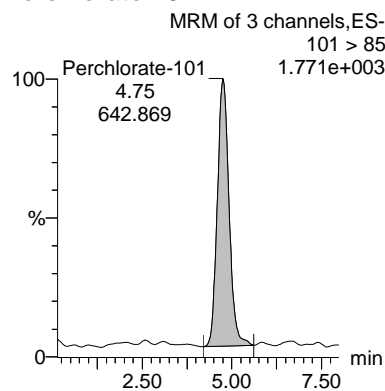
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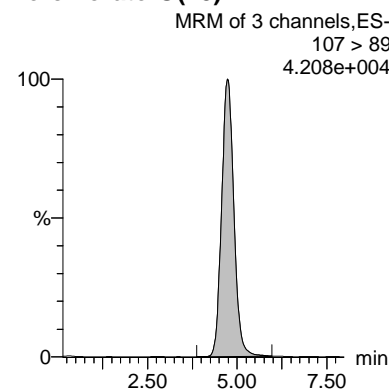
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-08CRI	Perchlorate	99 > 83	4.78	1731.328	0.052	bb			0.0512	102.39	2.39	374.037	2.69
WCL170417-08CRI	Perchlorate-101	101 > 85	4.75	642.869	0.019	bb			0.0560	111.93	11.93	91.633	
WCL170417-08CRI	Perchlorate-O(18)	107 > 89	4.72	16507.576	16507.576	bb			0.4695	93.91	-6.09	3054.9...	

Quantify Sample Report MassLynx 4.0 SP4
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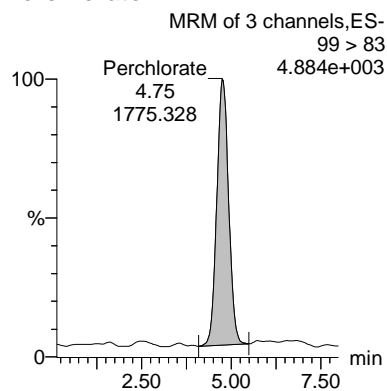
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 04/28/2017

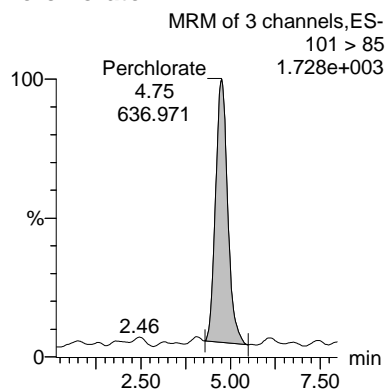
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Vial: 1:2,C

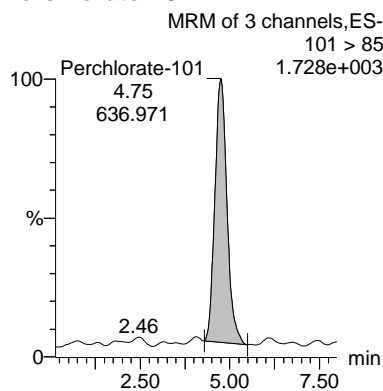
Perchlorate



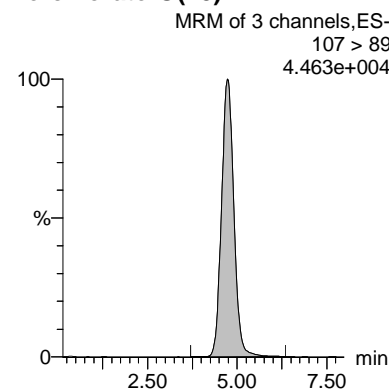
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
WCL170417-08CRI	Perchlorate	99 > 83	4.75	1775.328	0.050	bb			0.0492	98.34	-1.66	98.234	2.79
WCL170417-08CRI	Perchlorate-101	101 > 85	4.75	636.971	0.018	bb			0.0519	103.88	3.88	89.341	
WCL170417-08CRI	Perchlorate-O(18)	107 > 89	4.72	17624.100	17624.100	bb			0.5013	100.26	0.26	2974.5...	

Quality Control Data

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1659583

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

MB

Date Received: 27-APR-17

GEL Job No (SDG): 421250

GEL Sample ID: 1203776248

Date Filtered: 27-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.200	ug/L	U	1	27-APR-17 16:45	per0427013a
	Perchlorate-O(18)			0.464	ug/L		1	27-APR-17 16:45	per0427013a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

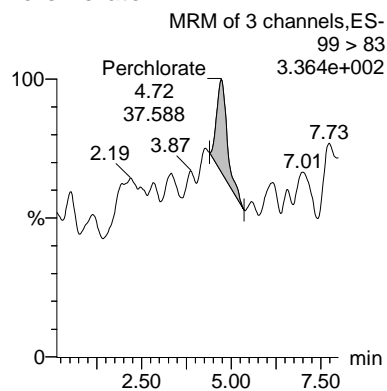
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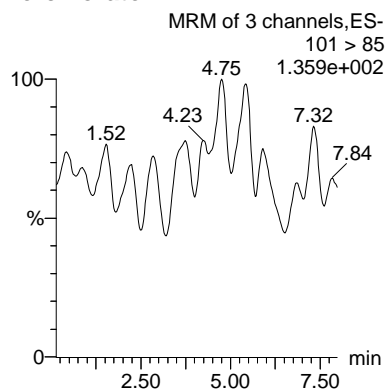
MA
 05/01/2017

Name: per0427013a
Date: 27-Apr-2017
Time: 16:45:55
ID: 1203776248
Vial: 1:3,A

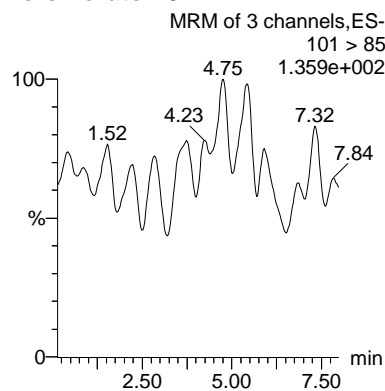
Perchlorate



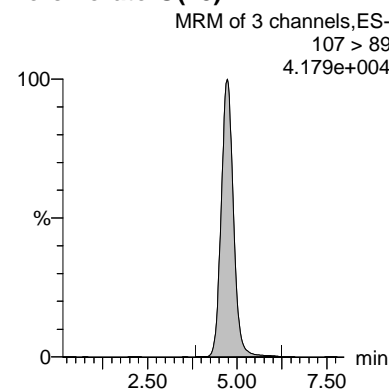
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
1203776248	Perchlorate	99 > 83	4.72	37.588	0.001	bb			0.0011			2.691 0.00
1203776248	Perchlorate-101	101 > 85										
1203776248	Perchlorate-O(18)	107 > 89	4.72	16313.787	16313.787	bb			0.4640	92.81	-7.19	1587.7...

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: EPA 6850 Modified

Matrix: WATER

Extraction Batch ID: 1659583

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LCS

Date Received: 27-APR-17

GEL Job No (SDG): 421250

GEL Sample ID: 1203776249

Date Filtered: 27-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.204	ug/L		1	27-APR-17 16:56	per0427014a
	Perchlorate-O(18)			0.452	ug/L		1	27-APR-17 16:56	per0427014a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

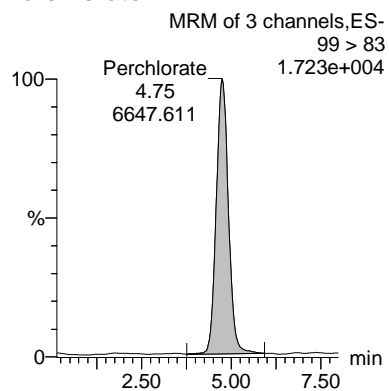
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 Last Altered: Friday, April 28, 2017 8:42:13 AM Eastern Daylight Time
 Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

GL
 04/28/2017

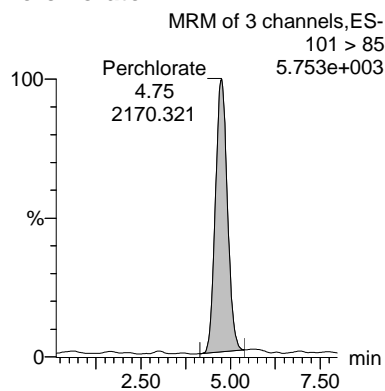
MA
 05/01/2017

Name: per0427014a
Date: 27-Apr-2017
Time: 16:56:54
ID: 1203776249
Vial: 1:3,B

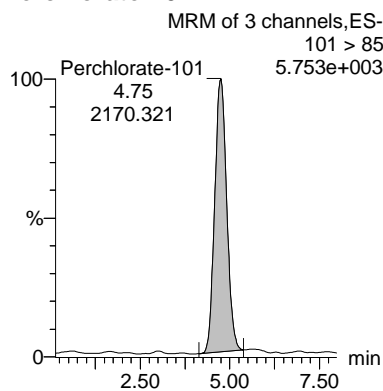
Perchlorate



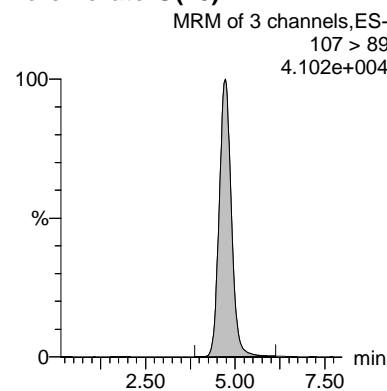
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203776249	Perchlorate	99 > 83	4.75	6647.611	0.209	bb			0.2042	102.09	2.09	702.492	3.06
1203776249	Perchlorate-101	101 > 85	4.75	2170.321	0.068	bb			0.1963	98.13	-1.87	151.691	
1203776249	Perchlorate-O(18)	107 > 89	4.72	15891.034	15891.034	bb			0.4520	90.40	-9.60	2171.0...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1659583

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

ICS

Date Received:

GEL Job No (SDG): 421250

GEL Sample ID: 1203776252

Date Filtered: 27-APR-17

Injection Volume (uL): 20

%Solids:

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.203	ug/L		1	27-APR-17 17:07	per0427015a
	Perchlorate-O(18)			0.486	ug/L		1	27-APR-17 17:07	per0427015a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

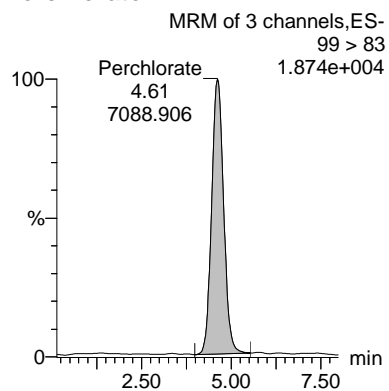
Dataset: C:\MassLynx\Perchlorate.PRO\per042717a.qld
Last Altered: Friday, April 28, 2017 8:42:13 AM Eastern Daylight Time
Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

GL
 04/28/2017

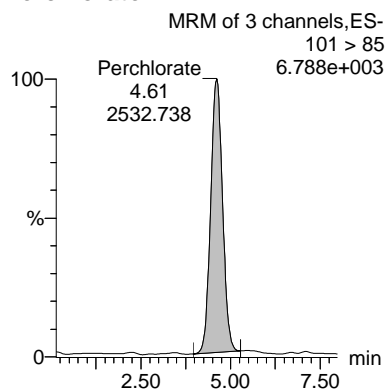
MA
 05/01/2017

Name: per0427015a
Date: 27-Apr-2017
Time: 17:07:52
ID: 1203776252
Vial: 1:3,C

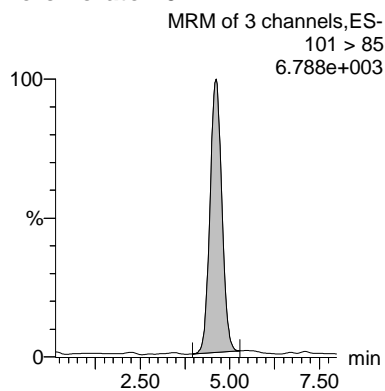
Perchlorate



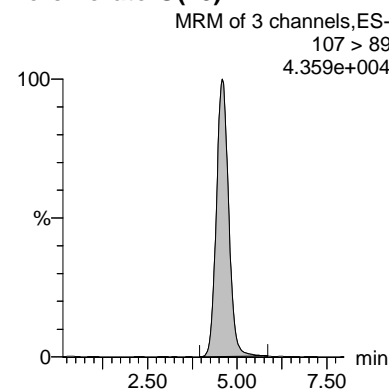
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203776252	Perchlorate	99 > 83	4.61	7088.906	0.207	bb			0.2025	101.26	1.26	458.235	2.80
1203776252	Perchlorate-101	101 > 85	4.61	2532.738	0.074	bb			0.2130	106.52	6.52	239.353	
1203776252	Perchlorate-O(18)	107 > 89	4.59	17085.008	17085.008	bb			0.4860	97.19	-2.81	2846.7...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1659583

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6434-GrabMS

Date Received: 21-APR-17

GEL Job No (SDG): 421250

GEL Sample ID: 1203776250

Date Filtered: 27-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.206	ug/L		1	27-APR-17 17:29	per0427017a
	Perchlorate-O(18)			0.467	ug/L		1	27-APR-17 17:29	per0427017a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

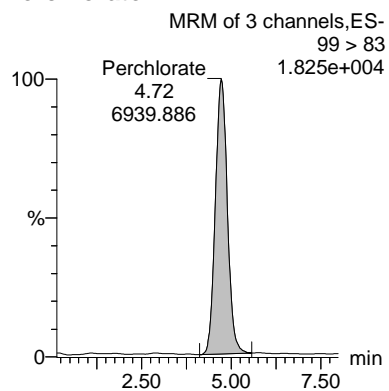
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Last Altered: Friday, April 28, 2017 8:42:13 AM Eastern Daylight Time
Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

GL
 04/28/2017

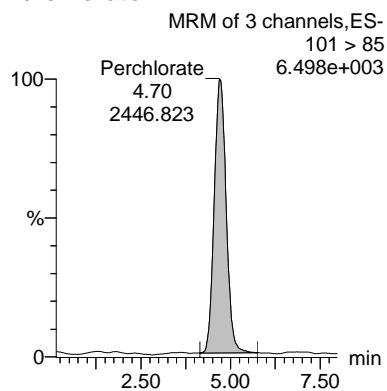
MA
 05/01/2017

Name: per0427017a
Date: 27-Apr-2017
Time: 17:29:48
ID: 1203776250
Vial: 1:3,E

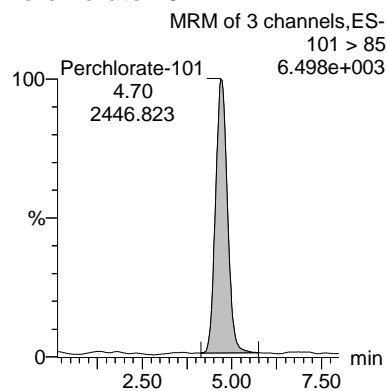
Perchlorate



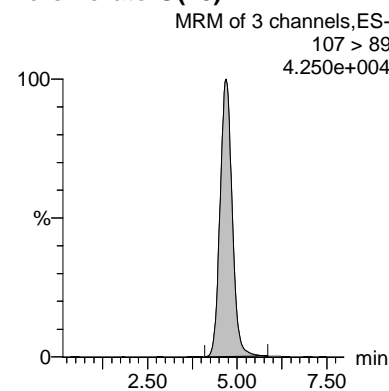
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203776250	Perchlorate	99 > 83	4.72	6939.886	0.211	bb			0.2063	103.17	3.17	873.836	2.84
1203776250	Perchlorate-101	101 > 85	4.70	2446.823	0.075	bb			0.2142	107.09	7.09	462.260	
1203776250	Perchlorate-O(18)	107 > 89	4.70	16416.842	16416.842	bb			0.4670	93.39	-6.61	2103.5...	

Perchlorate Analysis Data Sheet

Lab Name: GEL Laboratories LLC

Lab Code: GEL

Instrument: LCMSMS

Method: SW846 6850 Modified

Matrix: WATER

Extraction Batch ID: 1659583

Extraction Type: Filter/DAI

Sample Volume/Weight: 10.0 mL

Concentrated Extract Volume: 10.0

Client Sample No.

LH18/24-SP650-6434-GrabMSD

Date Received: 21-APR-17

GEL Job No (SDG): 421250

GEL Sample ID: 1203776251

Date Filtered: 27-APR-17

Injection Volume (uL): 20

%Solids: .

CAS No.	Analyte^	MDL	RL	Conc*	Units	Q	Dilution Factor	Date Analyzed	GEL File ID
14797-73-0	Perchlorate	.05	.2	0.207	ug/L		1	27-APR-17 17:40	per0427018a
	Perchlorate-O(18)			0.484	ug/L		1	27-APR-17 17:40	per0427018a

^ When the analyte name is Perchlorate Isotope Ratio the concentration is a unitless value calculated from the ratio of Perchlorate peak area to Perchlorate-101 peak area. The Perchlorate-101 and isotopic ratio results are provided for qualitative purposes only. The results are used to verify the presence and quantitation of Perchlorate.

*Concentration =

$$\text{Instrument Value} \times \frac{\text{Concentrated Extract Volume}}{\text{Aliquot}} \times \frac{1}{\% \text{Solids}}$$

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

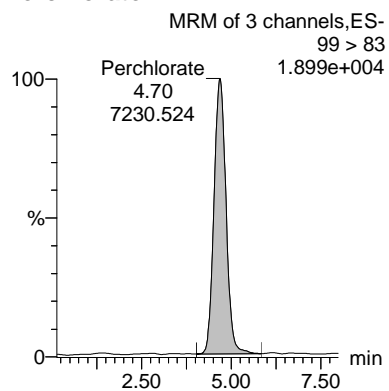
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Last Altered: Friday, April 28, 2017 8:42:13 AM Eastern Daylight Time
Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

GL
 04/28/2017

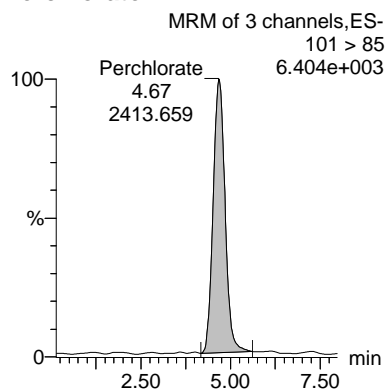
MA
 05/01/2017

Name: per0427018a
Date: 27-Apr-2017
Time: 17:40:45
ID: 1203776251
Vial: 1:3,F

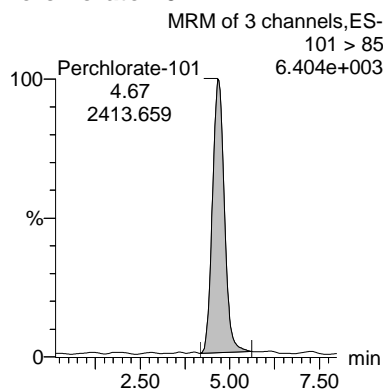
Perchlorate



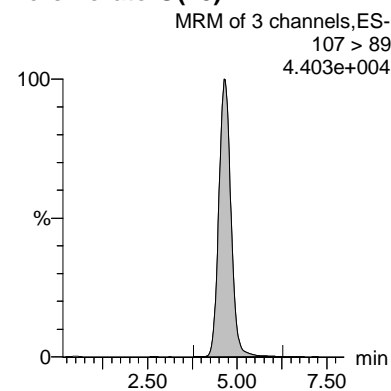
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N	Ion Ratio
1203776251	Perchlorate	99 > 83	4.70	7230.524	0.213	bb			0.2075	103.75	3.75	441.885	3.00
1203776251	Perchlorate-101	101 > 85	4.67	2413.659	0.071	bb			0.2039	101.96	1.96	166.412	
1203776251	Perchlorate-O(18)	107 > 89	4.64	17009.314	17009.314	bb			0.4838	96.76	-3.24	3802.5...	

Perchlorate Initial Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421250Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	27-APR-17	per0427001a	IPB001
Perchlorate-101	0.00	0	NA	27-APR-17	per0427001a	IPB001
Perchlorate	0.00	0	NA	27-APR-17	per0427002a	IPB001
Perchlorate-101	0.00	0	NA	27-APR-17	per0427002a	IPB001

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

Dataset: C:\MassLynx\Perchlorate.PRO\per042717a.qld
 Last Altered: Friday, April 28, 2017 8:42:13 AM Eastern Daylight Time
 Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

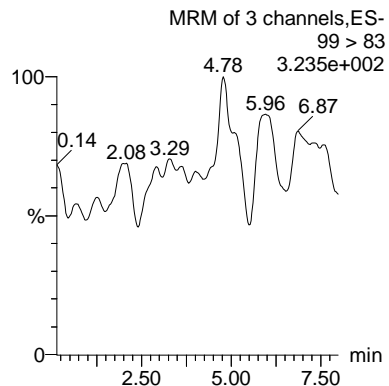
GL
 04/28/2017

MA
 05/01/2017

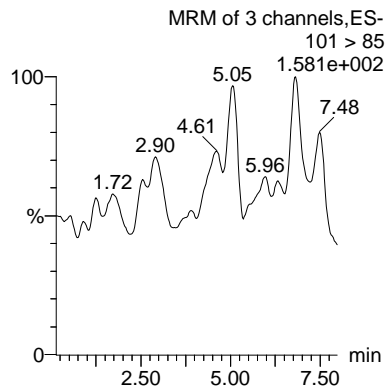
Method: C:\MassLynx\Perchlorate.PRO\MethDB\per042717a.mdb 28 Apr 2017 08:41:18
 Calibration: C:\MassLynx\Perchlorate.PRO\CurveDB\per042717a.cdb 28 Apr 2017 08:42:12

Name: per0427001a
 Date: 27-Apr-2017
 Time: 14:34:22
 ID: IPB001
 Vial: 1:1,A

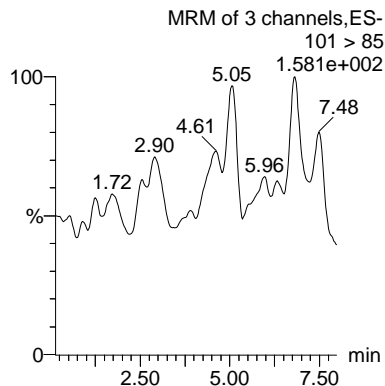
Perchlorate



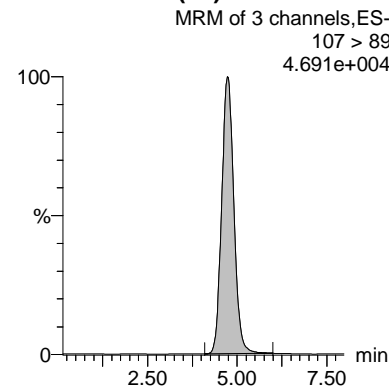
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83										0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	4.72	18310.953	18310.953	bb			0.5208	104.17	4.17	3306.8...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

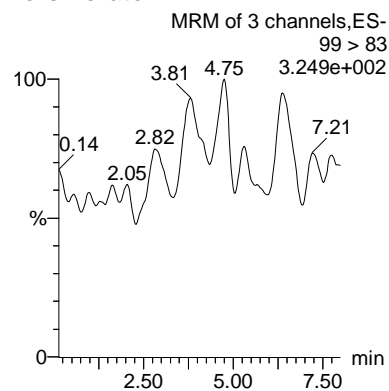
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GL
 04/28/2017

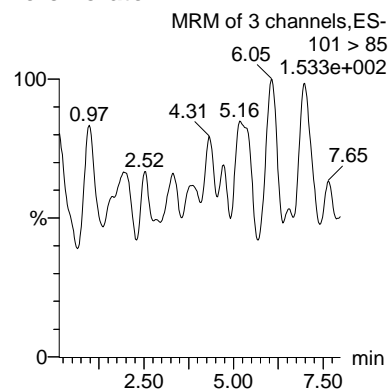
MA
 05/01/2017

Name: per0427002a
Date: 27-Apr-2017
Time: 14:45:24
ID: IPB001
Vial: 1:1,A

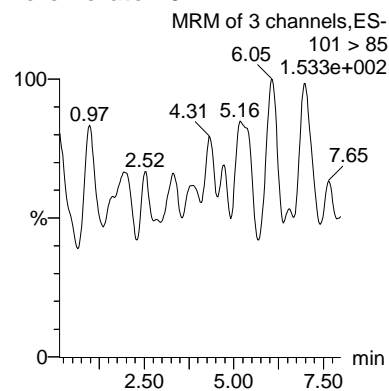
Perchlorate



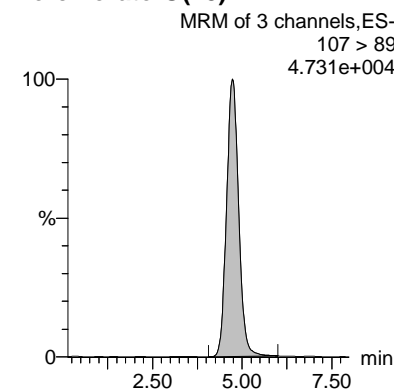
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB001	Perchlorate	99 > 83										0.00
IPB001	Perchlorate-101	101 > 85										
IPB001	Perchlorate-O(18)	107 > 89	4.72	18329.318	18329.318	bb			0.5214	104.27	4.27	873.600

Perchlorate Continuing Calibration Blank

Lab Name: General Engineering LaboratoriesGEL Job No.(SDG): 421250Lab Code: GELReporting Units: ug/L

Analyte	True	Found	%Rec	Date Analyzed	GEL File Id	GEL Sample ID
Perchlorate	0.00	0	NA	27-APR-17	per0427009a	IPB002
Perchlorate-101	0.00	0	NA	27-APR-17	per0427009a	IPB002
Perchlorate	0.00	0	NA	27-APR-17	per0427011a	IPB003
Perchlorate-101	0.00	0	NA	27-APR-17	per0427011a	IPB003
Perchlorate	0.00	0	NA	27-APR-17	per0427019a	IPB004
Perchlorate-101	0.00	0	NA	27-APR-17	per0427019a	IPB004
Perchlorate	0.00	0	NA	27-APR-17	per0427024a	IPB005
Perchlorate-101	0.00	0	NA	27-APR-17	per0427024a	IPB005

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

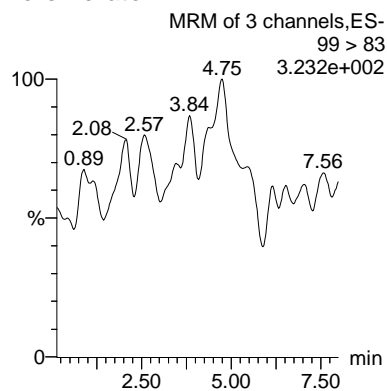
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 Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

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 04/28/2017

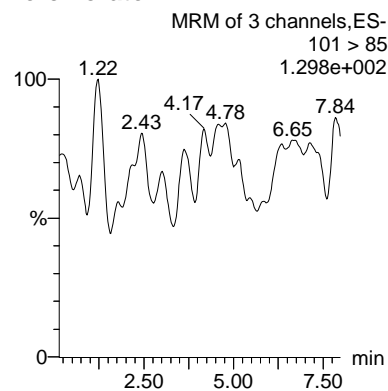
MA
 05/01/2017

Name: per0427009a
Date: 27-Apr-2017
Time: 16:02:03
ID: IPB002
Vial: 1:1,A

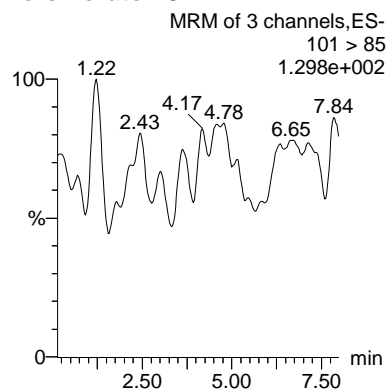
Perchlorate



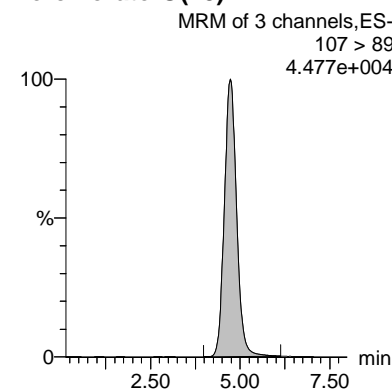
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB002	Perchlorate	99 > 83										0.00
IPB002	Perchlorate-101	101 > 85										
IPB002	Perchlorate-O(18)	107 > 89	4.72	17533.225	17533.225	bb			0.4987	99.74	-0.26	1216.0...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

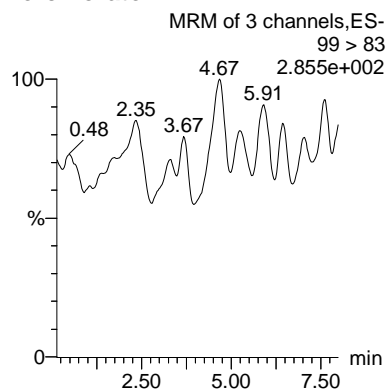
Dataset: C:\MassLynx\Perchlorate.PRO\per042717a.qld
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 Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

GL
 04/28/2017

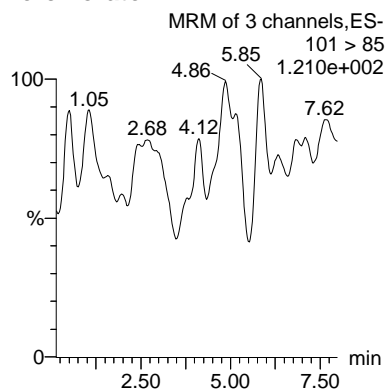
MA
 05/01/2017

Name: per0427011a
 Date: 27-Apr-2017
 Time: 16:23:59
 ID: IPB003
 Vial: 1:1,A

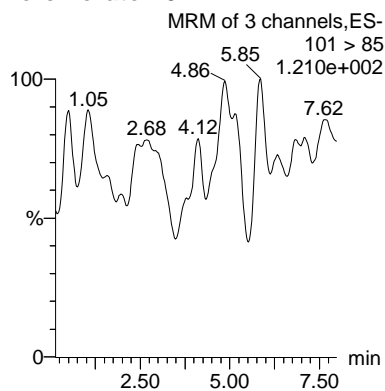
Perchlorate



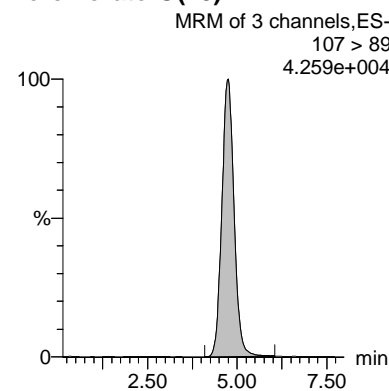
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB003	Perchlorate	99 > 83										0.00
IPB003	Perchlorate-101	101 > 85										
IPB003	Perchlorate-O(18)	107 > 89	4.75	16581.008	16581.008	bb			0.4716	94.33	-5.67	3778.7...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

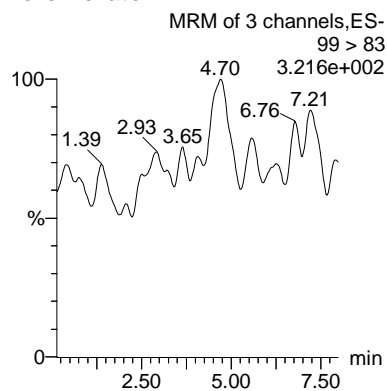
Dataset: C:\MassLynx\Perchlorate.PRO\per042717a.qld
 Last Altered: Friday, April 28, 2017 8:42:13 AM Eastern Daylight Time
 Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

GL
 04/28/2017

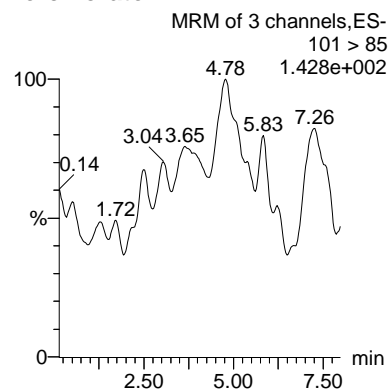
MA
 05/01/2017

Name: per0427019a
Date: 27-Apr-2017
Time: 17:51:41
ID: IPB004
Vial: 1:1,A

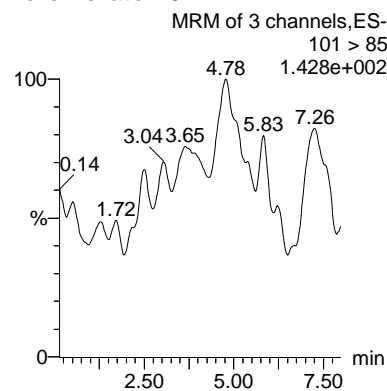
Perchlorate



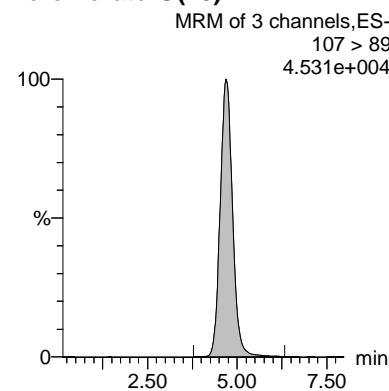
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB004	Perchlorate	99 > 83										0.00
IPB004	Perchlorate-101	101 > 85										
IPB004	Perchlorate-O(18)	107 > 89	4.70	17843.080	17843.080	bb			0.5075	101.50	1.50	3066.4...

Quantify Sample Report MassLynx 4.0 SP4
 The GEL Group, LLC Analyst: Grace L. Cappelmann

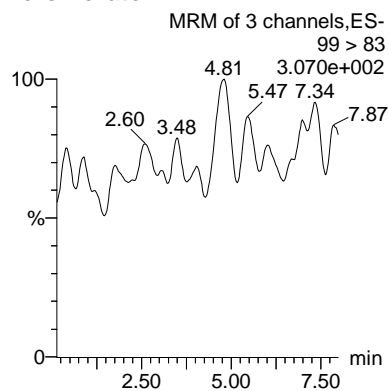
Dataset: C:\MassLynx\Perchlorate.PRO\per042717a.qld
 Last Altered: Friday, April 28, 2017 8:42:13 AM Eastern Daylight Time
 Printed: Friday, April 28, 2017 9:01:22 AM Eastern Daylight Time

GL
 04/28/2017

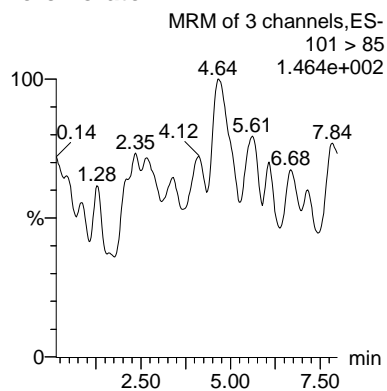
MA
 05/01/2017

Name: per0427024a
Date: 27-Apr-2017
Time: 18:46:33
ID: IPB005
Vial: 1:1,A

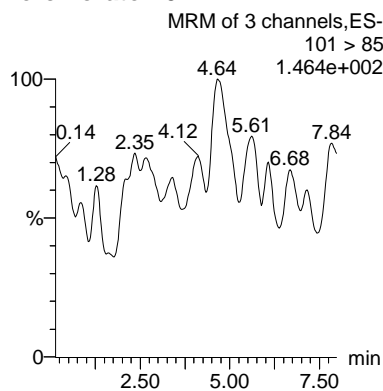
Perchlorate



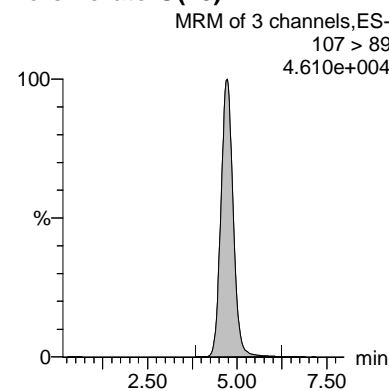
Perchlorate



Perchlorate-101



Perchlorate-O(18)



ID	Name	Trace	RT	Area	Response	Flags	Mod.Date	Mod.Time	ng/mL	%Rec	%Error	S/N Ion Ratio
IPB005	Perchlorate	99 > 83										0.00
IPB005	Perchlorate-101	101 > 85										
IPB005	Perchlorate-O(18)	107 > 89	4.72	17998.117	17998.117	bb			0.5119	102.39	2.39	2399.9...

Miscellaneous

Definitive Low Level Perchlorate Analysis Utilizing Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS) by EPA Method 6850 Modified (6850M)

Batch ID: 1659583 **Verified by:** _____
Analyst: Grace Cappelmann
Method: SW846 6850 Modified

Lab SOP: GL-OA-E-067 REV# 14
Instrument: LCMSMS Manual Instrument

Sample ID	Prep Date	Initial Volume (mL)	Final Volume (mL)	Prepped Factor (mL/mL)
1203776248 MB	27-APR-2017 12:00:00	10	10	1
1203776249 LCS	27-APR-2017 12:00:00	10	10	1
1203776252 ICS	27-APR-2017 12:00:00	10	10	1
421250001	27-APR-2017 12:00:00	10	10	1
1203776250 MS (421250001)	27-APR-2017 12:00:00	10	10	1
1203776251 MSD (421250001)	27-APR-2017 12:00:00	10	10	1

Type	Sample Id	Description	Serial Number	Spike Amt	Units	Comments:
ICS	1203776252	10 ug/L ICV/CCV Second Source	UCL161229-01.2	.2	mL	De-salting cartridge: 170221-2.5-Ba/Ag/H
LCS	1203776249	10 ug/L ICV/CCV Second Source	UCL161229-01.2	.2	mL	
MS	1203776250	10 ug/L ICV/CCV Second Source	UCL161229-01.2	.2	mL	
MSD	1203776251	10 ug/L ICV/CCV Second Source	UCL161229-01.2	.2	mL	
RGNT	All	TYPE I Water for HPLC	2457559	10	mL	
RGNT	All	500 ppm Carbonate, Bicarbonate, Chloride, Sulfate	2463729	10	mL	

GEL ORGANIC RUN LOG

INSTRUMENT ID: LC-MS/MS#2

Date: 04/27/17

Method: EPA 6850-Modified

Extr. Injection Volume: 20uL

Int. Std.: UCL161103-01

Sequence Number: per042717a

Mobile Phase Lot#: 2536603, 2457559

SOP: GL-OA-E-067

Initial Calibration Date: 04/27/17

Standard-Samp Reagent Lot#: 2457559

Alt Check Std. ID: WCL170417-07

DataFile	Sample	Analyst	Injection Date	Batch	SDG	Dilution	Client	Comments	QC_Flag
per0427001a	IPB001	GXC1	4/27/2017 14:34			1		USE	B
per0427002a	IPB001	GXC1	4/27/2017 14:45			1		USE	B
per0427003a	WCLICAL-01	GXC1	4/27/2017 14:56			1		USE	I
per0427004a	WCLICAL-02	GXC1	4/27/2017 15:07			1		USE	I
per0427005a	WCLICAL-03	GXC1	4/27/2017 15:18			1		USE	I
per0427006a	WCLICAL-04	GXC1	4/27/2017 15:29			1		USE	I
per0427007a	WCLICAL-05	GXC1	4/27/2017 15:40			1		USE	I
per0427008a	WCLICAL-06	GXC1	4/27/2017 15:51			1		USE	I
per0427009a	IPB002	GXC1	4/27/2017 16:02			1		USE	B
per0427010a	WCLICV	GXC1	4/27/2017 16:13			1		USE	C
per0427011a	IPB003	GXC1	4/27/2017 16:23			1		USE	B
per0427012a	WCLCRI	GXC1	4/27/2017 16:34			1		USE	C
per0427013a	1203776248	GXC1	4/27/2017 16:45	1659584	421250	1	MBAC	USE	S
per0427014a	1203776249	GXC1	4/27/2017 16:56	1659584	421250	1	MBAC	USE	S
per0427015a	1203776252	GXC1	4/27/2017 17:07	1659584	421250	1	MBAC	USE	S
per0427016a	421250001	GXC1	4/27/2017 17:18	1659584	421250	1	MBAC	USE	S
per0427017a	1203776250	GXC1	4/27/2017 17:29	1659584	421250	1	MBAC	USE	S
per0427018a	1203776251	GXC1	4/27/2017 17:40	1659584	421250	1	MBAC	USE	S
per0427019a	IPB004	GXC1	4/27/2017 17:51			1		USE	B
per0427020a	1203776588	GXC1	4/27/2017 18:02	1659709	421316	1	HGLG	USE	S
per0427021a	1203776589	GXC1	4/27/2017 18:13	1659709	421316	1	HGLG	USE	S
per0427022a	1203776592	GXC1	4/27/2017 18:24	1659709	421316	1	HGLG	USE	S
per0427023a	WCLCCV	GXC1	4/27/2017 18:35			1		USE	C
per0427024a	IPB005	GXC1	4/27/2017 18:46			1		USE	B
per0427025a	WCLCRI	GXC1	4/27/2017 18:57			1		USE	C
per0427026a	421316001	GXC1	4/27/2017 19:08	1659709	421316	1	HGLG	USE	S
per0427027a	421316002	GXC1	4/27/2017 19:19	1659709	421316	1	HGLG	USE	S
per0427028a	1203776590	GXC1	4/27/2017 19:30	1659709	421316	1	HGLG	USE	S
per0427029a	1203776591	GXC1	4/27/2017 19:41	1659709	421316	1	HGLG	USE	S

per0427030a	421316003	GXC1	4/27/2017 19:52	1659709	421316	1	HGLG	USE	S
per0427031a	WCLCCV	GXC1	4/27/2017 20:03			1		USE	C
per0427032a	IPB006	GXC1	4/27/2017 20:14			1		USE	B
per0427033a	WCLCRI	GXC1	4/27/2017 20:25			1		USE	C
per0427034a	Sand screenMB W	GXC1	4/27/2017 20:36			1		USE	B
per0427035a	Sand screenLCS \	GXC1	4/27/2017 20:47			1		USE	B

Isotope Ratio Criteria

Isotope Ratio $^{35}\text{Cl}/^{37}\text{Cl}$

2.31-3.85

Tune Criteria

The tuning solution is introduced directly into the mass spectrometer using the ESI interface in the positive ion mode. The mass range scanned is 20 to 1100 amu using at least six scans. The observed mass for the target compound in the daily calibration standards must be within 0.2 amu of the expected value. If it is greater than 0.2 amu, then a mass calibration is performed and the instrument is re-calibrated.

Laboratory Report Number: L17041302

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on April 28 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com

Lab Report #: L17041302

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00114151	H	2.0		J4616881560	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

**Lab Report #:** L17041302**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP650-6435	L17041302-01	04/26/2017 15:00	04/27/2017 09:52
LH18/24-SP140-7435	L17041302-02	04/26/2017 15:00	04/27/2017 09:52



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041302
Project Name:		Method:	6850
Prep Batch Number(s):	WG611875	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-28 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2017-04-28 19:36:50



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041302
Project Name:		Method:	6850
Prep Batch Number(s):	WG611875	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-28 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041302
Project Name:		Method:	6850
Prep Batch Number(s):	WG611875	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-28 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041302
Project Name:		Method:	6850
Prep Batch Number(s):	WG611875	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-28 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041302
Project Name:		Method:	6850
Prep Batch Number(s):	WG611875	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-28 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041302
Project Name:		Method:	6850
Prep Batch Number(s):	WG611875	Reviewer Name:	Eric Lawson
LRC Date:	2017-04-28 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.

Lab Report #: L17041302
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041302-01	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP650-6435	Prep Method: 6850	Prep Date: 04/27/2017 13:00
Matrix: Water	Analytical Method: 6850	Cal Date: 04/24/2017 15:40
Workgroup #: WG611875	Analyst: JWR	Run Date: 04/27/2017 16:06
Collect Date: 04/26/2017 15:00	Dilution: 1	File ID: 1LM.LM39559
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17041302
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041302-02	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP140-7435	Prep Method: 6850	Prep Date: 04/27/2017 13:00
Matrix: Water	Analytical Method: 6850	Cal Date: 04/24/2017 15:40
Workgroup #: WG611875	Analyst: JWR	Run Date: 04/27/2017 17:02
Collect Date: 04/26/2017 15:00	Dilution: 10000	File ID: 1LM.LM39562
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	10800		4000	2000	1000

2.1 General Chromatography Data

2.1.1 LC/MS Data (6850)

2.1.1.1 Summary Data

Lab Report #: L17041302

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041302-01	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP650-6435	Prep Method: 6850	Prep Date: 04/27/2017 13:00
Matrix: Water	Analytical Method: 6850	Cal Date: 04/24/2017 15:40
Workgroup #: WG611875	Analyst: JWR	Run Date: 04/27/2017 16:06
Collect Date: 04/26/2017 15:00	Dilution: 1	File ID: 1LM.LM39559
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17041302

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041302-02

PrePrep Method: N/A

Instrument: LCMS1

Client ID: LH18/24-SP140-7435

Prep Method: 6850

Prep Date: 04/27/2017 13:00

Matrix: Water

Analytical Method: 6850

Cal Date: 04/24/2017 15:40

Workgroup #: WG611875

Analyst: JWR

Run Date: 04/27/2017 17:02

Collect Date: 04/26/2017 15:00

Dilution: 10000

File ID: 1LM.LM39562

Sample Tag: DL01

Units: ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	10800		4000	2000	1000

2.1.1.2 QC Summary Data

Example Calculation 6850 - Perchlorate**Concentration from Linear Regression****Step 1: Retrieve Curve Data From Plot, $y = mx + b$**

y = response ratio = response of analyte / response of internal standard (IS) = R_x/R_{istd}

x = amount ratio = concentration analyte/concentration internal standard (IS) = C_x / C_{istd}

m = slope from curve (1.45)

b = intercept from curve (-0.00242)

$y = 1.45x + -0.00242$

Step 2: Substitute the value for y

where $y = 12600/226000 = 0.055752$

Step 3: Solve for x

$x = (y - b)/m = 0.0040119$

Step 4: Solve for analyte concentration C_x

$C_x = (C_{is})(x) = (5 \text{ ug/L})(0.0040119) = 0.200594 \text{ ug/L}$

Example Calculation - Water:

Slope from curve, m :	1.45
Intercept from curve, b :	-0.00242
Response of analyte, R_x :	12600
Response of Internal Standard, R_{istd} :	226000
Concentration of IS, C_{istd} (ug/L):	5.00
Response Ratio:	0.05575
Amount Ratio:	0.04012
Analyte Concentration, C_x (ug/L) :	0.200594

Example Calculation - Soil:

Analyte Concentration, C_x (ug/L):	0.20059
Amount of soil extracted (g):	5.00
Final volume of extract (mL):	50.00
Percent solids (Pct wt.)	100
Concentration in soil (ug/kg):	2.005938

Microbac Laboratories Inc.
Instrument Run Log

Instrument: LCMS1 Dataset: 042417_JWR.TXT
 Analyst1: JWR Analyst2: NA
 Method: 6850 SOP: HPLC06 Rev: 8

Maintenance Log ID: _____ Syringe Filter Lot#: 160109254
 Eluent ID#: _____

Workgroups: Column 1 ID: KP-RPPX250 Column 2 ID: NA
 Analytical WG611327 (waters) Analytical WG611328 (waters)
 Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (04/24/2017)
 CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: STD80234

Comments: ICAL WG611288 : Alternate Source STD80234
 Analytical Column : RPPX 5um (250x4.6mm)
 K'Prime S/N RPPX250-02115

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	1LM.LM39494	WG611288-01 CCB	1	1		04/24/17 13:27
2	1LM.LM39495	WG611288-02 STD (0.1 ug/L)	1	1	STD80232	04/24/17 13:46
3	1LM.LM39496	WG611288-03 STD (0.2 ug/L)	1	1	STD80232	04/24/17 14:05
4	1LM.LM39497	WG611288-04 STD (0.5 ug/L)	1	1	STD80232	04/24/17 14:24
5	1LM.LM39498	WG611288-05 STD (1.0 ug/L)	1	1	STD80232	04/24/17 14:43
6	1LM.LM39499	WG611288-06 STD (2.0 ug/L)	1	1	STD80232	04/24/17 15:02
7	1LM.LM39500	WG611288-07 STD (5.0 ug/L)	1	1	STD80232	04/24/17 15:21
8	1LM.LM39501	WG611288-08 STD (10 ug/L)	1	1	STD80232	04/24/17 15:40
9	1LM.LM39502	WG611288-09 SSCV (1.0 ug/L)	1	1	STD80234	04/24/17 15:59
10	1LM.LM39503	WG611330-01 CCB	1	1		04/24/17 16:18
11	1LM.LM39504	WG611330-02 CCV (1.0ug/L)	1	1	STD80232	04/24/17 16:37
12	1LM.LM39505	WG611327-07 MRL (0.2ug/L)	1	1	STD80232	04/24/17 16:56
13	1LM.LM39506	WG611327-01 MCT (0.2ug/L)	1	1	STD80234	04/24/17 17:14
14	1LM.LM39507	WG611327-02 BLANK	1	1		04/24/17 17:34
15	1LM.LM39508	WG611327-03 LCS (0.2ug/L)	1	1	STD80234	04/24/17 17:52
16	1LM.LM39509	L17040713-06 RS	1	1		04/24/17 18:11
17	1LM.LM39510	L17040713-07 MS	1	1	STD80234	04/24/17 18:30
18	1LM.LM39511	L17040713-08 MSD	1	1	STD80234	04/24/17 18:49
19	1LM.LM39512	L17040713-01	1	1		04/24/17 19:08
20	1LM.LM39513	L17040713-02	1	1		04/24/17 19:27
21	1LM.LM39514	L17040713-03	1	1		04/24/17 19:46
22	1LM.LM39515	L17040713-04	1	1		04/24/17 20:05
23	1LM.LM39516	WG611330-03 CCV (1.0ug/L)	1	1	STD80232	04/24/17 20:24
24	1LM.LM39517	WG611327-08 MRL (0.2ug/L)	1	1	STD80232	04/24/17 20:43
25	1LM.LM39518	WG611330-04 CCB	1	1		04/24/17 21:02
26	1LM.LM39519	L17040713-05	1	1		04/24/17 21:21
27	1LM.LM39520	L17040713-09	1	1		04/24/17 21:40
28	1LM.LM39521	L17040713-10	1	1		04/24/17 21:59
29	1LM.LM39522	L17040713-11	1	1		04/24/17 22:17
30	1LM.LM39523	L17040713-12	1	1		04/24/17 22:36
31	1LM.LM39524	L17040713-13	1	1		04/24/17 22:55
32	1LM.LM39525	WG611330-05 CCV (1.0ug/L)	1	1	STD80232	04/24/17 23:14
33	1LM.LM39526	WG611327-09 MRL (0.2ug/L)	1	1	STD80232	04/24/17 23:33

Page: 1

Approved: 25-APR-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: LCMS1 Dataset: 042417_JWR.TXT
 Analyst1: JWR Analyst2: NA
 Method: 6850 SOP: HPLC06 Rev: 8

Maintenance Log ID: _____ Syringe Filter Lot#: 160109254
 Eluent ID#: _____

Workgroups: Column 1 ID: KP-RPPX250 Column 2 ID: NA
 Analytical WG611327 (waters) Analytical WG611328 (waters)
 Internal STD: COA19471 Surrogate STD: NA STD80232 (04/24/2017)
 CCV STD: STD80232 LCS STD: STD80234 STD80234

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
34	1LM.LM39527	WG611328-07 MRL (0.2ug/L)	1	1	STD80232	04/24/17 23:52
35	1LM.LM39528	WG611330-06 CCB	1	1		04/25/17 00:11
36	1LM.LM39529	WG611328-01 MCT (0.2ug/L)	1	1	STD80234	04/25/17 00:30
37	1LM.LM39530	WG611328-02 BLANK	1	1		04/25/17 00:49
38	1LM.LM39531	WG611328-03 LCS (0.2ug/L)	1	1	STD80234	04/25/17 01:08
39	1LM.LM39532	L17040841-08 RS	1	1		04/25/17 01:27
40	1LM.LM39533	L17040841-09 MS	1	1	STD80234	04/25/17 01:46
41	1LM.LM39534	L17040841-10 MSD	1	1	STD80234	04/25/17 02:05
42	1LM.LM39535	L17040841-01	1	1		04/25/17 02:23
43	1LM.LM39536	L17040841-02	1	1		04/25/17 02:42
44	1LM.LM39537	L17040841-03	1	1		04/25/17 03:01
45	1LM.LM39538	L17040841-04	1	1		04/25/17 03:20
46	1LM.LM39539	WG611330-07 CCV (1.0ug/L)	1	1	STD80232	04/25/17 03:39
47	1LM.LM39540	WG611328-08 MRL (0.2ug/L)	1	1	STD80232	04/25/17 03:58
48	1LM.LM39541	WG611330-08 CCB	1	1		04/25/17 04:17
49	1LM.LM39542	L17040841-05	1	1		04/25/17 04:36
50	1LM.LM39543	L17040841-06	1	1		04/25/17 04:55
51	1LM.LM39544	L17040841-07	1	1		04/25/17 05:14
52	1LM.LM39545	L17040841-11	1	1		04/25/17 05:33
53	1LM.LM39546	L17040841-12	1	1		04/25/17 05:52
54	1LM.LM39547	L17040841-13	1	1		04/25/17 06:11
55	1LM.LM39548	WG611330-09 CCV (1.0ug/L)	1	1	STD80232	04/25/17 06:30
56	1LM.LM39549	WG611328-09 MRL (0.2ug/L)	1	1	STD80232	04/25/17 06:49
57	1LM.LM39550	WG611330-10 CCB	1	1		04/25/17 07:07

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Page: 2

Approved: 25-APR-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: LCMS1 Dataset: 042717_JWR.TXT
 Analyst1: JWR Analyst2: NA
 Method: 6850 SOP: HPLC06 Rev: 8

Maintenance Log ID: _____ Syringe Filter Lot#: 160109254
 Eluent ID#: _____

Workgroups: Column 1 ID: KP-RPPX250 Column 2 ID: NA
Analytical WG611875 (waters)
 Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (04/24/2017)
 CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: STD80234

Comments: Sample L17041302-02 was analyzed at a dilution of 10,000x based on its pre-run screen results.

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	1LM.LM39553	WG611877-01 CCB	1	1		04/27/17 14:12
2	1LM.LM39554	WG611877-02 CCV (1.0ug/L)	1	1	STD80232	04/27/17 14:31
3	1LM.LM39555	WG611875-07 MRL (0.2ug/L)	1	1	STD80232	04/27/17 14:50
4	1LM.LM39556	WG611875-01 MCT (0.2ug/L)	1	1	STD80234	04/27/17 15:09
5	1LM.LM39557	WG611875-02 BLANK	1	1		04/27/17 15:28
6	1LM.LM39558	WG611875-03 LCS (0.2ug/L)	1	1	STD80234	04/27/17 15:47
7	1LM.LM39559	L17041302-01 REF	1	1		04/27/17 16:06
8	1LM.LM39560	L17041302-01 MS	1	1	STD80234	04/27/17 16:24
9	1LM.LM39561	L17041302-01 MSD	1	1	STD80234	04/27/17 16:43
10	1LM.LM39562	L17041302-02 (10,000x)	1	10000		04/27/17 17:02
11	1LM.LM39563	WG611877-03 CCV (1.0ug/L)	1	1	STD80232	04/27/17 17:21
12	1LM.LM39564	WG611875-08 MRL (0.2ug/L)	1	1	STD80232	04/27/17 17:40
13	1LM.LM39565	WG611877-04 CCB	1	1		04/27/17 17:59

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Mary Schilling



Microbac Laboratories Inc.

Data Checklist

Date: 24-APR-2017
Analyst: JWR
Analyst: NA
Method: 6850
Instrument: LCMS1
Curve Workgroup: WG611288
Runlog ID: 81726
Analytical Workgroups: L17040713, L17040841

ANALYTICAL	
System Performance Check	NA
DFTPP (GCMS)	NA
Endrin/DDT breakdown (8081/GCMS)	NA
Pentachlorophenol/benzidine tailing (GCMS)	NA
Eluent check (IC)/system pressure (HPLC)	NA
Window standard (FID)	NA
Initial Calibration	X
Average RF	NA
Linear regression or higher order curve	X
Alternate source standard (ICV) % Difference	X
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (GCMS)	X
Continuing calibration blank (CCB) (IC/LCMS)	X
Limit of quantitation verification (LOQV) (LCMS)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	X
Recoveries	X
%RPD	X
Interference check sample (ICS) (LCMS)	MCT
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	NA
Surrogate recoveries	NA
Internal standard areas (MS)	X
Library searches (GCMS)	NA
Calculations & correct factors	X
Compounds above calibration range	NA
Reruns	NA
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	NA
Check for completeness	X
Primary Reviewer	JWR
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	ECL

Primary Reviewer:
25-APR-2017

John Richards

Secondary Reviewer:
25-APR-2017

Eri C. Zimm

CHECKLIST1 - Modified 03/05/2008

Generated: APR-25-2017 14:21:32



Microbac Laboratories Inc.

Data Checklist

Date: 27-APR-2017
Analyst: JWR
Analyst: NA
Method: 6850
Instrument: LCMS1
Curve Workgroup: NA
Runlog ID: 81803
Analytical Workgroups: L17041302

ANALYTICAL	
System Performance Check	NA
DFTPP (GCMS)	NA
Endrin/DDT breakdown (8081/GCMS)	NA
Pentachlorophenol/benzidine tailing (GCMS)	NA
Eluent check (IC)/system pressure (HPLC)	NA
Window standard (FID)	NA
Initial Calibration	NA
Average RF	NA
Linear regression or higher order curve	NA
Alternate source standard (ICV) % Difference	NA
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (GCMS)	X
Continuing calibration blank (CCB) (IC/LCMS)	X
Limit of quantitation verification (LOQV) (LCMS)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	X
Recoveries	X
%RPD	X
Interference check sample (ICS) (LCMS)	MCT
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	NA
Surrogate recoveries	NA
Internal standard areas (MS)	X
Library searches (GCMS)	NA
Calculations & correct factors	X
Compounds above calibration range	NA
Reruns	NA
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	
Check for completeness	X
Primary Reviewer	JWR
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	MES

Primary Reviewer:
28-APR-2017

John Richards

Secondary Reviewer:
28-APR-2017

Mary Sheehy

CHECKLIST1 - Modified 03/05/2008

Generated: APR-28-2017 10:44:52



Analytical Method:6850
Login Number:L17041302

AAB#:WG611875

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6435	01	04/26/17					04/27/2017	.9	28		04/27/17	.1	28	
LH18/24-SP140-7435	02	04/26/17					04/27/2017	.9	28		04/27/17	.2	28	

* = SEE PROJECT QAPP REQUIREMENTS



Underline = Result out of surrogate limits

DL = surrogate diluted out

ND = surrogate not detected

SURROGATES - Modified 03/06/2008
PDF File ID: 5268413
Report generated: 04/28/2017 15:37



METHOD BLANK SUMMARY

Login Number: L17041302 Work Group: WG611875
 Blank File ID: 1LM.LM39557 Blank Sample ID: WG611875-02
 Prep Date: 04/27/17 13:00 Instrument ID: LCMS1
 Analyzed Date: 04/27/17 15:28 Method: 6850
 Analyst: JWR

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
QCMRL	WG611875-07	1LM.LM39555	04/27/17 14:50	01
MCT	WG611875-01	1LM.LM39556	04/27/17 15:09	01
LCS	WG611875-03	1LM.LM39558	04/27/17 15:47	01
LH18/24-SP650-6435	L17041302-01	1LM.LM39559	04/27/17 16:06	01
LH18/24-SP140-7435	L17041302-02	1LM.LM39562	04/27/17 17:02	DL01
QCMRL	WG611875-08	1LM.LM39564	04/27/17 17:40	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5267427
 Report generated 04/28/2017 10:10



Login Number: L17041302 Prep Date: 04/27/17 13:00 Sample ID: WG611875-02
Instrument ID: LCMS1 Run Date: 04/27/17 15:28 Prep Method: 6850
File ID: 1LM.LM39557 Analyst: JWR Method: 6850
Workgroup (AAB#): WG611875 Matrix: Water Units: ug/L
Contract #: _____ Cal ID: LCMS1-24-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Perchlorate	0.100	0.400	0.100	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5267428
28-APR-2017 10:10



Login Number: L17041302 Run Date: 04/27/2017 Sample ID: WG611875-03
Instrument ID: LCMS1 Run Time: 15:47 Prep Method: 6850
File ID: 1LM.LM39558 Analyst: JWR Method: 6850
Workgroup (AAB#): WG611875 Matrix: Water Units: ug/L
QC Key: DOD4 Lot#: STD80234 Cal ID: LCMS1-24-APR-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Perchlorate	0.200	0.196	98.0	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 5267429
Report generated: 04/28/2017 10:10



Loginnum: L17041302 Cal ID: LCMS1 - Worknum: WG611875
 Instrument ID: LCMS1 Contract #: _____ Method: 6850
 Parent ID: WG611875-04 File ID: LLM.LM39559 Dil: 1 Matrix: WATER
 Sample ID: WG611875-05 MS File ID: LLM.LM39560 Dil: 1 Units: ug/L
 Sample ID: WG611875-06 MSD File ID: LLM.LM39561 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Perchlorate	ND	0.200	0.194	97.0	0.200	0.185	92.5	4.75	80 - 120	15	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Login Number: L17041302
Analytical Method: 6850
ICAL Workgroup: WG611288

Instrument ID: LCMS1
Initial Calibration Date: 24-APR-17 15:40
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
Perchlorate	1.286	4.98	1.00000	

R = Correlation coefficient; 0.995 minimum
R² = Coefficient of determination; 0.99 minimum



Login Number: L17041302
 Analytical Method: 6850

Instrument ID: LCMS1
 Initial Calibration Date: 24-APR-17 15:40
 Column ID: F

Analyte	WG611288-02			WG611288-03			WG611288-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	0.100	21000.0000	1.332	0.200	38200.0000	1.222	0.500	104000.000	1.335

INT_CAL - Modified 03/06/2008
 PDF File ID: 5267454
 Report generated 04/28/2017 10:42



Login Number: L17041302
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 24-APR-17 15:40
Column ID: F

Analyte	WG611288-05			WG611288-06			WG611288-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	1.00	206000.000	1.288	2.00	412000.000	1.312	5.00	955000.000	1.270

INT_CAL - Modified 03/06/2008
PDF File ID: 5267454
Report generated 04/28/2017 10:42



Login Number: L17041302
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 24-APR-17 15:40
Column ID: F

Analyte	WG611288-08		
	CONC	RESP	RF
Perchlorate	10.0	1860000.00	1.244

INT_CAL - Modified 03/06/2008
PDF File ID: 5267454
Report generated 04/28/2017 10:42



Login Number: L17041302 Run Date: 04/24/2017 Sample ID: WG611288-09
 Instrument ID: LCMS1 Run Time: 15:59 Method: 6850
 File ID: 1LM.LM39502 Analyst: JWR QC Key: DOD4
 ICal Workgroup: WG611288 Cal ID: LCMS1 - 24-APR-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
Perchlorate	1.00	0.977	ug/L	1.24	2.30	15	

* Exceeds %D Limit



Login Number: L17041302 Run Date: 04/27/2017 Sample ID: WG611877-01
Instrument ID: LCMS1 Run Time: 14:12 Method: 6850
File ID: LLM.LM39553 Analyst: JWR Units: ug/L
Workgroup (AAB#): WG611875 Cal ID: LCMS1 - 24-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17041302 Run Date: 04/27/2017 Sample ID: WG611877-04
 Instrument ID: LCMS1 Run Time: 17:59 Method: 6850
 File ID: LLM.LM39565 Analyst: JWR Units: ug/L
 Workgroup (AAB#): WG611875 Cal ID: LCMS1 - 24-APR-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
 F = Result is between MDL and RL.
 * = Result is above RL.



Login Number: L17041302 Run Date: 04/27/2017 Sample ID: WG611877-02
Instrument ID: LCMS1 Run Time: 14:31 Method: 6850
File ID: 1LM.LM39554 Analyst: JWR QC Key: DOD4
Workgroup (AAB#): WG611875 Cal ID: LCMS1 - 24-APR-17
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.04	ug/L	1.32	4.00	15	

* Exceeds %D Criteria



Login Number: L17041302 Run Date: 04/27/2017 Sample ID: WG611877-03
 Instrument ID: LCMS1 Run Time: 17:21 Method: 6850
 File ID: 1LM.LM39563 Analyst: JWR QC Key: DOD4
 Workgroup (AAB#): WG611875 Cal ID: LCMS1 - 24-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.03	ug/L	1.31	3.00	15	

* Exceeds %D Criteria



Login Number: L17041302 Run Date: 04/27/2017 Sample ID: WG611875-07
 Instrument ID: LCMS1 Run Time: 14:50 Prep Method: 6850
 File ID: 1LM.LM39555 Analyst: JWR Method: 6850
 Workgroup (AAB#): WG611875 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: LCMS1-24-APR-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.197	98.5	70 - 130	



Login Number: L17041302 Run Date: 04/27/2017 Sample ID: WG611875-08
 Instrument ID: LCMS1 Run Time: 17:40 Prep Method: 6850
 File ID: 1LM.LM39564 Analyst: JWR Method: 6850
 Workgroup (AAB#): WG611875 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: LCMS1-24-APR-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.205	103	70 - 130	



Login Number: L17041302
Instrument ID: LCMS1
Workgroup (AAB#): WG611875

ICAL CCV Number: WG611288-05
CAL ID: LCMS1-24-APR-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG611288	NA	NA	777000
Upper Limit	NA	NA	1165500
Lower Limit	NA	NA	388500
<u>L17041302-01</u>	1.00	01	625000
L17041302-02	10000	DL01	849000
WG611875-02	1.00	01	836000
WG611875-03	1.00	01	844000

IS-1 - 018LP

Underline = Response outside limits



Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: 6850	Samplenum: L17041302-01
Instrument: LCMS1	Prep Date: 04/27/2017 13:00	File ID: 1LM.LM39559
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/27/2017 16:06	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: 6850	Samplenum: L17041302-02
Instrument: LCMS1	Prep Date: 04/27/2017 13:00	File ID: 1LM.LM39562
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/27/2017 17:02	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	232000	73400	3.16	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611288-02
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39495
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/24/2017 13:46	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	21000	6820	3.08	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611288-03
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39496
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/24/2017 14:05	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	38200	13500	2.83	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611288-04
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39497
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/24/2017 14:24	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	104000	33400	3.11	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611288-05
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39498
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/24/2017 14:43	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	206000	65300	3.15	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611288-06
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39499
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/24/2017 15:02	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	412000	130000	3.17	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611288-07
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39500
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/24/2017 15:21	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	955000	298000	3.20	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611288-08
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39501
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/24/2017 15:40	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	1860000	603000	3.08	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611288-09
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39502
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/24/2017 15:59	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	197000	65000	3.03	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302
Instrument: LCMS1
Analyst: JWR
Worknum: WG611875

Prep Method: 6850
Prep Date: 04/27/2017 13:00
Anal Method: 6850
Analysis Date: 04/27/2017 15:09

Samplenum: WG611875-01
File ID: 1LM.LM39556
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	40300	12500	3.22	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: 6850	Samplenum: WG611875-02
Instrument: LCMS1	Prep Date: 04/27/2017 13:00	File ID: 1LM.LM39557
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/27/2017 15:28	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302
Instrument: LCMS1
Analyst: JWR
Worknum: WG611875

Prep Method: 6850
Prep Date: 04/27/2017 13:00
Anal Method: 6850
Analysis Date: 04/27/2017 15:47

Samplenum: WG611875-03
File ID: 1LM.LM39558
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	43500	14200	3.06	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: 6850	Samplenum: WG611875-05
Instrument: LCMS1	Prep Date: 04/27/2017 13:00	File ID: 1LM.LM39560
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/27/2017 16:24	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	34100	10300	3.31	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: 6850	Samplenum: WG611875-06
Instrument: LCMS1	Prep Date: 04/27/2017 13:00	File ID: 1LM.LM39561
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/27/2017 16:43	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	35900	11600	3.09	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302
Instrument: LCMS1
Analyst: JWR
Worknum: WG611875

Prep Method: 6850
Prep Date: 04/27/2017 13:00
Anal Method: 6850
Analysis Date: 04/27/2017 14:50

Samplenum: WG611875-07
File ID: 1LM.LM39555
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	42300	13300	3.18	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: 6850	Samplenum: WG611875-08
Instrument: LCMS1	Prep Date: 04/27/2017 13:00	File ID: 1LM.LM39564
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/27/2017 17:40	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	48100	15800	3.04	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611877-01
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39553
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/27/2017 14:12	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	1250	546	2.29	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611877-02
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39554
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/27/2017 14:31	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	221000	70000	3.16	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611877-03
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39563
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/27/2017 17:21	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	231000	74800	3.09	2.3	3.8	

Perchlorate Ion Ratios
 Microbac Laboratories Inc.



Login #: L17041302	Prep Method: _____	Samplenum: WG611877-04
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39565
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG611875	Analysis Date: 04/27/2017 17:59	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	817	0.000	0.000	2.3	3.8	*

3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
April 28, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
OJE - OMOYEMWEN J. ENGLISH	PDM - PIERCE D. MORRIS
PIT - MICROBAC WARRENDALE	REK - BOB E. KYER
RLB - BOB BUCHANAN	RNP - RICK N. PETTY
SAV - SARAH A. VANDENBERG	SCA - SUEELLEN C. ADAMS
SCB - SARAH C. BOGOLIN	SCJ - SUE ELLEN C. JOHNSON
SDC - SHALYN D. CONLEY	TB - TODD BOYLE
TMB - TIFFANY M. BAILEY	TMM - TAMMY M. MORRIS
VC - VICKI COLLIER	WTD - WADE T. DELONG
XXX - UNAVAILABLE OR SUBCONTRACT	

List of Valid Qualifiers

April 28, 2017

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample receipt exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample receipt exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentatively identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound



List of Valid Qualifiers

April 28, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample receipt exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below



CHAIN OF CUSTODY

Name Of Lab Shipping To: MICROBAC (800) 373-4071 ATTN: STEPHANIE MOSSBURG

Project: AECOM LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS		Project No.: 60256135.GWTPPT HRUMAR16	
Job: GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES			
Prepared By: Scott Beesinger		P.O. Number	
Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD
LH18/24-SP650-6435	Water	04/26/17 / 15:00	1 X
LH18/24-SP140-7435	Water	04/26/17 / 15:00	1 X
Analyses PERCHLORATE			
No. OF CONTAINERS: 1 X Microbac OVD Received: 04/27/2017 09:52 By: BRENDA GREENMALT 221000100042 <i>Brenda Greenmalt</i>			
Remarks (Preservatives, etc.) Lab I.D.#			

Additional Remarks: 24 HOUR TAT

Send results to Linda Raabe at linda.raabe@aecom.com or call at 210-253-7518

Relinquished By: <i>Scott Beesinger</i>	Date: 04/26/17	Time: 15:30	Received By:	Date:	Time:	Relinquished By:	Date:	Time:
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Received At Lab By:				For Lab Use Only				
Date:	Time:	Alphal. No.:	Opened By:	Date:	Time:	Temp of Container:	Seal No.:	Condition:
Remarks:								

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17041302

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 28-APR-2017

Samplenum Container ID Products
L17041302-01 899938 6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	27-APR-2017 10:43	BRG		
2	PREP	W1	SEM	27-APR-2017 10:53	CAS	BRG	
3	STORE	SEM	A1	28-APR-2017 10:49	BRG	JWR	

Samplenum Container ID Products
L17041302-02 899939 6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	27-APR-2017 10:43	BRG		
2	PREP	W1	SEM	27-APR-2017 10:53	CAS	BRG	
3	STORE	SEM	A1	28-APR-2017 10:49	BRG	JWR	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login



NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
 Total Halide by Bomb Combustion (TX)
 Particle Sizing - 200 Mesh (PS200)
 Specific Gravity/Density (SPGRAV)
 Total Residual Chlorine (CL-TRL)
 Total Volatile Solids (all forms) (TVS)
 Total Coliform Bacteria (all methods)
 Fecal Coliform Bacteria (all methods)
 Sulfite (SO₃)
 Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS

Nitrogen, Ammonia by Method 350.1
 Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
 Phenolics, Total by Method 420.1
 ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
 Acetic acid
 Butyric acid
 Lactic acid
 Propionic acid
 Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
 1-Methylnaphthalene
 1,4-Dioxane
 Atrazine
 Benzaldehyde
 Biphenyl
 Caprolactam
 Hexamethylphosphoramide (HMPA)
 Pentachlorobenzene
 Pentachloroethane

NELAP Accreditation by Laboratory SOP**NONPOTABLE WATER**OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALSOVD MSS01/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP**SOLID AND HAZARDOUS CHEMICALS**OVD MSV01/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)



Laboratory Report Number: L17041304

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on May 08 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com

Lab Report #: L17041304

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution
-------------	------------

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00114151	H	2.0		J4616881560	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

**Lab Report #:** L17041304**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP650-6435-GRAB	L17041304-01	04/26/2017 15:00	04/27/2017 09:52

Microbac REPORT L17041304
PREPARED FOR AECOM Technical Services, Inc.
WORK ID:

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1.0 Summary Data

1.1 Narratives



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	NH3
Prep Batch Number(s):	WG612149	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-05-08 13:02:44



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	NH3
Prep Batch Number(s):	WG612149	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	NH3
Prep Batch Number(s):	WG612149	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	NH3
Prep Batch Number(s):	WG612149	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	NH3
Prep Batch Number(s):	WG612149	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	NH3
Prep Batch Number(s):	WG612149	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611841	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-05-08 13:02:00



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611841	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611841	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611841	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611841	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	PO4
Prep Batch Number(s):	WG611841	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611940	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-05-08 13:03:13



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611940	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):	X				
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611940	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?			X		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611940	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			X		
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?			X		
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)			X		
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions			X		
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611940	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	X				
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17041304
Project Name:		Method:	TOC
Prep Batch Number(s):	WG611940	Reviewer Name:	Deanna Hesson
LRC Date:	2017-05-08 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

1.2 Certificate of Analysis

Lab Report #: L17041304
 Lab Project #: 2551.096
 Project Name: Longhorn Army Ammunition
 Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041304-01	PrePrep Method: N/A	Instrument: SMARTCHEM2
Client ID: LH18/24-SP650-6435-GRAB	Prep Method: 350.1	Prep Date: N/A
Matrix: Water	Analytical Method: 350.1	Cal Date: 05/01/2017 08:38
Workgroup #: WG612149	Analyst: DCM	Run Date: 05/01/2017 09:40
Collect Date: 04/26/2017 15:00	Dilution: 10	File ID: S2170501001.075
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrogen, Ammonia	7664-41-7	16.3		2.00	1.00	0.500

Certificate of Analysis

Sample #: L17041304-01	PrePrep Method: N/A	Instrument: V-1200
Client ID: LH18/24-SP650-6435-GRAB	Prep Method: 365.2	Prep Date: N/A
Matrix: Water	Analytical Method: 365.2	Cal Date: 03/09/2017 11:26
Workgroup #: WG611841	Analyst: DLP	Run Date: 04/27/2017 15:00
Collect Date: 04/26/2017 15:00	Dilution: 5	File ID: 00.1704271500-06
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Orthophosphate	14265-44-2	3.37		0.500	0.250	0.125

Certificate of Analysis

Sample #: L17041304-01	PrePrep Method: N/A	Instrument: TOC-VWP
Client ID: LH18/24-SP650-6435-GRAB	Prep Method: 415.1	Prep Date: N/A
Matrix: Water	Analytical Method: 415.1	Cal Date: 02/10/2017 10:25
Workgroup #: WG611940	Analyst: DCM	Run Date: 05/01/2017 14:38
Collect Date: 04/26/2017 15:00	Dilution: 10	File ID: TC05012017.033
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	138		20.0	10.0	5.00

2.0 Full Sample Data Package

2.1 General Chemistry Data

2.1.1 Ammonia Data

2.1.1.1 Summary Data

Lab Report #: L17041304

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041304-01	PrePrep Method: N/A	Instrument: SMARTCHEM2
Client ID: LH18/24-SP650-6435-GRAB	Prep Method: 350.1	Prep Date: N/A
Matrix: Water	Analytical Method: 350.1	Cal Date: 05/01/2017 08:38
Workgroup #: WG612149	Analyst: DCM	Run Date: 05/01/2017 09:40
Collect Date: 04/26/2017 15:00	Dilution: 10	File ID: S2170501001.075
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Nitrogen, Ammonia	7664-41-7	16.3		2.00	1.00	0.500

2.1.1.2 QC Summary Data

Example Calculations for Visible Spectrophotometric Methods

Linear Calibration Model

Step 1 - Retrieve Curve Data from ICAL

m = slope of the linear equation
 b = intercept from the linear equation
 y = instrument response as absorbance or OD
 x = concentration of analyte (mg/L)
 $y = mx + b$

Step 2: Calculate the instrument concentration, x

Where:

$$x = (y - b)/m$$

Step 3: Solve for analyte concentration in sample, Cx

$$Cx = (x) (D)$$

Example Calculation (LCS):

Value of m from plot:	7.809
Value of b from plot:	0.0004135
Absorbance of unknown from quantitation report (y):	0.31
Calculated concentration (x):	0.03964483
Dilution factor (D):	1.00
Concentration of analyte in sample, Cy:	0.0396 mg/L

SmartChem Autoanalyzer - Quadratic Calibration for Chloride and Sulfate

Step 1 - Retrieve Curve Data from Smartchem ICAL

A, B, C = constants from the ICAL quadratic regression

x = instrument response as absorbance or OD

y = concentration of analyte (mg/L)

Step 2: Calculate the instrument concentration, y

Where:

$$y = Ax^2 + Bx + C$$

Step 3: Solve for analyte concentration in sample, Cy

$$Cy = (y) (D)$$

Example Calculation (LCS):

Value of A from plot:	101.2796
Value of B from plot:	318.9056
Value of C from plot:	-2.2712
Absorbance of unknown from quantitation report (x):	0.1583
Calculated concentration (y):	50.7495108
Dilution factor (D):	1.00
Concentration of analyte in sample, Cy:	50.75 mg/L

Microbac Laboratories Inc.

Data Checklist

Date: 01-MAY-2017
 Analyst: DCM
 Analyst: NA
 Method: NH3
 Instrument: SC2
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG612149 WG612146

Calibration/Linearity	05-01-2017
Second Source Check	X
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	X
QC Violation Sheet	X
Case Narratives	X
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	DCM
Secondary Reviewer	SAV
Comments	

Primary Reviewer:
01-MAY-2017



Secondary Reviewer:
01-MAY-2017




Analytical Method: 350.1
Login Number: L17041304

AAB#: WG612149

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6435-GRAB	01	04/26/17					05/01/2017	4.8	28		05/01/17	4.8	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17041304 Work Group: WG612149
 Blank File ID: S2170501001.043 Blank Sample ID: WG612149-01
 Prep Date: 05/01/17 09:11 Instrument ID: SMARTCHEM2
 Analyzed Date: 05/01/17 09:11 Method: 350.1
 Analyst: DCM

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG612149-02	S2170501001.046	05/01/17 09:14	01
DUP	WG612149-04	S2170501001.071	05/01/17 09:36	01
LH18/24-SP650-6435-GRAB	L17041304-01	S2170501001.075	05/01/17 09:40	DL01

Report Name: BLANK_SUMMARY
 PDF File ID: 5269575
 Report generated 05/01/2017 14:31



Login Number: L17041304 Prep Date: 05/01/17 09:11 Sample ID: WG612149-01
Instrument ID: SMARTCHEM2 Run Date: 05/01/17 09:11 Prep Method: 350.1
File ID: S2170501001.043 Analyst: DCM Method: 350.1
Workgroup (AAB#): WG612149 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: SMARTC-01-MAY-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Nitrogen, Ammonia	0.0500	0.200	0.0500	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5269576
01-MAY-2017 14:31



Login Number: L17041304 Run Date: 05/01/2017 Sample ID: WG612149-02
Instrument ID: SMARTCHEM2 Run Time: 09:14 Prep Method: 350.1
File ID: S2170501001.046 Analyst: DCM Method: 350.1
Workgroup (AAB#): WG612149 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD80299 Cal ID: SMARTC - 01-MAY-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Nitrogen, Ammonia	2.00	1.90	94.8	90 - 110	

LCS - Modified 03/06/2008
PDF File ID: 5269577
Report generated: 05/01/2017 14:31



2.1.1.3 Raw Data

SMARTCHEM RUN LOG
(smartchem2, smartchem3)

WORKGROUP: WG612146
6/12/14

Daily Check

- Lamp On
- Probe Rinse Full
- DI Water > 1/2 Full
- Wash Solution > 1/2 Full
- NO3 Reagent bottle connected / purged
- NO3 pH adj to pH 5-9
- Syringe filter lot # _____
- pH paper Lot #: _____
- WBL Run
- Reagents Full
- Dilution H2O Full
- Waste Container Check

- 1) Workgroup _____
Plan # 20170501001
- 2) Workgroup _____
Plan # _____
- 3) Workgroup _____
Plan # _____
- Instrument: SC1 SC2

Analyte	1 2 3		
	NH3		
SC Prepared Curve			
Position			
1-1	ICV		
1-2	Bik		
1-3	LCS		
1-4	LCSDUP		
1-5	04-1270-01		
1-6	MS 02		
1-7	MSD 03		
1-8	10		
1-9	13		
1-10	16		
1-11	19		
1-12	22		
1-13	25		
1-14	04-1334-35		
1-15	37		
1-16	39		
1-17	04-1457-01		
1-18	04		
1-19	MS 05		
1-20	MSD 06		
1-21	13		
1-22	16		
2-1	19		
2-2	22		
2-3	25		

Position	Analyte	1 2 3		
2-4	04-1457-28			
2-5	31			
2-6	34			
2-7	DUP 04-1457-31			
2-8	Bik			
2-9	LCS			
2-10	04-1240-01			
2-11	03			
2-12	05			
2-13	07			
2-14	09			
2-15	04-1258-01	4ml/40	* 1/25	
2-16	02	4ml/40	* 1/20	
2-17	03	4ml/40	* 1/20	
2-18	05	4ml/40	* 1/2	
2-19	04-1304-01	1/25		
2-20	04-1313-01			
2-21	02			
2-22	03			
2-23	04			
2-24	04-1335-23			
2-25	24			
2-26	04-1348-01			
3-1	04-1433-01	Auto	1/2	
3-2	02	Auto	1/5	

NOTES:
 * Run NO2 std on NO3 runs
 * LCSD must be run if no MS or Duplicate
 *MS(10% sample): NO3, TKN, NH3, PHOS

DCN#125522



SMARTCHEM RUN LOG
(smartchem2, smartchem3)

WORKGROUP: WG612146

Analyte	1	2	3
Position			
3-3	04-1433-c3	Auto X5	
3-4	DUP 04-1246-c1		
3-5	MS 04-1246-c1		
3-6	MS 04-1246-c3		
3-7	B/K		
3-8	64-1304-c1	1/10	
3-9			
3-10			
3-11			
3-12			
3-13			
3-14			
3-15			

Analyte	1	2	3
Position			
3-16			
3-17			
3-18			
3-19			
3-20			
3-21			
3-22			
3-23			
3-24			
3-25			
3-26			
3-27			
3-28			

Chloride	EPA 325.2/SM 4500-Cl E-2000
Nitrate-Nitrite	EPA 353.2/SM 4500-NO3 F-2000
Alkalinity	EPA 310.2
Sulfate	EPA 375.4/SM 426C (15 th)/SM4500-504 E-1997

<input checked="" type="checkbox"/> Ammonia	EPA 350.1/SM 4500-NH3 B-1997
TKN	EPA 351.2
Phos	EPA 365.4

Analyte	NH3	AT	Reagents
SOP & Revision	K321 R24		REAG 39749
Curve Stock (SC made)	Std 81544		REAG 39873
NO2 STD			REAG 39807
ICV	Std 81402		
CCV	Std 81545		
LCS	st	Std 81658	
MS	see distill Dilution log	Std 80299 0.16102/0.16102 = 1	

Comments: _____

Analyst: David Merkle

Date: 5/1/17

DCN#125522



AMMONIA DISTILLATION LOG

SOP K3501 Revision # 24LCS: std 80299SPIKE: std 80299WATER (mg/L)DAILY DIL. $\frac{5(100)}{250} = 2.0$ DAILY DIL. $\frac{4(100)}{40} = 1.0$

SOIL (mg/Kg)

* All Distillate are at a Final Volume of 40 mL.

RGT 39399RGT 39883

SAMPLE	VOLUME DISTILLED (mL or g)	CHLORINE PRESENT?	pH ADJUSTED 9.5 ± 0.2	COMMENTS
BLANK	40	NO	YES	
LCS(2.0)	40	NO	YES	
LCS-DUP()				
04-1246-01	40	NO	YES	
-03	40	NO	YES	
-05	40	NO	YES	
-07	40	NO	YES	
-09	40	NO	YES	
04-1258-01	4	NO	YES	
-02	4	NO	YES	
-03	4	NO	YES	
-05	4	NO	YES	
04-1304-01	4	NO	YES	
04-1313-01	40	NO	YES	
-02	40	NO	YES	
-03	40	NO	YES	
-04	40	NO	YES	
04-1335-23	40	NO	YES	
-24	40	NO	YES	
04-1348-01	40	NO	YES	
04-1433-01	40	NO	YES	
-02	40	NO	YES	
-03	40	NO	YES	
DUP 04-1246-01	40	NO	YES	
MS(1.0) 04-1246-01	40	NO	YES	
MS(1.0) 04-1246-0203	40	NO	YES	

Analyst: Edna ToddDate/Time: 4-28-17 1047

*MS required on 10% of samples (EPA 350.1)

*MS/MS required on each set of 20 samples (SM4500)

MICROBAC (OVD)
 SMARTCHEM200 INST2 (VER3.1.14)
 NH3, TKN, NO3NO2 (MG/L N)
 ALK (MG/L CaCO3) CL, SO4 (MG/L)

Method : WNH3 -Unit [mg/L] - EPA 350.1/SM4500-NH3 AMMONIA

Smp#[Dil Fact]	Sample ID	Conc	OD	%Recovery/RPD	Flag	Analysis Time
DIL-1	RBL	0.000	0.1041	0.00	R	8:31:00 AM
DIL-1	RBL	0.000	0.0500	0.00		8:31:18 AM
DIL-1	RBL	0.000	0.0521	0.00		8:32:49 AM
DIL-1	Std-1	0.000	0.0001	0.00		8:33:06 AM
SR5-1	Std-2	0.030	0.0078	0.00		8:34:36 AM
SR5-2	Std-3	0.094	0.0273	0.00		8:34:55 AM
SR5-3	Std-4	0.600	0.1876	0.00		8:36:24 AM
SR5-4	Std-5	1.050	0.3141	0.00		8:36:43 AM
SR5-5	Std-6	2.100	0.6225	0.00		8:38:13 AM
ST-1	Std-7	3.000	0.9029	0.00		8:38:31 AM
ST-3	1CCV (1.5 mg/L)	1.473	0.4416	98.17		8:40:01 AM
ST-2	2CCB (0 mg/L)	-0.032	-0.0093	0.00	INV,><,LL	8:40:19 AM
1	ICV	1.476	0.4426	0.00		8:41:49 AM
2	WG612146-01 BLK	-0.032	-0.0093	0.00	INV,><,LL	8:42:07 AM
3	WG612146-02 LCS	1.987	0.5957	0.00		8:43:37 AM
4	WG612146-03 LCSDUP	1.997	0.5987	0.00		8:43:55 AM
5	L17041270-01	0.014	0.0045	0.00		8:45:25 AM
6	L17041270-02 MS	0.973	0.2919	0.00		8:45:43 AM
7	L17041270-03 MSD	0.984	0.2952	0.00		8:47:13 AM
8	L17041270-10	0.024	0.0074	0.00		8:47:31 AM
9	L17041270-13	0.031	0.0096	0.00		8:49:01 AM
10	L17041270-16	0.032	0.0100	0.00		8:49:19 AM
ST-3	1CCV (1.5 mg/L)	1.486	0.4456	99.06		8:50:49 AM
ST-2	2CCB (0 mg/L)	-0.028	-0.0082	0.00	INV,><,LL	8:51:07 AM
11	L17041270-19	-0.007	-0.0016	0.00	INV,><,LL	8:52:37 AM
12	L17041270-22	-0.011	-0.0029	0.00	INV,><,LL	8:52:55 AM
13	L17041270-25	-0.005	-0.0012	0.00	INV,><,LL	8:54:25 AM
14	L17041334-35	-0.009	-0.0025	0.00	INV,><,LL	8:54:43 AM
15	L17041334-37	-0.008	-0.0021	0.00	INV,><,LL	8:56:13 AM
16	L17041334-39	-0.011	-0.0030	0.00	INV,><,LL	8:56:31 AM
17	L17041457-01	0.015	0.0050	0.00		8:58:37 AM
18	L17041457-04	-0.011	-0.0029	0.00	INV,><,LL	8:58:55 AM

Report Date :05/01/2017 Run Date :5/1/2017 Operator : SMARTCHEM2 Plan # :20170501001
 Plan Description : NH3-A2-DCM/05/01/2017

MICROBAC (OVD)
 SMARTCHEM200 INST2 (VER3.1.14)
 NH3, TKN, NO3NO2 (MG/L N)
 ALK (MG/L CaCO3) CL, SO4 (MG/L)

Method : WNH3 -Unit [mg/L] - EPA 350.1/SM4500-NH3 AMMONIA

Smp#[/Dil Fact]	Sample ID	Conc	OD	%Recovery/RPD	Flag	Analysis Time
19	L17041457-05 MS	0.966	0.2897	0.00		9:00:25 AM
20	L17041457-06 MSD	0.957	0.2870	0.00		9:00:43 AM
ST-3	1CCV (1.5 mg/L)	1.481	0.4440	98.71		9:02:13 AM
ST-2	2CCB (0 mg/L)	-0.025	-0.0073	0.00	INV,><,LL	9:02:31 AM
21	L17041457-13	-0.010	-0.0027	0.00	INV,><,LL	9:04:01 AM
22	L17041457-16	-0.010	-0.0027	0.00	INV,><,LL	9:04:19 AM
23	L17041457-19	-0.013	-0.0034	0.00	INV,><,LL	9:05:49 AM
24	L17041457-22	0.013	0.0041	0.00		9:06:07 AM
25	L17041457-25	-0.009	-0.0023	0.00	INV,><,LL	9:07:37 AM
26	L17011457-28	-0.004	-0.0010	0.00	INV,><,LL	9:07:55 AM
27	L17041457-31	0.005	0.0018	0.00		9:09:25 AM
28	L17041457-34	-0.017	-0.0047	0.00	INV,><,LL	9:09:43 AM
29	WG612146-11 DUP	-0.011	-0.0030	0.00	INV,><,LL	9:11:13 AM
30	WG612149-01 BLK	0.011	0.0038	0.00		9:11:31 AM
ST-3	1CCV (1.5 mg/L)	1.492	0.4473	99.44		9:13:01 AM
ST-2	2CCB (0 mg/L)	-0.022	-0.0063	0.00	INV,><,LL	9:13:19 AM
31	WG612149-02 LCS	1.896	0.5683	0.00		9:14:49 AM
32	L17041246-01	0.092	0.0279	0.00		9:15:07 AM
33	L17041246-03	0.673	0.2020	0.00		9:16:37 AM
34	L17041246-05	0.903	0.2709	0.00		9:16:55 AM
35	L17041246-07	0.042	0.0130	0.00		9:18:25 AM
36	L17041246-09	0.064	0.0196	0.00		9:18:43 AM
37	L17041258-01 (250)	2.217	0.6645	0.00		9:20:13 AM
38	L17041258-02 (200)	2.494	0.7476	0.00		9:20:31 AM
39	L17041258-03 (200)	1.402	0.4204	0.00		9:22:01 AM
40	L17041258-05 (20)	2.847	0.8533	0.00		9:22:19 AM
ST-3	1CCV (1.5 mg/L)	1.490	0.4468	99.33		9:23:49 AM
ST-2	2CCB (0 mg/L)	-0.016	-0.0045	0.00	INV,><,LL	9:24:07 AM
41	L17041304-01 (25)	0.637	0.1912	0.00		9:25:37 AM
42	L17041313-01	0.064	0.0196	0.00		9:25:55 AM
43	L17041313-02	0.062	0.0190	0.00		9:27:26 AM
44	L17041313-03	0.071	0.0216	0.00		9:27:44 AM

Report Date :05/01/2017 Run Date :5/1/2017 Operator : SMARTCHEM2 Plan # :20170501001
 Plan Description : NH3-A2-DCM/05/01/2017

MICROBAC (OVD)
 SMARTCHEM200 INST2 (VER3.1.14)
 NH3, TKN, NO3NO2 (MG/L N)
 ALK (MG/L CaCO3) CL, SO4 (MG/L)

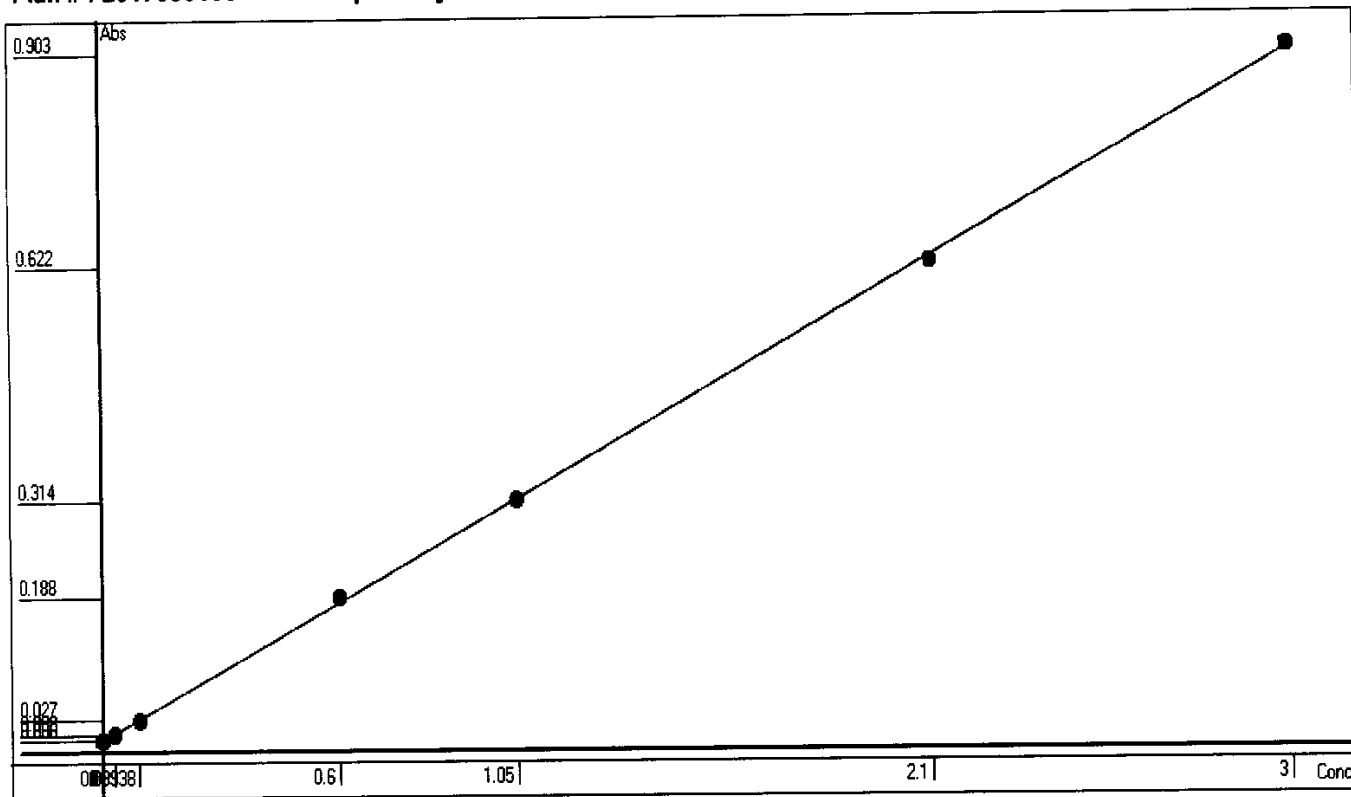
Method : WNH3 -Unit [mg/L] - EPA 350.1/SM4500-NH3 AMMONIA

Smp#[/Dil Fact]	Sample ID	Conc	OD	%Recovery/RPD	Flag	Analysis Time
45	L17041313-04	0.085	0.0259	0.00		9:29:14 AM
46	L17041355-23	0.033	0.0103	0.00		9:29:32 AM
47	L17041355-24	0.078	0.0237	0.00		9:31:02 AM
48	L17041348-01	0.182	0.0550	0.00		9:31:20 AM
49	L17041433-01	7.065	2.1171	0.00	><,LH	9:32:50 AM
50	L17041433-02	15.682	4.6986	0.00	><,LH	9:33:07 AM
ST-3	1CCV (1.5 mg/L)	1.504	0.4509	100.24		9:34:37 AM
ST-2	2CCB (0 mg/L)	-0.018	-0.0051	0.00	INV,><,LL	9:34:55 AM
51	L17041433-03	15.685	4.6995	0.00	><,LH	9:36:26 AM
52	WG612149-04 DUP	0.198	0.0596	0.00		9:36:43 AM
53	WG612149-05 MS	1.083	0.3250	0.00		9:38:14 AM
54	WG612149-07 MS	1.549	0.4644	0.00		9:38:32 AM
55	ID 55 311	0.009	0.0032	0.00		9:40:02 AM
56	ID 56 04-1304-01 (1a)	1.628	0.4882	0.00		9:40:20 AM
ST-3	1CCV (1.5 mg/L)	1.509	0.4526	100.62		9:41:50 AM
ST-2	2CCB (0 mg/L)	-0.016	-0.0043	0.00	INV,><,LL	9:42:08 AM
49-[1/2]	L17041433-01 (2)	3.260	0.4887	0.00	LH	9:54:18 AM
50-[1/2]	L17041433-02 (5)	1.645	0.2469	0.00		9:56:06 AM
51-[1/2]	L17041433-03 (5)	2.073	0.3110	0.00		9:57:54 AM
ST-3	1CCV (1.5 mg/L)	1.508	0.4521	100.51		9:57:54 AM
ST-2	2CCB (0 mg/L)	-0.011	-0.0030	0.00	INV,><,LL	9:59:24 AM

Report Date :05/01/2017 Run Date :5/1/2017 Operator : SMARTCHEM2 Plan # :20170501001
 Plan Description : NH3-A2-DCM/05/01/2017

Calibrant Report - WNH3 -

Calib Lot #:010104 Exp Date:6/17/2020 User:Westco Scientific
 Plan #: 20170501001 Description: [NH3-A2-DCM/05/01/2017] Unit



Point	OD	Conc	Recalc Conc	% Error
1	0.0001	0	-0.0009	-0.09
2	0.0078	0.03	0.0248	-17.33
3	0.0272	0.0938	0.0896	-4.48
4	0.1875	0.6	0.6246	4.10
5	0.3140	1.05	1.0469	-0.30
6	0.6224	2.1	2.0762	-1.13
7	0.9028	3	3.0122	0.41

Conc= +3.3378*Abso -0.0012 R²=0.9998

RBL
0.051
0

Report Date 5/1/2017 Run Date 5/1/2017

2.1.2 Orthophosphate Data

2.1.2.1 Summary Data

Lab Report #: L17041304

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041304-01	PrePrep Method: N/A	Instrument: V-1200
Client ID: LH18/24-SP650-6435-GRAB	Prep Method: 365.2	Prep Date: N/A
Matrix: Water	Analytical Method: 365.2	Cal Date: 03/09/2017 11:26
Workgroup #: WG611841	Analyst: DLP	Run Date: 04/27/2017 15:00
Collect Date: 04/26/2017 15:00	Dilution: 5	File ID: 00.1704271500-06
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Orthophosphate	14265-44-2	3.37		0.500	0.250	0.125

2.1.2.2 QC Summary Data

Example Calculations for Visible Spectrophotometric Methods

Linear Calibration Model

Step 1 - Retrieve Curve Data from ICAL

m = slope of the linear equation
 b = intercept from the linear equation
 y = instrument response as absorbance or OD
 x = concentration of analyte (mg/L)
 $y = mx + b$

Step 2: Calculate the instrument concentration, x

Where:

$$x = (y - b)/m$$

Step 3: Solve for analyte concentration in sample, Cx

$$Cx = (x) (D)$$

Example Calculation (LCS):

Value of m from plot:	7.809
Value of b from plot:	0.0004135
Absorbance of unknown from quantitation report (y):	0.31
Calculated concentration (x):	0.03964483
Dilution factor (D):	1.00
Concentration of analyte in sample, Cy:	0.0396 mg/L

SmartChem Autoanalyzer - Quadratic Calibration for Chloride and Sulfate

Step 1 - Retrieve Curve Data from Smartchem ICAL

A, B, C = constants from the ICAL quadratic regression

x = instrument response as absorbance or OD

y = concentration of analyte (mg/L)

Step 2: Calculate the instrument concentration, y

Where:

$$y = Ax^2 + Bx + C$$

Step 3: Solve for analyte concentration in sample, Cy

$$Cy = (y) (D)$$

Example Calculation (LCS):

Value of A from plot:	101.2796
Value of B from plot:	318.9056
Value of C from plot:	-2.2712
Absorbance of unknown from quantitation report (x):	0.1583
Calculated concentration (y):	50.7495108
Dilution factor (D):	1.00
Concentration of analyte in sample, Cy:	50.75 mg/L

Microbac Laboratories Inc.

Data Checklist

Date: 27-APR-2017
 Analyst: DLP
 Analyst: NA
 Method: PO4
 Instrument: V-1200
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG611841

Calibration/Linearity	
Second Source Check	03-09-17
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	
QC Violation Sheet	X
Case Narratives	
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	
Primary Reviewer	DLP
Secondary Reviewer	SAV
Comments	

Primary Reviewer:
28-APR-2017

Secondary Reviewer:
01-MAY-2017

Dwight Payne

Sarah Vandenberg



Analytical Method: 365.2
Login Number: L17041304

AAB#: WG611841

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6435-GRAB	01	04/26/17					04/27/2017	1	2		04/27/17	1	2	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17041304 Work Group: WG611841
 Blank File ID: 00.1704271500-03 Blank Sample ID: WG611841-01
 Prep Date: 04/27/17 15:00 Instrument ID: V-1200
 Analyzed Date: 04/27/17 15:00 Method: 365.2
 Analyst: DLP

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG611841-02	00.1704271500-04	04/27/17 15:00	
LCS2	WG611841-03	00.1704271500-05	04/27/17 15:00	
LH18/24-SP650-6435-GRAB	L17041304-01	00.1704271500-06	04/27/17 15:00	
DUP	WG611841-05	00.1704271500-07	04/27/17 15:00	

Report Name: BLANK_SUMMARY
 PDF File ID: 5269364
 Report generated 05/01/2017 13:44



Login Number: L17041304 Prep Date: 04/27/17 15:00 Sample ID: WG611841-01
Instrument ID: V-1200 Run Date: 04/27/17 15:00 Prep Method: 365.2
File ID: 00.1704271500-03 Analyst: DLP Method: 365.2
Workgroup (AAB#): WG611841 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: V-1200-12-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Orthophosphate	0.0250	0.100	0.0250	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name: BLANK
PDF ID: 5269365
01-MAY-2017 13:44



Login Number: L17041304 Analyst: DLP Prep Method: 365.2
 Instrument ID: V-1200 Matrix: Water Method: 365.2
 Workgroup (AAB#): WG611841 Units: mg/L
 QC Key: DOD4 Lot #: STD81623
 Sample ID: WG611841-02 LCS File ID: 00.1704271500-04 Run Date: 04/27/2017 15:00
 Sample ID: WG611841-03 LCS2 File ID: 00.1704271500-05 Run Date: 04/27/2017 15:00

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Orthophosphate	1.00	0.999	99.9	1.00	0.999	99.9	0.00	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5269366
 Report generated: 05/01/2017 13:44



2.1.2.3 Raw Data

Std 605653

Curves

Parameter: P04

Spectrophotometer: V-1200

Calibration (Curve) standard stock: 79640

Concentration: 1000 mg/L

Recipe for preparation of curve standards found in:
 SOP: 3653 Revision: 11 Page: 9

Second Source Stock: 58130857 (concentration: 10)

Daily Preparation: 10(10)/100
 concentration = 1.0

Calibration Standards (mg/L)	Volume (mL)	Cell Size (cm)	Wavelength (nm)	Absorbance
1.0	50	1cm	9540	0.635
0.7	↓	↓	↓	0.440
0.5	↓	↓	↓	0.318
0.2	↓	↓	↓	0.129
0.1	↓	↓	↓	0.067
0.05	↓	↓	↓	0.038
0	↓	↓	↓	0.007
2nd Source 1.0	↓	↓	↓	0.631

Analyst: Ariel Greene

Date/Time: 3/9/12 @ 0125

DCN#124439



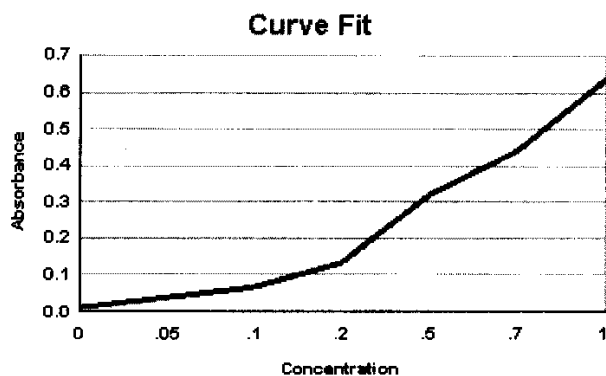
Microbac Laboratories Inc.
INITIAL CALIBRATION

Workgroup: WG605653
Analytical Method: 300
Instrument ID: V-1200

Analyst: ADG
Initial Calibration Date: 03/09/2017

Analyte: **ORTHOPHOSPHATE**
Number of Points: 7
Slope: 0.626650
Y-Intercept: 0.00514888
Coef. Of Correlation (R^2): 0.999901
Coef. Of Correlation (R): 0.999951

Concentration X	Absorbance Y	X ²	X * Y	Y-Fitted (mX ² +B)
0.00	0.00700	0.00	0.00	0.00514888
0.0500	0.0380	0.00250	0.00190	0.0364814
0.100	0.0670	0.0100	0.00670	0.0678139
0.200	0.129	0.0400	0.0258	0.130479
0.500	0.318	0.250	0.159	0.318474
0.700	0.440	0.490	0.308	0.443804
1.00	0.635	1.00	0.635	0.631799



WG_ICAL_CAL_WET - Modified 03/06/2008
Report generated 03/09/2017 12:03



Microbac Laboratories Inc.
ALTERNATE SOURCE REPORT

Workgroup #: WG605653
File ID: 00.1703091126-08
CCV ID: WG605653-08
Units: mg/L
Analyte: ORTHOPHOSPHATE

Instrument ID: V-1200
Run Date: 03/09/2017
Run Time: 11:26
Analyst: ADG
Cal ID: V-1200 - 09-MAR-17 11:26:07

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	1	0.999	0.631	0.1	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_SSCV - Modified 03/06/2008
Report generated 03/09/2017 12:06



Microbac Laboratories Inc.
SAMPLE REPORT

Workgroup: WG611841
Analyte: ORTHOPHOSPHATE

Analyst: DLP
Date: 04/27/2017

Sample ID	I Vol	F Vol	Response	Slope	Y Intercept	Anal. Conc.	Rep. Conc.	Dil	Units
WG611841-01	50	50	0	0.6267	0.005149	-0.0082165	-0.0082165	1	mg/L
WG611841-02	50	50	0.631	0.6267	0.005149	0.99872	0.99872	1	mg/L
WG611841-03	50	50	0.631	0.6267	0.005149	0.99872	0.99872	1	mg/L
L17041304-01	50	50	0.427	0.6267	0.005149	0.67318	3.3659	5	mg/L
WG611841-04	50	50	0.427	0.6267	0.005149	0.67318	3.3659	5	mg/L
WG611841-05	50	50	0.427	0.6267	0.005149	0.67318	3.3659	5	mg/L
WG611841-06	50	50	0.468	0.6267	0.005149	0.73861	3.6931	5	mg/L

UV_SAMPLE_REPORT - Modified 03/06/2008

Report generated 04/28/2017 08:10

Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00854715

Workgroup #: WG611938 Instrument ID: V-1200
File ID: 00.1704271500-09 Run Date: 04/27/2017
CCV ID: WG611938-03 Run Time: 15:00
Units: mg/L Analyst: DLP
Analyte: ORTHOPOSPHATE Cal ID: V-1200 - 12-APR-17

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	.5	0.504	0.642	0.8	

* Exceeds %D Limit

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/28/2017 08:08



Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00854716

Workgroup #: WG611938
File ID: 00.1704271500-01
CCV ID: WG611938-01
Units: mg/L
Analyte: ORTHOPHOSPHATE

Instrument ID: V-1200
Run Date: 04/27/2017
Run Time: 15:00
Analyst: DLP
Cal ID: V-1200 - 12-APR-17

Analyte	Expected	Found	RF	%D	Q
Orthophosphate	.5	0.509	0.648	1.8	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 04/28/2017 08:08



2.1.3 Total Organic Carbon Data

2.1.3.1 Summary Data

Lab Report #: L17041304

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17041304-01	PrePrep Method: N/A	Instrument: TOC-VWP
Client ID: LH18/24-SP650-6435-GRAB	Prep Method: 415.1	Prep Date: N/A
Matrix: Water	Analytical Method: 415.1	Cal Date: 02/10/2017 10:25
Workgroup #: WG611940	Analyst: DCM	Run Date: 05/01/2017 14:38
Collect Date: 04/26/2017 15:00	Dilution: 10	File ID: TC05012017.033
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Total Organic Carbon	TOC	138		20.0	10.0	5.00

2.1.3.2 QC Summary Data

**Total Organic Carbon Example Calculations
(Direct Readout Parameter)**

$$(\text{Readout})/(\text{dilution}) = \text{mg/L}$$

where:

Readout = direct readout from the instrument

dilution = dilution in decimal form (ex. 1/5 dilution = 0.2)

Microbac Laboratories Inc.

Data Checklist

Date: 01-MAY-2017
 Analyst: ADG
 Analyst: NA
 Method: TOC
 Instrument: TOCVPM
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG612017 611940

Calibration/Linearity	02/10/17
Second Source Check	
ICV/CCV (std)	X
ICB/CCB	X
Blank	X
LCS/LCS Dup	X
MS/MSD	X
Duplicate	X
Upload Results	X
Client Forms	X
QC Violation Sheet	X
Case Narratives	X
Signed Raw Data	X
STD/LCS on benchsheet	X
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Primary Reviewer	ADG
Secondary Reviewer	SAV
Comments	

Primary Reviewer:
03-MAY-2017

April Greene

Secondary Reviewer:
03-MAY-2017

Sarah Vandenberg



Analytical Method: 415.1
Login Number: L17041304

AAB#: WG611940

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6435-GRAB	01	04/26/17					05/01/2017	5	28		05/01/17	5	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17041304 Work Group: WG611940
 Blank File ID: TC05012017.004 Blank Sample ID: WG611940-01
 Prep Date: 05/01/17 08:10 Instrument ID: TOC-VWP
 Analyzed Date: 05/01/17 08:10 Method: 415.1
 Analyst: DCM

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG611940-02	TC05012017.005	05/01/17 08:22	01
LCS2	WG611940-03	TC05012017.006	05/01/17 08:34	01
DUP	WG611940-05	TC05012017.031	05/01/17 14:10	01
LH18/24-SP650-6435-GRAB	L17041304-01	TC05012017.033	05/01/17 14:38	DL01

Report Name: BLANK_SUMMARY
 PDF File ID: 5275056
 Report generated 05/03/2017 16:20



Login Number: L17041304 Prep Date: 05/01/17 08:10 Sample ID: WG611940-01
 Instrument ID: TOC-VWP Run Date: 05/01/17 08:10 Prep Method: 415.1
 File ID: TC05012017.004 Analyst: DCM Method: 415.1
 Workgroup (AAB#): WG611940 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: TOC-VW-10-FEB-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Total Organic Carbon	0.500	2.00	0.500	1	U

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5275057
 03-MAY-2017 16:20



Login Number: L17041304 Analyst: DCM Prep Method: 415.1
 Instrument ID: TOC-VWP Matrix: Water Method: 415.1
 Workgroup (AAB#): WG611940 Units: mg/L
 QC Key: DOD4 Lot #: STD80787

Sample ID: WG611940-02 LCS File ID: TC05012017.005 Run Date: 05/01/2017 08:22
 Sample ID: WG611940-03 LCS2 File ID: TC05012017.006 Run Date: 05/01/2017 08:34

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Total Organic Carbon	25.0	26.3	105	25.0	26.2	105	0.114	85 - 115	15	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5275058
 Report generated: 05/03/2017 16:20



2.1.3.3 Raw Data

Curve

~~WG 602411~~
~~WG 602476~~ *dm/11/13/17*
 WG 602481

Total Organic Carbon

MAKE DAILY

CCV (TOC): _____ LCS (TOC): _____
 (5/200)(1000) = 25mg/L (5/200)(1000) = 25mg/L

CCV (TIC): _____ MS (TOC): _____
 (5/200)(1000) = 25mg/L _____

Calibration Curve Date: _____ Reagent: RET 35944
RET 37673

SM5310-C : Matrix 2 WG _____
 EPA 415.1/9060A(mod): Matrix 1 WG _____ SOP: K 4151 Rev. 18 *dm/11/13/17*
 Instrument: Shimadza TOC-VWP/ASI

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> drain reservoir filled | <input checked="" type="checkbox"/> DAILY CHECK | <input checked="" type="checkbox"/> sufficient acid waste container |
| <input checked="" type="checkbox"/> ASI water bottle full | <input checked="" type="checkbox"/> 3 rd bottle full | |
| <input checked="" type="checkbox"/> dilution water bottle full | <input checked="" type="checkbox"/> sufficient gas | |
| | <input checked="" type="checkbox"/> sufficient persulfate | |

Position	Sample ID	Dilution	Position	Sample ID	Dilution	Position	Sample ID	Dilution
1	TC Curve		26	TC Curve		51		
2	TC ICV		27	Std 79318		52	See SOP	
3	TIC Curve		28			53	for point	
4	TIC ICV		29	TIC Curve		54	preparation	
5			30	Std 80415		55		
6			31			56		
7			32			57		
8			33	TOC (TC)		58		
9			34	ICV		59		
10			35	Std 77870		60	5/200 (1000) = 25	
11			36			61		
12			37	TIC ICV		62		
13			38	Std 80416		63		
14			39			64		
15			40			65		
16			41			66		
17			42			67		
18			43			68		
19	all points		44	analyzed in duplicate		69		
20			45			70		
21			46			71		
22			47			72		
23			48			73		
24			49			74		
25			50			75		

Analyst: David Merckel Date/Time: 2/10/17

DCN#123915



C:\TOC3201\Data\CURVES-02-10-2017.t32

	Analysis	Sample Name	Result	Status	Date / Time	Vial
1	TC	TCCURVE		Complete	2/10/2017 10:29:51 A	0, 1, 2, 3, 4, 5
2	TC	TOC ICV	TC:23.90mg/L	Complete	2/10/2017 10:47:48 A	6
3	IC	TICCURVE		Complete	2/10/2017 3:55:41 PM	0, 1, 2, 3, 4, 5
4	IC	TIC CURVE	IC:24.27mg/L	Complete	2/10/2017 4:12:07 PM	6
5	TC		TC:0.000mg/L	Complete	2/10/2017 4:31:41 PM	7
6	IC	TOC/TIC	IC:8.571mg/L	Complete	2/10/2017 4:42:05 PM	7
7	TC	TOC/TIC	TC:32.10mg/L	Complete	2/10/2017 5:01:02 PM	7

2/13/2017 7:01:58 AM

1/1

2/12/2017 11:18:36 AM

CURVES-02-10-2017.i32

Instr. Information

System
DetectorTOCVW ASI
Wet Chemical

Cal. Curve

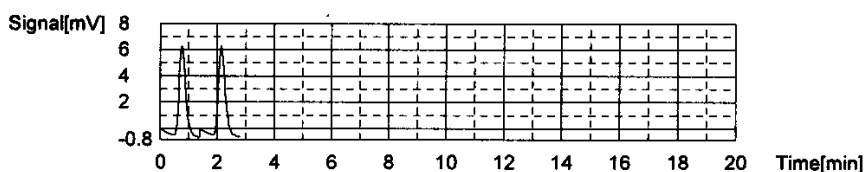
Sample Name: TCCURVE
 Sample ID: Untitled
 Cal. Curve: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
 Status: Completed

Type	Anal.
Standard	TC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.83	500uL	1	*****		2/10/2017 9:36:31 AM
2	10.82	500uL	1	*****		2/10/2017 9:40:05 AM

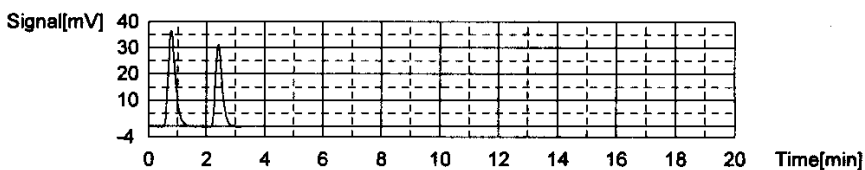
Acid Add. 0.000%
 Mean Area 10.82



Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	64.31	500uL	1	*****		2/10/2017 9:45:28 AM
2	51.52	500uL	1	*****		2/10/2017 9:49:19 AM

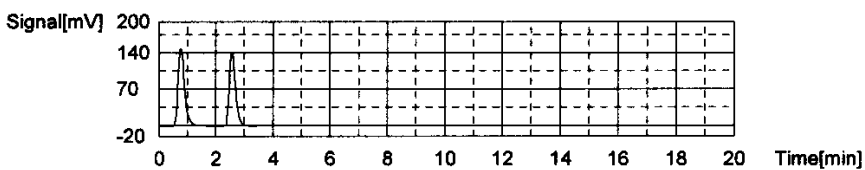
Acid Add. 0.000%
 Mean Area 57.92



Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	238.4	500uL	1	*****		2/10/2017 9:55:04 AM
2	216.3	500uL	1	*****		2/10/2017 9:58:58 AM

Acid Add. 0.000%
 Mean Area 227.4

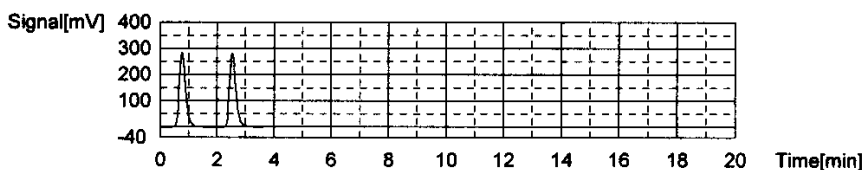


Conc: 10.00mg/L

1/6

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	442.5	500uL	1	*****		2/10/2017 10:04:41 AM
2	437.9	500uL	1	*****		2/10/2017 10:08:48 AM

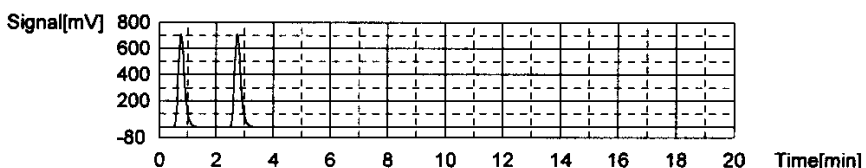
Acid Add. 0.000%
Mean Area 440.2



Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1091	500uL	1	*****		2/10/2017 10:14:47 AM
2	1092	500uL	1	*****		2/10/2017 10:19:05 AM

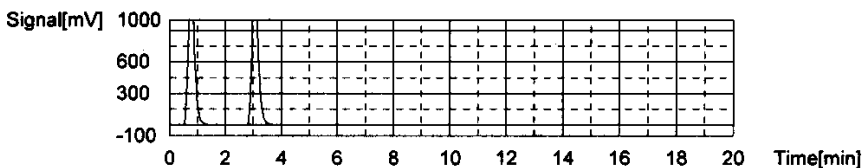
Acid Add. 0.000%
Mean Area 1092



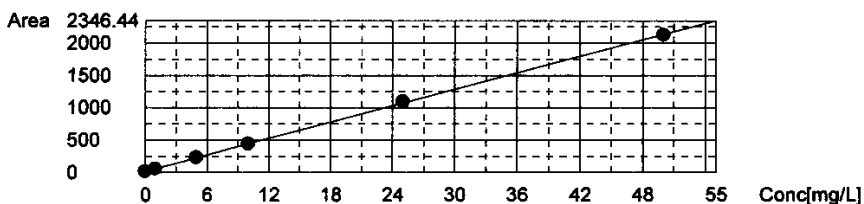
Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	2132	500uL	1	*H*****		2/10/2017 10:25:19 AM
2	2118	500uL	1	*H*****		2/10/2017 10:29:51 AM

Acid Add. 0.000%
Mean Area 2125



Slope: 42.33
Intercept 16.87
r^2 0.999887
Zero Shift No



Sample

Sample Name: TOC ICV
Sample ID: Untitled
Origin: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
Status: Completed
Chk. Result:

Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:23.90mg/L

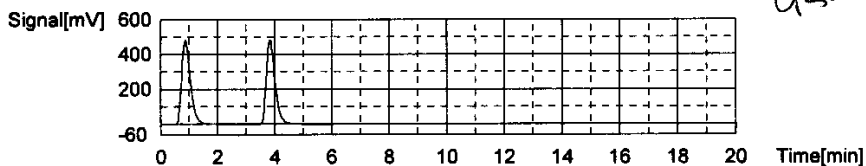
1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1029	23.91mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	2/10/2017 10:42:11 AM
2	1028	23.89mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	2/10/2017 10:47:48 AM

95.6%

Mean Area 1029
Mean Conc. 23.90mg/L



Cal. Curve

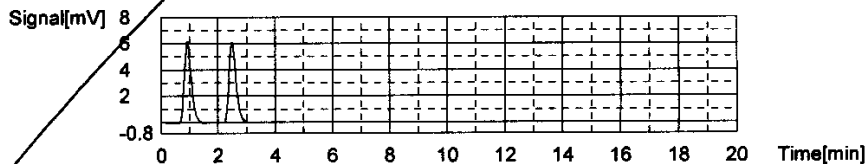
Sample Name: TICCURVE
Sample ID: Untitled
Cal. Curve: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
Status: Completed

Type	Anal.
Standard	TC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.59	500uL	1	*****		2/10/2017 2:49:09 PM
2	10.43	500uL	1	*****		2/10/2017 2:53:06 PM

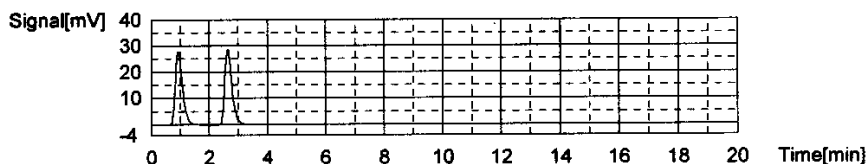
Acid Add. 3.000%
Mean Area 10.51



Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	48.13	500uL	1	*****		2/10/2017 3:00:24 PM
2	49.13	500uL	1	*****		2/10/2017 3:04:41 PM

Acid Add. 3.000%
Mean Area 48.63

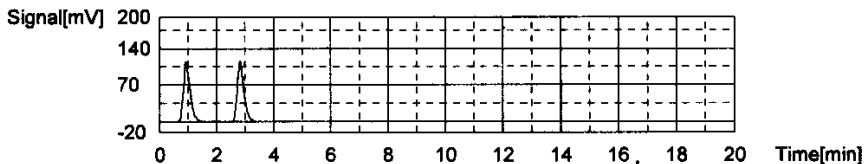


Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	189.0	500uL	1	*****		2/10/2017 3:12:24 PM
2	190.1	500uL	1	*****		2/10/2017 3:16:55 PM

*dem
3/23/17*

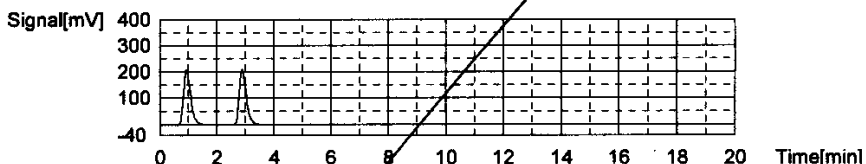
Acid Add. 3.000%
Mean Area 189.6



Conc: 10.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	360.6	500uL	1	*****		2/10/2017 3:24:47 PM
2	362.2	500uL	1	*****		2/10/2017 3:29:24 PM

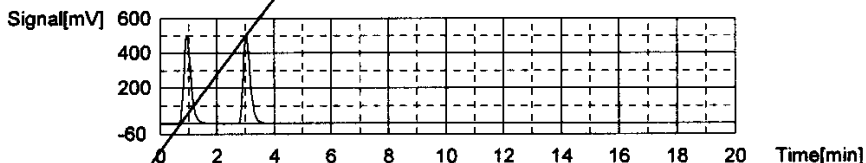
Acid Add. 3.000%
Mean Area 361.4



Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	859.3	500uL	1	*****		2/10/2017 3:37:23 PM
2	856.9	500uL	1	*****		2/10/2017 3:42:16 PM

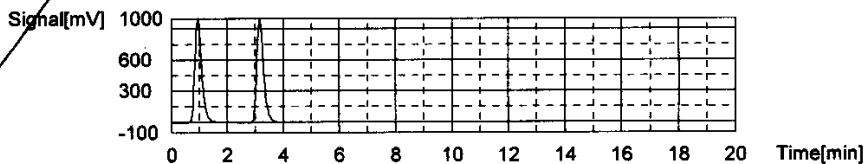
Acid Add. 3.000%
Mean Area 858.1



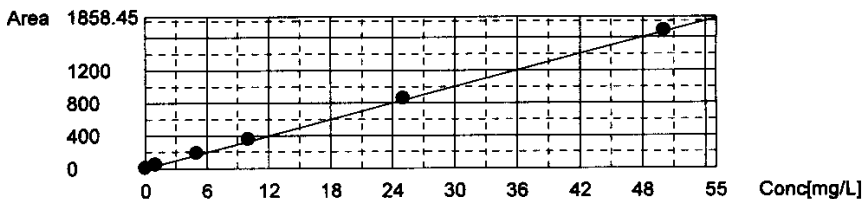
Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1690	500uL	1	*****		2/10/2017 3:50:31 PM
2	1689	500uL	1	*****		2/10/2017 3:55:41 PM

Acid Add. 3.000%
Mean Area 1690



Slope: 33.49
Intercept: 0.000
r^2: 0.999919
Zero Shift: Yes



Sample

dcm

See following pages for curve, slope, intercept
and zero shift unchecked

TOC-V Cal Curve Information
TICCURVE-02-10-2017.2017_02_10_14_45_10.cal

Date of Creation 2:10:17 PM 2/10/2017
User
System TOCVW ASI

Cal. Curve

Sample Name: TICCURVE
Sample ID: Untitled
Cal. Curve: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
Status Completed
Comment:

Type	Anal.
Standard	IC

Conc: 0.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	10.59	500uL	1	*****		2/10/2017 2:49:09 PM
2	10.43	500uL	1	*****		2/10/2017 2:53:06 PM

Acid Add. 3.000%
Mean Area 10.51
SD Area 0.1131
CV Area 1.08%
Vial 0

Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	48.13	500uL	1	*****		2/10/2017 3:00:24 PM
2	49.13	500uL	1	*****		2/10/2017 3:04:41 PM

Acid Add. 3.000%
Mean Area 48.63
SD Area 0.7071
CV Area 1.45%
Vial 1

Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	189.0	500uL	1	*****		2/10/2017 3:12:24 PM
2	190.1	500uL	1	*****		2/10/2017 3:16:55 PM

Acid Add. 3.000%
Mean Area 189.6
SD Area 0.7778
CV Area 0.41%
Vial 2

Conc: 10.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	360.6	500uL	1	*****		2/10/2017 3:24:47 PM
2	362.2	500uL	1	*****		2/10/2017 3:29:24 PM

Acid Add. 3.000%
 Mean Area 361.4
 SD Area 1.131
 CV Area 0.31%
 Vial 3

Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	859.3	500uL	1	*****		2/10/2017 3:37:23 PM
2	856.9	500uL	1	*****		2/10/2017 3:42:16 PM

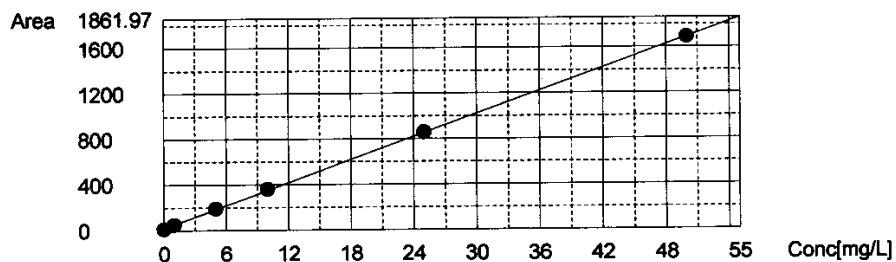
Acid Add. 3.000%
 Mean Area 858.1
 SD Area 1.697
 CV Area 0.20%
 Vial 4

Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	1690	500uL	1	*****		2/10/2017 3:50:31 PM
2	1689	500uL	1	*****		2/10/2017 3:55:41 PM

Acid Add. 3.000%
 Mean Area 1690
 SD Area 0.7071
 CV Area 0.04%
 Vial 5

Slope: 33.49
 Intercept 18.41
 r^2 0.999919
 Zero Shift No



Sample Name: TIC CURVE
 Sample ID: Untitled
 Origin: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
 Status: Completed
 Chk. Result:

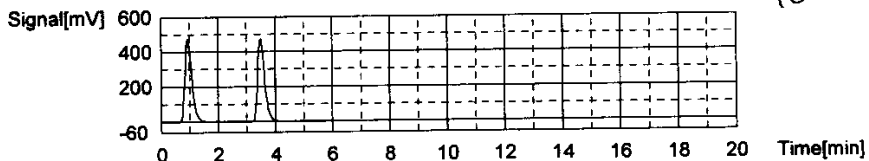
Type	Anal.	Dil.	Result
Unknown	IC	1.000	IC:24.27mg/L

1. Det

Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	810.5	24.20mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	2/10/2017 4:08:15 PM
2	814.6	24.33mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	2/10/2017 4:12:07 PM

Mean Area 812.5
 Mean Conc. 24.27mg/L



Sample

Sample Name: Untitled
 Sample ID: TCCURVE-02-10-2017.2017_02_10_14_14_25.cal
 Origin: Completed
 Status: Completed
 Chk. Result:

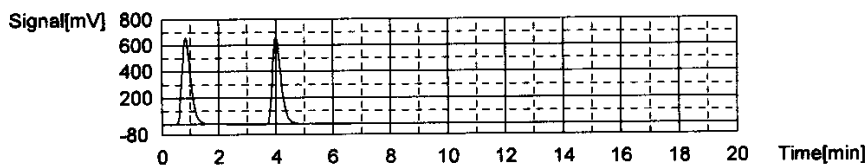
Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:0.000mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1406	0.000mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_14_14	2/10/2017 4:25:42 PM
2	1411	0.000mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_14_14	2/10/2017 4:31:41 PM

Mean Area 1409
 Mean Conc. 0.000mg/L



Sample

Sample Name: TOC/TIC
 Sample ID: Untitled
 Origin: TICCURVE-02-10-2017.2017_02_10_14_45_10.cal
 Status: Completed
 Chk. Result:

2/12/2017 11:18:36 AM

CURVES-02-10-2017.132

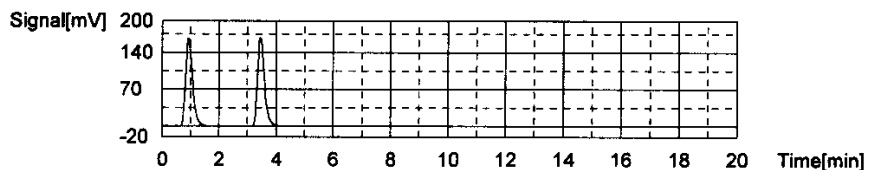
Type	Anal.	Dil.	Result
Unknown	IC	1.000	IC:8.571mg/L

1. Det

Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	286.8	8.565mg/L	500ul	1		TICCURVE-02-10-2017.2017_02_10_14_45	12/10/2017 4:37:09 PM
2	287.2	8.577mg/L	500ul	1		TICCURVE-02-10-2017.2017_02_10_14_45	12/10/2017 4:42:05 PM

Mean Area 287.0
Mean Conc. 8.571mg/L



Sample

Sample Name: TOC/TIC
Sample ID: Untitled
Origin: TCCURVE-02-10-2017.2017_02_10_09_32_59.cal
Status: Completed
Chk. Result

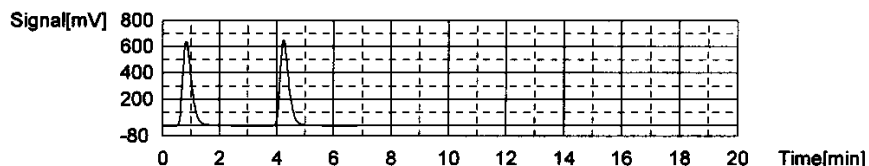
Type	Anal.	Dil.	Result
Unknown	TC	1.000	TC:32.10mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1378	32.16mg/L	500ul	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	12/10/2017 4:55:07 PM
2	1373	32.04mg/L	500ul	1		TCCURVE-02-10-2017.2017_02_10_09_32_52	12/10/2017 5:01:02 PM

Mean Area 1376
Mean Conc. 32.10mg/L



Total Organic Carbon

MAKE DAILY

CCV (TOC): 80787 79381 LCS (TOC): 80787
 $(5/200)(1000) = 25\text{mg/L}$ $(5/200)(1000) = 25\text{mg/L}$

CCV (TIC): 80414 MS (TOC): 80787
 $(5/200)(1000) = 25\text{mg/L}$ $0.4(1000)/40 = 10$

Calibration Curve Date: 2-10-17 Reagent: 39266
39685

SM5310-C : Matrix 2 WG _____
 EPA 415.1/9060A(mod): Matrix 1 WG 611940 SOP: K 1451 Rev. 19
 WG 612017 Instrument: Shimadza TOC-VWP/ASI

- drain reservoir filled
 ASI water bottle full
 dilution water bottle full
- 3rd bottle full
 sufficient gas
 sufficient persulfate
- sufficient acid
 waste container

Position	Sample ID	Dilution
1	TIC	
2	TOC/TIC	
3	BK CCV	
4	MS BK	
5	LCS	
6	LCS Dup	
7	1315-01	1/4
8	02	1/5
9	03	
10	1321-01	1/2
11	02	1/2
12	1252-06	1/4
13	07	1/4
14	CCV	
15	CCB	
16	1252-11	1/4
17	12	1/25
18	13	1/10
19	21	
20	23	
21	24	
22	25	
23	26	
24	1273-01	
25	03	

Position	Sample ID	Dilution
26	CCV	
27	CCB	
28	1273-05	
29	1304-01	1/25
30	1307-01	
31	1273-05 Dup	
32	1273-05 MS	
33	04-1304-01	1/10
34	BK	
35	LCS	
36	LCS Dup	
37	1307-02	1/2
38	CCV	
39	CCB	
40	1307-03	
41	04	
42	05	
43	06	
44	07	
45	08	
46	09	
47	11	
48	12	
49	13	
50	CCV	

Position	Sample ID	Dilution
51	CCB	
52	1307-14	1/3
53	15	1/25
54	16	
55	17	
56	18	
57	19	
58	20	
59	21	
60	CCV 1307-03 Dup	
61	CCB 1307-05 MS	
62	CCV	
63	CCB	
64	1378-01	1/3
65	CCV	
66	CCB	
67	CCV	
68	CCB	
69	1307-13	1/2
70	1378-01	1/3
71	CCV	
72	CCB	
73		
74		
75		

Analyst: April Greene Date/Time: 5/16/17

DCN#125486



	Analysis	Sample Name	Result	Status	Date / Time	Vial
1	TOC	TIC	TOC:1.949mg/L TC:26.89mg/L IC:24.94mg/L	Complete	5/1/2017 7:40:58 AM	1
2	TOC	TOC/TIC	TOC:26.95mg/L TC:35.82mg/L IC:8.872mg/L	Complete	5/1/2017 7:53:47 AM	2
3	TOC	CCV	!!Error!! TOC:24.62mg/L TC:24.27mg/L IC:-0.3560mg/L	Complete	5/1/2017 8:05:58 AM	3
4	TOC	WG611940-01 BLK	!!Error!! TOC:0.1529mg/L TC:-0.1343mg/L IC:-0.2872mg/L	Complete	5/1/2017 8:14:52 AM	0
5	TOC	WG611940-02 LCS	!!Error!! TOC:26.26mg/L TC:25.87mg/L IC:-0.3810mg/L	Complete	5/1/2017 8:27:03 AM	5
6	TOC	WG611940-03 LCSDUF	!!Error!! TOC:26.23mg/L TC:25.85mg/L IC:-0.3800mg/L	Complete	5/1/2017 8:39:15 AM	6
7	TOC	L17041315-01 (4)	TOC:2.088mg/L TC:19.07mg/L IC:16.98mg/L	Complete	5/1/2017 9:19:15 AM	7
8	TOC	L17041315-02 (5)	TOC:2.329mg/L TC:19.51mg/L IC:17.18mg/L	Complete	5/1/2017 9:31:42 AM	8
9	TOC	L17041315-03	TOC:2.735mg/L TC:13.69mg/L IC:10.96mg/L	Complete	5/1/2017 9:45:52 AM	9
10	TOC	L17041321-01 (2)	TOC:2.063mg/L TC:19.52mg/L IC:17.46mg/L	Complete	5/1/2017 9:58:46 AM	10
11	TOC	L17041321-02 (2)	TOC:2.387mg/L TC:17.91mg/L IC:15.52mg/L	Complete	5/1/2017 10:11:54 AM	11
12	TOC	L17041252-06 (4)	TOC:4.592mg/L TC:18.67mg/L IC:14.07mg/L	Complete	5/1/2017 10:24:25 AM	12
13	TOC	L17041252-07 (4)	TOC:3.213mg/L TC:17.65mg/L IC:14.43mg/L	Complete	5/1/2017 10:36:46 AM	13
14	TOC	CCV	!!Error!! TOC:23.25mg/L TC:22.97mg/L IC:-0.2845mg/L	Complete	5/1/2017 10:49:05 AM	14
15	TOC	CCB	!!Error!! TOC:0.1366mg/L TC:-0.1459mg/L IC:-0.2825mg/L	Complete	5/1/2017 10:58:02 AM	0
16	TOC	L17041252-11 (4)	TOC:4.227mg/L TC:20.36mg/L IC:16.13mg/L	Complete	5/1/2017 11:10:49 AM	16
17	TOC	L17041252-12 (25)	TOC:12.60mg/L TC:18.89mg/L IC:6.292mg/L	Complete	5/1/2017 11:23:08 AM	17
18	TOC	L17041252-13 (10)	TOC:12.74mg/L TC:19.54mg/L IC:6.802mg/L	Complete	5/1/2017 11:35:34 AM	18
19	TOC	L17041252-21	TOC:2.581mg/L TC:23.72mg/L IC:21.14mg/L	Complete	5/1/2017 11:48:32 AM	19
20	TOC	L17041252-23	TOC:2.341mg/L TC:24.37mg/L IC:30.03mg/L	Complete	5/1/2017 12:01:31 PM	20
21	TOC	L17041252-24	TOC:1.792mg/L TC:17.27mg/L IC:15.47mg/L	Complete	5/1/2017 12:14:04 PM	21
22	TOC	L17041252-26	TOC:1.917mg/L TC:24.08mg/L IC:22.16mg/L	Complete	5/1/2017 12:26:33 PM	22
23	TOC	L17041252-26	TOC:1.677mg/L TC:17.51mg/L IC:15.83mg/L	Complete	5/1/2017 12:38:46 PM	23
24	TOC	L17041273-01	TOC:2.220mg/L TC:24.24mg/L IC:22.02mg/L	Complete	5/1/2017 12:51:15 PM	24
25	TOC	L17041273-03	TOC:2.221mg/L TC:12.16mg/L IC:9.938mg/L	Complete	5/1/2017 1:03:40 PM	25
26	TOC	CCV	!!Error!! TOC:23.76mg/L TC:23.49mg/L IC:-0.2724mg/L	Complete	5/1/2017 1:15:53 PM	26
27	TOC	CCB	!!Error!! TOC:0.1408mg/L TC:-0.1454mg/L IC:-0.2862mg/L	Complete	5/1/2017 1:24:48 PM	0
28	TOC	L17041273-05	TOC:2.212mg/L TC:48.25mg/L IC:46.04mg/L	Complete	5/1/2017 1:37:46 PM	28
29	TOC		TOC:6.453mg/L TC:6.630mg/L IC:0.1779mg/L	Complete	5/1/2017 1:49:34 PM	29
30	TOC	L17041307-01	TOC:1.241mg/L TC:19.46mg/L IC:18.22mg/L	Complete	5/1/2017 2:02:06 PM	30
31	TOC	WG611940-05 DUP	TOC:2.646mg/L TC:44.68mg/L IC:42.04mg/L	Complete	5/1/2017 2:15:25 PM	31
32	TOC	WG611940-06 MS	TOC:13.02mg/L TC:41.04mg/L IC:28.03mg/L	Complete	5/1/2017 2:30:55 PM	32
33	TOC	L17041304-01 (10)	TOC:13.81mg/L TC:14.84mg/L IC:1.035mg/L	Complete	5/1/2017 2:42:59 PM	33
34	TOC	WG612017-01 BLK	!!Error!! TOC:0.1343mg/L TC:-0.1450mg/L IC:-0.2793mg/L	Complete	5/1/2017 2:56:48 PM	0
35	TOC	WG612017-02 LCS	!!Error!! TOC:25.51mg/L TC:25.21mg/L IC:-0.2993mg/L	Complete	5/1/2017 3:08:49 PM	35
36	TOC	WG612017-03 LCSDUF	!!Error!! TOC:25.56mg/L TC:25.26mg/L IC:-0.3050mg/L	Complete	5/1/2017 3:21:03 PM	36
37	TOC	L17041307-02 (2)	TOC:2.042mg/L TC:23.35mg/L IC:21.30mg/L	Complete	5/1/2017 3:33:35 PM	37
38	TOC	CCV	!!Error!! TOC:23.64mg/L TC:23.42mg/L IC:-0.2226mg/L	Complete	5/1/2017 3:45:49 PM	38
39	TOC	CCB	!!Error!! TOC:0.1378mg/L TC:-0.1471mg/L IC:-0.2849mg/L	Complete	5/1/2017 3:54:42 PM	0
40	TOC	L17041307-03	TOC:1.347mg/L TC:21.10mg/L IC:19.76mg/L	Complete	5/1/2017 4:07:04 PM	40
41	TOC	L17041307-04	TOC:2.173mg/L TC:21.05mg/L IC:18.88mg/L	Complete	5/1/2017 4:19:44 PM	41
42	TOC	L17041307-05	TOC:2.415mg/L TC:37.52mg/L IC:35.11mg/L	Complete	5/1/2017 4:32:17 PM	42
43	TOC	L17041307-06	TOC:3.498mg/L TC:35.23mg/L IC:31.73mg/L	Complete	5/1/2017 4:45:53 PM	43
44	TOC	L17041307-07	TOC:2.599mg/L TC:24.31mg/L IC:21.72mg/L	Complete	5/1/2017 4:58:37 PM	44
45	TOC	L17041307-08	TOC:2.294mg/L TC:24.86mg/L IC:22.56mg/L	Complete	5/1/2017 5:11:13 PM	45
46	TOC	L17041307-09	TOC:1.589mg/L TC:23.54mg/L IC:21.95mg/L	Complete	5/1/2017 5:23:41 PM	46
47	TOC	L17041307-10 H <i>10/5/17</i>	TOC:6.253mg/L TC:46.85mg/L IC:40.60mg/L	Complete	5/1/2017 5:36:38 PM	47
48	TOC	L17041307-12	TOC:2.642mg/L TC:39.15mg/L IC:36.51mg/L	Complete	5/1/2017 5:49:42 PM	48
49	TOC		TOC:3.857mg/L TC:57.63mg/L IC:53.77mg/L	Complete	5/1/2017 6:03:01 PM	49
50	TOC	CCV	!!Error!! TOC:23.85mg/L TC:23.75mg/L IC:-0.09779mg/L	Complete	5/1/2017 6:15:18 PM	50
51	TOC	CCB	!!Error!! TOC:0.1327mg/L TC:-0.1376mg/L IC:-0.2704mg/L	Complete	5/1/2017 6:24:11 PM	0
52	TOC	L17041307-14 (3)	TOC:6.708mg/L TC:27.76mg/L IC:21.06mg/L	Complete	5/1/2017 6:37:37 PM	52
53	TOC	L17041307-15 (25)	TOC:12.61mg/L TC:16.29mg/L IC:3.673mg/L	Complete	5/1/2017 6:50:04 PM	53
54	TOC	L17041307-16	TOC:2.026mg/L TC:23.98mg/L IC:21.96mg/L	Complete	5/1/2017 7:02:51 PM	54
55	TOC	L17041307-17	TOC:1.075mg/L TC:2.345mg/L IC:1.270mg/L	Complete	5/1/2017 7:14:31 PM	55
56	TOC	L17041307-18	TOC:2.342mg/L TC:29.06mg/L IC:26.72mg/L	Complete	5/1/2017 7:26:57 PM	56
57	TOC	L17041307-19	TOC:1.505mg/L TC:14.80mg/L IC:13.30mg/L	Complete	5/1/2017 7:39:06 PM	57
58	TOC	L17041307-20	TOC:1.718mg/L TC:17.20mg/L IC:15.48mg/L	Complete	5/1/2017 7:51:25 PM	58
59	TOC	L17041307-21	TOC:1.453mg/L TC:9.433mg/L IC:7.979mg/L	Complete	5/1/2017 8:03:27 PM	59
60	TOC	WG612017-05 DUP	TOC:2.280mg/L TC:12.32mg/L IC:10.04mg/L	Complete	5/1/2017 8:15:31 PM	60
61	TOC	WG612017-06 MS	TOC:11.82mg/L TC:18.67mg/L IC:6.847mg/L	Complete	5/1/2017 8:27:41 PM	61
62	TOC	CCV	!!Error!! TOC:23.72mg/L TC:23.49mg/L IC:-0.2313mg/L	Complete	5/1/2017 8:39:59 PM	62
63	TOC	CCB	!!Error!! TOC:0.1412mg/L TC:-0.1414mg/L IC:-0.2826mg/L	Complete	5/1/2017 8:48:51 PM	0
64	TOC		TOC:1.126mg/L TC:9.768mg/L IC:8.642mg/L	Complete	5/1/2017 9:00:59 PM	64
65	TOC	CCV	!!Error!! TOC:23.72mg/L TC:23.49mg/L IC:-0.2370mg/L	Complete	5/1/2017 9:13:28 PM	62
66	TOC	CCB	!!Error!! TOC:0.1376mg/L TC:-0.1461mg/L IC:-0.2838mg/L	Complete	5/1/2017 9:22:21 PM	0
67	TOC	CCV	!!Error!! TOC:24.76mg/L TC:24.62mg/L IC:-0.1423mg/L	Complete	5/2/2017 7:28:37 AM	62

5/2/2017 8:32:43 AM

1/2

C:\TOC3201\Data\05-01-2017-ADG-TOC.t32

	Analysis	Sample Name	Result	Status	Date / Time	Vial
68	TOC	CCB	!!Error!! TOC:0.1396mg/L TC:-0.1409mg/L IC:-0.2805mg/L	Complete	5/2/2017 7:37:36 AM	0
69	TOC	L17041307-13 (2)	TOC:6.251mg/L TC:30.20mg/L IC:23.95mg/L	Complete	5/2/2017 7:50:16 AM	1
70	TOC	L17041378-01 (3)	TOC:1.721mg/L TC:18.78mg/L IC:17.06mg/L	Complete	5/2/2017 8:02:24 AM	2
71	TOC	CCV	!!Error!! TOC:24.07mg/L TC:23.96mg/L IC:-0.1082mg/L	Complete	5/2/2017 8:14:47 AM	62
72	TOC	CCV	!!Error!! TOC:0.1271mg/L TC:-0.1476mg/L IC:-0.2746mg/L	Complete	5/2/2017 8:23:41 AM	0

5/2/2017 8:32:43 AM

2/2

Instr.Information

System TOCVW ASI
 Detector Wet Chemical

Sample

Sample Name: TIC
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

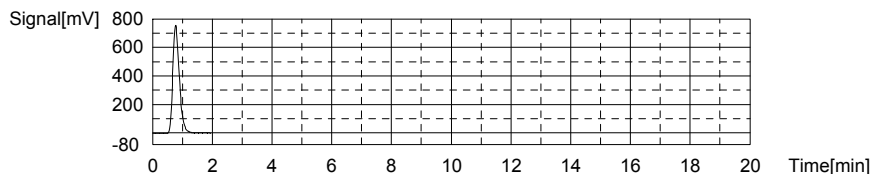
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.949mg/L TC:26.89mg/L IC:24.94mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1155	26.89mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	5/1/2017 7:35:57 AM

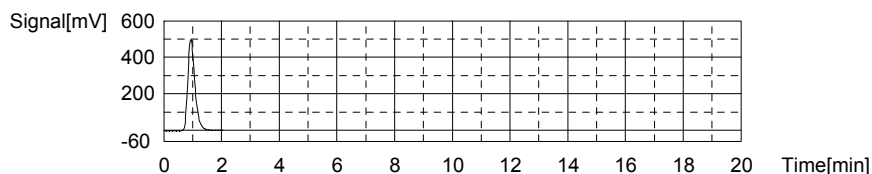
Mean Area 1155
 Mean Conc. 26.89mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	853.6	24.94mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	5/1/2017 7:40:58 AM

Mean Area 853.6
 Mean Conc. 24.94mg/L



Sample

Sample Name: TOC/TIC
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

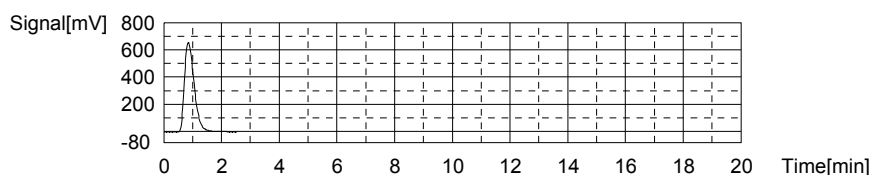
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:26.95mg/L TC:35.82mg/L IC:8.872mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1533	35.82mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	1/2017 7:48:56 AM

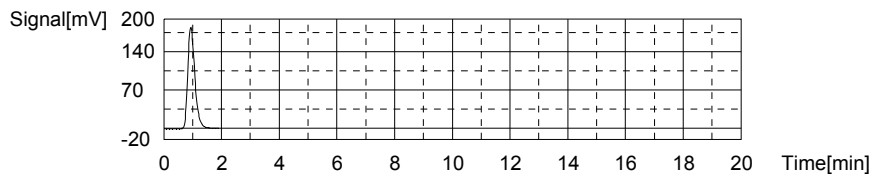
Mean Area 1533
Mean Conc. 35.82mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	315.5	8.872mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	1/2017 7:53:47 AM

Mean Area 315.5
Mean Conc. 8.872mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

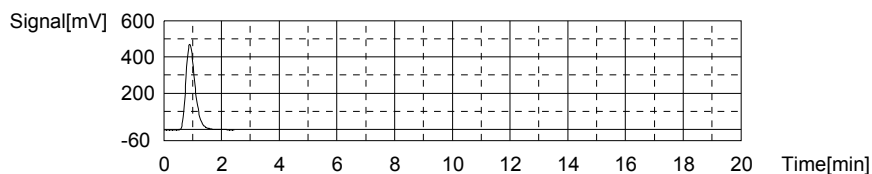
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.62mg/L TC:24.27mg/L IC:-0.3560mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1044	24.27mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	1/2017 8:01:40 AM

Mean Area 1044
Mean Conc. 24.27mg/L



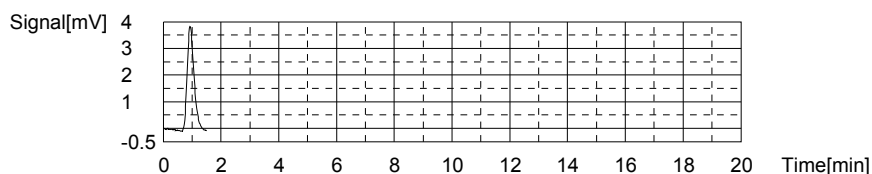
Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	6.493	-0.3560mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	1/2017 8:05:58 AM

5/2/2017 8:32:46 AM

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Mean Area 6.493
Mean Conc. -0.3560mg/L



Sample

Sample Name: WG611940-01 BLK
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

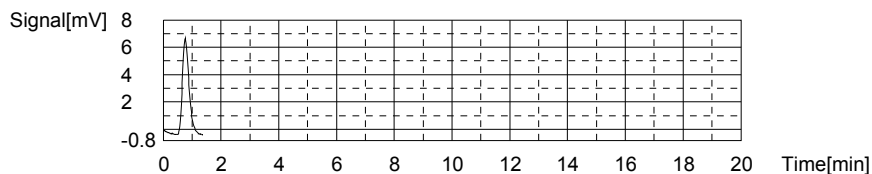
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1529mg/L TC:-0.1343mg/L IC:-0.2872mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	11.18	-0.1343mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 8:10:59 AM

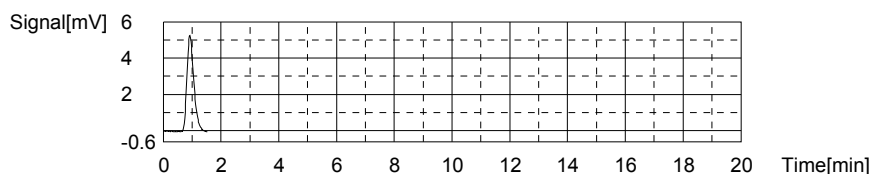
Mean Area 11.18
Mean Conc. -0.1343mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.797	-0.2872mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45	15/1/2017 8:14:52 AM

Mean Area 8.797
Mean Conc. -0.2872mg/L



Sample

Sample Name: WG611940-02 LCS
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:26.26mg/L TC:25.87mg/L IC:-0.3810mg/L

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5/2/2017 8:32:46 AM

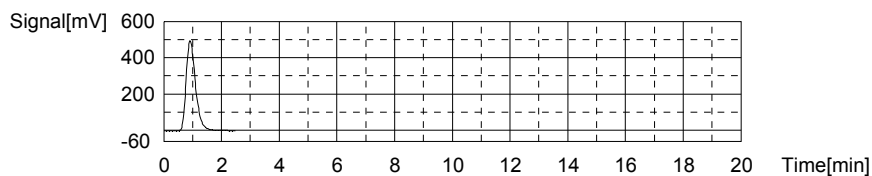
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1112	25.87mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 8:22:46 AM

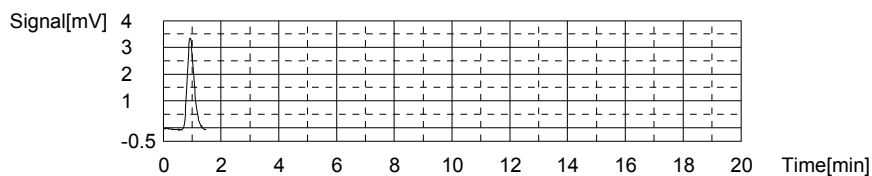
Mean Area 1112
Mean Conc. 25.87mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	5.657	-0.3810mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 8:27:03 AM

Mean Area 5.657
Mean Conc. -0.3810mg/L



Sample

Sample Name: WG611940-03 LCSDUP
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

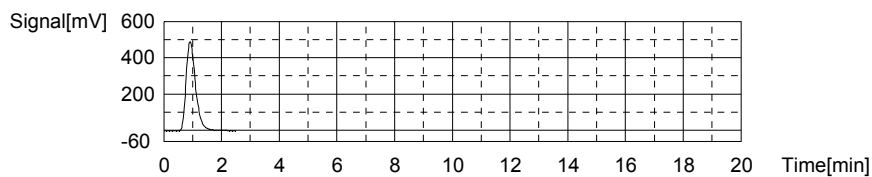
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:26.23mg/L TC:25.85mg/L IC:-0.3800mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1111	25.85mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 8:34:59 AM

Mean Area 1111
Mean Conc. 25.85mg/L

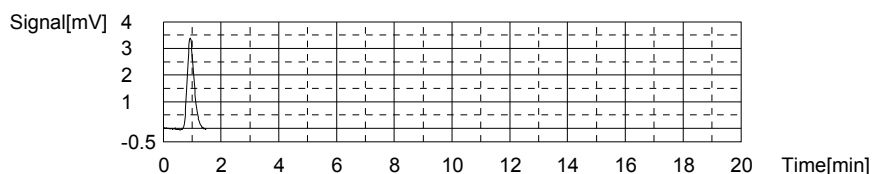


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	5.689	-0.3800mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 8:39:15 AM

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Mean Area 5.689
Mean Conc. -0.3800mg/L



Sample

Sample Name: L17041315-01 (4)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

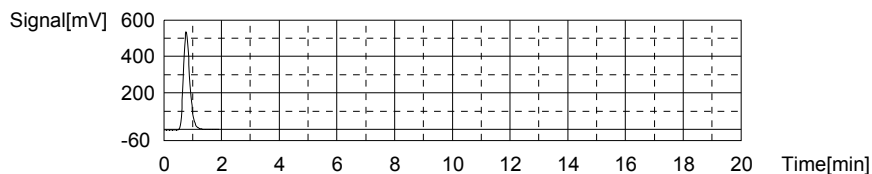
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.088mg/L TC:19.07mg/L IC:16.98mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	823.8	19.07mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	5/1/2017 9:14:13 AM

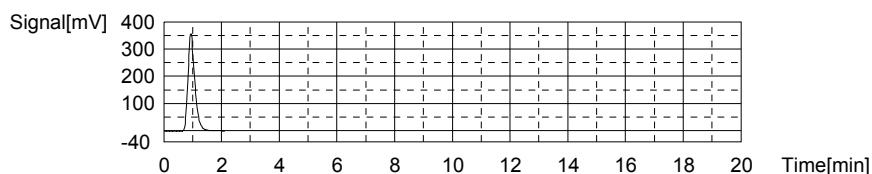
Mean Area 823.8
Mean Conc. 19.07mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	586.9	16.98mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	5/1/2017 9:19:15 AM

Mean Area 586.9
Mean Conc. 16.98mg/L



Sample

Sample Name: L17041315-02 (5)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.329mg/L TC:19.51mg/L IC:17.18mg/L

5/2/2017 8:32:46 AM

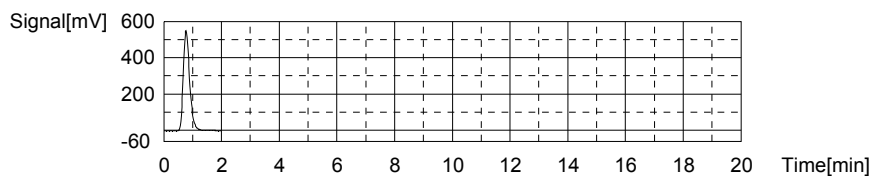
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	842.6	19.51mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 9:26:41 AM

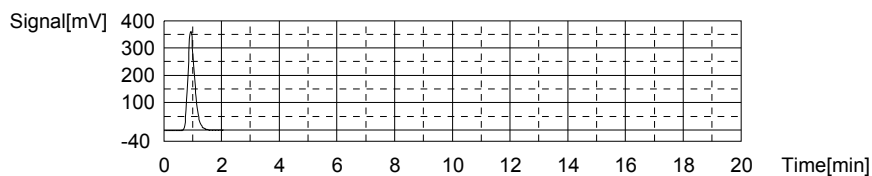
Mean Area 842.6
Mean Conc. 19.51mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	593.7	17.18mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 9:31:42 AM

Mean Area 593.7
Mean Conc. 17.18mg/L



Sample

Sample Name: L17041315-03
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

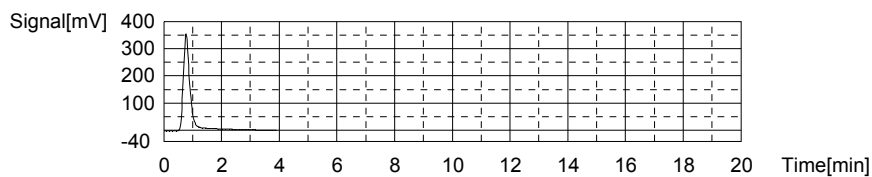
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.735mg/L TC:13.69mg/L IC:10.96mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	596.5	13.69mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 9:41:02 AM

Mean Area 596.5
Mean Conc. 13.69mg/L

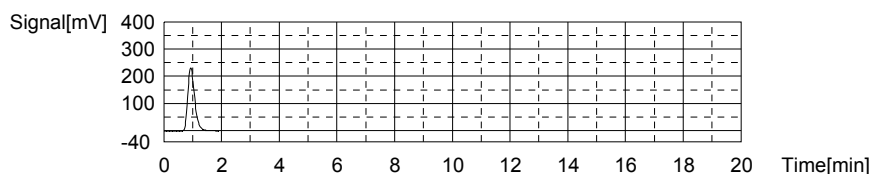


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	385.4	10.96mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 9:45:52 AM

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Mean Area 385.4
Mean Conc. 10.96mg/L



Sample

Sample Name: L17041321-01 (2)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

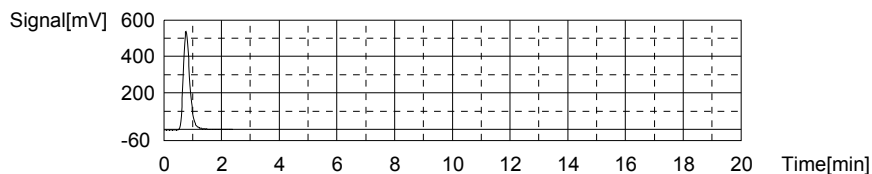
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.063mg/L TC:19.52mg/L IC:17.46mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	843.2	19.52mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 9:53:41 AM

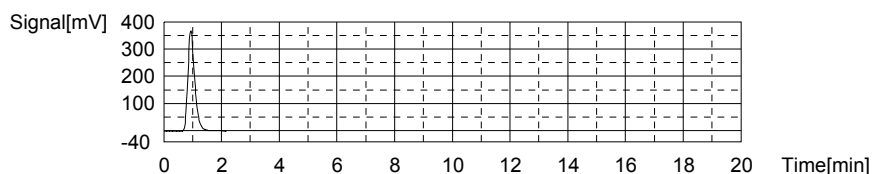
Mean Area 843.2
Mean Conc. 19.52mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	603.1	17.46mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 9:58:46 AM

Mean Area 603.1
Mean Conc. 17.46mg/L



Sample

Sample Name: L17041321-02 (2)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.387mg/L TC:17.91mg/L IC:15.52mg/L

5/2/2017 8:32:46 AM

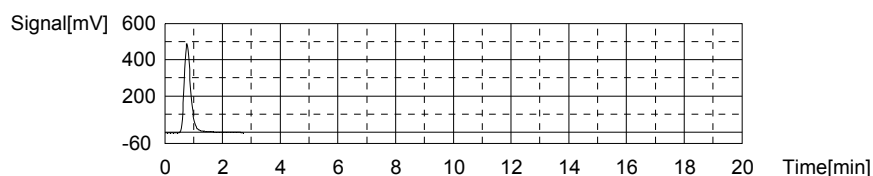
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	774.9	17.91mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 10:06:57 AM

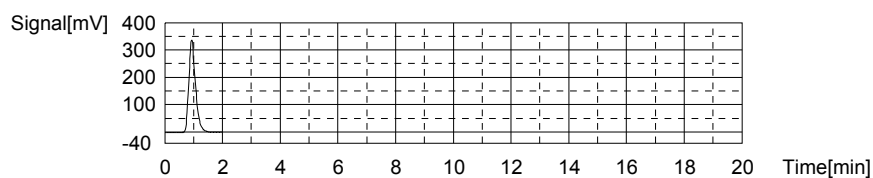
Mean Area 774.9
Mean Conc. 17.91mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	538.2	15.52mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 10:11:54 AM

Mean Area 538.2
Mean Conc. 15.52mg/L



Sample

Sample Name: L17041252-06 (4)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

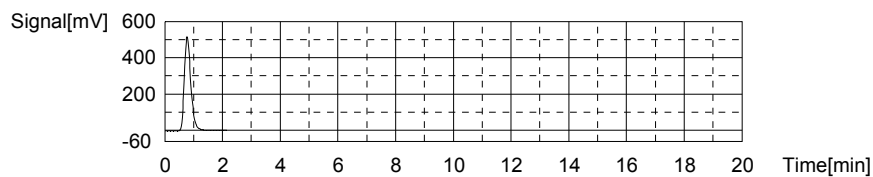
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:4.592mg/L TC:18.67mg/L IC:14.07mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	806.9	18.67mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 10:19:31 AM

Mean Area 806.9
Mean Conc. 18.67mg/L

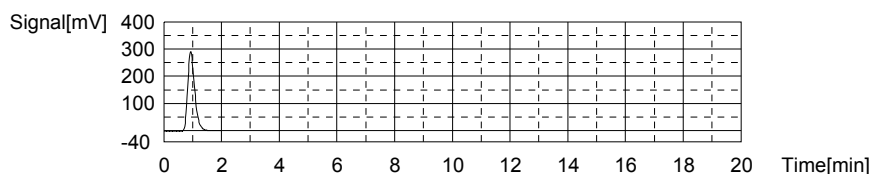


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	489.7	14.07mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 10:24:25 AM

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Mean Area 489.7
Mean Conc. 14.07mg/L



Sample

Sample Name: L17041252-07 (4)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

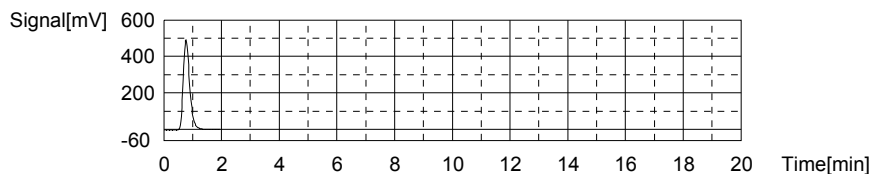
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.213mg/L TC:17.65mg/L IC:14.43mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	763.7	17.65mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 10:31:49 AM

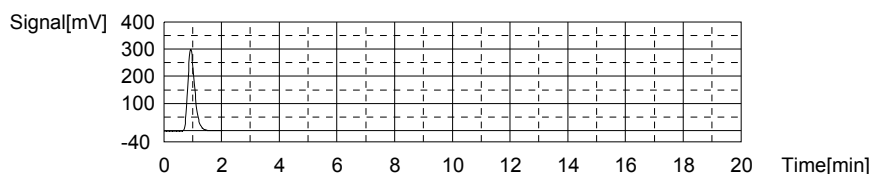
Mean Area 763.7
Mean Conc. 17.65mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	501.7	14.43mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45	15/1/2017 10:36:46 AM

Mean Area 501.7
Mean Conc. 14.43mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:23.25mg/L TC:22.97mg/L IC:-0.2845mg/L

5/2/2017 8:32:46 AM

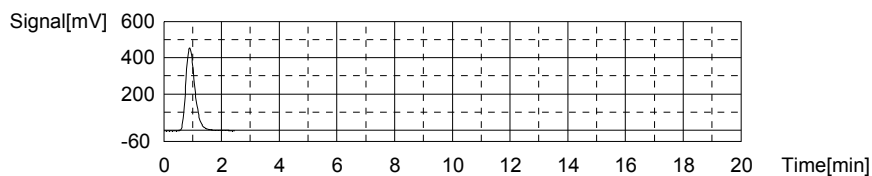
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	988.9	22.97mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 10:44:41 AM

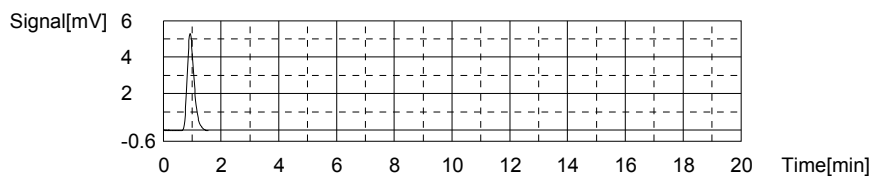
Mean Area 988.9
Mean Conc. 22.97mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.889	-0.2845mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 10:49:05 AM

Mean Area 8.889
Mean Conc. -0.2845mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

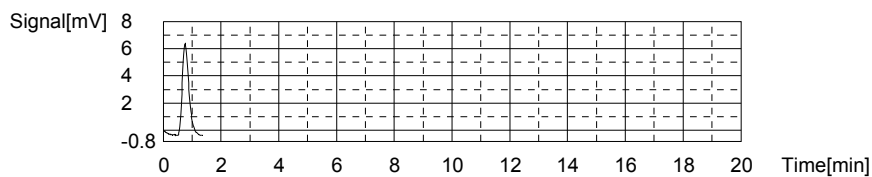
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1366mg/L TC:-0.1459mg/L IC:-0.2825mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.69	-0.1459mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 10:54:05 AM

Mean Area 10.69
Mean Conc. -0.1459mg/L



Anal.: IC

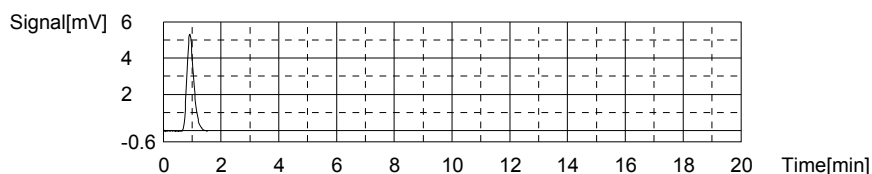
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.954	-0.2825mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 10:58:02 AM

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Mean Area 8.954
Mean Conc. -0.2825mg/L



Sample

Sample Name: L17041252-11 (4)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

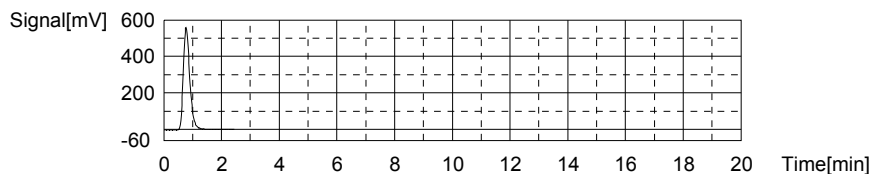
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:4.227mg/L TC:20.36mg/L IC:16.13mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	878.7	20.36mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 11:05:55 AM

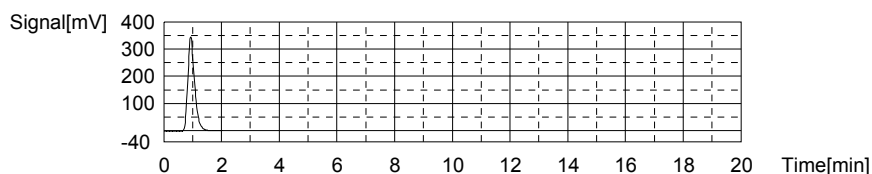
Mean Area 878.7
Mean Conc. 20.36mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	558.7	16.13mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 11:10:49 AM

Mean Area 558.7
Mean Conc. 16.13mg/L



Sample

Sample Name: L17041252-12 (25)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:12.60mg/L TC:18.89mg/L IC:6.292mg/L

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5/2/2017 8:32:46 AM

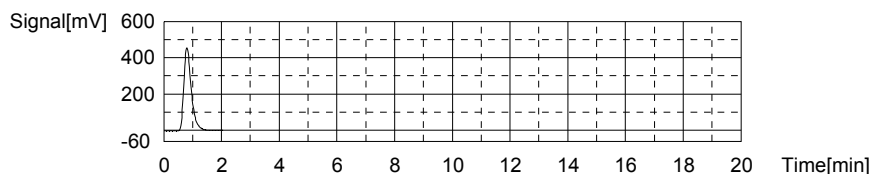
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	816.6	18.89mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 11:18:18 AM

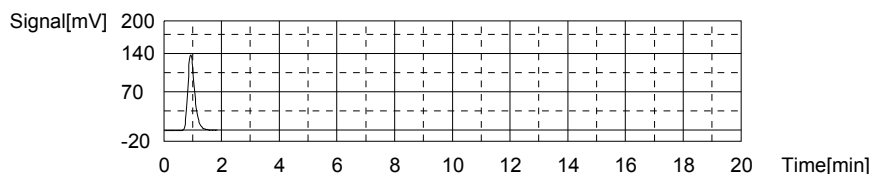
Mean Area 816.6
Mean Conc. 18.89mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	229.1	6.292mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 11:23:08 AM

Mean Area 229.1
Mean Conc. 6.292mg/L



Sample

Sample Name: L17041252-13 (10)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status Completed
Chk. Result

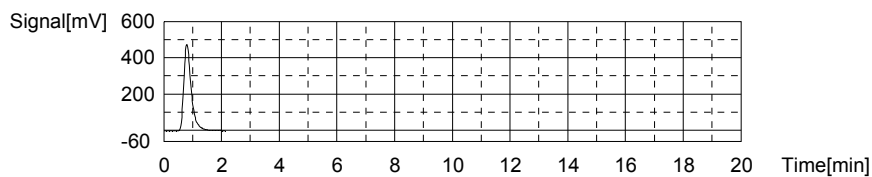
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:12.74mg/L TC:19.54mg/L IC:6.802mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	843.8	19.54mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 11:30:47 AM

Mean Area 843.8
Mean Conc. 19.54mg/L



Anal.: IC

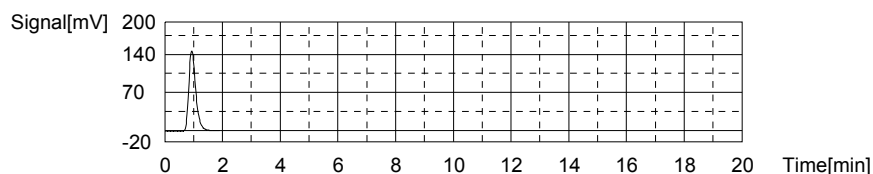
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	246.2	6.802mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 11:35:34 AM

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Mean Area 246.2
Mean Conc. 6.802mg/L



Sample

Sample Name: L17041252-21
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

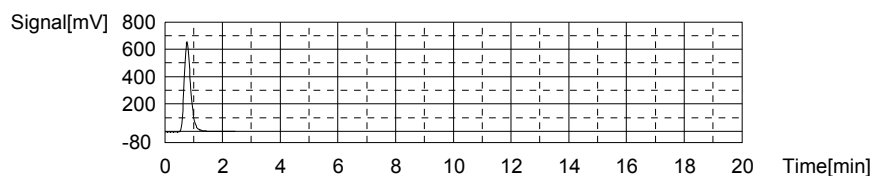
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.581mg/L TC:23.72mg/L IC:21.14mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1021	23.72mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 11:43:27 AM

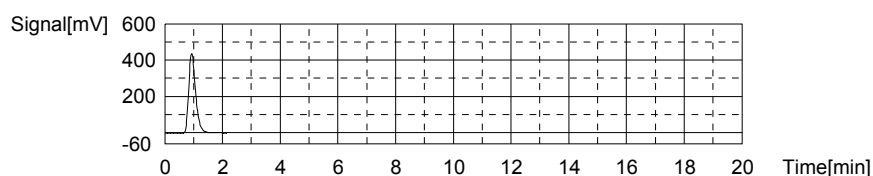
Mean Area 1021
Mean Conc. 23.72mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	726.4	21.14mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 11:48:32 AM

Mean Area 726.4
Mean Conc. 21.14mg/L



Sample

Sample Name: L17041252-23
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.341mg/L TC:32.37mg/L IC:30.03mg/L

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5/2/2017 8:32:46 AM

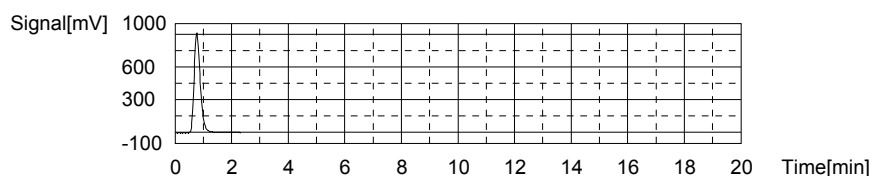
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1387	32.37mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 11:56:17 AM

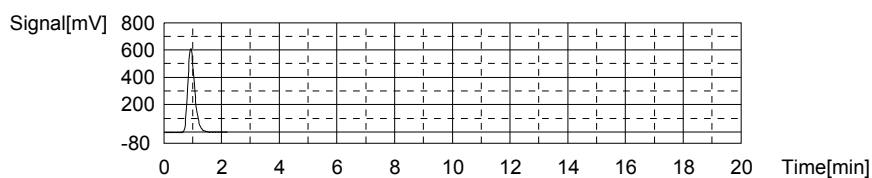
Mean Area 1387
Mean Conc. 32.37mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1024	30.03mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 12:01:31 PM

Mean Area 1024
Mean Conc. 30.03mg/L



Sample

Sample Name: L17041252-24
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

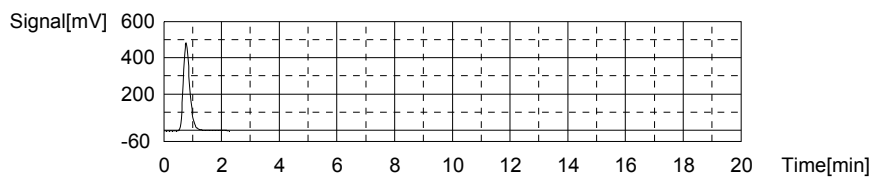
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.792mg/L TC:17.27mg/L IC:15.47mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	747.7	17.27mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 12:09:13 PM

Mean Area 747.7
Mean Conc. 17.27mg/L



Anal.: IC

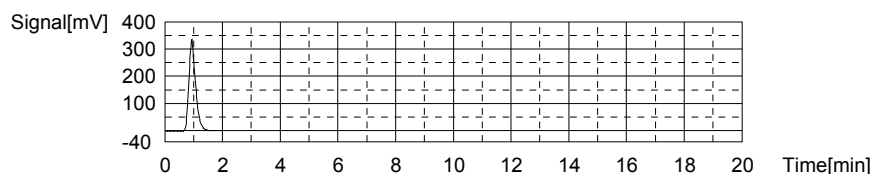
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	536.6	15.47mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 12:14:04 PM

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Mean Area 536.6
Mean Conc. 15.47mg/L



Sample

Sample Name: L17041252-25
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

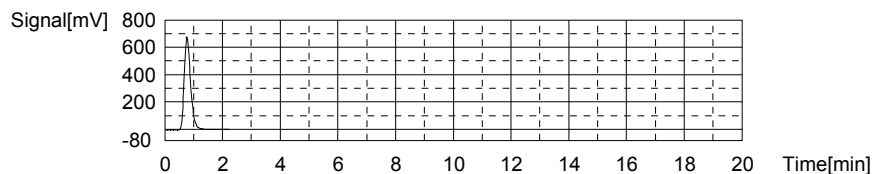
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.917mg/L TC:24.08mg/L IC:22.16mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1036	24.08mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 12:21:42 PM

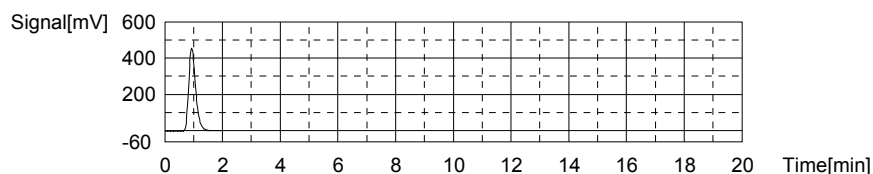
Mean Area 1036
Mean Conc. 24.08mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	760.5	22.16mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45	15/1/2017 12:26:33 PM

Mean Area 760.5
Mean Conc. 22.16mg/L



Sample

Sample Name: L17041252-26
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.677mg/L TC:17.51mg/L IC:15.83mg/L

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5/2/2017 8:32:46 AM

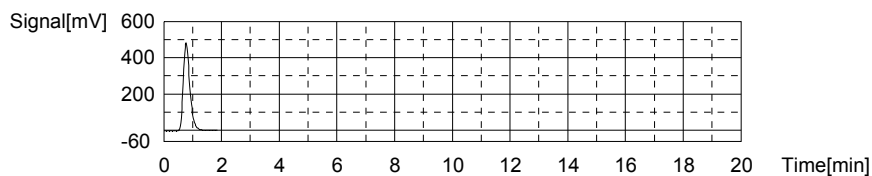
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	758.0	17.51mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 12:33:50 PM

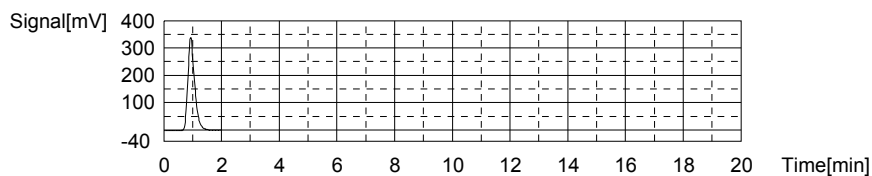
Mean Area 758.0
Mean Conc. 17.51mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	548.6	15.83mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 12:38:46 PM

Mean Area 548.6
Mean Conc. 15.83mg/L



Sample

Sample Name: L17041273-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

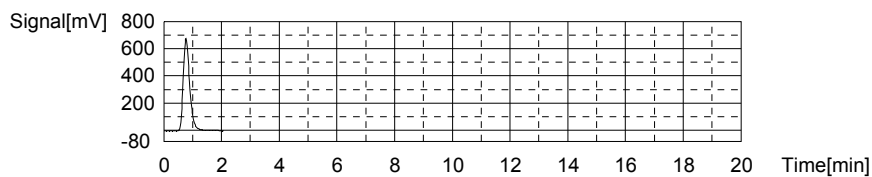
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.220mg/L TC:24.24mg/L IC:22.02mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1043	24.24mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 12:46:17 PM

Mean Area 1043
Mean Conc. 24.24mg/L

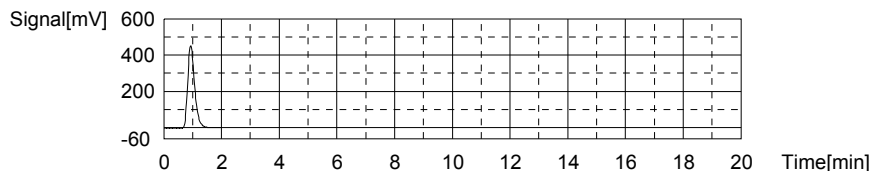


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	755.9	22.02mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 12:51:15 PM

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Mean Area 755.9
Mean Conc. 22.02mg/L



Sample

Sample Name: L17041273-03
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

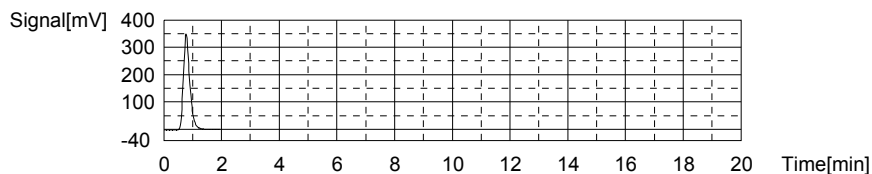
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.221mg/L TC:12.16mg/L IC:9.938mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	531.5	12.16mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 12:58:48 PM

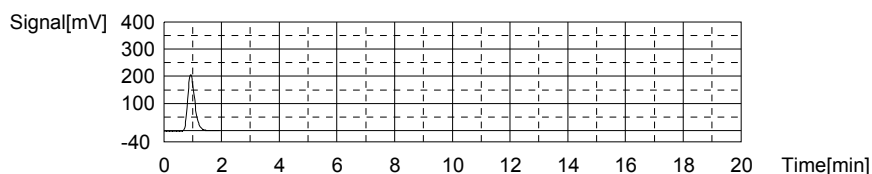
Mean Area 531.5
Mean Conc. 12.16mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	351.2	9.938mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	15/1/2017 1:03:40 PM

Mean Area 351.2
Mean Conc. 9.938mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:23.76mg/L TC:23.49mg/L IC:-0.2724mg/L

5/2/2017 8:32:46 AM

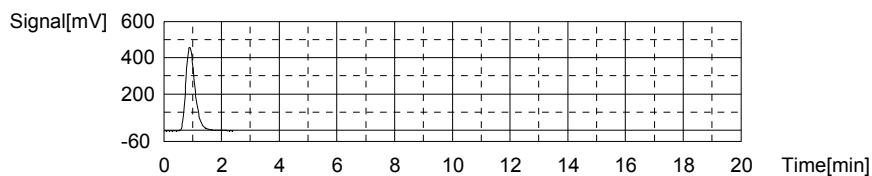
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1011	23.49mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 1:11:31 PM

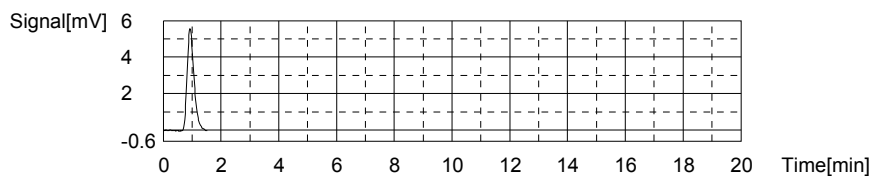
Mean Area 1011
Mean Conc. 23.49mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.294	-0.2724mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 1:15:53 PM

Mean Area 9.294
Mean Conc. -0.2724mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

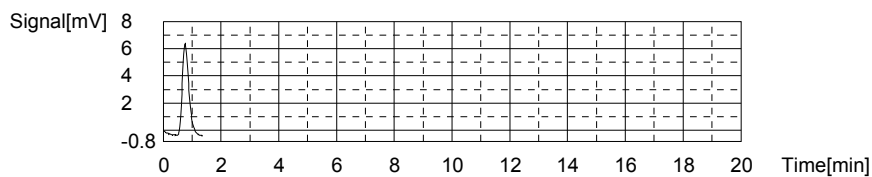
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1408mg/L TC:-0.1454mg/L IC:-0.2862mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.71	-0.1454mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 1:20:53 PM

Mean Area 10.71
Mean Conc. -0.1454mg/L



Anal.: IC

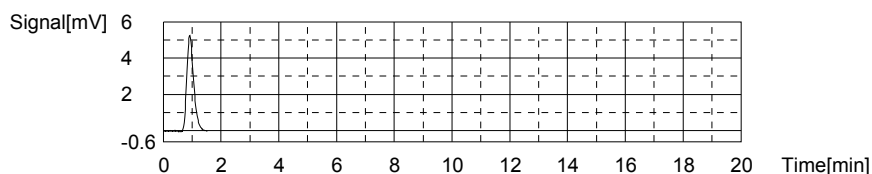
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.831	-0.2862mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 1:24:48 PM

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Mean Area 8.831
Mean Conc. -0.2862mg/L



Sample

Sample Name: L17041273-05
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

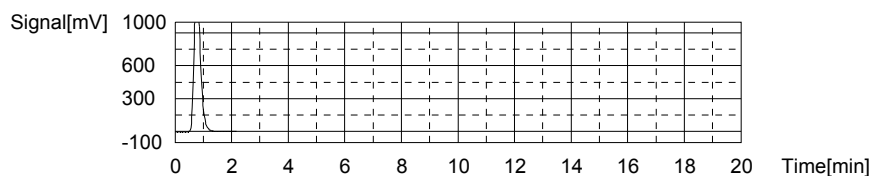
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.212mg/L TC:48.25mg/L IC:46.04mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	2059	48.25mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 1:32:25 PM

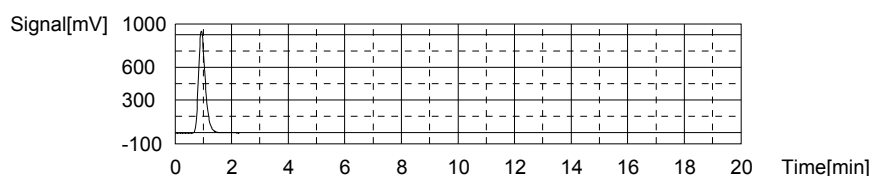
Mean Area 2059
Mean Conc. 48.25mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1560	46.04mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 1:37:46 PM

Mean Area 1560
Mean Conc. 46.04mg/L



Sample

Sample Name: <Untitled>
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:6.453mg/L TC:6.630mg/L IC:0.1779mg/L

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5/2/2017 8:32:46 AM

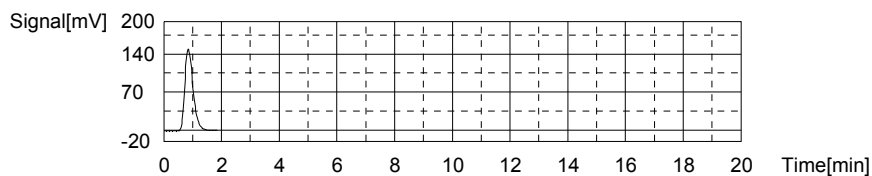
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	297.5	6.630mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 1:45:04 PM

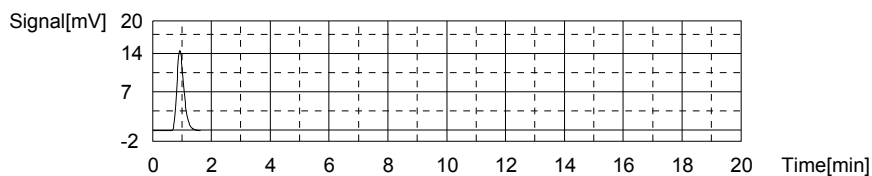
Mean Area 297.5
Mean Conc. 6.630mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	24.37	0.1779mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 1:49:34 PM

Mean Area 24.37
Mean Conc. 0.1779mg/L



Sample

Sample Name: L17041307-01
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

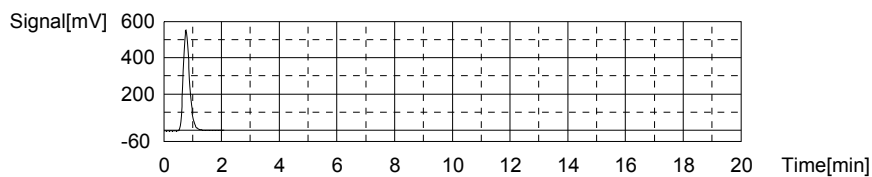
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.241mg/L TC:19.46mg/L IC:18.22mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	840.4	19.46mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 1:57:08 PM

Mean Area 840.4
Mean Conc. 19.46mg/L

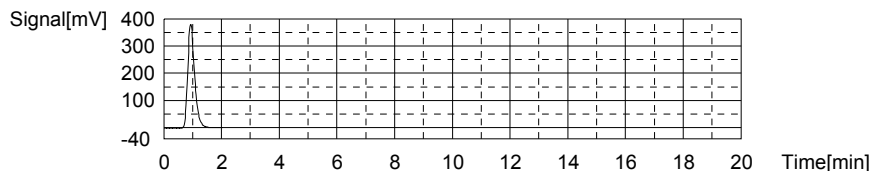


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	628.4	18.22mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 2:02:06 PM

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Mean Area 628.4
Mean Conc. 18.22mg/L



Sample

Sample Name: WG611940-05 DUP
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

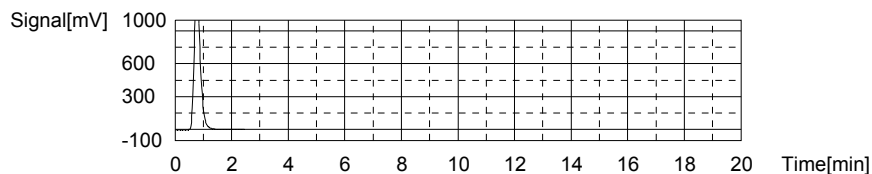
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.646mg/L TC:44.68mg/L IC:42.04mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1908	44.68mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	5/1/2017 2:10:00 PM

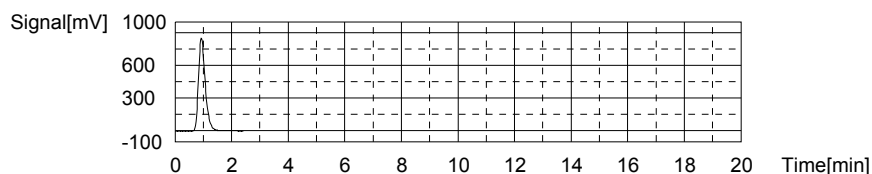
Mean Area 1908
Mean Conc. 44.68mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1426	42.04mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	5/1/2017 2:15:25 PM

Mean Area 1426
Mean Conc. 42.04mg/L



Sample

Sample Name: WG611940-06 MS
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:13.02mg/L TC:41.04mg/L IC:28.03mg/L

5/2/2017 8:32:46 AM

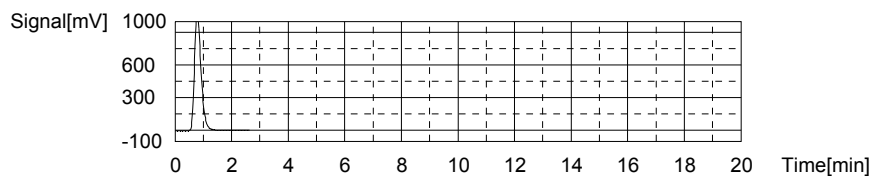
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1754	41.04mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 2:25:42 PM

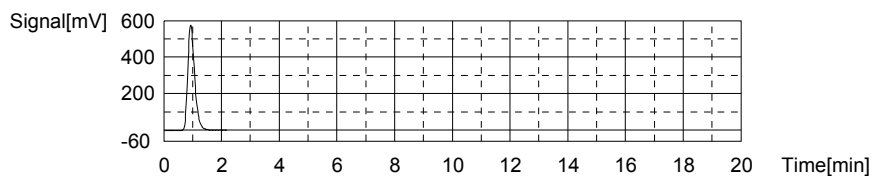
Mean Area 1754
Mean Conc. 41.04mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	956.9	28.03mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 2:30:55 PM

Mean Area 956.9
Mean Conc. 28.03mg/L



Sample

Sample Name: L17041304-01 (10)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

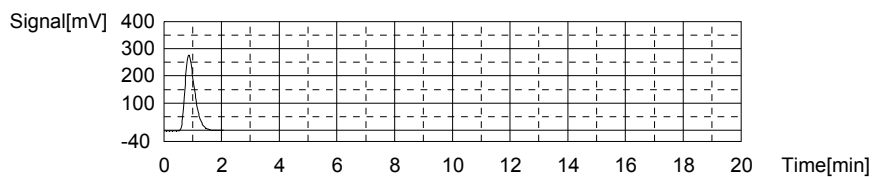
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:13.81mg/L TC:14.84mg/L IC:1.035mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	645.0	14.84mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 2:38:26 PM

Mean Area 645.0
Mean Conc. 14.84mg/L



Anal.: IC

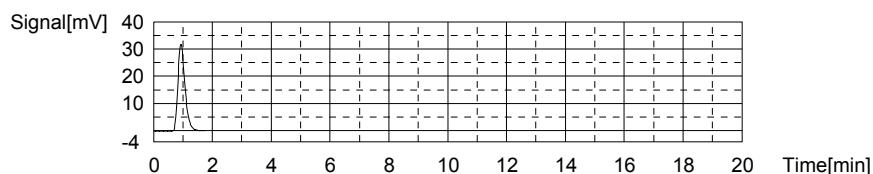
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	53.06	1.035mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 2:42:59 PM

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Mean Area 53.06
Mean Conc. 1.035mg/L



Sample

Sample Name: WG612017-01 BLK
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

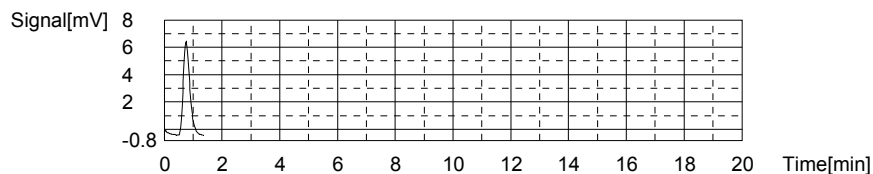
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1343mg/L TC:-0.1450mg/L IC:-0.2793mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.73	-0.1450mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 2:52:54 PM

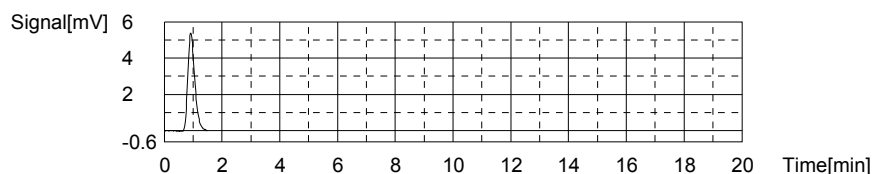
Mean Area 10.73
Mean Conc. -0.1450mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.063	-0.2793mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 2:56:48 PM

Mean Area 9.063
Mean Conc. -0.2793mg/L



Sample

Sample Name: WG612017-02 LCS
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:25.51mg/L TC:25.21mg/L IC:-0.2993mg/L

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5/2/2017 8:32:46 AM

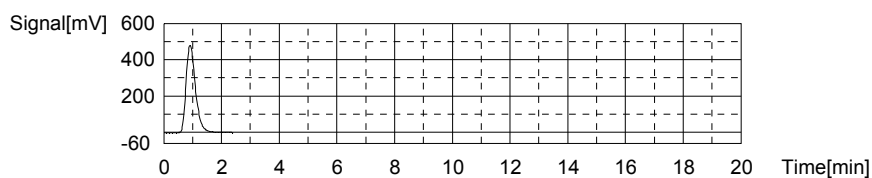
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1084	25.21mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 3:04:31 PM

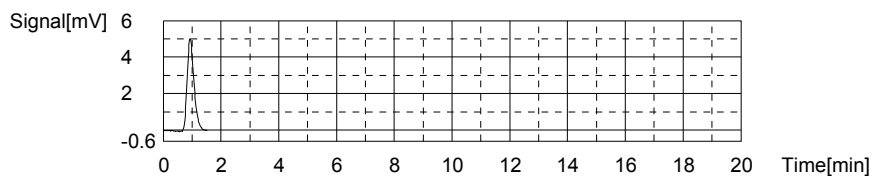
Mean Area 1084
Mean Conc. 25.21mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.393	-0.2993mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 3:08:49 PM

Mean Area 8.393
Mean Conc. -0.2993mg/L



Sample

Sample Name: WG612017-03 LCSDUP
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

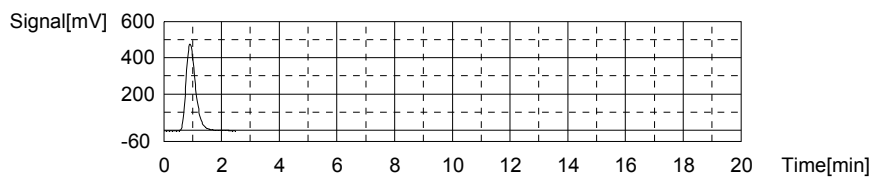
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:25.56mg/L TC:25.26mg/L IC:-0.3050mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1086	25.26mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 3:16:45 PM

Mean Area 1086
Mean Conc. 25.26mg/L

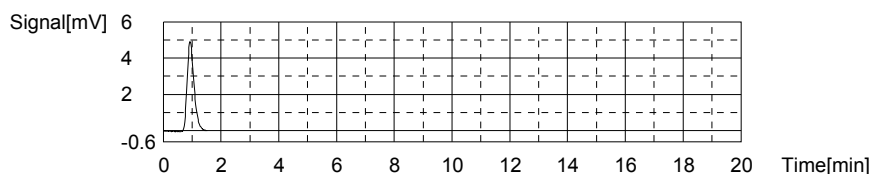


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.201	-0.3050mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 3:21:03 PM

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Mean Area 8.201
Mean Conc. -0.3050mg/L



Sample

Sample Name: L17041307-02 (2)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

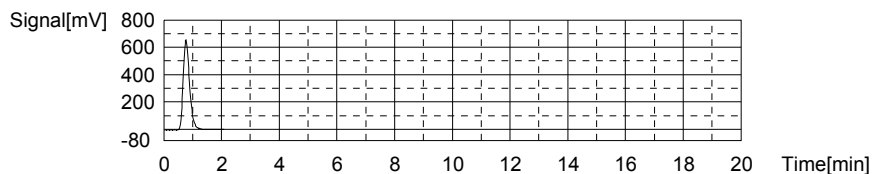
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.042mg/L TC:23.35mg/L IC:21.30mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1005	23.35mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 3:28:36 PM

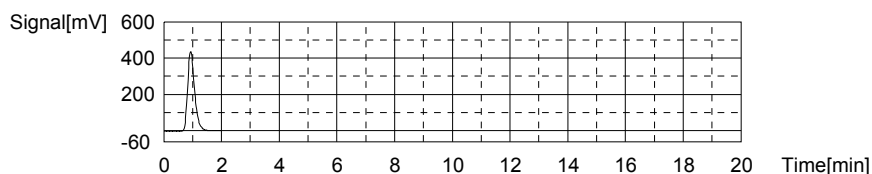
Mean Area 1005
Mean Conc. 23.35mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	731.8	21.30mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 3:33:35 PM

Mean Area 731.8
Mean Conc. 21.30mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:23.64mg/L TC:23.42mg/L IC:-0.2226mg/L

5/2/2017 8:32:46 AM

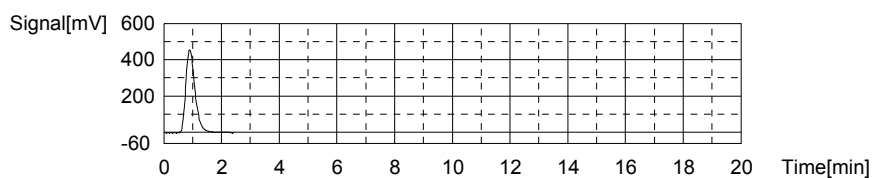
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1008	23.42mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 3:41:29 PM

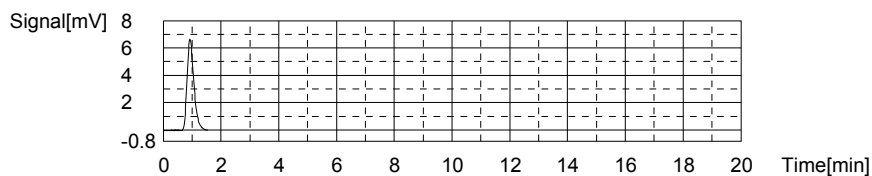
Mean Area 1008
Mean Conc. 23.42mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.96	-0.2226mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 3:45:49 PM

Mean Area 10.96
Mean Conc. -0.2226mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

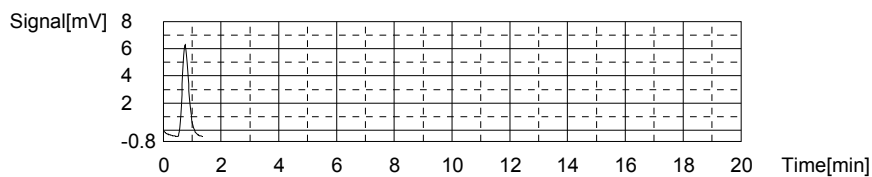
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1378mg/L TC:-0.1471mg/L IC:-0.2849mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.64	-0.1471mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 3:50:49 PM

Mean Area 10.64
Mean Conc. -0.1471mg/L



Anal.: IC

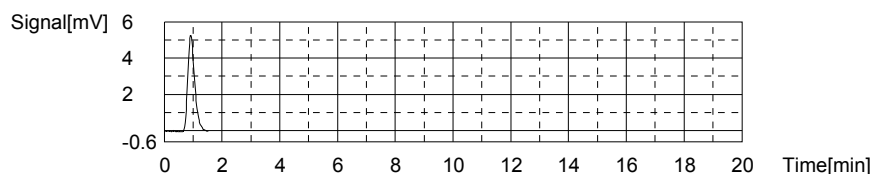
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.874	-0.2849mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 3:54:42 PM

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Mean Area 8.874
Mean Conc. -0.2849mg/L



Sample

Sample Name: L17041307-03
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

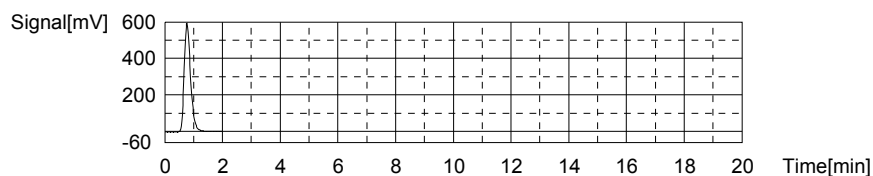
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.347mg/L TC:21.10mg/L IC:19.76mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	910.1	21.10mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 4:02:08 PM

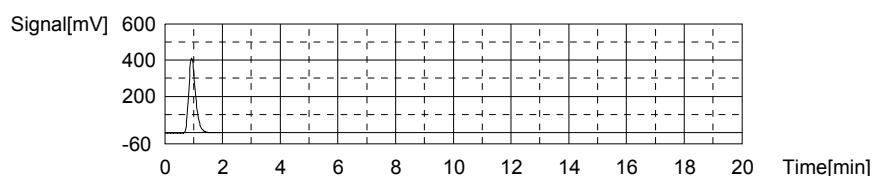
Mean Area 910.1
Mean Conc. 21.10mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	680.0	19.76mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 4:07:04 PM

Mean Area 680.0
Mean Conc. 19.76mg/L



Sample

Sample Name: L17041307-04
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.173mg/L TC:21.05mg/L IC:18.88mg/L

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5/2/2017 8:32:46 AM

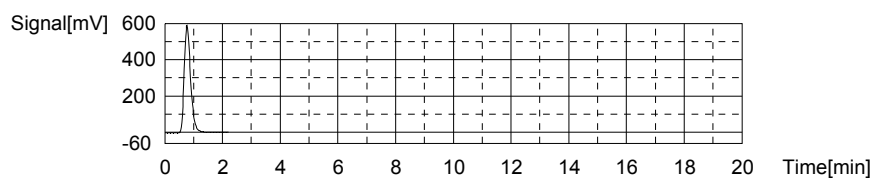
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	907.8	21.05mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 4:14:46 PM

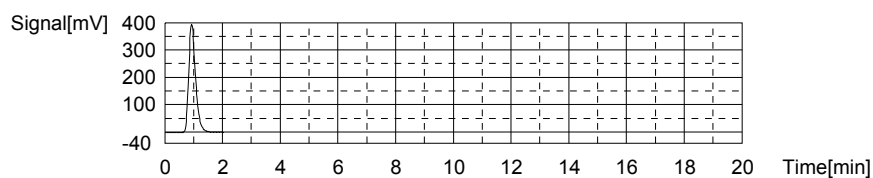
Mean Area 907.8
Mean Conc. 21.05mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	650.5	18.88mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 4:19:44 PM

Mean Area 650.5
Mean Conc. 18.88mg/L



Sample

Sample Name: L17041307-05
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

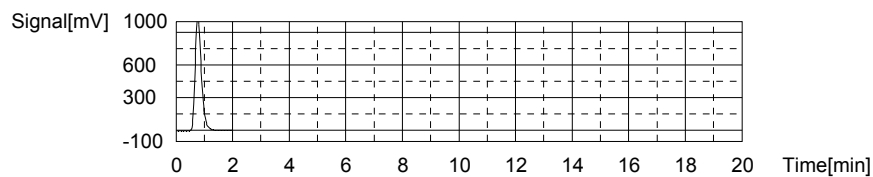
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.415mg/L TC:37.52mg/L IC:35.11mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1605	37.52mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 4:27:10 PM

Mean Area 1605
Mean Conc. 37.52mg/L



Anal.: IC

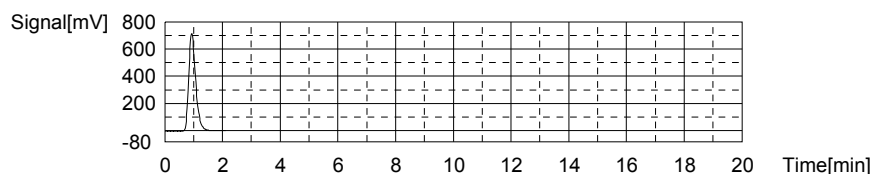
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1194	35.11mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 4:32:17 PM

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Mean Area 1194
Mean Conc. 35.11mg/L



Sample

Sample Name: L17041307-06
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

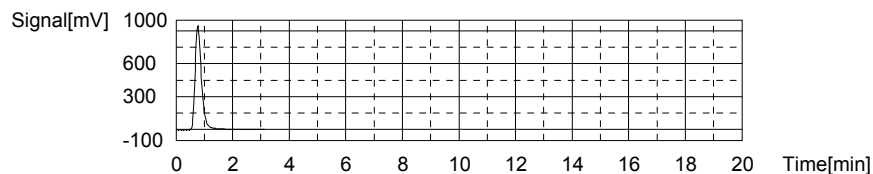
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.498mg/L TC:35.23mg/L IC:31.73mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1508	35.23mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 4:40:52 PM

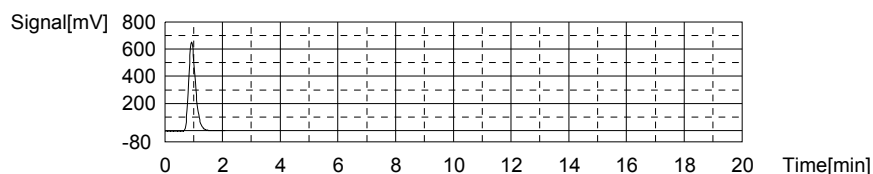
Mean Area 1508
Mean Conc. 35.23mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1081	31.73mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 4:45:53 PM

Mean Area 1081
Mean Conc. 31.73mg/L



Sample

Sample Name: L17041307-07
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.599mg/L TC:24.31mg/L IC:21.72mg/L

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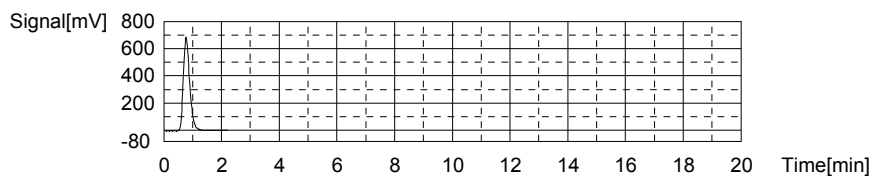
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1046	24.31mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 4:53:33 PM

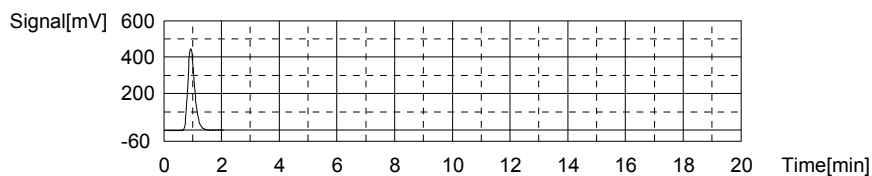
Mean Area 1046
Mean Conc. 24.31mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	745.6	21.72mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 4:58:37 PM

Mean Area 745.6
Mean Conc. 21.72mg/L



Sample

Sample Name: L17041307-08
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

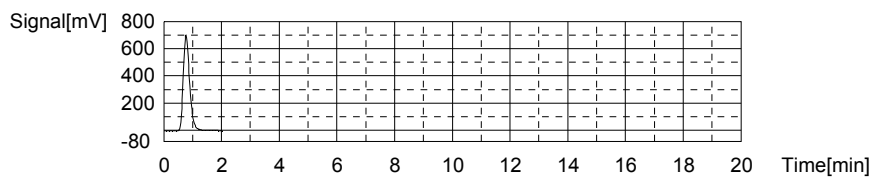
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.294mg/L TC:24.86mg/L IC:22.56mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1069	24.86mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 5:06:06 PM

Mean Area 1069
Mean Conc. 24.86mg/L



Anal.: IC

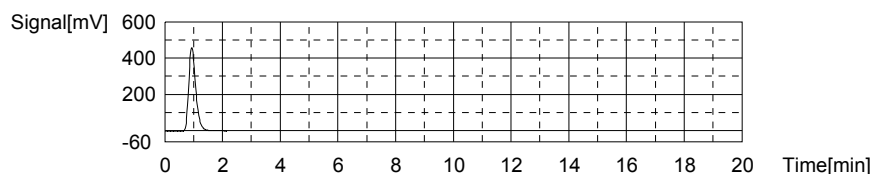
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	774.0	22.56mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 5:11:13 PM

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Mean Area 774.0
Mean Conc. 22.56mg/L



Sample

Sample Name: L17041307-09
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

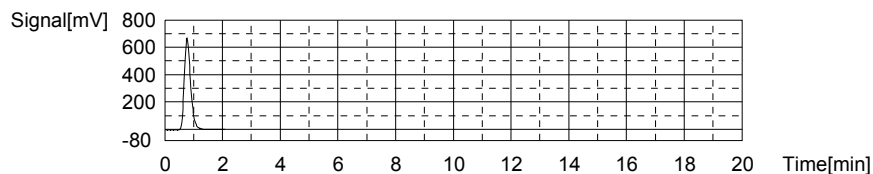
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.589mg/L TC:23.54mg/L IC:21.95mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1013	23.54mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 5:18:46 PM

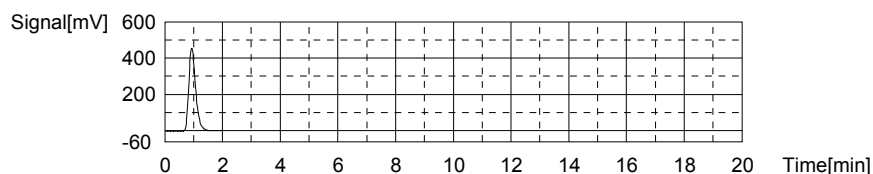
Mean Area 1013
Mean Conc. 23.54mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	753.3	21.95mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 5:23:41 PM

Mean Area 753.3
Mean Conc. 21.95mg/L



Sample

Sample Name: L17041307-10
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:6.253mg/L TC:46.85mg/L IC:40.60mg/L

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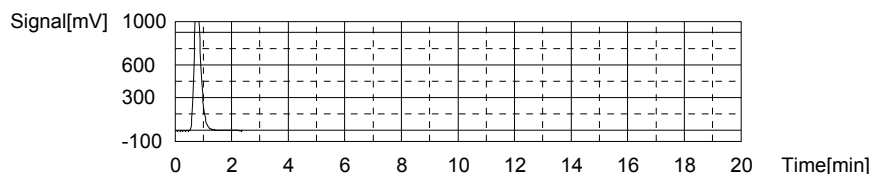
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	2000	46.85mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 5:31:32 PM

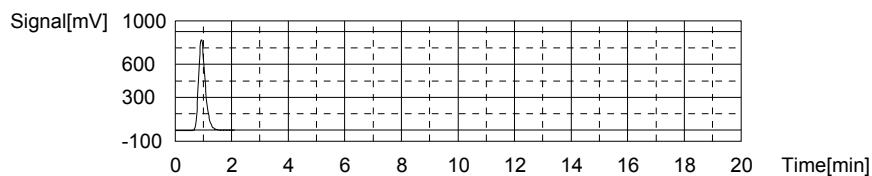
Mean Area 2000
Mean Conc. 46.85mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1378	40.60mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 5:36:38 PM

Mean Area 1378
Mean Conc. 40.60mg/L



Sample

Sample Name: L17041307-12
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

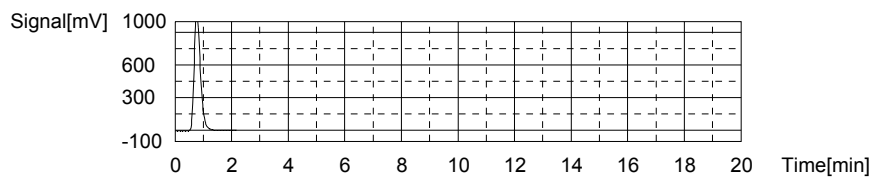
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.642mg/L TC:39.15mg/L IC:36.51mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1674	39.15mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 5:44:17 PM

Mean Area 1674
Mean Conc. 39.15mg/L

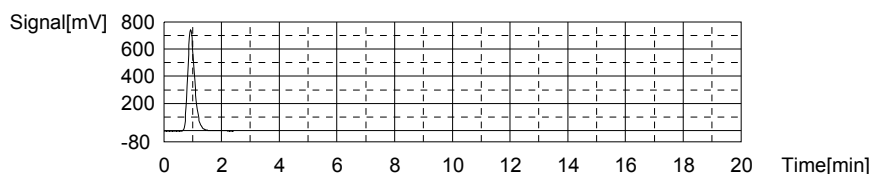


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1241	36.51mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 5:49:42 PM

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Mean Area 1241
Mean Conc. 36.51mg/L



Sample

Sample Name: <Untitled>
Sample ID: TOC-02-10-2017.met
Origin: Completed
Status: Completed
Chk. Result

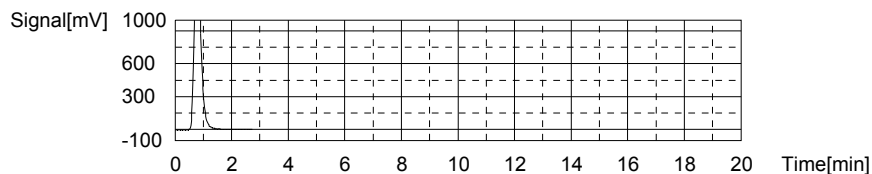
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:3.857mg/L TC:57.63mg/L IC:53.77mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	2456	57.63mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	5/1/2017 5:57:53 PM

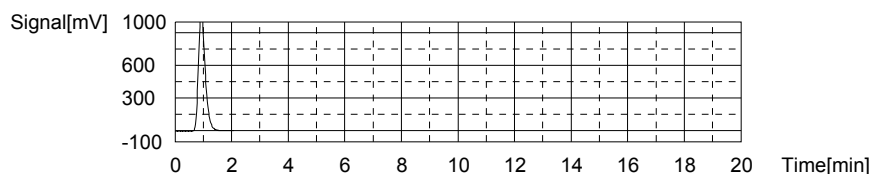
Mean Area 2456
Mean Conc. 57.63mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1819	53.77mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	5/1/2017 6:03:01 PM

Mean Area 1819
Mean Conc. 53.77mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:23.85mg/L TC:23.75mg/L IC:-0.09779mg/L

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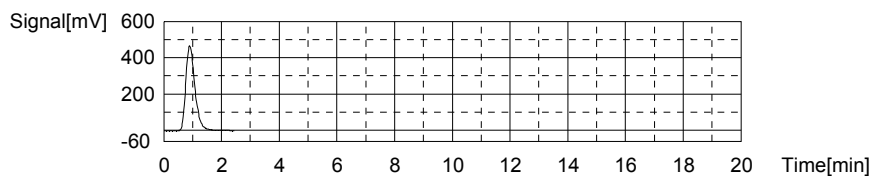
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1022	23.75mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 6:10:56 PM

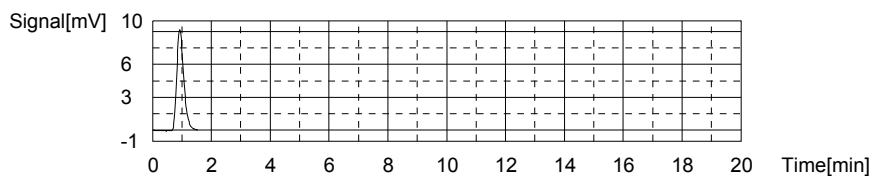
Mean Area 1022
Mean Conc. 23.75mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	15.14	-0.09779mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 6:15:18 PM

Mean Area 15.14
Mean Conc. -0.09779mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

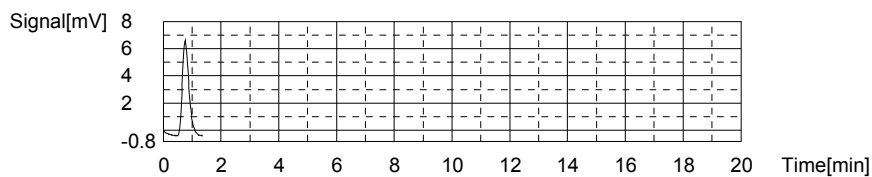
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1327mg/L TC:-0.1376mg/L IC:-0.2704mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	11.04	-0.1376mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 6:20:18 PM

Mean Area 11.04
Mean Conc. -0.1376mg/L



Anal.: IC

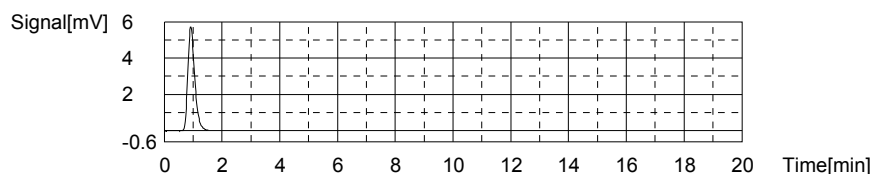
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.361	-0.2704mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 6:24:11 PM

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Mean Area 9.361
Mean Conc. -0.2704mg/L



Sample

Sample Name: L17041307-14 (3)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

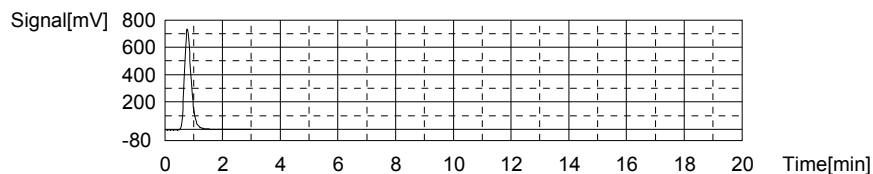
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:6.708mg/L TC:27.76mg/L IC:21.06mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1192	27.76mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 6:32:39 PM

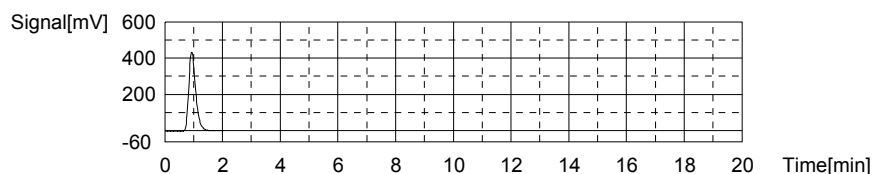
Mean Area 1192
Mean Conc. 27.76mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	723.5	21.06mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 6:37:37 PM

Mean Area 723.5
Mean Conc. 21.06mg/L



Sample

Sample Name: L17041307-15 (25)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:12.61mg/L TC:16.29mg/L IC:3.673mg/L

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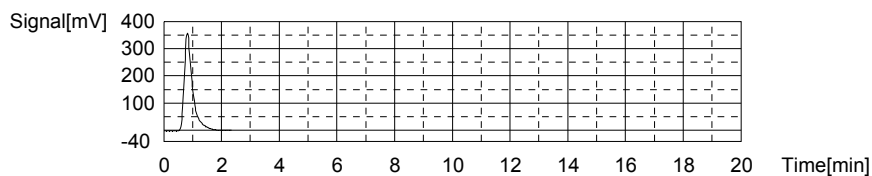
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	706.2	16.29mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 6:45:25 PM

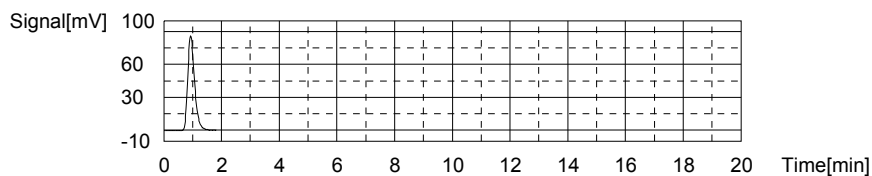
Mean Area 706.2
Mean Conc. 16.29mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	141.4	3.673mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 6:50:04 PM

Mean Area 141.4
Mean Conc. 3.673mg/L



Sample

Sample Name: L17041307-16
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

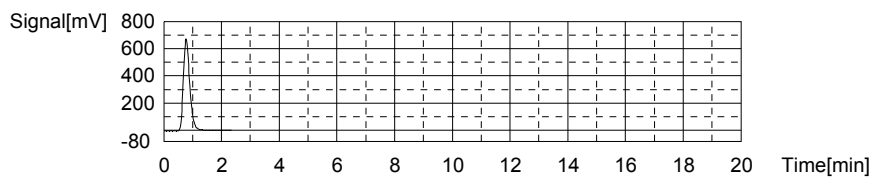
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.026mg/L TC:23.98mg/L IC:21.96mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1032	23.98mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 6:57:53 PM

Mean Area 1032
Mean Conc. 23.98mg/L



Anal.: IC

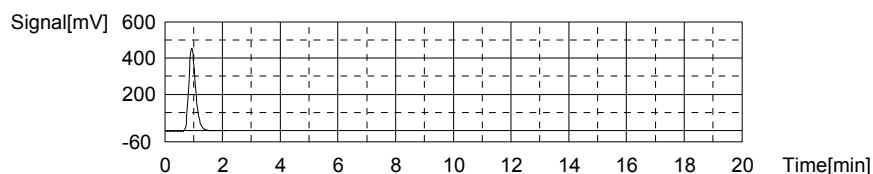
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	753.7	21.96mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 7:02:51 PM

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Mean Area 753.7
Mean Conc. 21.96mg/L



Sample

Sample Name: L17041307-17
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

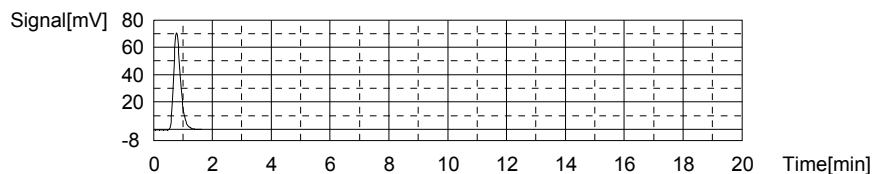
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.075mg/L TC:2.345mg/L IC:1.270mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	116.1	2.345mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 7:09:58 PM

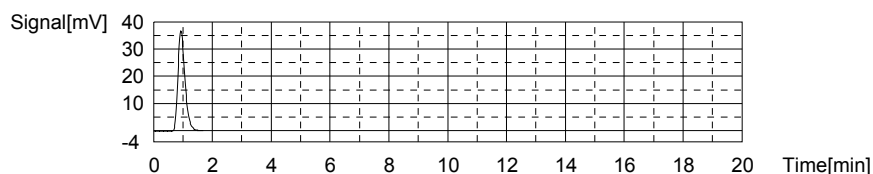
Mean Area 116.1
Mean Conc. 2.345mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	60.93	1.270mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 7:14:31 PM

Mean Area 60.93
Mean Conc. 1.270mg/L



Sample

Sample Name: L17041307-18
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.342mg/L TC:29.06mg/L IC:26.72mg/L

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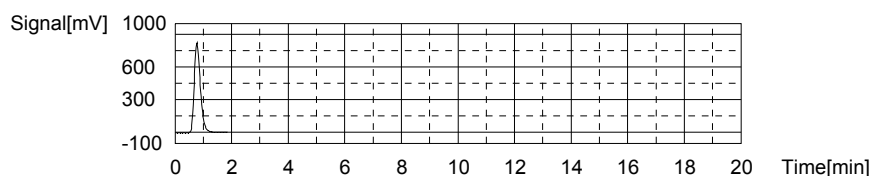
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1247	29.06mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 7:21:51 PM

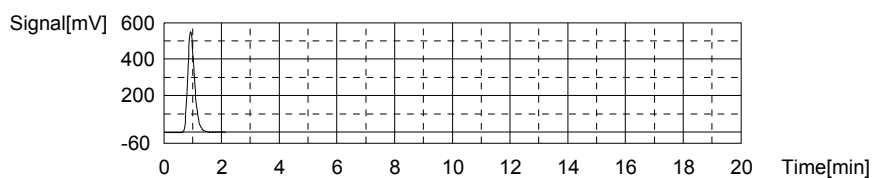
Mean Area 1247
Mean Conc. 29.06mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	913.2	26.72mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 7:26:57 PM

Mean Area 913.2
Mean Conc. 26.72mg/L



Sample

Sample Name: L17041307-19
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

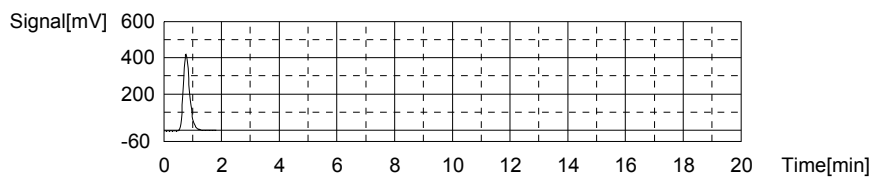
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.505mg/L TC:14.80mg/L IC:13.30mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	643.4	14.80mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 7:34:15 PM

Mean Area 643.4
Mean Conc. 14.80mg/L



Anal.: IC

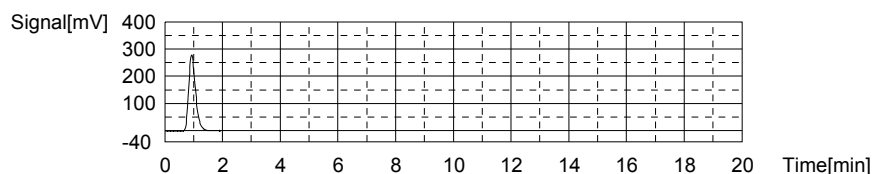
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	463.7	13.30mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 7:39:06 PM

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Mean Area 463.7
Mean Conc. 13.30mg/L



Sample

Sample Name: L17041307-20
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

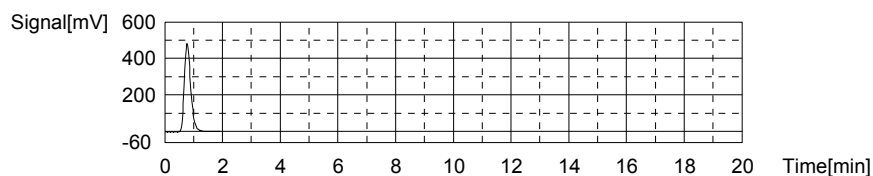
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.718mg/L TC:17.20mg/L IC:15.48mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	744.7	17.20mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 7:46:29 PM

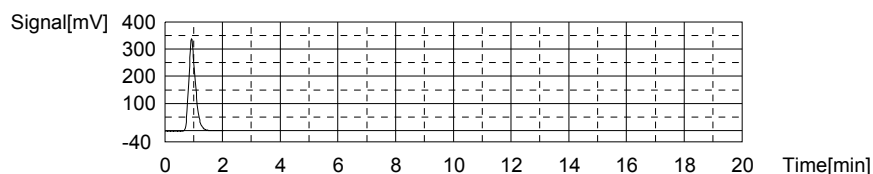
Mean Area 744.7
Mean Conc. 17.20mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	536.7	15.48mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 7:51:25 PM

Mean Area 536.7
Mean Conc. 15.48mg/L



Sample

Sample Name: L17041307-21
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.453mg/L TC:9.433mg/L IC:7.979mg/L

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5/2/2017 8:32:46 AM

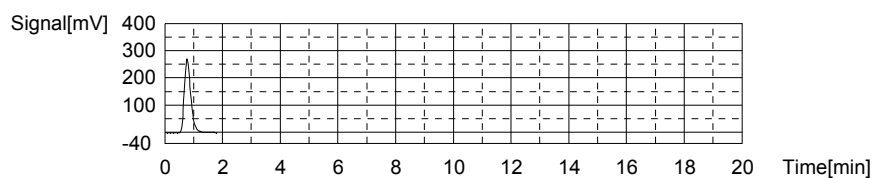
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	416.1	9.433mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 7:58:43 PM

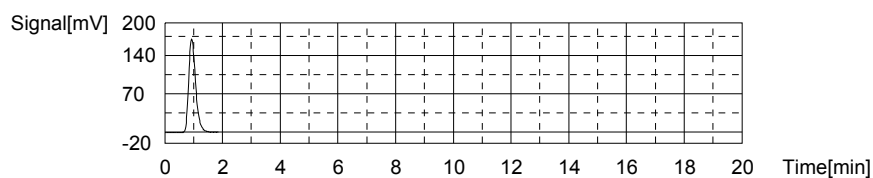
Mean Area 416.1
Mean Conc. 9.433mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	285.6	7.979mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 8:03:27 PM

Mean Area 285.6
Mean Conc. 7.979mg/L



Sample

Sample Name: WG612017-05 DUP
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

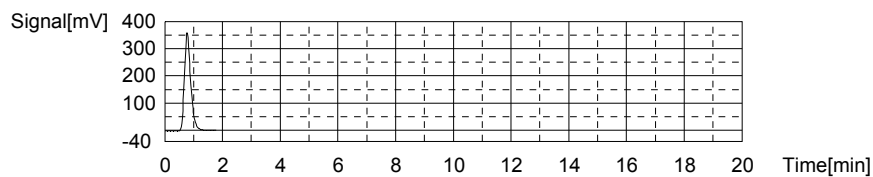
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:2.280mg/L TC:12.32mg/L IC:10.04mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	538.3	12.32mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 8:10:42 PM

Mean Area 538.3
Mean Conc. 12.32mg/L

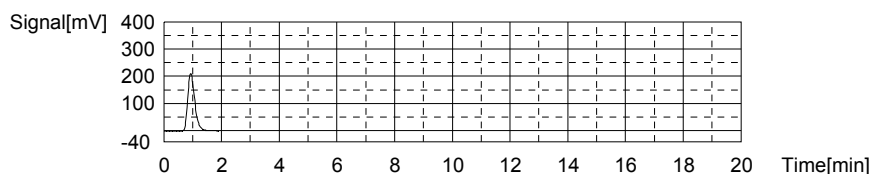


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	354.6	10.04mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 8:15:31 PM

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Mean Area 354.6
 Mean Conc. 10.04mg/L



Sample

Sample Name: WG612017-06 MS
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

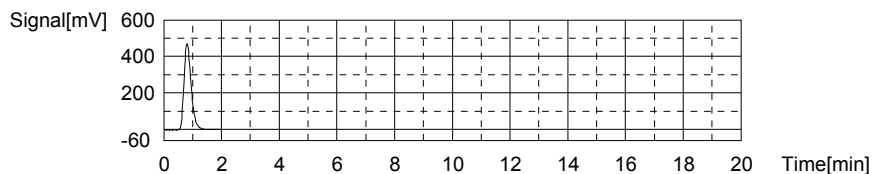
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:11.82mg/L TC:18.67mg/L IC:6.847mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	807.1	18.67mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 8:23:01 PM

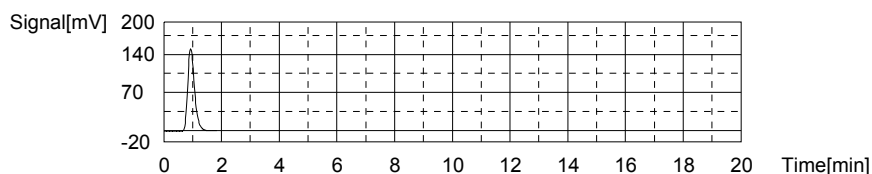
Mean Area 807.1
 Mean Conc. 18.67mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	247.7	6.847mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45	15/1/2017 8:27:41 PM

Mean Area 247.7
 Mean Conc. 6.847mg/L



Sample

Sample Name: CCV
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:23.72mg/L TC:23.49mg/L IC:-0.2313mg/L

5/2/2017 8:32:46 AM

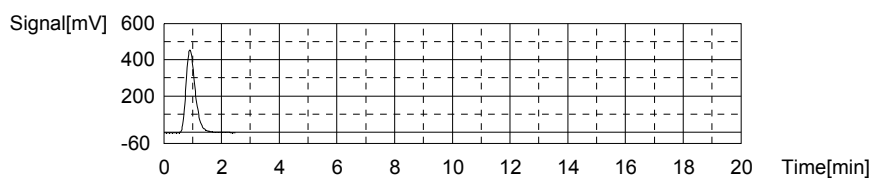
05-01-2017-ADG-TOC.132

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1011	23.49mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 8:35:39 PM

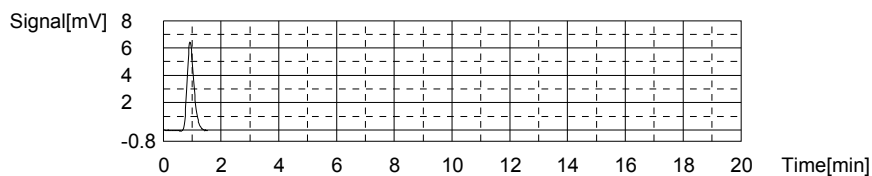
Mean Area 1011
Mean Conc. 23.49mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.67	-0.2313mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 8:39:59 PM

Mean Area 10.67
Mean Conc. -0.2313mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

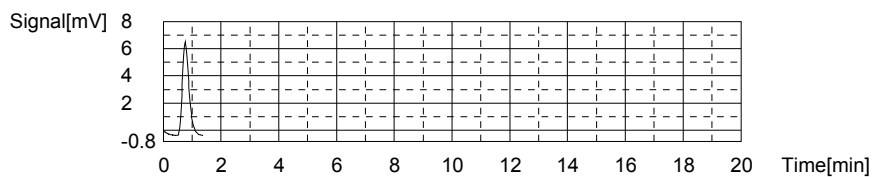
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1412mg/L TC:-0.1414mg/L IC:-0.2826mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.88	-0.1414mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 8:45:00 PM

Mean Area 10.88
Mean Conc. -0.1414mg/L

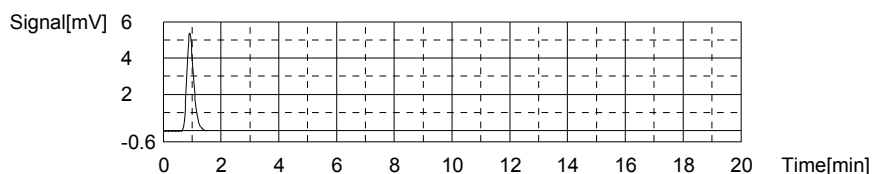


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.951	-0.2826mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 8:48:51 PM

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Mean Area 8.951
 Mean Conc. -0.2826mg/L



Sample

Sample Name: <Untitled>
 Sample ID: TOC-02-10-2017.met
 Origin: Completed
 Status: Completed
 Chk. Result

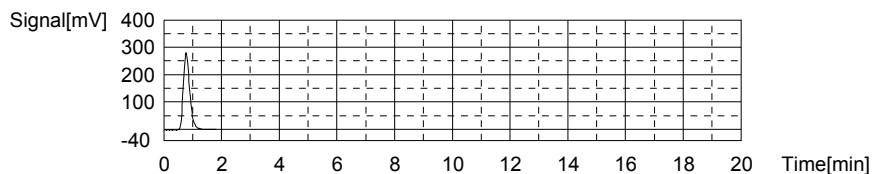
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.126mg/L TC:9.768mg/L IC:8.642mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	430.3	9.768mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 8:56:12 PM

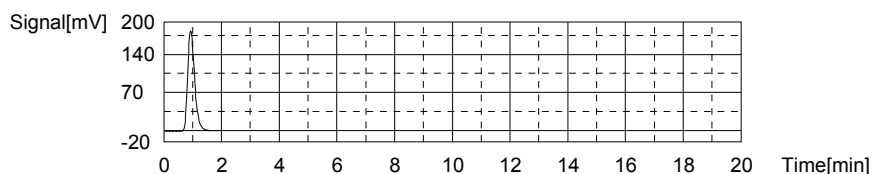
Mean Area 430.3
 Mean Conc. 9.768mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	307.8	8.642mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 9:00:59 PM

Mean Area 307.8
 Mean Conc. 8.642mg/L



Sample

Sample Name: CCV
 Sample ID: <Untitled>
 Origin: TOC-02-10-2017.met
 Status: Completed
 Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:23.72mg/L TC:23.49mg/L IC:-0.2370mg/L

5/2/2017 8:32:46 AM

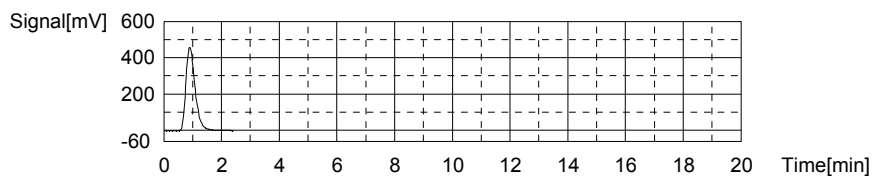
05-01-2017-ADG-TOC.132

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1011	23.49mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 9:09:05 PM

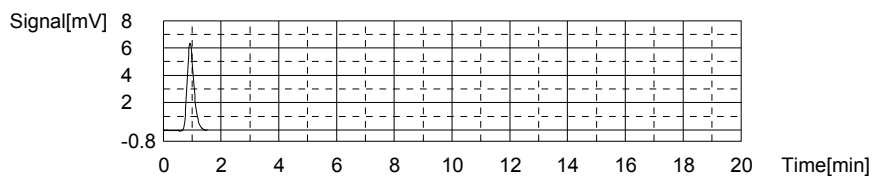
Mean Area 1011
Mean Conc. 23.49mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.48	-0.2370mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 9:13:28 PM

Mean Area 10.48
Mean Conc. -0.2370mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

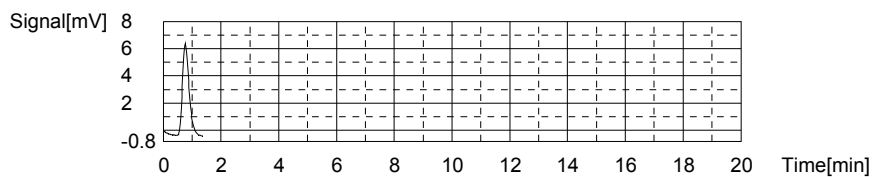
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1376mg/L TC:-0.1461mg/L IC:-0.2838mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.68	-0.1461mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	15/1/2017 9:18:29 PM

Mean Area 10.68
Mean Conc. -0.1461mg/L



Anal.: IC

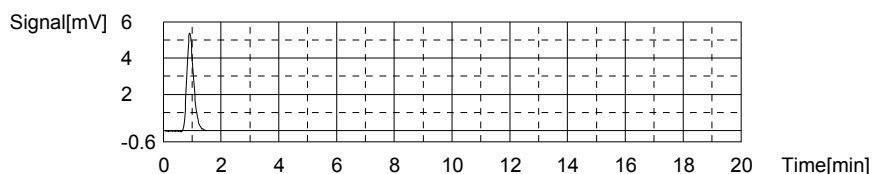
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	8.912	-0.2838mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	15/1/2017 9:22:21 PM

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5/2/2017 8:32:46 AM

05-01-2017-ADG-TOC.132

Mean Area 8.912
Mean Conc. -0.2838mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

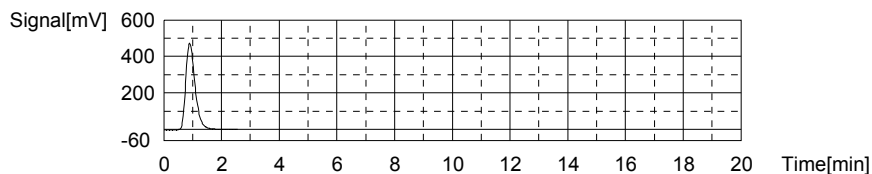
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.76mg/L TC:24.62mg/L IC:-0.1423mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1059	24.62mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	5/2/2017 7:24:13 AM

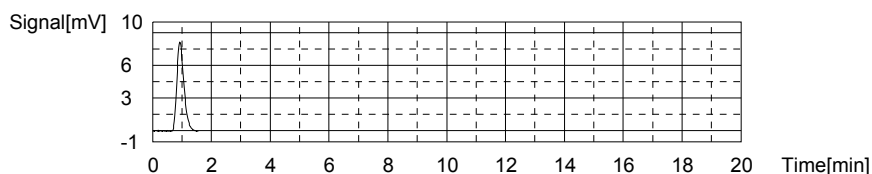
Mean Area 1059
Mean Conc. 24.62mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	13.65	-0.1423mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	5/2/2017 7:28:37 AM

Mean Area 13.65
Mean Conc. -0.1423mg/L



Sample

Sample Name: CCB
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1396mg/L TC:-0.1409mg/L IC:-0.2805mg/L

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5/2/2017 8:32:46 AM

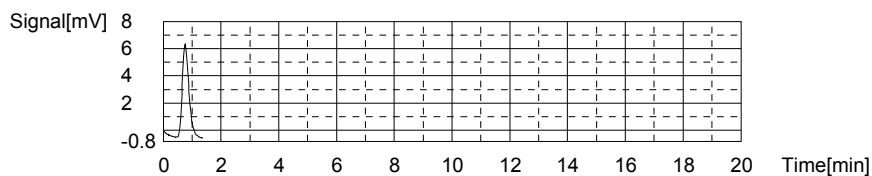
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.90	-0.1409mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	5/2/2017 7:33:38 AM

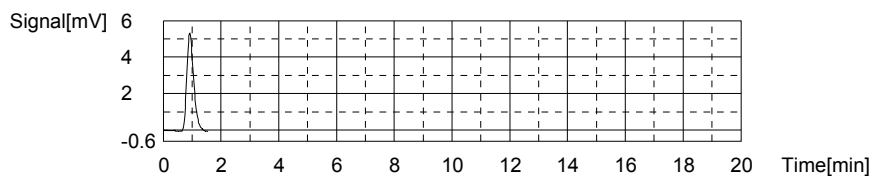
Mean Area 10.90
Mean Conc. -0.1409mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.021	-0.2805mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	5/2/2017 7:37:36 AM

Mean Area 9.021
Mean Conc. -0.2805mg/L



Sample

Sample Name: L17041307-13 (2)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

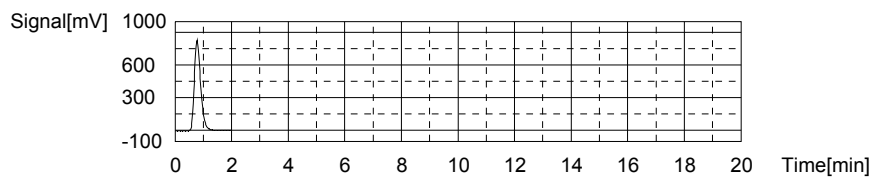
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:6.251mg/L TC:30.20mg/L IC:23.95mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1295	30.20mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	5/2/2017 7:45:17 AM

Mean Area 1295
Mean Conc. 30.20mg/L

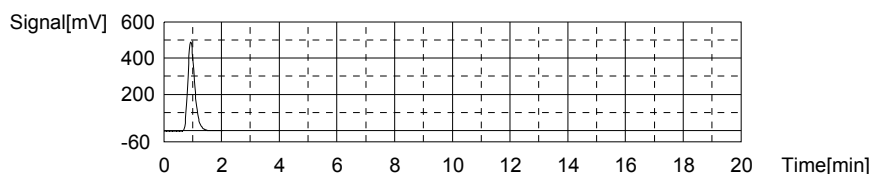


Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	820.3	23.95mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	5/2/2017 7:50:16 AM

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Mean Area 820.3
Mean Conc. 23.95mg/L



Sample

Sample Name: L17041378-01 (3)
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

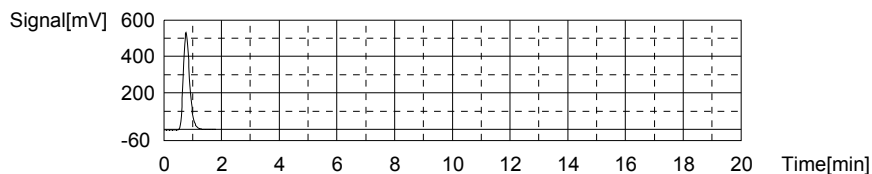
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	TOC:1.721mg/L TC:18.78mg/L IC:17.06mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	811.8	18.78mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	5/2/2017 7:57:31 AM

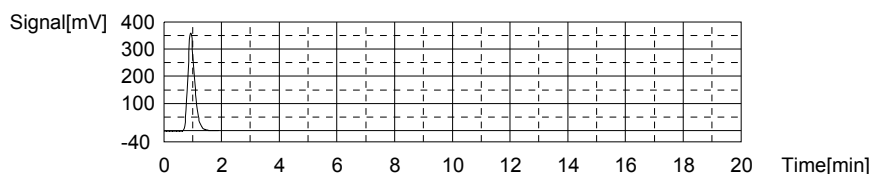
Mean Area 811.8
Mean Conc. 18.78mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	589.7	17.06mg/L	500uL	1		TICCURVE-02-10-2017.2017_02_10_14_45	5/2/2017 8:02:24 AM

Mean Area 589.7
Mean Conc. 17.06mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:24.07mg/L TC:23.96mg/L IC:-0.1082mg/L

5/2/2017 8:32:46 AM

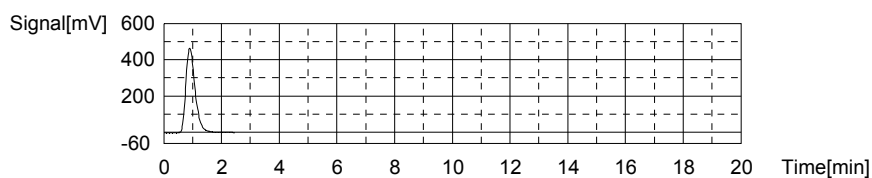
05-01-2017-ADG-TOC.i32

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1031	23.96mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	5/2/2017 8:10:19 AM

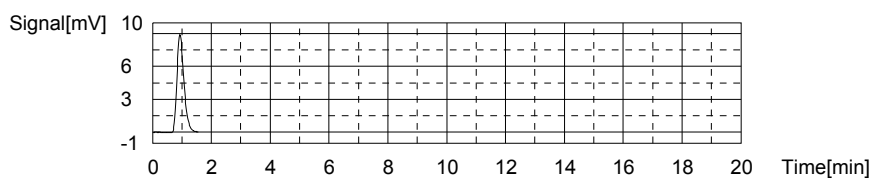
Mean Area 1031
Mean Conc. 23.96mg/L



Anal.: IC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	14.79	-0.1082mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	5/2/2017 8:14:47 AM

Mean Area 14.79
Mean Conc. -0.1082mg/L



Sample

Sample Name: CCV
Sample ID: <Untitled>
Origin: TOC-02-10-2017.met
Status: Completed
Chk. Result

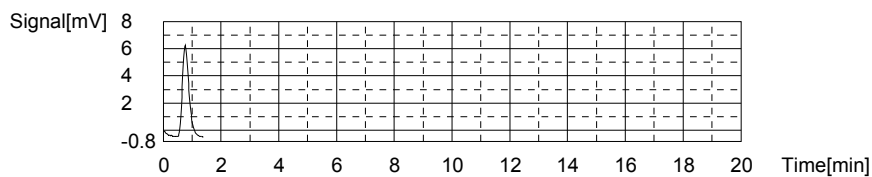
Type	Anal.	Dil.	Result
Unknown	TOC	1.000	!!Error!! TOC:0.1271mg/L TC:-0.1476mg/L IC:-0.2746mg/L

1. Det

Anal.: TC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	10.62	-0.1476mg/L	500uL	1		TCCURVE-02-10-2017.2017_02_10_09_32_55	5/2/2017 8:19:49 AM

Mean Area 10.62
Mean Conc. -0.1476mg/L



Anal.: IC

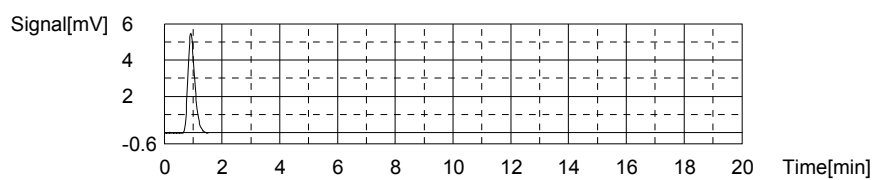
No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	9.218	-0.2746mg/L	500uL	1		TICURVE-02-10-2017.2017_02_10_14_45_15	5/2/2017 8:23:41 AM

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5/2/2017 8:32:46 AM

05-01-2017-ADG-TOC.i32

Mean Area 9.218
Mean Conc. -0.2746mg/L



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3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
May 8, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
OJE - OMOYEMWEN J. ENGLISH	PDM - PIERCE D. MORRIS
PIT - MICROBAC WARRENDALE	REK - BOB E. KYER
RLB - BOB BUCHANAN	RNP - RICK N. PETTY
SAV - SARAH A. VANDENBERG	SCA - SUEELLEN C. ADAMS
SCB - SARAH C. BOGOLIN	SCJ - SUE ELLEN C. JOHNSON
SDC - SHALYN D. CONLEY	TB - TODD BOYLE
TMB - TIFFANY M. BAILEY	TMM - TAMMY M. MORRIS
VC - VICKI COLLIER	WTD - WADE T. DELONG
XXX - UNAVAILABLE OR SUBCONTRACT	

List of Valid Qualifiers

May 08, 2017

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample receipt exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample receipt exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentatively identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound



List of Valid Qualifiers

May 08, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample receipt exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below



CHAIN OF CUSTODY

Name Of Lab Shipping To: MICROBAC (740) 373-4071 A/TN: STEPHANIE MOSSBURG

Project: AECOM
 LONGHORN ARMY AMMN. PLANT (LHAAP)
 GROUNDWATER TREATMENT PLANT (GWTP)
 KARNACK, TEXAS
Project No.:
 60266135.GWTPPT
 HRUMAR16

Job:
GROUNDWATER TREATMENT PLANT
WEEKLY SAMPLES

Prepared By:
 Scott Beesinger

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	AMMONIA-N	ORTHO-PHOSPHATE	TOTAL ORGANIC CARBON	Analyses	Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650-6435-Grab	Water	04/26/17 / 15:00		2	X		X		H2SO4	
LH18/24-SP650-6435-Grab	Water	04/26/17 / 15:00		1	X	X			NONE	

Microbac OVD
 Received: 04/27/2017 09:52
 By: BRENDA GREENMALT
 221000100043



Brenda Greenmalt

Additional Remarks: Standard TAT on all parameters Send results to Linda Raabe at linda.raabe@aecom.com or call at 210-253-7518

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
<i>Scott Beesinger</i>	04/26/17	15:30									

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

Remarks:

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17041304

Account: 2551

Project: 2551.096

Samples: 1

Due Date: 08-MAY-2017

Samplenum Container ID Products
L17041304-01 899941 PO4

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	27-APR-2017 10:48	BRG		
2	ANALYZ	W1	WET	27-APR-2017 10:50	DLP	BRG	
3	STORE	WET	A1	28-APR-2017 09:20	BRG	DLP	

Samplenum Container ID Products
L17041304-01 899942 TOC

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	27-APR-2017 10:48	BRG		<2
2	ANALYZ	W1	WET	28-APR-2017 08:22	EPT	BRG	
3	ANALYZ	W1	A1	02-MAY-2017 11:50	BRG	ADG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	27-APR-2017 10:48	BRG		<2

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login



NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
 Total Halide by Bomb Combustion (TX)
 Particle Sizing - 200 Mesh (PS200)
 Specific Gravity/Density (SPGRAV)
 Total Residual Chlorine (CL-TRL)
 Total Volatile Solids (all forms) (TVS)
 Total Coliform Bacteria (all methods)
 Fecal Coliform Bacteria (all methods)
 Sulfite (SO₃)
 Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS

Nitrogen, Ammonia by Method 350.1
 Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
 Phenolics, Total by Method 420.1
 ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
 Acetic acid
 Butyric acid
 Lactic acid
 Propionic acid
 Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
 1-Methylnaphthalene
 1,4-Dioxane
 Atrazine
 Benzaldehyde
 Biphenyl
 Caprolactam
 Hexamethylphosphoramide (HMPA)
 Pentachlorobenzene
 Pentachloroethane

NELAP Accreditation by Laboratory SOP**NONPOTABLE WATER**OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALSOVD MSS01/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP**SOLID AND HAZARDOUS CHEMICALS**OVD MSV01/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)



Laboratory Report Number: L17050243

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on May 10 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com

Lab Report #: L17050243

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00113842	I	5.0		J4616881588	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

**Lab Report #:** L17050243**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP650-6436	L17050243-01	05/03/2017 15:00	05/04/2017 09:41
LH18/24-SP140-7436	L17050243-02	05/03/2017 15:00	05/04/2017 09:41



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050243
Project Name:		Method:	6850
Prep Batch Number(s):	WG612896	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-09 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a. if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2017-05-09 14:29:17



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050243
Project Name:		Method:	6850
Prep Batch Number(s):	WG612896	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-09 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050243
Project Name:		Method:	6850
Prep Batch Number(s):	WG612896	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-09 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050243
Project Name:		Method:	6850
Prep Batch Number(s):	WG612896	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-09 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050243
Project Name:		Method:	6850
Prep Batch Number(s):	WG612896	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-09 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050243
Project Name:		Method:	6850
Prep Batch Number(s):	WG612896	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-09 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.

Lab Report #: L17050243
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17050243-01	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP650-6436	Prep Method: 6850	Prep Date: 05/04/2017 13:15
Matrix: Water	Analytical Method: 6850	Cal Date: 04/24/2017 15:40
Workgroup #: WG612896	Analyst: JWR	Run Date: 05/04/2017 15:09
Collect Date: 05/03/2017 15:00	Dilution: 1	File ID: 1LM.LM39591
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17050243
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17050243-02	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP140-7436	Prep Method: 6850	Prep Date: 05/04/2017 13:15
Matrix: Water	Analytical Method: 6850	Cal Date: 04/24/2017 15:40
Workgroup #: WG612896	Analyst: JWR	Run Date: 05/04/2017 16:06
Collect Date: 05/03/2017 15:00	Dilution: 10000	File ID: 1LM.LM39594
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	10100		4000	2000	1000

2.1 General Chromatography Data

2.1.1 LC/MS Data (6850)

2.1.1.1 Summary Data

Lab Report #: L17050243

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17050243-01	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP650-6436	Prep Method: 6850	Prep Date: 05/04/2017 13:15
Matrix: Water	Analytical Method: 6850	Cal Date: 04/24/2017 15:40
Workgroup #: WG612896	Analyst: JWR	Run Date: 05/04/2017 15:09
Collect Date: 05/03/2017 15:00	Dilution: 1	File ID: 1LM.LM39591
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17050243

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17050243-02

PrePrep Method: N/A

Instrument: LCMS1

Client ID: LH18/24-SP140-7436

Prep Method: 6850

Prep Date: 05/04/2017 13:15

Matrix: Water

Analytical Method: 6850

Cal Date: 04/24/2017 15:40

Workgroup #: WG612896

Analyst: JWR

Run Date: 05/04/2017 16:06

Collect Date: 05/03/2017 15:00

Dilution: 10000

File ID: 1LM.LM39594

Sample Tag: DL01

Units: ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	10100		4000	2000	1000

2.1.1.2 QC Summary Data

Example Calculation 6850 - Perchlorate**Concentration from Linear Regression****Step 1: Retrieve Curve Data From Plot, $y = mx + b$**

y = response ratio = response of analyte / response of internal standard (IS) = R_x/R_{istd}

x = amount ratio = concentration analyte/concentration internal standard (IS) = C_x / C_{istd}

m = slope from curve (1.45)

b = intercept from curve (-0.00242)

$y = 1.45x + -0.00242$

Step 2: Substitute the value for y

where $y = 12600/226000 = 0.055752$

Step 3: Solve for x

$x = (y - b)/m = 0.0040119$

Step 4: Solve for analyte concentration C_x

$C_x = (C_{is})(x) = (5 \text{ ug/L})(0.0040119) = 0.200594 \text{ ug/L}$

Example Calculation - Water:

Slope from curve, m :	1.45
Intercept from curve, b :	-0.00242
Response of analyte, R_x :	12600
Response of Internal Standard, R_{istd} :	226000
Concentration of IS, C_{istd} (ug/L):	5.00
Response Ratio:	0.05575
Amount Ratio:	0.04012
Analyte Concentration, C_x (ug/L) :	0.200594

Example Calculation - Soil:

Analyte Concentration, C_x (ug/L):	0.20059
Amount of soil extracted (g):	5.00
Final volume of extract (mL):	50.00
Percent solids (Pct wt.)	100
Concentration in soil (ug/kg):	2.005938

Microbac Laboratories Inc.
Instrument Run Log

Instrument: LCMS1 Dataset: 042417_JWR.TXT
 Analyst1: JWR Analyst2: NA
 Method: 6850 SOP: HPLC06 Rev: 8

Maintenance Log ID: _____ Syringe Filter Lot#: 160109254
 Eluent ID#: _____

Workgroups: Column 1 ID: KP-RPPX250 Column 2 ID: NA
 Analytical WG611327 (waters) Analytical WG611328 (waters)
 Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (04/24/2017)
 CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: STD80234

Comments: ICAL WG611288 : Alternate Source STD80234
 Analytical Column : RPPX 5um (250x4.6mm)
 K'Prime S/N RPPX250-02115

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	1LM.LM39494	WG611288-01 CCB	1	1		04/24/17 13:27
2	1LM.LM39495	WG611288-02 STD (0.1 ug/L)	1	1	STD80232	04/24/17 13:46
3	1LM.LM39496	WG611288-03 STD (0.2 ug/L)	1	1	STD80232	04/24/17 14:05
4	1LM.LM39497	WG611288-04 STD (0.5 ug/L)	1	1	STD80232	04/24/17 14:24
5	1LM.LM39498	WG611288-05 STD (1.0 ug/L)	1	1	STD80232	04/24/17 14:43
6	1LM.LM39499	WG611288-06 STD (2.0 ug/L)	1	1	STD80232	04/24/17 15:02
7	1LM.LM39500	WG611288-07 STD (5.0 ug/L)	1	1	STD80232	04/24/17 15:21
8	1LM.LM39501	WG611288-08 STD (10 ug/L)	1	1	STD80232	04/24/17 15:40
9	1LM.LM39502	WG611288-09 SSCV (1.0 ug/L)	1	1	STD80234	04/24/17 15:59
10	1LM.LM39503	WG611330-01 CCB	1	1		04/24/17 16:18
11	1LM.LM39504	WG611330-02 CCV (1.0ug/L)	1	1	STD80232	04/24/17 16:37
12	1LM.LM39505	WG611327-07 MRL (0.2ug/L)	1	1	STD80232	04/24/17 16:56
13	1LM.LM39506	WG611327-01 MCT (0.2ug/L)	1	1	STD80234	04/24/17 17:14
14	1LM.LM39507	WG611327-02 BLANK	1	1		04/24/17 17:34
15	1LM.LM39508	WG611327-03 LCS (0.2ug/L)	1	1	STD80234	04/24/17 17:52
16	1LM.LM39509	L17040713-06 RS	1	1		04/24/17 18:11
17	1LM.LM39510	L17040713-07 MS	1	1	STD80234	04/24/17 18:30
18	1LM.LM39511	L17040713-08 MSD	1	1	STD80234	04/24/17 18:49
19	1LM.LM39512	L17040713-01	1	1		04/24/17 19:08
20	1LM.LM39513	L17040713-02	1	1		04/24/17 19:27
21	1LM.LM39514	L17040713-03	1	1		04/24/17 19:46
22	1LM.LM39515	L17040713-04	1	1		04/24/17 20:05
23	1LM.LM39516	WG611330-03 CCV (1.0ug/L)	1	1	STD80232	04/24/17 20:24
24	1LM.LM39517	WG611327-08 MRL (0.2ug/L)	1	1	STD80232	04/24/17 20:43
25	1LM.LM39518	WG611330-04 CCB	1	1		04/24/17 21:02
26	1LM.LM39519	L17040713-05	1	1		04/24/17 21:21
27	1LM.LM39520	L17040713-09	1	1		04/24/17 21:40
28	1LM.LM39521	L17040713-10	1	1		04/24/17 21:59
29	1LM.LM39522	L17040713-11	1	1		04/24/17 22:17
30	1LM.LM39523	L17040713-12	1	1		04/24/17 22:36
31	1LM.LM39524	L17040713-13	1	1		04/24/17 22:55
32	1LM.LM39525	WG611330-05 CCV (1.0ug/L)	1	1	STD80232	04/24/17 23:14
33	1LM.LM39526	WG611327-09 MRL (0.2ug/L)	1	1	STD80232	04/24/17 23:33

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Approved: 25-APR-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: LCMS1 Dataset: 042417_JWR.TXT
 Analyst1: JWR Analyst2: NA
 Method: 6850 SOP: HPLC06 Rev: 8

Maintenance Log ID: _____ Syringe Filter Lot#: 160109254
 Eluent ID#: _____

Workgroups: Column 1 ID: KP-RPPX250 Column 2 ID: NA
 Analytical WG611327 (waters) Analytical WG611328 (waters)
 Internal STD: COA19471 Surrogate STD: NA STD80232 (04/24/2017)
 CCV STD: STD80232 LCS STD: STD80234 STD80234

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
34	1LM.LM39527	WG611328-07 MRL (0.2ug/L)	1	1	STD80232	04/24/17 23:52
35	1LM.LM39528	WG611330-06 CCB	1	1		04/25/17 00:11
36	1LM.LM39529	WG611328-01 MCT (0.2ug/L)	1	1	STD80234	04/25/17 00:30
37	1LM.LM39530	WG611328-02 BLANK	1	1		04/25/17 00:49
38	1LM.LM39531	WG611328-03 LCS (0.2ug/L)	1	1	STD80234	04/25/17 01:08
39	1LM.LM39532	L17040841-08 RS	1	1		04/25/17 01:27
40	1LM.LM39533	L17040841-09 MS	1	1	STD80234	04/25/17 01:46
41	1LM.LM39534	L17040841-10 MSD	1	1	STD80234	04/25/17 02:05
42	1LM.LM39535	L17040841-01	1	1		04/25/17 02:23
43	1LM.LM39536	L17040841-02	1	1		04/25/17 02:42
44	1LM.LM39537	L17040841-03	1	1		04/25/17 03:01
45	1LM.LM39538	L17040841-04	1	1		04/25/17 03:20
46	1LM.LM39539	WG611330-07 CCV (1.0ug/L)	1	1	STD80232	04/25/17 03:39
47	1LM.LM39540	WG611328-08 MRL (0.2ug/L)	1	1	STD80232	04/25/17 03:58
48	1LM.LM39541	WG611330-08 CCB	1	1		04/25/17 04:17
49	1LM.LM39542	L17040841-05	1	1		04/25/17 04:36
50	1LM.LM39543	L17040841-06	1	1		04/25/17 04:55
51	1LM.LM39544	L17040841-07	1	1		04/25/17 05:14
52	1LM.LM39545	L17040841-11	1	1		04/25/17 05:33
53	1LM.LM39546	L17040841-12	1	1		04/25/17 05:52
54	1LM.LM39547	L17040841-13	1	1		04/25/17 06:11
55	1LM.LM39548	WG611330-09 CCV (1.0ug/L)	1	1	STD80232	04/25/17 06:30
56	1LM.LM39549	WG611328-09 MRL (0.2ug/L)	1	1	STD80232	04/25/17 06:49
57	1LM.LM39550	WG611330-10 CCB	1	1		04/25/17 07:07

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Page: 2

Approved: 25-APR-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: LCMS1 Dataset: 050417_JWR.TXT
 Analyst1: JWR Analyst2: NA
 Method: 6850 SOP: HPLC06 Rev: 8

Maintenance Log ID: _____ Syringe Filter Lot#: 160109254
 Eluent ID#: _____

Workgroups: Column 1 ID: KP-RPPX250 Column 2 ID: NA
 Analytical WG612896 (waters)
 Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (04/24/2017)
 CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: NA

Comments: Sample L17050243-02 was analyzed at a dilution based on its historical results.

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	1LM.LM39585	WG612898-01 CCB	1	1		05/04/17 13:15
2	1LM.LM39586	WG612898-02 CCV (1.0ug/L)	1	1	STD80232	05/04/17 13:34
3	1LM.LM39587	WG612896-07 MRL (0.2ug/L)	1	1	STD80232	05/04/17 13:53
4	1LM.LM39588	WG612896-01 MCT (0.2ug/L)	1	1	STD80234	05/04/17 14:12
5	1LM.LM39589	WG612896-02 BLANK	1	1		05/04/17 14:31
6	1LM.LM39590	WG612896-03 LCS (0.2ug/L)	1	1	STD80234	05/04/17 14:50
7	1LM.LM39591	L17050243-01 REF	1	1		05/04/17 15:09
8	1LM.LM39592	L17050243-01 MS	1	1	STD80234	05/04/17 15:28
9	1LM.LM39593	L17050243-01 MSD	1	1	STD80234	05/04/17 15:47
10	1LM.LM39594	L17050243-02 (10,000x)	1	10000		05/04/17 16:06
11	1LM.LM39595	WG612898-03 CCV (1.0ug/L)	1	1	STD80232	05/04/17 16:25
12	1LM.LM39596	WG612896-08 MRL (0.2ug/L)	1	1	STD80232	05/04/17 16:44
13	1LM.LM39597	WG612898-04 CCB	1	1		05/04/17 17:03

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Page: 1

Approved: 05-MAY-17




Microbac Laboratories Inc.

Data Checklist

Date: 24-APR-2017
 Analyst: JWR
 Analyst: NA
 Method: 6850
 Instrument: LCMS1
 Curve Workgroup: WG611288
 Runlog ID: 81726
 Analytical Workgroups: L17040713, L17040841

ANALYTICAL	
System Performance Check	NA
DFTPP (GCMS)	NA
Endrin/DDT breakdown (8081/GCMS)	NA
Pentachlorophenol/benzidine tailing (GCMS)	NA
Eluent check (IC)/system pressure (HPLC)	NA
Window standard (FID)	NA
Initial Calibration	X
Average RF	NA
Linear regression or higher order curve	X
Alternate source standard (ICV) % Difference	X
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (GCMS)	X
Continuing calibration blank (CCB) (IC/LCMS)	X
Limit of quantitation verification (LOQV) (LCMS)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	X
Recoveries	X
%RPD	X
Interference check sample (ICS) (LCMS)	MCT
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	NA
Surrogate recoveries	NA
Internal standard areas (MS)	X
Library searches (GCMS)	NA
Calculations & correct factors	X
Compounds above calibration range	NA
Reruns	NA
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	NA
Check for completeness	X
Primary Reviewer	JWR
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	ECL

Primary Reviewer:
25-APR-2017



Secondary Reviewer:
25-APR-2017




Microbac Laboratories Inc.

Data Checklist

Date: 04-MAY-2017
 Analyst: JWR
 Analyst: NA
 Method: 6850
 Instrument: LCMS1
 Curve Workgroup: NA
 Runlog ID: 81971
 Analytical Workgroups: L17050243

ANALYTICAL	
System Performance Check	NA
DFTPP (GCMS)	NA
Endrin/DDT breakdown (8081/GCMS)	NA
Pentachlorophenol/benzidine tailing (GCMS)	NA
Eluent check (IC)/system pressure (HPLC)	NA
Window standard (FID)	NA
Initial Calibration	NA
Average RF	NA
Linear regression or higher order curve	NA
Alternate source standard (ICV) % Difference	NA
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (GCMS)	X
Continuing calibration blank (CCB) (IC/LCMS)	X
Limit of quantitation verification (LOQV) (LCMS)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	X
Recoveries	X
%RPD	X
Interference check sample (ICS) (LCMS)	MCT
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	NA
Surrogate recoveries	NA
Internal standard areas (MS)	X
Library searches (GCMS)	NA
Calculations & correct factors	X
Compounds above calibration range	NA
Reruns	NA
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	
Check for completeness	X
Primary Reviewer	JWR
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	MES

Primary Reviewer:
05-MAY-2017

John Richards

Secondary Reviewer:
05-MAY-2017

Mary Sheehy



Analytical Method:6850
 Login Number:L17050243

AAB#:WG612896

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6436	01	05/03/17					05/04/2017	.9	28		05/04/17	.1	28	
LH18/24-SP140-7436	02	05/03/17					05/04/2017	.9	28		05/04/17	.1	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17050243 Work Group: WG612896
 Blank File ID: 1LM.LM39589 Blank Sample ID: WG612896-02
 Prep Date: 05/04/17 13:15 Instrument ID: LCMS1
 Analyzed Date: 05/04/17 14:31 Method: 6850
 Analyst: JWR

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
QCMRL	WG612896-07	1LM.LM39587	05/04/17 13:53	01
MCT	WG612896-01	1LM.LM39588	05/04/17 14:12	01
LCS	WG612896-03	1LM.LM39590	05/04/17 14:50	01
LH18/24-SP650-6436	L17050243-01	1LM.LM39591	05/04/17 15:09	01
LH18/24-SP140-7436	L17050243-02	1LM.LM39594	05/04/17 16:06	DL01
QCMRL	WG612896-08	1LM.LM39596	05/04/17 16:44	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5279064
 Report generated 05/05/2017 15:51



Login Number: L17050243 Prep Date: 05/04/17 13:15 Sample ID: WG612896-02
 Instrument ID: LCMS1 Run Date: 05/04/17 14:31 Prep Method: 6850
 File ID: 1LM.LM39589 Analyst: JWR Method: 6850
 Workgroup (AAB#): WG612896 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: LCMS1-24-APR-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Perchlorate	0.100	0.400	0.100	1	U

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5279065
 05-MAY-2017 15:51



Login Number: L17050243 Run Date: 05/04/2017 Sample ID: WG612896-03
Instrument ID: LCMS1 Run Time: 14:50 Prep Method: 6850
File ID: 1LM.LM39590 Analyst: JWR Method: 6850
Workgroup (AAB#): WG612896 Matrix: Water Units: ug/L
QC Key: DOD4 Lot#: STD80234 Cal ID: LCMS1-24-APR-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Perchlorate	0.200	0.186	93.0	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 5279066
Report generated: 05/05/2017 15:51



Loginnum: L17050243 Cal ID: LCMS1 - Worknum: WG612896
 Instrument ID: LCMS1 Contract #: _____ Method: 6850
 Parent ID: WG612896-04 File ID: LLM.LM39591 Dil: 1 Matrix: WATER
 Sample ID: WG612896-05 MS File ID: LLM.LM39592 Dil: 1 Units: ug/L
 Sample ID: WG612896-06 MSD File ID: LLM.LM39593 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Perchlorate	ND	0.200	0.184	92.0	0.200	0.175	87.5	5.01	80 - 120	15	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Login Number: L17050243
Analytical Method: 6850
ICAL Workgroup: WG611288

Instrument ID: LCMS1
Initial Calibration Date: 24-APR-17 15:40
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
Perchlorate	1.286	4.98	1.00000	

R = Correlation coefficient; 0.995 minimum
R² = Coefficient of determination; 0.99 minimum

INT_CAL - Modified 03/06/2008
PDF File ID: 5279292
Report generated 05/05/2017 15:51



Login Number: L17050243
 Analytical Method: 6850

Instrument ID: LCMS1
 Initial Calibration Date: 24-APR-17 15:40
 Column ID: F

Analyte	WG611288-02			WG611288-03			WG611288-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	0.100	21000.0000	1.332	0.200	38200.0000	1.222	0.500	104000.000	1.335

INT_CAL - Modified 03/06/2008
 PDF File ID: 5279292
 Report generated 05/05/2017 15:51



Login Number: L17050243
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 24-APR-17 15:40
Column ID: F

Analyte	WG611288-05			WG611288-06			WG611288-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	1.00	206000.000	1.288	2.00	412000.000	1.312	5.00	955000.000	1.270

INT_CAL - Modified 03/06/2008
PDF File ID: 5279292
Report generated 05/05/2017 15:51



Login Number: L17050243
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 24-APR-17 15:40
Column ID: F

Analyte	WG611288-08		
	CONC	RESP	RF
Perchlorate	10.0	1860000.00	1.244

INT_CAL - Modified 03/06/2008
PDF File ID: 5279292
Report generated 05/05/2017 15:51



Login Number: L17050243 Run Date: 04/24/2017 Sample ID: WG611288-09
 Instrument ID: LCMS1 Run Time: 15:59 Method: 6850
 File ID: 1LM.LM39502 Analyst: JWR QC Key: DOD4
 ICal Workgroup: WG611288 Cal ID: LCMS1 - 24-APR-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
Perchlorate	1.00	0.977	ug/L	1.24	2.30	15	

* Exceeds %D Limit



Login Number: L17050243 Run Date: 05/04/2017 Sample ID: WG612898-01
Instrument ID: LCMS1 Run Time: 13:15 Method: 6850
File ID: LLM.LM39585 Analyst: JWR Units: ug/L
Workgroup (AAB#): WG612896 Cal ID: LCMS1 - 24-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.



Login Number: L17050243 Run Date: 05/04/2017 Sample ID: WG612898-04
Instrument ID: LCMS1 Run Time: 17:03 Method: 6850
File ID: LLM.LM39597 Analyst: JWR Units: ug/L
Workgroup (AAB#): WG612896 Cal ID: LCMS1 - 24-APR-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 5279070
Report generated 05/05/2017 15:52



Login Number: L17050243 Run Date: 05/04/2017 Sample ID: WG612898-02
Instrument ID: LCMS1 Run Time: 13:34 Method: 6850
File ID: 1LM.LM39586 Analyst: JWR QC Key: DOD4
Workgroup (AAB#): WG612896 Cal ID: LCMS1 - 24-APR-17
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	0.995	ug/L	1.26	0.500	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008
PDF File ID: 5279069
Report generated 05/05/2017 15:52



Login Number: L17050243 Run Date: 05/04/2017 Sample ID: WG612898-03
 Instrument ID: LCMS1 Run Time: 16:25 Method: 6850
 File ID: 1LM.LM39595 Analyst: JWR QC Key: DOD4
 Workgroup (AAB#): WG612896 Cal ID: LCMS1 - 24-APR-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	0.978	ug/L	1.24	2.20	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008
 PDF File ID: 5279069
 Report generated 05/05/2017 15:52



Login Number: L17050243 Run Date: 05/04/2017 Sample ID: WG612896-07
Instrument ID: LCMS1 Run Time: 13:53 Prep Method: 6850
File ID: 1LM.LM39587 Analyst: JWR Method: 6850
Workgroup (AAB#): WG612896 Matrix: Water Units: ug/L
Contract #: _____ Cal ID: LCMS1-24-APR-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.193	96.5	70 - 130	



Login Number: L17050243 Run Date: 05/04/2017 Sample ID: WG612896-08
Instrument ID: LCMS1 Run Time: 16:44 Prep Method: 6850
File ID: 1LM.LM39596 Analyst: JWR Method: 6850
Workgroup (AAB#): WG612896 Matrix: Water Units: ug/L
Contract #: _____ Cal ID: LCMS1-24-APR-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.188	94.0	70 - 130	



Login Number: L17050243
Instrument ID: LCMS1
Workgroup (AAB#): WG612896

ICAL CCV Number: WG611288-05
CAL ID: LCMS1-24-APR-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG611288	NA	NA	777000
Upper Limit	NA	NA	1165500
Lower Limit	NA	NA	388500
<u>L17050243-01</u>	1.00	01	562000
L17050243-02	10000	DL01	682000
WG612896-02	1.00	01	649000
WG612896-03	1.00	01	629000

IS-1 - 018LP

Underline = Response outside limits



Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: 6850	Samplenum: L17050243-01
Instrument: LCMS1	Prep Date: 05/04/2017 13:15	File ID: 1LM.LM39591
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 05/04/2017 15:09	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: 6850	Samplenum: L17050243-02
Instrument: LCMS1	Prep Date: 05/04/2017 13:15	File ID: 1LM.LM39594
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 05/04/2017 16:06	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	174000	58100	2.99	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243
Instrument: LCMS1
Analyst: JWR
Worknum: WG612896

Prep Method:
Prep Date:
Anal Method: 6850
Analysis Date: 04/24/2017 13:46

Samplenum: WG611288-02
File ID: 1LM.LM39495
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	21000	6820	3.08	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: _____	Samplenum: WG611288-03
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39496
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 04/24/2017 14:05	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	38200	13500	2.83	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: _____	Samplenum: WG611288-04
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39497
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 04/24/2017 14:24	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	104000	33400	3.11	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243
Instrument: LCMS1
Analyst: JWR
Worknum: WG612896

Prep Method:
Prep Date:
Anal Method: 6850
Analysis Date: 04/24/2017 14:43

Samplenum: WG611288-05
File ID: 1LM.LM39498
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	206000	65300	3.15	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: _____	Samplenum: WG611288-06
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39499
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 04/24/2017 15:02	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	412000	130000	3.17	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: _____	Samplenum: WG611288-07
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39500
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 04/24/2017 15:21	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	955000	298000	3.20	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: _____	Samplenum: WG611288-08
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39501
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 04/24/2017 15:40	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	1860000	603000	3.08	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: _____	Samplenum: WG611288-09
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39502
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 04/24/2017 15:59	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	197000	65000	3.03	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: 6850	Samplenum: WG612896-01
Instrument: LCMS1	Prep Date: 05/04/2017 13:15	File ID: 1LM.LM39588
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 05/04/2017 14:12	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	30800	10600	2.91	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: 6850	Samplenum: WG612896-02
Instrument: LCMS1	Prep Date: 05/04/2017 13:15	File ID: 1LM.LM39589
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 05/04/2017 14:31	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243
Instrument: LCMS1
Analyst: JWR
Worknum: WG612896

Prep Method: 6850
Prep Date: 05/04/2017 13:15
Anal Method: 6850
Analysis Date: 05/04/2017 14:50

Samplenum: WG612896-03
File ID: 1LM.LM39590
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	30700	9850	3.12	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243
Instrument: LCMS1
Analyst: JWR
Worknum: WG612896

Prep Method: 6850
Prep Date: 05/04/2017 13:15
Anal Method: 6850
Analysis Date: 05/04/2017 15:28

Samplenum: WG612896-05
File ID: 1LM.LM39592
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	24900	8060	3.09	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: 6850	Samplenum: WG612896-06
Instrument: LCMS1	Prep Date: 05/04/2017 13:15	File ID: 1LM.LM39593
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 05/04/2017 15:47	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	24400	8200	2.98	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: 6850	Samplenum: WG612896-07
Instrument: LCMS1	Prep Date: 05/04/2017 13:15	File ID: 1LM.LM39587
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 05/04/2017 13:53	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	30400	10400	2.92	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243
Instrument: LCMS1
Analyst: JWR
Worknum: WG612896

Prep Method: 6850
Prep Date: 05/04/2017 13:15
Anal Method: 6850
Analysis Date: 05/04/2017 16:44

Samplenum: WG612896-08
File ID: 1LM.LM39596
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	36600	12200	3.00	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: _____	Samplenum: WG612898-01
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39585
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 05/04/2017 13:15	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243
Instrument: LCMS1
Analyst: JWR
Worknum: WG612896

Prep Method:
Prep Date:
Anal Method: 6850
Analysis Date: 05/04/2017 13:34

Samplenum: WG612898-02
File ID: 1LM.LM39586
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	147000	47500	3.09	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243
Instrument: LCMS1
Analyst: JWR
Worknum: WG612896

Prep Method: _____
Prep Date: _____
Anal Method: 6850
Analysis Date: 05/04/2017 16:25

Samplenum: WG612898-03
File ID: 1LM.LM39595
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	184000	60000	3.07	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17050243	Prep Method: _____	Samplenum: WG612898-04
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM39597
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG612896	Analysis Date: 05/04/2017 17:03	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
May 10, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
OJE - OMOYEMWEN J. ENGLISH	PDM - PIERCE D. MORRIS
PIT - MICROBAC WARRENDALE	REK - BOB E. KYER
RLB - BOB BUCHANAN	RNP - RICK N. PETTY
SAV - SARAH A. VANDENBERG	SCA - SUEELLEN C. ADAMS
SCB - SARAH C. BOGOLIN	SCJ - SUE ELLEN C. JOHNSON
SDC - SHALYN D. CONLEY	TB - TODD BOYLE
TMB - TIFFANY M. BAILEY	TMM - TAMMY M. MORRIS
VC - VICKI COLLIER	WTD - WADE T. DELONG
XXX - UNAVAILABLE OR SUBCONTRACT	

List of Valid Qualifiers

May 10, 2017

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample receipt exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample receipt exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentatively identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound



List of Valid Qualifiers

May 10, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample receipt exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below



CHAIN OF CUSTODY

Name Of Lab Shipping To: MICROBAC (800) 373 - 4071 ATTN: STEPANIE MOSSBURG

Project: AECOM LONGHORN ARMY AMMN. PLANT (LHAAP) GROUNDWATER TREATMENT PLANT (GWTP) KARNACK, TEXAS		Project No.: 60256135.GWTPPT HRUMAR16	
Job: GROUNDWATER TREATMENT PLANT BI-WEEKLY SAMPLES			
Prepared By: Scott Beesinger		P.O Number	
Field Sample I.D. LH18/24-SP650-6436 LH18/24-SP140-7436		Sample Matrix Water Water	
Date / Time 05/03/17 / 15:00 05/03/17 / 15:00		MS / MSD 1 1	
No. OF CONTAINERS 1 1		PERCHLORATE	
Analyses		Remarks (Preservatives, etc.) NONE NONE	
Lab I.D.#			

Additional Remarks: 24 HR. TAT on both Samples

EMAIL RESULTS TO info@microbac.com

Relinquished By:	Date	Time	Received By:	Date	Time
<i>Scott Beesinger</i>	05/03/17	15:30			

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

Microbac OVD
 Received: 05/04/2017 09:41
 By: CARA STRICKLER
 221000100389



Cara Strickler

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17050243

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 05-MAY-2017

Samplenum **Container ID** **Products**
L17050243-01 904279 6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	04-MAY-2017 10:14	CLS		
2	PREP	W1	SEM	04-MAY-2017 10:36	CAS	BRG	
3	STORE	SEM	A1	08-MAY-2017 12:34	CLS	JWR	

Samplenum **Container ID** **Products**
L17050243-02 904280 6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	04-MAY-2017 10:14	CLS		
2	PREP	W1	SEM	04-MAY-2017 10:37	CAS	BRG	
3	STORE	SEM	A1	08-MAY-2017 12:34	CLS	JWR	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login



NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
 Total Halide by Bomb Combustion (TX)
 Particle Sizing - 200 Mesh (PS200)
 Specific Gravity/Density (SPGRAV)
 Total Residual Chlorine (CL-TRL)
 Total Volatile Solids (all forms) (TVS)
 Total Coliform Bacteria (all methods)
 Fecal Coliform Bacteria (all methods)
 Sulfite (SO₃)
 Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS

Nitrogen, Ammonia by Method 350.1
 Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
 Phenolics, Total by Method 420.1
 ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
 Acetic acid
 Butyric acid
 Lactic acid
 Propionic acid
 Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
 1-Methylnaphthalene
 1,4-Dioxane
 Atrazine
 Benzaldehyde
 Biphenyl
 Caprolactam
 Hexamethylphosphoramide (HMPA)
 Pentachlorobenzene
 Pentachloroethane

NELAP Accreditation by Laboratory SOP**NONPOTABLE WATER**OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALSOVD MSS01/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP**SOLID AND HAZARDOUS CHEMICALS**OVD MSV01/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)



Laboratory Report Number: L17050257

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on May 16 2017



Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1



Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com

Lab Report #: L17050257

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution
-------------	------------

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00113842	I	5.0		J4616881588	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	Yes

**Lab Report #:** L17050257**Lab Project #:** 2551.096**Project Name:** Longhorn Army Ammunition**Lab Contact:** Adriane Steed**Samples Received**

Client ID	Laboratory ID	Date Collected	Date Received
LH18/24-SP650-6436	L17050257-01	05/03/2017 15:00	05/04/2017 09:41
TRIP BLANK	L17050257-02	05/03/2017 00:01	05/04/2017 09:41



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	8260
Prep Batch Number(s):	WG613811	Reviewer Name:	Franci Bolden
LRC Date:	2017-05-16 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Franci Bolden		Analyst I	2017-05-16 20:25:11



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	8260
Prep Batch Number(s):	WG613811	Reviewer Name:	Franci Bolden
LRC Date:	2017-05-16 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?	X				
Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	8260
Prep Batch Number(s):	WG613811	Reviewer Name:	Franci Bolden
LRC Date:	2017-05-16 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	8260
Prep Batch Number(s):	WG613811	Reviewer Name:	Franci Bolden
LRC Date:	2017-05-16 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	8260
Prep Batch Number(s):	WG613811	Reviewer Name:	Franci Bolden
LRC Date:	2017-05-16 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	8260
Prep Batch Number(s):	WG613811	Reviewer Name:	Franci Bolden
LRC Date:	2017-05-16 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	9056
Prep Batch Number(s):	WG613809	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-12 00:00:00		

Laboratory Data Package Cover Page

R1	Field chain-of-custody documentation;
R2	Sample identification cross-reference;
R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
R5	Test reports/summary forms for blank samples;
R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2017-05-12 12:36:06



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	9056
Prep Batch Number(s):	WG613809	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-12 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	9056
Prep Batch Number(s):	WG613809	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-12 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	9056
Prep Batch Number(s):	WG613809	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-12 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	9056
Prep Batch Number(s):	WG613809	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-12 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17050257
Project Name:		Method:	9056
Prep Batch Number(s):	WG613809	Reviewer Name:	Eric Lawson
LRC Date:	2017-05-12 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: This laboratory meets an exception under 30 TAC §25.6 and was last inspection by TCEQ or _____ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.

Lab Report #: L17050257

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17050257-01	PrePrep Method: N/A	Instrument: HPMS17
Client ID: LH18/24-SP650-6436	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 05/04/2017 16:16
Workgroup #: WG613811	Analyst: ADC	Run Date: 05/10/2017 21:54
Collect Date: 05/03/2017 15:00	Dilution: 1	File ID: 17M0273604
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.31	J	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	1.02		1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	3.37		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,2-Dichloroethane-d4	98.1	70	120			
4-Bromofluorobenzene	110	75	120			
Dibromofluoromethane	103	85	115			
Toluene-d8	105	85	120			
J	Estimated value ; the analyte concentration was less than the LOQ.					
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17050257
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17050257-01	PrePrep Method: N/A	Instrument: IC2
Client ID: LH18/24-SP650-6436	Prep Method: 9056	Prep Date: 05/10/2017 17:56
Matrix: Water	Analytical Method: 9056	Cal Date: 04/11/2017 18:31
Workgroup #: WG613809	Analyst: CAS	Run Date: 05/11/2017 00:20
Collect Date: 05/03/2017 15:00	Dilution: 5	File ID: I2_051017-23
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfate	14808-79-8	40.3		10.0	5.00	2.50
J	Estimated value ; the analyte concentration was greater than the highest standard					

Lab Report #: L17050257
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17050257-01	PrePrep Method: N/A	Instrument: IC2
Client ID: LH18/24-SP650-6436	Prep Method: 9056	Prep Date: 05/10/2017 17:56
Matrix: Water	Analytical Method: 9056	Cal Date: 04/11/2017 18:31
Workgroup #: WG613809	Analyst: CAS	Run Date: 05/11/2017 00:40
Collect Date: 05/03/2017 15:00	Dilution: 50	File ID: I2_051017-24
Sample Tag: DL02	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	588		20.0	10.0	5.00
J	Estimated value ; the analyte concentration was less than the LOQ.					

Lab Report #: L17050257

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17050257-02	PrePrep Method: N/A	Instrument: HPMS17
Client ID: TRIP BLANK	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 05/04/2017 16:16
Workgroup #: WG613811	Analyst: ADC	Run Date: 05/10/2017 21:15
Collect Date: 05/03/2017 00:01	Dilution: 1	File ID: 17M0273602
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.12	J	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,2-Dichloroethane-d4	99.6	70	120			
4-Bromofluorobenzene	115	75	120			
Dibromofluoromethane	101	85	115			
Toluene-d8	107	85	120			
J	Estimated value ; the analyte concentration was less than the LOQ.					
U	Analyte was not detected. The concentration is below the reported LOD.					

2.1 Volatiles Data

2.1.1 Volatiles GCMS Data (8260)

2.1.1.1 Summary Data

Certificate of Analysis

Sample #: L17050257-01	PrePrep Method: N/A	Instrument: HPMS17
Client ID: LH18/24-SP650-6436	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 05/04/2017 16:16
Workgroup #: WG613811	Analyst: ADC	Run Date: 05/10/2017 21:54
Collect Date: 05/03/2017 15:00	Dilution: 1	File ID: 17M0273604
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.31	J	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	1.02		1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	3.37		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	98.1	70	120	
4-Bromofluorobenzene	110	75	120	
Dibromofluoromethane	103	85	115	
Toluene-d8	105	85	120	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Certificate of Analysis

Sample #: L17050257-02

PrePrep Method: N/A

Instrument: HPMS17

Client ID: TRIP BLANK

Prep Method: 5030B/5030C/5035A

Prep Date: N/A

Matrix: Water

Analytical Method: 8260B

Cal Date: 05/04/2017 16:16

Workgroup #: WG613811

Analyst: ADC

Run Date: 05/10/2017 21:15

Collect Date: 05/03/2017 00:01

Dilution: 1

File ID: 17M0273602

Sample Tag: 01

Units: ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	0.500	U	1.00	0.500	0.250
1,1,2-Trichloroethane	79-00-5	0.500	U	1.00	0.500	0.250
1,1-Dichloroethane	75-34-3	0.250	U	0.500	0.250	0.125
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.12	J	10.0	5.00	2.50
Benzene	71-43-2	0.250	U	0.500	0.250	0.125
Carbon tetrachloride	56-23-5	0.500	U	1.00	0.500	0.250
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
Ethylbenzene	100-41-4	0.500	U	1.00	0.500	0.250
Methylene chloride	75-09-2	0.500	U	1.00	0.500	0.250
m,p-Xylene	179601-23-1	1.00	U	2.00	1.00	0.500
o-Xylene	95-47-6	0.500	U	1.00	0.500	0.250
Styrene	100-42-5	0.250	U	0.500	0.250	0.125
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,2-Dichloroethane-d4	99.6	70	120			
4-Bromofluorobenzene	115	75	120			
Dibromofluoromethane	101	85	115			
Toluene-d8	107	85	120			
J	Estimated value ; the analyte concentration was less than the LOQ.					
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17050257

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

2.1.1.2 QC Summary Data

Example 8260 Calculations

1.0 Calculating the Response Factor (RF) from the initial calibration (ICAL) data:

$$RF = [(Ax) (Cis)] / [(Ais) (Cx)]$$

where:

Ax = Area of the characteristic ion for the compound being measured:	3399156
Cis = Concentration of the specific internal standard (ug/mL)	25
Ais = Area of the characteristic ion of the specific internal standard	846471
Cx = Concentration of the compound in the standard being measured (ug/mL)	100
RF = Calculated Response Factor	1.0039

Example

2.0 Calculating the concentration (C) of a compound in water using the average RF: *

$$Cx = [(Ax) (Cis) (Vn)(D)] / [(Ais) (RF) (Vs)]$$

where:

Ax = Area of the characteristic ion for the compound being measured	3122498
Cis = Concentration of the specific internal standard (ug/L)	25
D = Dilution factor for sample as a multiplier (10x = 10)	1
Ais = Area of the characteristic ion of the specific internal standard	611048
RF = Average RF from the ICAL	1.004
Vs = Purge volume of sample (mL)	10
Vn = Nominal purge volume of sample (mL) (10.0 mL)	10
Cx = Concentration of the compound in the sample being measured (ug/L)	127.2428

Example

3.0 Calculating the concentration (C) of a compound in soil using the average RF: *

$$Cx = [(Ax) (Cis) (Wn)(D)] / [(Ais) (RF) (Ws)]$$

where:

Ax = Area of the characteristic ion for the compound being measured	3122498
Cis = Concentration of the specific internal standard (ug/L)	25
D = Dilution factor for sample as a multiplier (10x = 10)	1
Ais = Area of the characteristic ion of the specific internal standard	611048
RF = Average RF from the ICAL	1.004
Ws = Weight of sample purged (g)	5
Wn = Nominal purge weight (g) (5.0 g)	5
Cx = Concentration of the compound in the sample being measured (ug/L)	127.2428

Example

Dry weight correction:

Percent solids (PCT_S)	50
Cd = (Cx) (100)/PCT_S	254.4856

* Concentrations appearing on the instrument quantitation reports are on-column results and do not take into account initial volume, final volume, and the dilution factor.

4.0 Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, $y = mx + b$

y = response ratio = response of analyte / response of IS = Ax/Ais

x = amount ratio = concentration analyte/concentration internal standard = Cx / Cis

m = slope from curve = 0.213

b = intercept from curve = - 0.00642

Step 2: Calculate y from Quantitation Report

$$y = 86550/593147 = 0.1459$$

Step 3: Solve for x

$$x = (y - b)/m = [(0.1459 - (-0.00642))/0.213] = 0.7152$$

Step 4: Solve for analyte concentration Cx

$$Cx = Cis (x) = (25.0)(0.7152) = 17.88$$

Example Spreadsheet Calculation:

Slope from curve, m:	0.213
Intercept from curve, b:	-0.00642
Area of analyte, Ax:	86550
Area of Internal Standard, Ais:	593147
Concentration of IS, Cis	25.00
Response Ratio:	0.145917
Amount Ratio:	0.715195
Concentration:	17.87988
Units of Internal Standard:	ug/L

5.0 Concentration from Quadratic Regression**Step 1 - Retrieve Curve Data from Plot, $y = Ax^2 + Bx + C$**

Where:

$$Ax^2 + Bx + (C - y) = 0$$

A, B, C = constants from the ICAL quadratic regression

y = Response ratio = Area of analyte/Area of internal standard (IS)

x = Amount ratio = Concentration of analyte/concentration of IS

Step 2: Calculate y from Quantitation Report

$$y = Ax/Ais$$

Step 3: Solve for x using the quadratic formula

$$Ax^2 + Bx + C - y = 0$$

$$x = \frac{b \pm \sqrt{(b^2 - 4a(c - y))}}{2a} \quad (\text{Two possible solutions})$$

Step 4: Solve for analyte concentration Cx

$$Cx = (Cis)(\text{Amount ratio})$$

Example Spreadsheet Calculation:

Value of A from plot:	-0.00629
Value of B from plot:	0.511
Value of C from plot:	-0.0276
Area of unknown from quantitation report:	293821
Area of IS from quantitation report:	784848
Response ratio, y:	0.374367
C - y:	-0.40197
Root 1 - Computed amount ratio, X1:	80.44567
Root 2 - Computed amount ratio, X2:	0.794396 use this solution
Concentration of IS, Cis:	25.00
Concentration of analyte, Cx:	19.86 ug/L

Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS17 Dataset: 050417
 Analyst1: ADC Analyst2: NA
 Method: 8260 SOP: MSV01 / OVAP MSV01 Rev: 25 / 0
 Method: 5035/ 5030B/ 5030C SOP: PAT01 / OVAP PAT01 Rev: 18 / 1

Maintenance Log ID: _____

Internal Standard: STD81442 Surrogate Standard: STD81441
 CCV: STD81577 LCS: STD81680 MS/MSD: STD81680


Column 1 ID: RTX-VMS Column 2 ID: NA
 Workgroups: WG612871, WG612953

Comments: FJB completed secondary review of ICAL data 05/09/17.
 WG612953-01 blank has an F flag hit of 1,4-DCB (0.133ppb). Samples 1252-04,5,7, and 22 have F flag hits of 1,4-DCB.

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
17M0273330	WG612871-01 50ng BFB STD 8260	NA	1	1	STD81491	05/04/17 12:41
17M0273331	RINSE	NA	1	1		05/04/17 13:01
17M0273332	WG612871-02 0.3ug/L STD 8260	NA	1	1	STD81698	05/04/17 13:21
17M0273333	WG612871-03 0.4ug/L STD 8260	NA	1	1	STD81698	05/04/17 13:40
17M0273334	WG612871-04 1.0ug/L STD 8260	NA	1	1	STD81698	05/04/17 14:00
17M0273335	WG612871-05 2.0ug/L STD 8260	NA	1	1	STD81698	05/04/17 14:19
17M0273336	WG612871-06 5.0ug/L STD 8260	NA	1	1	STD81698	05/04/17 14:38
17M0273337	WG612871-07 20.0ug/L STD 8260	NA	1	1	STD81698	05/04/17 14:58
17M0273338	WG612871-08 50.0ug/L STD 8260	NA	1	1	STD81698	05/04/17 15:17
17M0273339	WG612871-09 100.0ug/L STD 8260	NA	1	1	STD81698	05/04/17 15:37
17M0273340	WG612871-10 200.0ug/L STD 8260	NA	1	1	STD81698	05/04/17 15:56
17M0273341	WG612871-11 300.0ug/L STD 8260	NA	1	1	STD81698	05/04/17 16:16
17M0273342	RINSE	NA	1	1		05/04/17 16:35
17M0273343	WG612871-12 50ug/L ALT 8260	NA	1	1	STD81720	05/04/17 16:55
17M0273344	RINSE	NA	1	1		05/04/17 17:14
17M0273345	WG612953-01 BLANK 8260	NA	1	1		05/04/17 17:52
17M0273346	WG612953-02 20ug/L LCS 8260	NA	1	1	STD81720	05/04/17 18:12
17M0273347	WG612953-03 20ug/L LCSDUP 8260	NA	1	1	STD81720	05/04/17 18:31
17M0273348	RINSE	NA	1	1		05/04/17 18:51
17M0273349	L17041172-05 B 826-SPE	<2	1	1		05/04/17 19:10
17M0273350	L17041172-06 B 826-SPE	<2	1	1		05/04/17 19:30
17M0273351	L17041172-07 B 826-SPE	<2	1	1		05/04/17 19:49
17M0273352	L17041172-08 B 826-SPE	<2	1	1		05/04/17 20:09
17M0273353	L17041444-04 B 826-SPE	<2	1	1		05/04/17 20:28
17M0273354	L17041444-05 B 826-SPE	<2	1	1		05/04/17 20:47
17M0273355	L17041444-10 B 826-SPE	<2	1	1		05/04/17 21:07
17M0273356	L17041444-16 B 826-SPE	<2	1	1		05/04/17 21:26
17M0273357	L17041252-01 B 826-SPE	<2	1	1		05/04/17 21:46
17M0273358	L17041252-02 B 826-SPE	<2	1	1		05/04/17 22:06
17M0273359	L17041252-04 B 826-SPE	<2	1	1		05/04/17 22:25
17M0273360	L17041252-05 B 826-SPE	<2	1	1		05/04/17 22:44
17M0273361	L17041252-22 B 826-SPE	<2	1	1		05/04/17 23:04

Approved: May 09, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS17 Dataset: 050417
 Analyst1: ADC Analyst2: NA
 Method: 8260 SOP: MSV01 / OVAP MSV01 Rev: 25 / 0
 Method: 5035/ 5030B/ 5030C SOP: PAT01 / OVAP PAT01 Rev: 18 / 1

Maintenance Log ID: _____

Internal Standard: STD81442 Surrogate Standard: STD81441
 CCV: STD81577 LCS: STD81680 MS/MSD: STD81680
 Column 1 ID: RTX-VMS Column 2 ID: NA
 Workgroups: WG612871, WG612953

Comments: FJB completed secondary review of ICAL data 05/09/17.
 WG612953-01 blank has an F flag hit of 1,4-DCB (0.133ppb). Samples 1252-04,5,7, and 22 have F flag hits of 1,4-DCB.


File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
17M0273362	L17041252-06 B 250X 826-SPE	<2	1	250		05/04/17 23:24
17M0273363	L17041252-07 B 100X 826-SPE	<2	1	100		05/04/17 23:43
17M0273364	L17041252-08 B 50X 826-SPE	<2	1	50		05/05/17 00:03
17M0273365	L17041252-09 B 5X 826-SPE	<2	1	5		05/05/17 00:23
17M0273366	L17041252-11 B 100X 826-SPE	<2	1	100		05/05/17 00:42
17M0273367	RINSE	NA	1	1		05/05/17 01:02
17M0273368	RINSE	NA	1	1		05/05/17 01:21
17M0273369	RINSE	NA	1	1		05/05/17 01:41

Comments

Seq.	Rerun	Dil.	Reason	Analytes
37				
File ID: 17M0273366				
L17041252-11 DNR MT				

Approved: May 09, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS17 Dataset: 051017
 Analyst1: ADC Analyst2: NA
 Method: 8260 SOP: MSV01 Rev: 24
 Method: 5035, 5030B, 5030C SOP: PAT01 Rev: 19

Maintenance Log ID: _____

Internal Standard: STD81442 Surrogate Standard: STD81441
 CCV: STD81698 LCS: STD81766 MS/MSD: STD81766
 Column 1 ID: RTX-VMS Column 2 ID: NA
 Workgroups: WG613718, WG613811

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
17M0273574	WG613713-01 50ng BFB STD 8260	NA	1	1	STD81491	05/10/17 12:04
17M0273575	WG613713-02 50ug/L CCV 8260	NA	1	1	STD81698	05/10/17 12:23
17M0273576	RINSE	NA	1	1		05/10/17 12:44
17M0273577	WG613718-01 BLANK 8260	NA	1	1		05/10/17 13:03
17M0273578	WG613718-02 20ug/L LCS 8260	NA	1	1	STD81766	05/10/17 13:23
17M0273579	WG613718-03 20ug/L LCSDUP 8260	NA	1	1	STD81766	05/10/17 13:43
17M0273580	RINSE	NA	1	1		05/10/17 14:02
17M0273581	L17041497-05 B 826-SPE	<2	1	1		05/10/17 14:22
17M0273582	L17041429-15 B 826-SPE	<2	1	1		05/10/17 14:41
17M0273583	L17041429-14 B 2.5X 826-SPE	<2	1	2.5		05/10/17 15:01
17M0273584	L17041497-01 B 826-SPE	<2	1	1		05/10/17 15:21
17M0273585	L17041497-02 B 826-SPE	<2	1	1		05/10/17 15:40
17M0273586	L17041497-03 B 826-SPE	7	1	1		05/10/17 16:00
17M0273587	L17041497-04 B 826-SPE	<2	1	1		05/10/17 16:20
17M0273588	L17041497-06 B 826-SPE	<2	1	1		05/10/17 16:39
17M0273589	L17041497-07 B 826-SPE	<2	1	1		05/10/17 16:59
17M0273590	L17041497-08 B 826-SPE	<2	1	1		05/10/17 17:19
17M0273591	L17041497-09 B 826-SPE	<2	1	1		05/10/17 17:38
17M0273592	L17041497-10 B 826-SPE	<2	1	1		05/10/17 17:58
17M0273593	L17041497-11 B 826-SPE	<2	1	1		05/10/17 18:18
17M0273594	L17041497-12 B 826-SPE	<2	1	1		05/10/17 18:37
17M0273595	L17041497-13 B 826-SPE	<2	1	1		05/10/17 18:57
17M0273596	L17041429-14 C 826-SPE	<2	1	1		05/10/17 19:17
17M0273597	WG613811-01 BLANK 8260	NA	1	1		05/10/17 19:36
17M0273598	WG613811-02 20ug/L LCS 8260	NA	1	1	STD81766	05/10/17 19:56
17M0273599	L17050184-08 A MS 826-SPE	<2	1	1	STD81766	05/10/17 20:16
17M0273600	L17050184-09 A MSD 826-SPE	<2	1	1	STD81766	05/10/17 20:35
17M0273601	RINSE	NA	1	1		05/10/17 20:55
17M0273602	L17050257-02 A 826-SPE TB	<2	1	1		05/10/17 21:15
17M0273603	L17050184-16 B 826-SPE TB	<2	1	1		05/10/17 21:34
17M0273604	L17050257-01 A 826-SPE	<2	1	1		05/10/17 21:54
17M0273605	L17050184-07 A 826-SPE	<2	1	1		05/10/17 22:14
17M0273606	L17050184-13 A 826-SPE	<2	1	1		05/10/17 22:33
17M0273607	L17050184-14 A 826-SPE	<2	1	1		05/10/17 22:53

Approved: May 15, 2017

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Wade D. [Signature]

Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS17 Dataset: 051017
 Analyst1: ADC Analyst2: NA
 Method: 8260 SOP: MSV01 Rev: 24
 Method: 5035, 5030B, 5030C SOP: PAT01 Rev: 19

Maintenance Log ID: _____

Internal Standard: STD81442 Surrogate Standard: STD81441
 CCV: STD81698 LCS: STD81766 MS/MSD: STD81766
 Column 1 ID: RTX-VMS Column 2 ID: NA
 Workgroups: WG613718, WG613811

Comments: _____

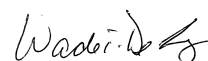
File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
17M0273608	L17050184-15 A 826-SPE	<2	1	1		05/10/17 23:13
17M0273609	RINSE	NA	1	1		05/10/17 23:33
17M0273610	RINSE	NA	1	1		05/10/17 23:53
17M0273611	RINSE	NA	1	1		05/11/17 00:13

Comments

Seq.	Rerun	Dil.	Reason	Analytes
10	X		Analyzed too dilute	
File ID: 17M0273583				
L17041429-14				

Approved: May 15, 2017

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Microbac Laboratories Inc.

Data Checklist

Date: 04-MAY-2017
 Analyst: ADC
 Analyst: NA
 Method: 8260
 Instrument: HPMS17
 Curve Workgroup: NA
 Runlog ID: 82010
 Analytical Workgroups: WG612871, WG612953

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	X
Samples	X
TCL Hits	X
Spectra of TCL Hits	ADC
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	X
Reruns	X
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	ADC
Secondary Reviewer	MES
	FJB SECONDARY REVIEWED ICAL DATA.
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
08-MAY-2017



Secondary Reviewer:
09-MAY-2017




Microbac Laboratories Inc.

Data Checklist

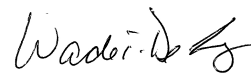
Date: 10-MAY-2017
 Analyst: ADC
 Analyst: NA
 Method: 8260
 Instrument: HPM17
 Curve Workgroup: NA
 Runlog ID: 82143
 Analytical Workgroups: WG613718, WG613811

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	X
Samples	X
TCL Hits	X
Spectra of TCL Hits	ADC
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	X
Reruns	X
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	ADC
Secondary Reviewer	WTD
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
15-MAY-2017



Secondary Reviewer:
15-MAY-2017




Analytical Method:8260B
Login Number:L17050257

AAB#:WG613811

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
LH18/24-SP650-6436	01	05/03/17					05/10/2017	7.3	14		05/10/17	7.3	14	
TRIP BLANK	02	05/03/17					05/10/2017	7.9	14		05/10/17	7.9	14	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17050257
 Instrument Id: HPMS17
 Workgroup (AAB#): WG613811

Method: 8260
 CAL ID: HPMS17-04-MAY-17
 Matrix: Water

Sample Number	Dilution	Tag	1	2	3	4
L17050257-01	1.00	01	98.1	103	110	105
L17050257-02	1.00	01	99.6	101	115	107
WG613811-01	1.00	01	98.1	100	109	105
WG613811-02	1.00	01	98.2	102	112	107

Surrogates	Surrogate Limits		
1 - 1,2-Dichloroethane-d4	70	-	120
2 - Dibromofluoromethane	85	-	115
3 - 4-Bromofluorobenzene	75	-	120
4 - Toluene-d8	85	-	120

Underline = Result out of surrogate limits

DL = surrogate diluted out

ND = surrogate not detected



METHOD BLANK SUMMARY

Login Number: L17050257 Work Group: WG613811
 Blank File ID: 17M0273597 Blank Sample ID: WG613811-01
 Prep Date: 05/10/17 19:36 Instrument ID: HPMS17
 Analyzed Date: 05/10/17 19:36 Method: 8260B
 Analyst: ADC

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG613811-02	17M0273598	05/10/17 19:56	01
TRIP BLANK	L17050257-02	17M0273602	05/10/17 21:15	01
LH18/24-SP650-6436	L17050257-01	17M0273604	05/10/17 21:54	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5292946
 Report generated 05/13/2017 17:48



Login Number: L17050257 Prep Date: 05/10/17 19:36 Sample ID: WG613811-01
 Instrument ID: HPMS17 Run Date: 05/10/17 19:36 Prep Method: 5030B/5030C/503
 File ID: 17M0273597 Analyst: ADC Method: 8260B
 Workgroup (AAB#): WG613811 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS17-04-MAY-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
1,1,1-Trichloroethane	0.250	1.00	0.250	1	U
1,1,2-Trichloroethane	0.250	1.00	0.250	1	U
1,1-Dichloroethane	0.125	0.500	0.125	1	U
1,1-Dichloroethene	0.500	2.00	0.500	1	U
1,2-Dichloroethane	0.250	1.00	0.250	1	U
Acetone	2.50	10.0	2.50	1	U
Benzene	0.125	0.500	0.125	1	U
Carbon tetrachloride	0.250	1.00	0.250	1	U
Chloroform	0.125	0.500	0.125	1	U
Ethylbenzene	0.250	1.00	0.250	1	U
Methylene chloride	0.250	1.00	0.250	1	U
m,p-Xylene	0.500	2.00	0.500	1	U
o-Xylene	0.250	1.00	0.250	1	U
Styrene	0.125	0.500	0.125	1	U
Tetrachloroethene	0.250	1.00	0.250	1	U
Trichloroethene	0.250	1.00	0.250	1	U
Toluene	0.250	1.00	0.250	1	U
Vinyl chloride	0.250	1.00	0.250	1	U

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	98.1	70 - 120	PASS
4-Bromofluorobenzene	109	75 - 120	PASS
Dibromofluoromethane	100	85 - 115	PASS
Toluene-d8	105	85 - 120	PASS

DL Method Detection Limit
 LOQ Reporting/Practical Quantitation Limit
 ND Analyte Not detected at or above reporting limit
 * |Analyte concentration| > 1/2 RL

Report Name: BLANK
 PDF ID: 5292947
 13-MAY-2017 17:48



Login Number: L17050257 Run Date: 05/10/2017 Sample ID: WG613811-02
 Instrument ID: HPMS17 Run Time: 19:56 Prep Method: 5030B/5030C/503
 File ID: 17M0273598 Analyst: ADC Method: 8260B
 Workgroup (AAB#): WG613811 Matrix: Water Units: ug/L
 QC Key: DOD4 Lot#: STD81656 Cal ID: HPMS17-04-MAY-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
1,1,1-Trichloroethane	20.0	19.7	98.4	65 - 130	
1,1,2-Trichloroethane	20.0	20.5	103	75 - 125	
1,1-Dichloroethane	20.0	19.3	96.6	70 - 135	
1,1-Dichloroethene	20.0	19.9	99.7	70 - 130	
1,2-Dichloroethane	20.0	19.3	96.3	70 - 130	
Acetone	20.0	20.0	100	40 - 140	
Benzene	20.0	20.5	102	80 - 120	
Carbon tetrachloride	20.0	19.6	97.9	65 - 140	
Chloroform	20.0	18.3	91.3	65 - 135	
Ethylbenzene	20.0	21.0	105	75 - 125	
Methylene chloride	20.0	18.8	94.0	55 - 140	
m,p-Xylene	40.0	42.6	107	75 - 130	
o-Xylene	20.0	21.8	109	80 - 120	
Styrene	20.0	22.1	111	65 - 135	
Tetrachloroethene	20.0	20.4	102	45 - 150	
Trichloroethene	20.0	20.2	101	70 - 125	
Toluene	20.0	21.1	105	75 - 120	
Vinyl chloride	20.0	20.2	101	50 - 145	

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	98.2	70 - 120	PASS
4-Bromofluorobenzene	112	75 - 120	PASS
Dibromofluoromethane	102	85 - 115	PASS
Toluene-d8	107	85 - 120	PASS

* EXCEEDS %REC LIMIT

LCS - Modified 03/06/2008
 PDF File ID: 5292948
 Report generated: 05/13/2017 17:48



BFB

Login Number: L17050257 Tune ID: WG612871-01
 Instrument: HPMS17 Run Date: 05/04/2017
 Analyst: ADC Run Time: 12:41
 Workgroup: WG612871 File ID: 17M0273330
 Cal ID: HPMS17-04-MAY-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	17.0	6123	PASS
75.0	95.0	30.0	60.0	46.8	16851	PASS
95.0	95.0	100	100	100	35968	PASS
96.0	95.0	5.00	9.00	6.80	2446	PASS
173	174	0	2.00	1.19	405	PASS
174	95.0	50.0	100	94.9	34139	PASS
175	174	5.00	9.00	7.64	2608	PASS
176	174	95.0	101	98.3	33568	PASS
177	176	5.00	9.00	6.62	2223	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG612871-02	STD	01	05/04/2017 13:21	
WG612871-03	STD	01	05/04/2017 13:40	
WG612871-04	STD	01	05/04/2017 14:00	
WG612871-05	STD	01	05/04/2017 14:19	
WG612871-06	STD	01	05/04/2017 14:38	
WG612871-07	STD	01	05/04/2017 14:58	
WG612871-08	STD-CCV	01	05/04/2017 15:17	
WG612871-09	STD	01	05/04/2017 15:37	
WG612871-10	STD	01	05/04/2017 15:56	
WG612871-11	STD	01	05/04/2017 16:16	
WG612871-12	SSCV	01	05/04/2017 16:55	

* Sample past 12 hour tune limit



BFB

Login Number: L17050257
Instrument: HPMS17
Analyst: ADC
Workgroup: WG613713

Tune ID: WG613713-01
Run Date: 05/10/2017
Run Time: 12:04
File ID: 17M0273574

Cal ID: HPMS17-04-MAY-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	15.7	4602	PASS
75.0	95.0	30.0	60.0	46.4	13615	PASS
95.0	95.0	100	100	100	29355	PASS
96.0	95.0	5.00	9.00	6.65	1952	PASS
173	174	0	2.00	1.04	287	PASS
174	95.0	50.0	100	93.9	27563	PASS
175	174	5.00	9.00	7.50	2067	PASS
176	174	95.0	101	95.5	26312	PASS
177	176	5.00	9.00	6.69	1760	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG613713-02	CCV	01	05/10/2017 12:23	
WG613811-01	BLANK	01	05/10/2017 19:36	
WG613811-02	LCS	01	05/10/2017 19:56	
L17050257-02	TRIP BLANK	01	05/10/2017 21:15	
L17050257-01	LH18/24-SP650-6436	01	05/10/2017 21:54	

* Sample past 12 hour tune limit

