

**LONGHORN ARMY
AMMUNITION PLANT
KARNACK, TEXAS**

**ADMINISTRATIVE
RECORD**

Volume 18

2018

Bate Stamp Numbers

00862311 - 00863563

Prepared for

**Department of the Army
Longhorn Army Ammunition Plant**

1976 – 2018

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

VOLUME 18

2018

- A. Title: Report (cont'd) – Quarterly Evaluation Report, 3rd Quarter (July-September) 2017, Groundwater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas
- Author(s): AECOM Technical Services
- Recipient: U.S. Army Corps of Engineers
- Date: November 2017
- Bate Stamp: 00862311 – 00863563

Laboratory Report Number: L17091647

Linda Raabe
AECOM Technical Services, Inc.
112 East Pecan
San Antonio, TX 78205

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 October 12 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 #: L17091647

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?
0016563	I	5.0		J4616882103	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 #:** L17091647**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-SP140-7472-GRAB	L17091647-01	09/27/2017 15:00	09/28/2017 10:01
TRIP BLANK	L17091647-02	09/27/2017 00:01	09/28/2017 10:01



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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>		2017-10-04 20:19:59



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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:	L17091647
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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:	L17091647
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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:	L17091647
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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:	L17091647
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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:	L17091647
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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	2017-10-10 13:16:36



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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			1
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:	L17091647
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091647
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091647
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091647
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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. Sample 01 yielded a recovery for the surrogate that was above the acceptance limit due to matrix interference. This sample has a history of high surrogate recoveries.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

Laboratory Data Package Cover Page

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

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2017-10-05 18:15:03



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
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:	L17091647
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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

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

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

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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

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

Exceptions Report

There are no exceptions.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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
Kerri Buck			2017-10-12 19:41:34



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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:	L17091647
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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:	L17091647
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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
Kerri Buck			2017-10-12 19:36:20



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports	X				
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				ER#1
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples					
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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:	L17091647
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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:	L17091647
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 00:00:00		

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

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

Exceptions Report

ER#1 - Client sample 01 required dilution analysis in order to obtain results for barium and manganese within the calibration range.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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	2017-10-09 17:38:35



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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:	L17091647
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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:	L17091647
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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:	L17091647
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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:	L17091647
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Laboratory Data Package Cover Page

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

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-10-05 13:16:18



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
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:	L17091647
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
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:	L17091647
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			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:	L17091647
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	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:	L17091647
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 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:	L17091647
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Laboratory Data Package Cover Page

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

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-10-05 13:16:56



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091647
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
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:	L17091647
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
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:	L17091647
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was the number of standards recommended in the method used for all analytes?			X		
Were all points generated between the lowest and highest standard used to calculate the curve?			X		
Are ICAL data available for all instruments used?			X		
Has the initial calibration curve been verified using an appropriate second source standard?			X		
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?			X		
Were percent differences for each analyte within the method-required QC limits?			X		
Was the ICAL curve verified for each analyte?			X		
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			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:	L17091647
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	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:	L17091647
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 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

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: HPMS8
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 09/13/2017 19:41
Workgroup #: WG631878	Analyst: TMB	Run Date: 09/30/2017 00:41
Collect Date: 09/27/2017 15:00	Dilution: 50	File ID: 8M421804
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	25.0	U	50.0	25.0	12.5
1,1,2-Trichloroethane	79-00-5	25.0	U	50.0	25.0	12.5
1,1-Dichloroethane	75-34-3	13.0	J	25.0	12.5	6.25
1,1-Dichloroethene	75-35-4	107		100	50.0	25.0
1,2-Dichloroethane	107-06-2	70.7		50.0	25.0	12.5
Acetone	67-64-1	250	U	500	250	125
Benzene	71-43-2	12.5	U	25.0	12.5	6.25
Carbon tetrachloride	56-23-5	25.0	U	50.0	25.0	12.5
Chloroform	67-66-3	16.5	J	25.0	12.5	6.25
Ethylbenzene	100-41-4	25.0	U	50.0	25.0	12.5
Methylene chloride	75-09-2	8370		50.0	25.0	12.5
m,p-Xylene	179601-23-1	50.0	U	100	50.0	25.0
o-Xylene	95-47-6	25.0	U	50.0	25.0	12.5
Styrene	100-42-5	12.5	U	25.0	12.5	6.25
Tetrachloroethene	127-18-4	54.4		50.0	25.0	12.5
Trichloroethene	79-01-6	9330		50.0	25.0	12.5
Toluene	108-88-3	25.0	U	50.0	25.0	12.5
Vinyl chloride	75-01-4	221		50.0	25.0	12.5
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,2-Dichloroethane-d4	96.7	70	120			
4-Bromofluorobenzene	102	75	120			
Dibromofluoromethane	94.6	85	115			
Toluene-d8	101	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 #: L17091647
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: HPMS15
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 3520C	Prep Date: 10/02/2017 18:00
Matrix: Water	Analytical Method: 8270D	Cal Date: 09/18/2017 12:55
Workgroup #: WG632529	Analyst: LJH	Run Date: 10/09/2017 13:42
Collect Date: 09/27/2017 15:00	Dilution: 5	File ID: 15M23017
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,4-Dioxane	123-91-1	17.9	J	10.2	5.10	2.55
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,4-Dioxane-d8	4440	20	129	*		
J	The reported result is an estimated value.					

Lab Report #: L17091647
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 6850	Prep Date: 10/04/2017 13:00
Matrix: Water	Analytical Method: 6850	Cal Date: 09/08/2017 16:52
Workgroup #: WG632566	Analyst: JWR	Run Date: 10/04/2017 18:08
Collect Date: 09/27/2017 15:00	Dilution: 10000	File ID: 1LM.LM40637
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	7010		4000	2000	1000

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: ICP-THERMO4
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 3015A	Prep Date: 10/03/2017 07:13
Matrix: Water	Analytical Method: 6010C	Cal Date: 10/05/2017 16:45
Workgroup #: WG632662	Analyst: KKB	Run Date: 10/05/2017 17:54
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: T4.100517.175454
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Aluminum, Total	7429-90-5	0.200	U	0.200	0.200	0.100
Iron, Total	7439-89-6	2.74		0.100	0.100	0.0500
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 #: L17091647

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 07:12
Matrix: Water	Analytical Method: 6020A	Cal Date: 10/02/2017 12:02
Workgroup #: WG632098	Analyst: JYH	Run Date: 10/02/2017 13:27
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: NI.100217.132739
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Antimony, Total	7440-36-0	0.00100	U	0.00200	0.00100	0.000500
Arsenic, Total	7440-38-2	0.00300		0.00200	0.00100	0.000500
Cadmium, Total	7440-43-9	0.000600	U	0.00120	0.000600	0.000300
Chromium, Total	7440-47-3	0.00193	J	0.00400	0.00200	0.00100
Cobalt, Total	7440-48-4	0.0125		0.00200	0.00100	0.000500
Lead, Total	7439-92-1	0.00100	U	0.00200	0.00100	0.000500
Nickel, Total	7440-02-0	0.0135		0.00800	0.00400	0.00200
Silver, Total	7440-22-4	0.00100	U	0.00200	0.00100	0.000500
Thallium, Total	7440-28-0	0.000183	J	0.000400	0.000200	0.000100
Vanadium, Total	7440-62-2	0.00100	U	0.00200	0.00100	0.000500
Zinc, Total	7440-66-6	0.0136	J	0.0500	0.0250	0.0125
J	Estimated value ; the analyte concentration was less than the LOQ.					
J	Estimated value ; the analyte concentration was greater than the highest standard					
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17091647
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 07:12
Matrix: Water	Analytical Method: 6020A	Cal Date: 10/02/2017 12:02
Workgroup #: WG632098	Analyst: JYH	Run Date: 10/02/2017 16:00
Collect Date: 09/27/2017 15:00	Dilution: 10	File ID: NI.100217.160020
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Barium, Total	7440-39-3	0.740		0.0600	0.0300	0.0150
Manganese, Total	7439-96-5	0.708		0.0400	0.0200	0.0100
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 #: L17091647
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: IC1
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 9056	Prep Date: 10/06/2017 15:09
Matrix: Water	Analytical Method: 9056	Cal Date: 08/30/2017 13:05
Workgroup #: WG633037	Analyst: CAS	Run Date: 10/06/2017 17:35
Collect Date: 09/27/2017 15:00	Dilution: 5	File ID: I1_100617-11
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfate	14808-79-8	45.1		10.0	5.00	2.50
J	Estimated value ; the analyte concentration was greater than the highest standard					

Lab Report #: L17091647
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: IC1
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 9056	Prep Date: 10/06/2017 15:09
Matrix: Water	Analytical Method: 9056	Cal Date: 08/30/2017 13:05
Workgroup #: WG633037	Analyst: CAS	Run Date: 10/06/2017 17:53
Collect Date: 09/27/2017 15:00	Dilution: 50	File ID: I1_100617-12
Sample Tag: DL02	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	425		20.0	10.0	5.00
J	Estimated value ; the analyte concentration was less than the LOQ.					

Lab Report #: L17091647
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: V-1200
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: METHOD	Prep Date: N/A
Matrix: Water	Analytical Method: 410.4 MOD	Cal Date: 08/29/2017 10:16
Workgroup #: WG632279	Analyst: DLP	Run Date: 10/03/2017 10:00
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: 00.1710031000-09
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chemical Oxygen Demand	COD	17.4	J	40.0	20.0	10.0
J	Estimated value ; the analyte concentration was less than the LOQ.					

Lab Report #: L17091647
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: HORIZON
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 1664A	Prep Date: N/A
Matrix: Water	Analytical Method: 1664A	Cal Date:
Workgroup #: WG632290	Analyst: AWE	Run Date: 10/03/2017 12:40
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: ON.1710031240-14
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
n-Hexane Extractable Material (HEM)	OILGREASE	2.80	U	5.60	2.80	1.40
U	Analyte was not detected. The concentration is below the reported LOD.					

Certificate of Analysis

Sample #: L17091647-02	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: 09/13/2017 19:41
Workgroup #: WG631878	Analyst: TMB	Run Date: 09/29/2017 17:53
Collect Date: 09/27/2017 00:01	Dilution: 1	File ID: 8M421791
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	5.45	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	0.282	J	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	94.8	70	120	
4-Bromofluorobenzene	103	75	120	
Dibromofluoromethane	94.0	85	115	
Toluene-d8	100	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 #: L17091647-01	PrePrep Method: N/A	Instrument: HPMS8
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 09/13/2017 19:41
Workgroup #: WG631878	Analyst: TMB	Run Date: 09/30/2017 00:41
Collect Date: 09/27/2017 15:00	Dilution: 50	File ID: 8M421804
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	25.0	U	50.0	25.0	12.5
1,1,2-Trichloroethane	79-00-5	25.0	U	50.0	25.0	12.5
1,1-Dichloroethane	75-34-3	13.0	J	25.0	12.5	6.25
1,1-Dichloroethene	75-35-4	107		100	50.0	25.0
1,2-Dichloroethane	107-06-2	70.7		50.0	25.0	12.5
Acetone	67-64-1	250	U	500	250	125
Benzene	71-43-2	12.5	U	25.0	12.5	6.25
Carbon tetrachloride	56-23-5	25.0	U	50.0	25.0	12.5
Chloroform	67-66-3	16.5	J	25.0	12.5	6.25
Ethylbenzene	100-41-4	25.0	U	50.0	25.0	12.5
Methylene chloride	75-09-2	8370		50.0	25.0	12.5
m,p-Xylene	179601-23-1	50.0	U	100	50.0	25.0
o-Xylene	95-47-6	25.0	U	50.0	25.0	12.5
Styrene	100-42-5	12.5	U	25.0	12.5	6.25
Tetrachloroethene	127-18-4	54.4		50.0	25.0	12.5
Trichloroethene	79-01-6	9330		50.0	25.0	12.5
Toluene	108-88-3	25.0	U	50.0	25.0	12.5
Vinyl chloride	75-01-4	221		50.0	25.0	12.5

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	96.7	70	120	
4-Bromofluorobenzene	102	75	120	
Dibromofluoromethane	94.6	85	115	
Toluene-d8	101	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 #: L17091647-02	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: 09/13/2017 19:41
Workgroup #: WG631878	Analyst: TMB	Run Date: 09/29/2017 17:53
Collect Date: 09/27/2017 00:01	Dilution: 1	File ID: 8M421791
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	5.45	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	0.282	J	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	94.8	70	120	
4-Bromofluorobenzene	103	75	120	
Dibromofluoromethane	94.0	85	115	
Toluene-d8	100	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.

2.1.1.2 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: 083117
 Analyst1: ADC Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT Rev: 18/1
 Maintenance Log ID: _____

Internal Standard: STD83648 Surrogate Standard: STD83648
 CCV: STD83554 LCS: STD83193 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG628027

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421173	WG628027-01 50ng BFB STD	NA	1	1	STD83478	08/31/17 13:56
8M421174	WG628027-01 50ng BFB STD	NA	1	1	STD83478	08/31/17 14:11
8M421175	RINSE	NA	1	1	STD83388	08/31/17 14:36
8M421176	WG628027-02 5ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 15:06
8M421177	WG628027-03 20ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 15:36
8M421178	WG628027-04 50ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 16:05
8M421179	WG628027-05 100ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 16:35
8M421180	WG628027-06 200ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 17:04
8M421181	WG628027-07 300ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 17:34
8M421182	WG628027-08 400ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 18:04
8M421183	WG628027-09 500ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 18:33
8M421184	RINSE	NA	1	1	STD83554	08/31/17 19:03
8M421185	WG628027-10 100ug/L A9FOO ALT SRC	NA	1	1	STD83193	08/31/17 19:33

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1	X			
File ID: 8M421173				
Tune failed, DNR.				

Approved: September 05, 2017

Page: 1




Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 091317
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 530B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54316

Internal Standard: STD83648 Surrogate Standard: STD83648
 CCV: STD83834 LCS: STD83830 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG629567

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421377	WG629567-01 50ng BFB STD 8260	NA	1	1	STD83478	09/13/17 14:18
8M421378	RINSE	NA	1	1	STD83478	09/13/17 14:44
8M421379	WG629567-02 0.3ug/L STD 8260	NA	1	1	STD83834	09/13/17 15:15
8M421380	WG629567-03 0.4ug/L STD 8260	NA	1	1	STD83834	09/13/17 15:44
8M421381	WG629567-04 1ug/L STD 8260	NA	1	1	STD83834	09/13/17 16:17
8M421382	WG629567-05 2ug/L STD 8260	NA	1	1	STD83834	09/13/17 16:49
8M421383	WG629567-06 5ug/L STD 8260	NA	1	1	STD83834	09/13/17 17:17
8M421384	WG629567-07 20ug/L STD 8260	NA	1	1	STD83834	09/13/17 17:46
8M421385	WG629567-08 50ug/L STD 8260	NA	1	1	STD83834	09/13/17 18:15
8M421386	WG629567-09 100ug/L STD 8260	NA	1	1	STD83834	09/13/17 18:44
8M421387	WG629567-10 200ug/L STD 8260	NA	1	1	STD83834	09/13/17 19:13
8M421388	WG629567-11 300ug/L STD 8260	NA	1	1	STD83834	09/13/17 19:41
8M421389	RINSE	NA	1	1		09/13/17 20:11
8M421390	RINSE	NA	1	1		09/13/17 20:40
8M421391	WG629567-12 50ug/L ALT SRC STD 8260	NA	1	1	STD83830	09/13/17 21:09
8M421392	CCV CHECK	NA	1	1	STD83834	09/13/17 21:38
8M421393	RINSE	NA	1	1		09/13/17 22:06

Approved: September 14, 2017

Page: 1

Cathy Carter



Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 092917
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54344

Internal Standard: STD84119 Surrogate Standard: STD84119
 CCV: STD83834 LCS: STD84126 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG631878

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421778	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 10:19
8M421779	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 10:32
8M421780	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 10:57
8M421781	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 12:56
8M421782	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 13:21
8M421783	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 13:54
8M421784	WG631877-02 50ug/L CCV STD 8260	NA	1	1	STD83834	09/29/17 14:20
8M421785	WG000000-01 100ug/L A9 CCV STD 8260	NA	1	1	STD84099	09/29/17 14:50
8M421786	RINSE	NA	1	1		09/29/17 15:21
8M421787	WG631878-01 BLANK 0929 8260	NA	1	1		09/29/17 15:51
8M421788	WG631878-02 20ug/L LCS 0929 8260	NA	1	1	STD84126	09/29/17 16:21
8M421789	WG631878-03 20ug/L LCS2 8260	NA	1	1	STD84126	09/29/17 16:52
8M421790	L17091648-02 A TB 826-SPE	<2	1	1		09/29/17 17:22
8M421791	L17091647-02 A TB 826-SPE	NA	1	1		09/29/17 17:53
8M421792	L17091645-07 A TB 826-SPE	<2	1	1		09/29/17 18:22
8M421793	L17091458-06 A TB 826-SPE	<2	1	1		09/29/17 18:54
8M421794	L17091277-02 B TB 826-SPE	<2	1	1		09/29/17 19:26
8M421795	L17091719-07 A TB 826-SPE	<2	1	1		09/29/17 19:56
8M421796	L17091719-05 A RB 826-SPE	<2	1	1		09/29/17 20:26
8M421797	L17091458-03 A 826-SPE	<2	1	1		09/29/17 20:58
8M421798	L17091458-05 A 826-SPE	<2	1	1		09/29/17 21:28
8M421799	L17091648-01 A 826-SPE	<2	1	1		09/29/17 22:03
8M421800	L17091719-01 A 826-SPE	<2	1	1		09/29/17 22:33
8M421801	L17091719-03 A 826-SPE	<2	1	1		09/29/17 23:05
8M421802	L17091645-01 A 826-SPE	<2	1	1		09/29/17 23:38
8M421803	L17091277-01 B 200X 826-SPE	<2	1	200		09/30/17 00:08
8M421804	L17091647-01 50X A 826-SPE	<2	1	50		09/30/17 00:41
8M421805	L17091470-15 A 826-SPE	<2	1	1		09/30/17 01:13
8M421806	L17091458-01 A 826-SPE	<2	1	1		09/30/17 01:48
8M421807	L17091645-08 A 826-SPE	<2	1	1		09/30/17 02:20
8M421808	RINSE	NA	1	1		09/30/17 02:52
8M421809	WG631878-04 BLK0929 STD 624	NA	2	1		09/30/17 03:31
8M421810	L17091574-02 B 50X D1 624-SPE	<2	2	50		09/30/17 04:06
8M421811	L17091582-01 B 5X D1 624-SPE	7	2	5		09/30/17 04:45

Approved: October 03, 2017

Page: 1




Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 092917
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54344

Internal Standard: STD84119 Surrogate Standard: STD84119
 CCV: STD83834 LCS: STD84126 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG631878

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421812	CCV	NA	1	1		09/30/17 05:22
8M421813	RINSE	NA	1	1		09/30/17 05:58
8M421814	RINSE	NA	1	1		09/30/17 06:30

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1	X			
File ID: 8M421778				
Tune failed, DNR.				
2	X			
File ID: 8M421779				
Tune failed, DNR. Changed the septa, liner, and o-ring.				
3	X			
File ID: 8M421780				
Tune failed, DNR.				
4	X			
File ID: 8M421781				
Tune failed, DNR. Changed the gold seal.				
5	X			
File ID: 8M421782				
Baked the instrument. DNR.				
8				
File ID: 8M421785				
Not needed, DNR.				
30	X	1	Missed Tune	
File ID: 8M421807				
L17091645-08 DNR.				
34	X	5	Internal standard and surrogate standard failure	
File ID: 8M421811				
Sample foamed, DNR. L17091582-01				

Approved: October 03, 2017

Page: 2

Sarah Vandenberg



Microbac Laboratories Inc.

Data Checklist

Date: 31-AUG-2017
 Analyst: ADC
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 84380
 Analytical Workgroups: WG628027

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	ADC
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:
05-SEP-2017

Tiffany Bailey

Secondary Reviewer:
05-SEP-2017

Cheryl Carter



Microbac Laboratories Inc.

Data Checklist

Date: 13-SEP-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 84588
 Analytical Workgroups: WG629567

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	ADC
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-SEP-2017

Tiffany Bailey

Secondary Reviewer:
14-SEP-2017

Aditya Carter



Microbac Laboratories Inc.

Data Checklist

Date: 29-SEP-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 84990
 Analytical Workgroups: WG631878

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:
02-OCT-2017

Tiffany Bailey

Secondary Reviewer:
03-OCT-2017

Sarah Vandenberg



Analytical Method:8260B
Login Number:L17091647

AAB#:WG631878

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-SP140-7472-GRAB	01	09/27/17					09/30/2017	2.4	14		09/30/17	2.4	14	
TRIP BLANK	02	09/27/17					09/29/2017	2.7	14		09/29/17	2.7	14	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17091647
 Instrument Id: HPMS8
 Workgroup (AAB#): WG631878

Method: 8260
 CAL ID: HPMS8-13-SEP-17
 Matrix: Water

Sample Number	Dilution	Tag	1	2	3	4
L17091647-01	50.0	DL01	96.7	94.6	102	101
L17091647-02	1.00	01	94.8	94.0	103	100
WG631878-01	1.00	01	96.3	94.4	102	101
WG631878-02	1.00	01	95.5	96.7	101	101
WG631878-03	1.00	01	95.3	94.9	101	101
WG631878-04	1.00	01	96.2	94.2	100	99.9

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: L17091647 Work Group: WG631878
 Blank File ID: 8M421787 Blank Sample ID: WG631878-01
 Prep Date: 09/29/17 15:51 Instrument ID: HPMS8
 Analyzed Date: 09/29/17 15:51 Method: 8260B
 Analyst: TMB

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG631878-02	8M421788	09/29/17 16:21	01
LCS2	WG631878-03	8M421789	09/29/17 16:52	01
TRIP BLANK	L17091647-02	8M421791	09/29/17 17:53	01
LH18/24-SP140-7472-GRAB	L17091647-01	8M421804	09/30/17 00:41	DL01

Report Name: BLANK_SUMMARY
 PDF File ID: 5507728
 Report generated 10/03/2017 13:52



Login Number: L17091647 Prep Date: 09/29/17 15:51 Sample ID: WG631878-01
 Instrument ID: HPMS8 Run Date: 09/29/17 15:51 Prep Method: 5030B/5030C/503
 File ID: 8M421787 Analyst: TMB Method: 8260B
 Workgroup (AAB#): WG631878 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS8-13-SEP-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	96.3	70 - 120	PASS
4-Bromofluorobenzene	102	75 - 120	PASS
Dibromofluoromethane	94.4	85 - 115	PASS
Toluene-d8	101	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: 5505622
 03-OCT-2017 13:52



Login Number: L17091647 Analyst: TMB Prep Method: 5030B/5030C/503
 Instrument ID: HPMS8 Matrix: Water Method: 8260B
 Workgroup (AAB#): WG631878 Units: ug/L
 QC Key: DOD4 Lot #: STD84126

Sample ID: WG631878-02 LCS File ID: 8M421788 Run Date: 09/29/2017 16:21
 Sample ID: WG631878-03 LCS2 File ID: 8M421789 Run Date: 09/29/2017 16:52

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
1,1,1-Trichloroethane	20.0	20.0	100	20.0	19.8	98.9	1.09	65 - 130	30	
1,1,2-Trichloroethane	20.0	21.0	105	20.0	21.2	106	0.998	75 - 125	30	
1,1-Dichloroethane	20.0	19.5	97.5	20.0	19.2	95.9	1.74	70 - 135	30	
1,1-Dichloroethene	20.0	20.1	101	20.0	19.6	98.2	2.48	70 - 130	30	
1,2-Dichloroethane	20.0	20.4	102	20.0	20.2	101	0.745	70 - 130	30	
Acetone	20.0	23.2	116	20.0	20.3	101	13.7	40 - 140	30	
Benzene	20.0	20.0	99.9	20.0	19.7	98.4	1.52	80 - 120	30	
Carbon tetrachloride	20.0	19.0	94.8	20.0	18.9	94.6	0.277	65 - 140	30	
Chloroform	20.0	18.8	94.2	20.0	18.7	93.7	0.489	65 - 135	30	
Ethylbenzene	20.0	19.9	99.7	20.0	19.7	98.4	1.39	75 - 125	30	
m,p-Xylene	40.0	40.5	101	40.0	40.6	102	0.339	75 - 130	30	
Methylene chloride	20.0	20.0	100	20.0	19.5	97.4	2.93	55 - 140	30	
o-Xylene	20.0	20.6	103	20.0	20.4	102	0.819	80 - 120	30	
Styrene	20.0	21.4	107	20.0	21.5	108	0.492	65 - 135	30	
Tetrachloroethene	20.0	20.3	101	20.0	19.9	99.4	2.09	45 - 150	30	
Toluene	20.0	20.2	101	20.0	20.0	100	1.07	75 - 120	30	
Trichloroethene	20.0	20.9	104	20.0	20.3	101	2.84	70 - 125	30	
Vinyl chloride	20.0	18.5	92.5	20.0	18.0	89.8	3.04	50 - 145	30	

Surogates	LCS	LCS2	Surrogate Limits	Qualifier
	% Recovery	% Recovery		
1,2-Dichloroethane-d4	95.5	95.3	70 - 120	PASS
Dibromofluoromethane	96.7	94.9	85 - 115	PASS
4-Bromofluorobenzene	101	101	75 - 120	PASS
Toluene-d8	101	101	85 - 120	PASS

* EXCEEDS %REC LIMIT
 # EXCEEDS RPD LIMIT



BFB

Login Number: L17091647 _____ Tune ID: WG628027-01 _____
 Instrument: HPMS8 _____ Run Date: 08/31/2017 _____
 Analyst: ADC _____ Run Time: 14:11 _____
 Workgroup: WG628027 _____ File ID: 8M421174 _____
 Cal ID: HPMS8-31-AUG-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	28.5	8248	PASS
75.0	95.0	30.0	60.0	48.8	14111	PASS
95.0	95.0	100	100	100	28896	PASS
96.0	95.0	5.00	9.00	5.97	1726	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	84.1	24314	PASS
175	174	5.00	9.00	7.59	1845	PASS
176	174	95.0	101	95.2	23149	PASS
177	176	5.00	9.00	6.57	1520	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG628027-02	STD	01	08/31/2017 15:06	
WG628027-03	STD	01	08/31/2017 15:36	
WG628027-04	STD	01	08/31/2017 16:05	
WG628027-05	STD-CCV	01	08/31/2017 16:35	
WG628027-06	STD	01	08/31/2017 17:04	
WG628027-07	STD	01	08/31/2017 17:34	
WG628027-08	STD	01	08/31/2017 18:04	
WG628027-09	STD	01	08/31/2017 18:33	
WG628027-10	SSCV	01	08/31/2017 19:33	

* Sample past 12 hour tune limit



BFB

Login Number: L17091647 Tune ID: WG629567-01
 Instrument: HPMS8 Run Date: 09/13/2017
 Analyst: TMB Run Time: 14:18
 Workgroup: WG629567 File ID: 8M421377
 Cal ID: HPMS8-13-SEP-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	28.0	11358	PASS
75.0	95.0	30.0	60.0	47.1	19109	PASS
95.0	95.0	100	100	100	40581	PASS
96.0	95.0	5.00	9.00	6.53	2650	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	82.9	33634	PASS
175	174	5.00	9.00	7.97	2681	PASS
176	174	95.0	101	99.2	33368	PASS
177	176	5.00	9.00	7.07	2359	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG629567-02	STD	01	09/13/2017 15:15	
WG629567-03	STD	01	09/13/2017 15:44	
WG629567-04	STD	01	09/13/2017 16:17	
WG629567-05	STD	01	09/13/2017 16:49	
WG629567-06	STD	01	09/13/2017 17:17	
WG629567-07	STD	01	09/13/2017 17:46	
WG629567-08	STD-CCV	01	09/13/2017 18:15	
WG629567-09	STD	01	09/13/2017 18:44	
WG629567-10	STD	01	09/13/2017 19:13	
WG629567-11	STD	01	09/13/2017 19:41	
WG629567-12	SSCV	01	09/13/2017 21:09	

* Sample past 12 hour tune limit



BFB

Login Number: L17091647 Tune ID: WG631877-01
 Instrument: HPMS8 Run Date: 09/29/2017
 Analyst: TMB Run Time: 13:54
 Workgroup: WG631877 File ID: 8M421783
 Cal ID: HPMS8-13-SEP-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	31.9	23970	PASS
75.0	95.0	30.0	60.0	46.9	35264	PASS
95.0	95.0	100	100	100	75237	PASS
96.0	95.0	5.00	9.00	7.20	5414	PASS
173	174	0	2.00	0.507	342	PASS
174	95.0	50.0	100	89.6	67429	PASS
175	174	5.00	9.00	7.44	5020	PASS
176	174	95.0	101	96.5	65056	PASS
177	176	5.00	9.00	7.64	4973	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG631877-02	CCV	01	09/29/2017 14:20	
WG631878-01	BLANK	01	09/29/2017 15:51	
WG631878-02	LCS	01	09/29/2017 16:21	
WG631878-03	LCS2	01	09/29/2017 16:52	
L17091647-02	TRIP BLANK	01	09/29/2017 17:53	
L17091647-01	LH18/24-SP140-7472-GRAB	DL01	09/30/2017 00:41	
WG631878-04	BLANK2	01	09/30/2017 03:31	*

* Sample past 12 hour tune limit



Calibration Table Report
 Method: A9FOOWTR.M
 Title: A9-FOO Water SOP:MSV01 08-31-17 HPMS8
 Last Calibration: Tue Sep 05 14:28:41 2017
 Curve: WG628027
 Calibration Files

Compound											Avg	%RSD
	5	20	50	100	200	300	400	500				
	8M421176.D	8M421177.D	8M421178.D	8M421179.D	8M421180.D	8M421181.D	8M421182.D	8M421183.D				
Fluorobenzene	ISTD											
Acetonitrile		0.029	0.031	0.029	0.028	0.030	0.030	0.031	0.030	3.362		
3-Chloro-1-propene	0.776	0.836	0.870	0.863	0.874	0.840	0.807	0.773	0.830	4.885		
2-Chloro-1,3-butadiene	0.670	0.740	0.785	0.794	0.804	0.769	0.737	0.700	0.750	6.291		
Ethyl Acetate		0.260	0.283	0.285	0.280	0.285	0.281	0.280	0.279	3.184		
Methacrylonitrile	0.069	0.078	0.083	0.085	0.083	0.085	0.085	0.086	0.082	6.972		
Isobutyl Alcohol			0.009	0.009	0.009	0.010	0.010	0.011	0.010	8.810		
1-Butanol									0.000	0.000		
Methyl methacrylate	0.282	0.290	0.314	0.318	0.318	0.319	0.311	0.310	0.308	4.536		
2-Nitropropane		0.092	0.099	0.101	0.101	0.103	0.101	0.103	0.100	3.821		
Chlorobenzene-d5	ISTD											
1,4-Dichlorobenzene-d4	ISTD											
Cyclohexanone			0.012	0.013	0.012	0.013	0.014	0.015	0.013	9.192		

Tue Sep 05 14:30:32 2017

Calibration Table Report

Method: 8260WT.M

Title: Method 8260B/624 WTR-SOP:OVLMSV01 09-13-17 HPMS8

Last Calibration: Thu Sep 14 08:56:14 2017

Curve: WG629567

Calibration Files

Compound	0.3 0.4 1 2 5 20 50 100 200 300											r^2			
	8M421379.D	8M421380.D	8M421381.D	8M421382.D	8M421383.D	8M421384.D	8M421385.D	8M421386.D	8M421387.D	8M421388.D	Avg		%RSD	Linear	Quad
I Fluorobenzene	ISTD														
T Dichlorodifluoromethane			0.376	0.401	0.408	0.474	0.467	0.424	0.438		0.427	8.334			
P Chloromethane			0.839	0.710	0.706	0.717	0.693	0.638	0.623		0.704	9.986			
C Vinyl Chloride	0.363	0.340	0.345	0.340	0.345	0.336	0.314	0.327		0.339	4.229				
T 1,3-Butadiene			0.390	0.370	0.354	0.299	0.241	0.247	0.230	0.304	22.045	0.999			
T Bromomethane		0.213	0.231	0.246	0.238	0.244	0.241	0.256		0.238	5.729				
T Chloroethane	0.237	0.223	0.241	0.250	0.250	0.258	0.241	0.252		0.244	4.484				
T Trichlorofluoromethane	0.517	0.457	0.493	0.538	0.516	0.528	0.488	0.520		0.507	5.191				
T Diethyl ether		0.272	0.282	0.278	0.277	0.275	0.280		0.268	0.276	1.732				
T Isoprene				0.432	0.418	0.425	0.392	0.409	0.386	0.410	4.486				
T Acrolein		0.035	0.039	0.040	0.040	0.041	0.044		0.044	0.040	7.806				
T 1,1,2-Trichloro-1,2,2-Trifluoroethane		0.225	0.254	0.273	0.265	0.268	0.249	0.262		0.257	6.203				
T Acetone				0.116	0.084	0.080	0.087	0.090	0.082	0.090	14.764				
C 1,1-Dichloroethene	0.579	0.527	0.533	0.562	0.565	0.571	0.529	0.546		0.551	3.702				
T Tert-Butyl Alcohol			0.018	0.017	0.017	0.018	0.019		0.020	0.018	7.921				
T Dimethyl Sulfide				0.350	0.353	0.372	0.357	0.364	0.352	0.358	2.344				
T Iodomethane		0.253	0.258	0.297	0.297	0.309	0.295	0.307	0.279	0.287	7.504				
T Methyl acetate				0.271	0.266	0.269	0.277	0.277	0.266	0.271	1.772				
T Methylene Chloride		0.273	0.280	0.287	0.273	0.278	0.261	0.265		0.274	3.218				
T Carbon Disulfide		0.847	0.895	0.897	0.884	0.896	0.828	0.831	0.771	0.856	5.278				
T Acrylonitrile		0.105	0.112	0.111	0.117	0.122	0.129		0.119	0.116	6.683				
T Methyl Tert Butyl Ether		0.549	0.546	0.589	0.585	0.597	0.584	0.594		0.578	3.658				
T trans-1,2-Dichloroethene	0.543	0.495	0.501	0.538	0.537	0.538	0.507	0.513		0.521	3.715				
T n-Hexane				0.640	0.596	0.616	0.570	0.608	0.584	0.602	4.092				
T Diisopropyl ether		1.728	1.782	1.754	1.754	1.718	1.624		1.441	1.686	7.060				
T Vinyl Acetate				0.759	0.641	0.712	0.692	0.681	0.663	0.692	5.936				
P 1,1-Dichloroethane	0.613	0.610	0.630	0.653	0.643	0.642	0.601	0.602		0.624	3.263				
T Ethyl-Tert-Butyl ether		1.069	1.105	1.087	1.100	1.085	1.085		1.015	1.078	2.793				
T 2-Butanone				0.141	0.139	0.139	0.147	0.145	0.143	0.142	2.331				
T Propionitrile		0.036	0.039	0.038	0.039	0.040	0.042		0.043	0.040	6.030				
T 2,2-Dichloropropane	0.423	0.425	0.437	0.461	0.434	0.438	0.413	0.426		0.432	3.314				
T cis-1,2-Dichloroethene	0.343	0.306	0.285	0.315	0.308	0.313	0.293	0.296		0.307	5.757				
C Chloroform	0.568	0.572	0.499	0.526	0.525	0.505	0.513	0.477	0.474	0.518	6.741				
T 1-Bromopropane				0.050	0.058	0.057	0.061	0.058	0.058	0.057	5.742				
T Bromochloromethane	0.185	0.160	0.180	0.181	0.184	0.186	0.179	0.180		0.179	4.637				
T Tetrahydrofuran		0.097	0.093	0.089	0.093	0.093	0.099		0.094	0.094	3.181				
S Dibromofluoromethane				0.324	0.311	0.298	0.291	0.291	0.283	0.281	5.251				
T 1,1,1-Trichloroethane	0.449	0.413	0.431	0.476	0.473	0.476	0.444	0.450		0.452	5.112				
T Cyclohexane		0.687	0.721	0.772	0.748	0.771	0.718	0.754	0.699	0.734	4.403				
T 1,1-Dichloropropene		0.352	0.369	0.386	0.393	0.395	0.371	0.380		0.378	4.111				
T Tert-Amyl-Methyl ether		0.604	0.645	0.639	0.650	0.641	0.652		0.616	0.635	2.869				
T Carbon Tetrachloride	0.466	0.401	0.429	0.469	0.462	0.466	0.43	0.443		0.4457	5.44121				
S 1,2-Dichloroethane-d4				0.368	0.347	0.335	0.324	0.329	0.318	0.31	5.83484				
T Heptane										0	0				
T 1,2-Dichloroethane	0.465	0.412	0.453	0.476	0.459	0.465	0.441	0.441		0.4514	4.46079				
T Benzene	1.136	1.054	1.105	1.121	1.103	1.1	1.014	0.969		1.0753	5.39779				
T Trichloroethene	0.279	0.262	0.302	0.301	0.312	0.32	0.303	0.31		0.2987	6.35845				
T Methylcyclohexane				0.458	0.438	0.451	0.423	0.445	0.421	0.4394	3.44851				
C 1,2-Dichloropropane	0.315	0.322	0.355	0.365	0.362	0.366	0.347	0.356		0.3484	5.65905				
T Bromodichloromethane	0.352	0.371	0.359	0.377	0.386	0.398	0.38	0.382		0.3755	3.88984				
T 1,4-Dioxane			0.001	0.001	0.001	0.002	0.002		0.002	0.0015	13.7848				
T Dibromomethane	0.165	0.149	0.146	0.156	0.158	0.164	0.156	0.158		0.1565	4.1959				
T 2-Chloroethyl Vinyl Ether		0.126	0.142	0.154	0.173	0.174	0.177	0.181	0.174	0.1628	12.2292				
T 4-Methyl-2-Pentanone				0.08	0.093	0.094	0.1	0.103	0.1	0.0951	8.75964				
T cis-1,3-Dichloropropene	0.403	0.384	0.428	0.442	0.446	0.463	0.44	0.444		0.4314	5.97072				

T	Dimethyl Disulfide				0.212	0.235	0.254	0.252	0.26	0.246	0.2429	7.21488
I	Chlorobenzene-d5	ISTD										
S	Toluene-d8			1.315	1.259	1.242	1.208	1.176	1.139	1.103	1.2059	6.04694
C	Toluene	1.506	1.416	1.422	1.502	1.462	1.466	1.313	1.23		1.4146	6.84092
T	Ethyl Methacrylate		0.227	0.262	0.29	0.307	0.322	0.323	0.327	0.321	0.2975	12.085
T	Paraldehyde										0	0
T	trans-1,3-Dichloropropene		0.43	0.427	0.466	0.466	0.479	0.46	0.464		0.4559	4.36352
T	1,1,2-Trichloroethane	0.241	0.236	0.231	0.247	0.25	0.254	0.242	0.246		0.2433	3.08076
T	2-Hexanone				0.091	0.099	0.104	0.11	0.113	0.114	0.1052	8.79897
T	1,3-Dichloropropane	0.418	0.424	0.439	0.445	0.44	0.443	0.42	0.424		0.4317	2.5632
T	Tetrachloroethene	0.296	0.292	0.31	0.329	0.319	0.326	0.304	0.316		0.3115	4.28753
T	Dibromochloromethane	0.331	0.303	0.304	0.344	0.348	0.36	0.35	0.361		0.3376	6.78962
T	1,2-Dibromoethane	0.215	0.224	0.23	0.251	0.254	0.258	0.249	0.257		0.2423	6.81501
T	1-Chlorohexane	0.408	0.441	0.44	0.48	0.483	0.502	0.465	0.479	0.451	0.4611	6.23991
P	Chlorobenzene	1.067	0.998	0.994	1.045	1.022	1.026	0.942	0.899		0.9992	5.54231
T	1,1,1,2-Tetrachloroethane	0.309	0.313	0.356	0.381	0.383	0.387	0.366	0.362		0.357	8.54005
C	Ethylbenzene		0.53	0.515	0.505	0.54	0.537	0.544	0.497	0.496	0.5204	3.8086
T	m-p-Xylene	0.659	0.612	0.62	0.666	0.654	0.655	0.592	0.545		0.6252	6.69883
T	o-Xylene		0.58	0.582	0.63	0.632	0.652	0.602	0.598		0.6108	4.5136
T	Styrene	0.898	0.942	0.928	1.049	1.078	1.092	1.002	0.951		0.9924	7.40772
P	Bromoform		0.163	0.182	0.207	0.217	0.23	0.227	0.236		0.209	13.0818
T	Isopropylbenzene	1.642	1.479	1.52	1.689	1.633	1.652	1.473	1.365		1.5568	7.31337
I	1,4-Dichlorobenzene-d4	ISTD										
P	1,1,2,2-Tetrachloroethane	0.451	0.445	0.473	0.498	0.499	0.501	0.493	0.502		0.4825	4.8626
S	p-Bromofluorobenzene			0.895	0.909	0.935	0.903	0.905	0.892	0.868	0.9011	2.22137
T	1,2,3-Trichloropropane		0.112	0.147	0.153	0.15	0.149	0.148	0.152		0.1444	10.0859
T	trans-1,4-Dichloro-2-Butene		0.191	0.24	0.261	0.262	0.271	0.28	0.287	0.246	0.2547	11.8469
T	n-Propylbenzene	3.708	3.33	3.494	3.824	3.738	3.615	3.211	2.811		3.4663	9.72764
T	Bromobenzene	0.766	0.779	0.729	0.786	0.8	0.798	0.795	0.759	0.766	0.7752	2.97971
T	1,3,5-Trimethylbenzene	2.484	2.27	2.367	2.576	2.587	2.529	2.342	2.171		2.4157	6.27806
T	2-Chlorotoluene	2.23	2.293	2.42	2.66	2.545	2.508	2.016	2.057		2.3413	9.93156
T	4-Chlorotoluene	2.217	2.006	2.056	2.115	2.088	1.993	2.046	1.76		2.0351	6.45972
T	a-Methylstyrene				1.351	1.435	1.471	1.389	1.37	1.213	1.3715	6.49608
T	tert-Butylbenzene		0.519	0.538	0.579	0.583	0.572	0.537	0.543		0.5531	4.46813
T	1,2,4-Trimethylbenzene	2.517	2.447	2.447	2.737	2.662	2.604	2.366	2.175		2.4944	7.15122
T	sec-Butylbenzene		2.911	2.968	3.279	3.226	3.12	2.828	2.558		2.9842	8.39029
T	p-Isopropyltoluene		2.459	2.557	2.814	2.824	2.778	2.525	2.308		2.6093	7.65785
T	1,3-Dichlorobenzene	1.616	1.485	1.556	1.627	1.597	1.583	1.479	1.442		1.5482	4.53513
T	1,4-Dichlorobenzene	1.683	1.627	1.507	1.533	1.626	1.584	1.56	1.462	1.416	1.5554	5.48999
T	n-Butylbenzene		2.382	2.431	2.692	2.626	2.538	2.286	2.098		2.436	8.40297
T	1,2-Dichlorobenzene	1.543	1.467	1.369	1.399	1.451	1.446	1.437	1.346	1.326	1.4205	4.77171
T	1,2-Dibromo-3-Chloropropane			0.077	0.097	0.094	0.095	0.098	0.101		0.0936	8.93058
T	1,2,4-Trichlorobenzene	1.129	0.997	1.028	1.062	1.067	1.074	1.008	1.012		1.0472	4.23768
T	Hexachlorobutadiene	0.469	0.419	0.455	0.457	0.47	0.472	0.454	0.459		0.457	3.74962
T	Naphthalene	1.489	1.352	1.515	1.682	1.727	1.723	1.547	1.589		1.5781	8.24736
T	1,2,3-Trichlorobenzene	0.826	0.919	0.883	0.899	0.95	0.952	0.947	0.885	0.893	0.906	4.53779

Thu Sep 14 09:01:55 2017

Login Number: L17091647 Run Date: 09/13/2017 Sample ID: WG629567-12
 Instrument ID: HPMS8 Run Time: 21:09 Method: 8260B
 File ID: 8M421391 Analyst: TMB QC Key: DOD4
 ICal Workgroup: WG629567 Cal ID: HPMS8 - 13-SEP-17

Analyte		Expected	Found	Units	RF	%D	UCL	Q
1,1-Dichloroethene	CCC	50.0	48.1	ug/L	0.531	3.70	20	
Chloroform	CCC	50.0	47.5	ug/L	0.492	5.00	20	
Ethylbenzene	CCC	50.0	50.8	ug/L	0.529	1.60	20	
Toluene	CCC	50.0	49.5	ug/L	1.40	1.10	20	
Vinyl Chloride	CCC	50.0	46.1	ug/L	0.312	7.80	20	
Bromoform	SPCC	50.0	51.8	ug/L	0.217	3.60	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	51.2	ug/L	0.494	2.40	20	
Chloromethane	SPCC	50.0	42.7	ug/L	0.601	14.6	20	
Chlorobenzene	SPCC	50.0	50.7	ug/L	1.01	1.30	20	
1,1-Dichloroethane	SPCC	50.0	48.1	ug/L	0.600	3.80	20	
1,1,1-Trichloroethane		50.0	49.9	ug/L	0.450	0.300	20	
1,1,2-Trichloroethane		50.0	50.8	ug/L	0.247	1.70	20	
1,2-Dichloroethane		50.0	50.1	ug/L	0.452	0.200	20	
Acetone		50.0	49.3	ug/L	0.0888	1.40	20	
Benzene		50.0	50.0	ug/L	1.07	0.100	20	
Carbon Tetrachloride		50.0	48.5	ug/L	0.432	3.00	20	
Methylene Chloride		50.0	48.9	ug/L	0.268	2.20	20	
m-,p-Xylene		100	103	ug/L	0.643	2.80	20	
o-Xylene		50.0	53.7	ug/L	0.656	7.30	20	
Styrene		50.0	54.3	ug/L	1.08	8.70	20	
Tetrachloroethene		50.0	50.0	ug/L	0.312	0	20	
Trichloroethene		50.0	51.5	ug/L	0.308	3.00	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17091647 Run Date: 09/29/2017 Sample ID: WG631877-02
Instrument ID: HPMS8 Run Time: 14:20 Method: 8260B
File ID: 8M421784 Analyst: TMB QC Key: DOD4
Workgroup (AAB#): WG631878 Cal ID: HPMS8 - 13-SEP-17
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
1,2-Dichloropropane	CCC	50.0	48.3	ug/L	0.337	3.33	20	
1,1-Dichloroethene	CCC	50.0	47.5	ug/L	0.524	4.94	20	
Chloroform	CCC	50.0	44.1	ug/L	0.456	11.9	20	
Ethylbenzene	CCC	50.0	46.9	ug/L	0.488	6.30	20	
Toluene	CCC	50.0	47.0	ug/L	1.33	6.01	20	
Vinyl Chloride	CCC	50.0	48.9	ug/L	0.332	2.13	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	51.2	ug/L	0.495	2.49	20	
Bromoform	SPCC	50.0	52.2	ug/L	0.218	4.42	20	
Chlorobenzene	SPCC	50.0	47.1	ug/L	0.941	5.82	20	
Chloromethane	SPCC	50.0	44.8	ug/L	0.630	10.5	20	
1,1-Dichloroethane	SPCC	50.0	47.4	ug/L	0.592	5.15	20	
Xylenes		150	143	ug/L	0.591	4.61	20	
1,1,1-Trichloroethane		50.0	47.1	ug/L	0.425	5.88	20	
1,1,2-Trichloroethane		50.0	48.9	ug/L	0.238	2.11	20	
1,2-Dichloroethane		50.0	47.1	ug/L	0.426	5.71	20	
Acetone		50.0	44.3	ug/L	0.0798	11.4	20	
Benzene		50.0	45.7	ug/L	0.982	8.67	20	
Carbon Tetrachloride		50.0	46.4	ug/L	0.413	7.27	20	
Methylene Chloride		50.0	46.5	ug/L	0.255	6.93	20	
m-,p-Xylene		100	95.0	ug/L	0.594	5.05	20	
o-Xylene		50.0	48.1	ug/L	0.588	3.73	20	
Styrene		50.0	49.9	ug/L	0.991	0.156	20	
Tetrachloroethene		50.0	47.9	ug/L	0.299	4.15	20	
Trichloroethene		50.0	48.9	ug/L	0.292	2.15	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

CCV - Modified 03/05/2008

PDF File ID: 5505626

Report generated 10/03/2017 13:52



Login Number: L17091647
Instrument ID: HPMS8
Workgroup (AAB#): WG631878

ICAL CCV Number: WG629567-08
CAL ID: HPMS8-13-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG629567-08	NA	NA	362138	640126	767485
Upper Limit	NA	NA	724276	1280252	1534970
Lower Limit	NA	NA	181069	320063	383743
<u>L17091647-01</u>	<u>50.0</u>	<u>DL01</u>	<u>481500</u>	<u>868161</u>	<u>1088978</u>
L17091647-02	1.00	01	472922	862255	1075630
WG631878-01	1.00	01	471410	854742	1072614
WG631878-02	1.00	01	485703	875230	1075317
WG631878-03	1.00	01	497035	883738	1083858

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)

00862403

Login Number: L17091647
 Instrument ID: HPMS8
 Workgroup (AAB#): WG631878

ICAL CCV Number: WG629567-08
 CAL ID: HPMS8-13-SEP-17
 Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG629567-08	NA	NA	17.79	14.76	10.89
Upper Limit	NA	NA	18.29	15.26	11.39
Lower Limit	NA	NA	17.29	14.26	10.39
<u>L17091647-01</u>	<u>50.0</u>	<u>DL01</u>	<u>17.74</u>	<u>14.72</u>	<u>10.84</u>
L17091647-02	1.00	01	17.74	14.72	10.85
WG631878-01	1.00	01	17.73	14.71	10.85
WG631878-02	1.00	01	17.73	14.72	10.85
WG631878-03	1.00	01	17.74	14.72	10.84

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

Underline = Response outside limits



2.2 General Chromatography Data

2.2.1 LC/MS Data (6850)

2.2.1.1 Summary Data

Lab Report #: L17091647

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 6850	Prep Date: 10/04/2017 13:00
Matrix: Water	Analytical Method: 6850	Cal Date: 09/08/2017 16:52
Workgroup #: WG632566	Analyst: JWR	Run Date: 10/04/2017 18:08
Collect Date: 09/27/2017 15:00	Dilution: 10000	File ID: 1LM.LM40637
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	7010		4000	2000	1000

2.2.1.2 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: 090817_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 WG628979 (waters)
 Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (09/08/2017)
 CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: NA

Comments: ICAL WG628977 : 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.LM40484	WG628977-01 CCB	1	1		09/08/17 14:40
2	1LM.LM40485	WG628977-02 STD (0.1 ug/L)	1	1	STD80232	09/08/17 14:59
3	1LM.LM40486	WG628977-03 STD (0.2 ug/L)	1	1	STD80232	09/08/17 15:18
4	1LM.LM40487	WG628977-04 STD (0.5 ug/L)	1	1	STD80232	09/08/17 15:37
5	1LM.LM40488	WG628977-05 STD (1.0 ug/L)	1	1	STD80232	09/08/17 15:56
6	1LM.LM40489	WG628977-06 STD (2.0 ug/L)	1	1	STD80232	09/08/17 16:15
7	1LM.LM40490	WG628977-07 STD (5.0 ug/L)	1	1	STD80232	09/08/17 16:34
8	1LM.LM40491	WG628977-08 STD (10 ug/L)	1	1	STD80232	09/08/17 16:52
9	1LM.LM40492	WG628977-09 SSCV (1.0 ug/L)	1	1	STD80234	09/08/17 17:11
10	1LM.LM40493	WG628984-01 CCB	1	1		09/08/17 17:30
11	1LM.LM40494	WG628984-02 CCV (1.0ug/L)	1	1	STD80232	09/08/17 17:49
12	1LM.LM40495	WG628979-05 MRL (0.2ug/L)	1	1	STD80232	09/08/17 18:08
13	1LM.LM40496	WG628979-01 MCT (0.2ug/L)	1	1	STD80234	09/08/17 18:27
14	1LM.LM40497	WG628979-02 BLANK	1	1		09/08/17 18:46
15	1LM.LM40498	WG628979-03 LCS (0.2ug/L)	1	1	STD80234	09/08/17 19:05
16	1LM.LM40499	WG628979-04 LCS2 (0.2ug/L)	1	1	STD80234	09/08/17 19:24
17	1LM.LM40500	L17081653-01	1	1		09/08/17 19:43
18	1LM.LM40501	L17081653-01 (10x) (NR)	1	10		09/08/17 20:02
19	1LM.LM40502	L17081653-01 (100x) (NR)	1	100		09/08/17 20:21
20	1LM.LM40503	L17090079-01	1	1		09/08/17 20:40
21	1LM.LM40504	L17090079-02	1	1		09/08/17 20:59
22	1LM.LM40505	L17090079-03	1	1		09/08/17 21:18
23	1LM.LM40506	WG628984-03 CCV (1.0ug/L)	1	1	STD80232	09/08/17 21:37
24	1LM.LM40507	WG628979-06 MRL (0.2ug/L)	1	1	STD80232	09/08/17 21:56
25	1LM.LM40508	WG628984-04 CCB	1	1		09/08/17 22:15

Comments

Seq.	Rerun	Dil.	Reason	Analytes

Page: 1

Approved: 11-SEP-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: LCMS1 Dataset: 100417_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 WG632566 (waters)
 Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (09/08/2017)
 CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: NA

Comments:

Samples L17091609-01 and L17091705-01 were analyzed neat and at multiple dilutions based on their range of historical results. Samples L17091647-01 and L17091706-01 were analyzed at dilutions only based on their historical results.
--

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	1LM.LM40625	WG632570-01 CCB	1	1		10/04/17 14:21
2	1LM.LM40626	WG632570-02 CCV (1.0ug/L)	1	1	STD80232	10/04/17 14:40
3	1LM.LM40627	WG632566-05 MRL (0.2ug/L)	1	1	STD80232	10/04/17 14:58
4	1LM.LM40628	WG632566-01 MCT (0.2ug/L)	1	1	STD80234	10/04/17 15:17
5	1LM.LM40629	WG632566-02 BLANK	1	1		10/04/17 15:36
6	1LM.LM40630	WG632566-03 LCS (0.2ug/L)	1	1	STD80234	10/04/17 15:55
7	1LM.LM40631	WG632566-04 LCS2 (0.2ug/L)	1	1	STD80234	10/04/17 16:14
8	1LM.LM40632	L17100003-01 LOQ (0.20ug/L)	1	1	STD80234	10/04/17 16:33
9	1LM.LM40633	L17100001-01 LOD (0.10ug/L)	1	1	STD80234	10/04/17 16:52
10	1LM.LM40634	L17091609-01	1	1		10/04/17 17:11
11	1LM.LM40635	L17091609-01 (10x) (NR)	1	10		10/04/17 17:30
12	1LM.LM40636	L17091609-01 (100x) (NR)	1	100		10/04/17 17:49
13	1LM.LM40637	L17091647-01 (10,000x)	1	10000		10/04/17 18:08
14	1LM.LM40638	WG632570-03 CCV (1.0ug/L)	1	1	STD80232	10/04/17 18:27
15	1LM.LM40639	WG632566-06 MRL (0.2ug/L)	1	1	STD80232	10/04/17 18:46
16	1LM.LM40640	WG632570-04 CCB	1	1		10/04/17 19:05
17	1LM.LM40641	L17091705-01	1	1		10/04/17 19:24
18	1LM.LM40642	L17091705-01 (10x) (NR)	1	10		10/04/17 19:42
19	1LM.LM40643	L17091705-01 (100x) (NR)	1	100		10/04/17 20:01
20	1LM.LM40644	L17091706-01 (10,000x)	1	10000		10/04/17 20:20
21	1LM.LM40645	WG632570-05 CCV (1.0ug/L)	1	1	STD80232	10/04/17 20:39
22	1LM.LM40646	WG632566-07 MRL (0.2ug/L)	1	1	STD80232	10/04/17 20:58
23	1LM.LM40647	WG632570-06 CCB	1	1		10/04/17 21:17

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Page: 1

Approved: 05-OCT-17




Microbac Laboratories Inc.

Data Checklist

Date: 08-SEP-2017
 Analyst: JWR
 Analyst: NA
 Method: 6850
 Instrument: LCMS1
 Curve Workgroup: WG628977
 Runlog ID: 84489
 Analytical Workgroups: L17081653, L17090079

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	NA
Recoveries	NA
%RPD	NA
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	ECL

Primary Reviewer:
11-SEP-2017



Secondary Reviewer:
11-SEP-2017




Microbac Laboratories Inc.

Data Checklist

Date: 04-OCT-2017
 Analyst: JWR
 Analyst: NA
 Method: 6850
 Instrument: LCMS1
 Curve Workgroup: NA
 Runlog ID: 85061
 Analytical Workgroups: L17091609, L17091647, L17091705, 091706 L17100001, 100003

ANALYTICAL	
System Performance Check	X
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	NA
Recoveries	NA
%RPD	NA
Interference check sample (ICS) (LCMS)	MCT
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	X
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	TRRP
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:
05-OCT-2017

John Richards

Secondary Reviewer:
05-OCT-2017

Eri C. Zimm

CHECKLIST1 - Modified 03/05/2008

Generated: OCT-05-2017 14:11:43



Analytical Method:6850
Login Number:L17091647

AAB#:WG632566

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-SP140-7472-GRAB	01	09/27/17					10/04/2017	6.9	28		10/04/17	.2	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091647 Work Group: WG632566
 Blank File ID: 1LM.LM40629 Blank Sample ID: WG632566-02
 Prep Date: 10/04/17 13:00 Instrument ID: LCMS1
 Analyzed Date: 10/04/17 15:36 Method: 6850
 Analyst: JWR

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
QCMRL	WG632566-05	1LM.LM40627	10/04/17 14:58	01
MCT	WG632566-01	1LM.LM40628	10/04/17 15:17	01
LCS	WG632566-03	1LM.LM40630	10/04/17 15:55	01
LCS2	WG632566-04	1LM.LM40631	10/04/17 16:14	01
LH18/24-SP140-7472-GRAB	L17091647-01	1LM.LM40637	10/04/17 18:08	DL01
QCMRL	WG632566-06	1LM.LM40639	10/04/17 18:46	01
QCMRL	WG632566-07	1LM.LM40646	10/04/17 20:58	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5512530
 Report generated 10/09/2017 08:36



Login Number: L17091647 Prep Date: 10/04/17 13:00 Sample ID: WG632566-02
 Instrument ID: LCMS1 Run Date: 10/04/17 15:36 Prep Method: 6850
 File ID: 1LM.LM40629 Analyst: JWR Method: 6850
 Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: LCMS1-08-SEP-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: 5512531
 09-OCT-2017 08:36



Login Number: L17091647 Analyst: JWR Prep Method: 6850
 Instrument ID: LCMS1 Matrix: Water Method: 6850
 Workgroup (AAB#): WG632566 Units: ug/L
 QC Key: DOD4 Lot #: STD80234
 Sample ID: WG632566-03 LCS File ID: 1LM.LM40630 Run Date: 10/04/2017 15:55
 Sample ID: WG632566-04 LCS2 File ID: 1LM.LM40631 Run Date: 10/04/2017 16:14

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Perchlorate	0.200	0.193	96.5	0.200	0.197	98.5	2.05	80 - 120	15	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5512532
 Report generated: 10/09/2017 08:36



Login Number: L17091647
Analytical Method: 6850
ICAL Workgroup: WG628977

Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
Perchlorate	1.469	6.88	1.00000	

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

INT_CAL - Modified 03/06/2008
PDF File ID: 5515815
Report generated 10/09/2017 08:36



Login Number: L17091647
 Analytical Method: 6850

Instrument ID: LCMS1
 Initial Calibration Date: 08-SEP-17 16:52
 Column ID: F

Analyte	WG628977-02			WG628977-03			WG628977-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	0.100	52500.0000	1.681	0.200	93400.0000	1.487	0.500	233000.000	1.445

INT_CAL - Modified 03/06/2008
 PDF File ID: 5515815
 Report generated 10/09/2017 08:36



Login Number: L17091647
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	WG628977-05			WG628977-06			WG628977-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	1.00	460000.000	1.440	2.00	925000.000	1.444	5.00	2230000.00	1.418

INT_CAL - Modified 03/06/2008
PDF File ID: 5515815
Report generated 10/09/2017 08:36



Login Number: L17091647
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	WG628977-08		
	CONC	RESP	RF
Perchlorate	10.0	4190000.00	1.371

INT_CAL - Modified 03/06/2008
PDF File ID: 5515815
Report generated 10/09/2017 08:36



Login Number: L17091647 Run Date: 09/08/2017 Sample ID: WG628977-09
 Instrument ID: LCMS1 Run Time: 17:11 Method: 6850
 File ID: 1LM.LM40492 Analyst: JWR QC Key: DOD4
 ICal Workgroup: WG628977 Cal ID: LCMS1 - 08-SEP-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
Perchlorate	1.00	1.04	ug/L	1.48	4.00	15	

* Exceeds %D Limit



Login Number: L17091647 Run Date: 10/04/2017 Sample ID: WG632570-01
Instrument ID: LCMS1 Run Time: 14:21 Method: 6850
File ID: 1LM.LM40625 Analyst: JWR Units: ug/L
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-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: 5512535
Report generated 10/09/2017 08:37



Login Number: L17091647 Run Date: 10/04/2017 Sample ID: WG632570-04
 Instrument ID: LCMS1 Run Time: 19:05 Method: 6850
 File ID: LLM.LM40640 Analyst: JWR Units: ug/L
 Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-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: 5512535
 Report generated 10/09/2017 08:37



Login Number: L17091647 Run Date: 10/04/2017 Sample ID: WG632570-06
Instrument ID: LCMS1 Run Time: 21:17 Method: 6850
File ID: LLM.LM40647 Analyst: JWR Units: ug/L
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-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: L17091647 Run Date: 10/04/2017 Sample ID: WG632570-02
Instrument ID: LCMS1 Run Time: 14:40 Method: 6850
File ID: 1LM.LM40626 Analyst: JWR QC Key: DOD4
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-17
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.12	ug/L	1.58	12.0	15	

* Exceeds %D Criteria



Login Number: L17091647 Run Date: 10/04/2017 Sample ID: WG632570-03
 Instrument ID: LCMS1 Run Time: 18:27 Method: 6850
 File ID: 1LM.LM40638 Analyst: JWR QC Key: DOD4
 Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.05	ug/L	1.48	5.00	15	

* Exceeds %D Criteria



Login Number: L17091647 Run Date: 10/04/2017 Sample ID: WG632570-05
 Instrument ID: LCMS1 Run Time: 20:39 Method: 6850
 File ID: 1LM.LM40645 Analyst: JWR QC Key: DOD4
 Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.07	ug/L	1.52	7.00	15	

* Exceeds %D Criteria



Login Number: L17091647 Run Date: 10/04/2017 Sample ID: WG632566-05
 Instrument ID: LCMS1 Run Time: 14:58 Prep Method: 6850
 File ID: 1LM.LM40627 Analyst: JWR Method: 6850
 Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: LCMS1-08-SEP-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.200	100	70 - 130	



Login Number: L17091647 Run Date: 10/04/2017 Sample ID: WG632566-06
 Instrument ID: LCMS1 Run Time: 18:46 Prep Method: 6850
 File ID: 1LM.LM40639 Analyst: JWR Method: 6850
 Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: LCMS1-08-SEP-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.204	102	70 - 130	



Login Number: L17091647 Run Date: 10/04/2017 Sample ID: WG632566-07
Instrument ID: LCMS1 Run Time: 20:58 Prep Method: 6850
File ID: 1LM.LM40646 Analyst: JWR Method: 6850
Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
Contract #: _____ Cal ID: LCMS1-08-SEP-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.197	98.5	70 - 130	



Login Number: L17091647
Instrument ID: LCMS1
Workgroup (AAB#): WG632566

ICAL CCV Number: WG628977-05
CAL ID: LCMS1-08-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG628977	NA	NA	1580000
Upper Limit	NA	NA	2370000
Lower Limit	NA	NA	790000
<u>L17091647-01</u>	10000	DL01	1890000
WG632566-02	1.00	01	1650000
WG632566-03	1.00	01	1670000
WG632566-04	1.00	01	1700000

IS-1 - 018LP

Underline = Response outside limits



Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: 6850
Prep Date: 10/04/2017 13:00
Anal Method: 6850
Analysis Date: 10/04/2017 18:08

Samplenum: L17091647-01
File ID: 1LM.LM40637
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	379000	120000	3.16	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG628977-02
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40485
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 14:59	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	52500	17500	3.00	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: _____
Prep Date: _____
Anal Method: 6850
Analysis Date: 09/08/2017 15:18

Samplenum: WG628977-03
File ID: 1LM.LM40486
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	93400	29500	3.17	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG628977-04
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40487
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 15:37	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	233000	79100	2.95	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG628977-05
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40488
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 15:56	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	460000	150000	3.07	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: _____
Prep Date: _____
Anal Method: 6850
Analysis Date: 09/08/2017 16:15

Samplenum: WG628977-06
File ID: 1LM.LM40489
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	925000	303000	3.05	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG628977-07
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40490
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 16:34	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	2230000	745000	2.99	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG628977-08
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40491
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 16:52	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	4190000	1390000	3.01	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG628977-09
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40492
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 17:11	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	478000	152000	3.14	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: 6850	Samplenum: WG632566-01
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40628
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 15:17	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	102000	34000	3.00	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: 6850
Prep Date: 10/04/2017 13:00
Anal Method: 6850
Analysis Date: 10/04/2017 15:36

Samplenum: WG632566-02
File ID: 1LM.LM40629
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	2230	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: 6850	Samplenum: WG632566-03
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40630
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 15:55	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	100000	34100	2.93	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: 6850
Prep Date: 10/04/2017 13:00
Anal Method: 6850
Analysis Date: 10/04/2017 16:14

Samplenum: WG632566-04
File ID: 1LM.LM40631
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	103000	32500	3.17	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: 6850	Samplenum: WG632566-05
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40627
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 14:58	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	98100	32300	3.04	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: 6850	Samplenum: WG632566-06
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40639
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 18:46	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	116000	37600	3.09	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: 6850	Samplenum: WG632566-07
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40646
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 20:58	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	116000	40300	2.88	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG632570-01
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40625
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 14:21	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	1420	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: _____
Prep Date: _____
Anal Method: 6850
Analysis Date: 10/04/2017 14:40

Samplenum: WG632570-02
File ID: 1LM.LM40626
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	490000	156000	3.14	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG632570-03
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40638
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 18:27	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	547000	183000	2.99	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG632570-04
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40640
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 19:05	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	1690	1440	1.17	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG632570-05
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40645
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 20:39	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	579000	190000	3.05	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091647	Prep Method: _____	Samplenum: WG632570-06
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40647
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 21:17	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	2310	1310	1.76	2.3	3.8	*

2.2 Semivolatiles Data

2.2.2 GC/MS Semivolatiles Data (827 Dioxane)

2.2.2.1 Summary Data

Lab Report #: L17091647

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: HPMS15
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 3520C	Prep Date: 10/02/2017 18:00
Matrix: Water	Analytical Method: 8270D	Cal Date: 09/18/2017 12:55
Workgroup #: WG632529	Analyst: LJH	Run Date: 10/09/2017 13:42
Collect Date: 09/27/2017 15:00	Dilution: 5	File ID: 15M23017
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,4-Dioxane	123-91-1	17.9	J	10.2	5.10	2.55
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,4-Dioxane-d8	4440	20	129	*		
J	The reported result is an estimated value.					

2.2.2.2 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: WG632088 TIME ON: 18:30 OFF: 12:30 ON: _____ OFF: _____
 Analyst: JDH methylene chloride Lot #: COA20050
 Spike Analyst: JDH 1:1 H2SO4 Lot #: RGT40991
 Method: 3520C Sodium Sulfate , Anhydrous , Granul Lot # COA19381
 Run Date: 10/02/2017 18:00
 SOP: EXB01 Revision 20
 Spike Witness: JLD
 Surr Solution: STD83262

	SAMPLE #	Type	Reference	Prod	pH	Init Amnt	Surr Amnt	Spike Amnt	Spike Sol	Final Vol	Color
1	L17091647-01	SAMP		827-DIOXANE	<2	980 mL	.05 mL			1 mL	Transparent
2	L17091648-01	SAMP		827-DIOXANE	<2	1000 mL	.05 mL			1 mL	Transparent
3	L17091705-01	SAMP		827-DIOXANE	<2	980 mL	.05 mL			1 mL	Transparent
4	L17100001-01	ML01		827-DIOXANE	<2	1000 mL	.05 mL	.005 mL	STD77209	1 mL	Transparent
5	L17100003-01	ML01		827-DIOXANE	<2	1000 mL	.05 mL	.01 mL	STD77209	1 mL	Transparent
6	WG632088-01	BLANK		827-DIOXANE	<2	1000 mL	.05 mL			1 mL	Transparent
7	WG632088-02	LCS		827-DIOXANE	<2	1000 mL	.05 mL	.05 mL	STD77209	1 mL	Transparent
8	WG632088-03	LCS2		827-DIOXANE	<2	1000 mL	.05 mL	.05 mL	STD77209	1 mL	Transparent

Due to insufficient sample volume, this preparation batch failed to include the method prescribed MS and MSD.

Analyst: Justin Hussen

Reviewer: Julia DeLong



Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 091817
 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
WG632192, WG630010, WG630071 (ICAL)
 Internal STD: STD83628 Surrogate STD: NA Calibration STD: _____
 CCV STD: STD83050 LCS STD: _____ MS/MSD STD: _____

Comments: WG629653 MS/MSD failed the %REC limit.
 L17090697-04 to 07 reporting sample re-extracts only. Not reporting this analysis.

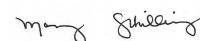
Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	15M22363	WG630071-01 5PPM DFTPP STD	1	1	STD83235	09/18/17 10:27
2	15M22364	WG630071-01 5PPM DFTPP STD	1	1	STD83235	09/18/17 10:44
3	15M22365	WG630071-02 5PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 11:01
4	15M22366	WG630071-03 10PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 11:24
5	15M22367	WG630071-04 7.5PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 11:47
6	15M22368	WG630071-05 2.5PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 12:10
7	15M22369	WG630071-06 1PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 12:32
8	15M22370	WG630071-07 0.4PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 12:55
9	15M22371	WG630071-08 5PPM 1,4-DIOX ALT SRC	1	1	STD83128	09/18/17 13:49
10	15M22372	WG629653-01 BLANK 9/14	7	1	SOIL	09/18/17 14:12
11	15M22373	WG629653-02 LCS 9/14	7	1	SOIL	09/18/17 14:35
12	15M22374	WG629658-01 BLANK 9/14	1	1		09/18/17 14:57
13	15M22375	WG629658-02 LCS 9/15	1	1		09/18/17 15:20
14	15M22376	WG629658-03 LCS2 9/16	1	1		09/18/17 15:43
15	15M22377	L17090697-09 827-DIOXANE	7	1	SOIL	09/18/17 16:05
16	15M22378	L17090697-10 827-DIOXANE	1	1		09/18/17 16:28
17	15M22379	L17090697-08 827-DIOXANE	7	1	SOIL	09/18/17 16:51
18	15M22380	L17090697-04 827-DIOXANE	7	1	SOIL	09/18/17 17:14
19	15M22381	L17090697-01 827-DIOXANE	7	1	SOIL	09/18/17 17:36
20	15M22382	L17090697-03 827-DIOXANE	7	1	SOIL	09/18/17 17:59
21	15M22383	L17090697-11 827-DIOXANE	1	1		09/18/17 18:22
22	15M22384	L17090697-02 827-DIOXANE	7	1	SOIL	09/18/17 18:45
34	15M22385	L17090697-06 MS 827-DIOXANE	7	1	SOIL	09/18/17 19:08
35	15M22386	L17090697-07 MSD 827-DIOXANE	7	1	SOIL	09/18/17 19:30
33	15M22387	L17090697-05 REF 827-DIOXANE	7	1		09/18/17 19:53
26	15M22388	L17090697-10 2X 827-DIOXANE	1	2		09/18/17 20:16
27	15M22389	L17090697-11 10X 827-DIOXANE	1	10		09/18/17 20:38
28	15M22390	BAKE OUT	1	1		09/18/17 21:01
29	15M22391	BAKE OUT	1	1		09/18/17 21:24
30	15M22392	BAKE OUT	1	1		09/18/17 21:46

Comments

Seq.	Rerun	Dil.	Reason	Analytes
------	-------	------	--------	----------

Page: 1

Approved: 19-SEP-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 091817
 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
WG632192, WG630010, WG630071 (ICAL)
 Internal STD: STD83628 Surrogate STD: NA
 CCV STD: STD83050 LCS STD: _____

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1				
			WG630071-01 5PPM DFTPP STD Ion failure, RR, NR.	
21	X	10	Over Calibration Range	1,4-DIOXANE
			L17090697-11 827-DIOXANE	
26				
			L17090697-10 2X 827-DIOXANE NR, unnecessary dilution.	

Page: 2

Approved: 19-SEP-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 100917
 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
WG632529

Internal STD: STD83628 Surrogate STD: NA Calibration STD: _____

CCV STD: STD83583 LCS STD: _____ MS/MSD STD: _____

Comments: Dilutions were made based on sample histories.

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	15M23005	BAKE OUT	1	1		10/09/17 08:42
2	15M23006	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 09:01
3	15M23007	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 09:17
4	15M23008	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 10:11
5	15M23009	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 10:34
6	15M23010	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 10:57
7	15M23011	WG633073-02 5PPM DIOXANE STD	1	1	STD83050	10/09/17 11:25
8	15M23012	WG632088-01 BLANK 827-DIOXANE	1	1		10/09/17 11:47
9	15M23013	WG632088-02 LCS 827-DIOXANE	1	1		10/09/17 12:10
10	15M23014	WG632088-03 LCS2 827-DIOXANE	1	1		10/09/17 12:33
11	15M23015	L17100001-01 827-DIOXANE	1	1		10/09/17 12:56
12	15M23016	L17100003-01 827-DIOXANE	1	1		10/09/17 13:19
13	15M23017	L17091647-01 5X 827-DIOXANE	1	5		10/09/17 13:42
14	15M23018	L17091648-01 5X 827-DIOXANE	1	5		10/09/17 14:05
15	15M23019	L17091705-01 5X 827-DIOXANE	1	5		10/09/17 14:28

Comments

Seq.	Rerun	Dil.	Reason	Analytes
2				
			WG633073-01 5PPM DFTPP STD Ion failure and Benzidine was greater than 2, RR, NR.	
3				
			WG633073-01 5PPM DFTPP STD Ion failure, change liner, RR, NR.	
4				
			WG633073-01 5PPM DFTPP STD Ion failure, changed the gold seal, RR, NR.	
5				
			WG633073-01 5PPM DFTPP STD Ion failure, quicktune, RR, NR.	
13			Surrogate standard failure	1
			L17091647-01 5X 827-DIOXANE surrogate failure is due to sample matrix interference. Previous sample history confirms that surrogates were affected by SMI.	

Page: 1

Approved: 09-OCT-17

Mary Schilling



Microbac Laboratories Inc.

Data Checklist

Date: 18-SEP-2017
 Analyst: LJH
 Analyst: NA
 Method: 827-DIOX
 Instrument: HPMS15
 Curve Workgroup: WG630071
 Runlog ID: 84667
 Analytical Workgroups: L17090697

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	NA
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	X
Recoveries	X
%RPD	X
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	NA
Manual integrations	X
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	MES

Primary Reviewer:
19-SEP-2017

Randy J. Bendoric

Secondary Reviewer:
19-SEP-2017

Mary Schilling



Microbac Laboratories Inc.

Data Checklist

Date: 09-OCT-2017
 Analyst: LJH
 Analyst: NA
 Method: 827-DIOX
 Instrument: HPMS15
 Curve Workgroup: NA
 Runlog ID: 85130
 Analytical Workgroups: L17091647, -1648, -1705, L17100001, -0003

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	X
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	MES

Primary Reviewer:
09-OCT-2017

Randy J. Henderson

Secondary Reviewer:
09-OCT-2017

Mary Schilling

CHECKLIST1 - Modified 03/05/2008

Generated: OCT-09-2017 15:29:58



Analytical Method:8270D
Login Number:L17091647

AAB#:WG632529

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-SP140-7472-GRAB	01	09/27/17					10/02/2017	5.1	7		10/09/17	6.8	40	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number:L17091647
Blank File ID:15M23012
Prep Date:10/02/17 18:00
Analyzed Date:10/09/17 11:47
Analyst:LJH

Work Group:WG632529
Blank Sample ID:WG632088-01
Instrument ID:HPMS15
Method:8270D

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632088-02	15M23013	10/09/17 12:10	01
LCS2	WG632088-03	15M23014	10/09/17 12:33	01
LH18/24-SP140-7472-GRAB	L17091647-01	15M23017	10/09/17 13:42	DL01

Report Name: BLANK_SUMMARY
PDF File ID: 5518207
Report generated 10/10/2017 08:28



Login Number: L17091647 Prep Date: 10/02/17 18:00 Sample ID: WG632088-01
 Instrument ID: HPMS15 Run Date: 10/09/17 11:47 Prep Method: 3520C
 File ID: 15M23012 Analyst: LJH Method: 8270D
 Workgroup (AAB#): WG632529 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS15-18-SEP-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	67.1	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: 5518208
 10-OCT-2017 08:28



Login Number: L17091647 Analyst: LJH Prep Method: 3520C
 Instrument ID: HPMS15 Matrix: Water Method: 8270D
 Workgroup (AAB#): WG632529 Units: ug/L
 QC Key: DOD4 Lot #: STD77209
 Sample ID: WG632088-02 LCS File ID: 15M23013 Run Date: 10/09/2017 12:10
 Sample ID: WG632088-03 LCS2 File ID: 15M23014 Run Date: 10/09/2017 12:33

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
1,4-Dioxane	5.00	2.98	59.6	5.00	2.56	51.2	15.1	30 - 104	30	

Surogates	LCS	LCS2	Surrogate Limits		Qualifier
	% Recovery	% Recovery			
1,4-Dioxane-d8	78.7	57.5	20	- 129	PASS

* EXCEEDS %REC LIMIT
EXCEEDS RPD LIMIT



DFTPP

Login Number: L17091647 Tune ID: WG630071-01
 Instrument: HPMS15 Run Date: 09/18/2017
 Analyst: SCB Run Time: 10:44
 Workgroup: WG630071 File ID: 15M22364
 Cal ID: HPMS15-18-SEP-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51.0	198	30.0	60.0	40.0	20820	PASS
68.0	69.0	0	2.00	0	0	PASS
69.0	198	0	100	43.4	22574	PASS
70.0	69.0	0	2.00	1.19	268	PASS
127	198	40.0	60.0	54.0	28131	PASS
197	198	0	1.00	0.803	418	PASS
198	198	100	100	100	52048	PASS
199	198	5.00	9.00	6.99	3637	PASS
275	198	10.0	30.0	26.2	13618	PASS
365	198	1.00	100	3.04	1581	PASS
441	443	0.0100	100	76.4	6552	PASS
442	198	40.0	100	83.0	43203	PASS
443	442	17.0	23.0	19.8	8575	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG630071-02	STD-CCV	01	09/18/2017 11:01	
WG630071-03	STD	01	09/18/2017 11:24	
WG630071-04	STD	01	09/18/2017 11:47	
WG630071-05	STD	01	09/18/2017 12:10	
WG630071-06	STD	01	09/18/2017 12:32	
WG630071-07	STD	01	09/18/2017 12:55	
WG630071-08	SSCV	01	09/18/2017 13:49	

* Sample past 12 hour tune limit



DFTPP

Login Number: L17091647 Tune ID: WG633073-01
 Instrument: HPMS15 Run Date: 10/09/2017
 Analyst: LJH Run Time: 10:57
 Workgroup: WG633073 File ID: 15M23010
 Cal ID: HPMS15-18-SEP-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51.0	198	30.0	60.0	50.4	32171	PASS
68.0	69.0	0	2.00	1.99	651	PASS
69.0	198	0	100	51.1	32675	PASS
70.0	69.0	0	2.00	0	0	PASS
127	198	40.0	60.0	57.3	36613	PASS
197	198	0	1.00	0.213	136	PASS
198	198	100	100	100	63891	PASS
199	198	5.00	9.00	6.30	4026	PASS
275	198	10.0	30.0	24.7	15772	PASS
365	198	1.00	100	3.28	2096	PASS
441	443	0.0100	100	67.5	5277	PASS
442	198	40.0	100	65.6	41931	PASS
443	442	17.0	23.0	18.7	7822	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG633073-02	CCV	01	10/09/2017 11:25	
WG632088-01	BLANK	01	10/09/2017 11:47	
WG632088-02	LCS	01	10/09/2017 12:10	
WG632088-03	LCS2	01	10/09/2017 12:33	
L17091647-01	LH18/24-SP140-7472-GRAB	DL01	10/09/2017 13:42	

* Sample past 12 hour tune limit



Login Number: L17091647
Analytical Method: 8270D
ICAL Workgroup: WG630071

Instrument ID: HPMS15
Initial Calibration Date: 18-SEP-17 12:55
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
1,4-Dioxane	0.3902	11.6		

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

INT_CAL - Modified 03/06/2008
PDF File ID: 5518210
Report generated 10/10/2017 08:28



Login Number: L17091647
 Analytical Method: 8270D

Instrument ID: HPMS15
 Initial Calibration Date: 18-SEP-17 12:55
 Column ID: F

Analyte	WG630071-02			WG630071-03			WG630071-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
1,4-Dioxane	5.00	64441.0000	0.3384	10.0	127608.000	0.3767	7.50	112923.000	0.3838

INT_CAL - Modified 03/06/2008
 PDF File ID: 5518210
 Report generated 10/10/2017 08:28



Login Number: L17091647
Analytical Method: 8270D

Instrument ID: HPMS15
Initial Calibration Date: 18-SEP-17 12:55
Column ID: F

Analyte	WG630071-05			WG630071-06			WG630071-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
1,4-Dioxane	2.50	29846.0000	0.3551	1.00	15338.0000	0.4313	0.400	5774.00000	0.4559

INT_CAL - Modified 03/06/2008
PDF File ID: 5518210
Report generated 10/10/2017 08:28



Method Path : C:\msdchem\1\methods\

Method File : DIOXANE_D8.M

Title : OVD MSS01 SIM 1,4-dioxane ICAL 091817

Last Update : Mon Sep 18 13:46:16 2017

Response Via : Initial Calibration

Curve: WG630071

Calibration Files

10 =15M22366.D 7.5 =15M22367.D 5 =15M22365.D 2.5 =15M22368.D 1 =15M22369.D
 0.4 =15M22370.D

Compound	10	7.5	5	2.5	1	0.4	Avg	%RSD
1) I 1,4-Dichlorobenzen...	-----ISTD-----							
2) 1,4-Dioxane	0.377	0.384	0.338	0.355	0.431	0.456	0.390	11.56
3) S 1,4-Dioxane-d8	0.473	0.481	0.423	0.443	0.530	0.520	0.478	8.78
4) S Nitrobenzene-d5	1.284	1.302	1.137	1.156	1.294	1.212	1.231	5.94
5) S 2-Fluorobiphenyl	2.573	2.615	2.339	2.482	2.903	2.842	2.626	8.16
6) S p-Terphenyl-d14	2.976	3.033	2.696	2.830	3.316	3.211	3.010	7.68

(#) = Out of Range

DIOXANE_D8.M Tue Sep 19 08:28:34 2017

Login Number: L17091647 Run Date: 09/18/2017 Sample ID: WG630071-08
 Instrument ID: HPMS15 Run Time: 13:49 Method: 8270D
 File ID: 15M22371 Analyst: SCB QC Key: DOD4
 ICal Workgroup: WG630071 Cal ID: HPMS15 - 18-SEP-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
1,4-Dioxane	5000	5000	ug/L	0.390	0	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17091647 Run Date: 10/09/2017 Sample ID: WG633073-02
 Instrument ID: HPMS15 Run Time: 11:25 Method: 8270D
 File ID: 15M23011 Analyst: LJH QC Key: DOD4
 Workgroup (AAB#): WG632529 Cal ID: HPMS15 - 18-SEP-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
1,4-Dioxane	5000	5080	ug/L	0.396	1.52	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds

CCV - Modified 03/05/2008
 PDF File ID: 5518213
 Report generated 10/10/2017 08:28



Login Number: L17091647
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

CCV Number: WG633073-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG633073-02	NA	NA	44189
Upper Limit	NA	NA	88378
Lower Limit	NA	NA	22095
<u>L17091647-01</u>	5.00	DL01	38258
WG632088-01	1.00	01	36033
WG632088-02	1.00	01	42281
WG632088-03	1.00	01	33892

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



Login Number: L17091647
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

ICAL CCV Number: WG630071-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG630071-02	NA	NA	37725
Upper Limit	NA	NA	75450
Lower Limit	NA	NA	18863
<u>L17091647-01</u>	5.00	DL01	38258
WG632088-01	1.00	01	36033
WG632088-02	1.00	01	42281
WG632088-03	1.00	01	33892

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



Login Number: L17091647
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

CCV Number: WG633073-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG633073-02	NA	NA	7.1
Upper Limit	NA	NA	7.6
Lower Limit	NA	NA	6.6
<u>L17091647-01</u>	5.00	DL01	7.095
WG632088-01	1.00	01	7.095
WG632088-02	1.00	01	7.095
WG632088-03	1.00	01	7.095

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



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

00862485

Login Number: L17091647
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

ICAL CCV Number: WG630071-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG630071-02	NA	NA	7.12
Upper Limit	NA	NA	7.62
Lower Limit	NA	NA	6.62
<u>L17091647-01</u>	5.00	DL01	7.095
WG632088-01	1.00	01	7.095
WG632088-02	1.00	01	7.095
WG632088-03	1.00	01	7.095

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits

INTERNAL_STD_RT_ICAL - Modified 03/06/2008
PDF File ID: 5518811
Report generated: 10/10/2017 08:29



2.3 Metals Data

2.3.1 Metals I C P Data

2.3.1.1 Summary Data

Lab Report #: L17091647

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: ICP-THERMO4
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 3015A	Prep Date: 10/03/2017 07:13
Matrix: Water	Analytical Method: 6010C	Cal Date: 10/05/2017 16:45
Workgroup #: WG632662	Analyst: KKB	Run Date: 10/05/2017 17:54
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: T4.100517.175454
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Aluminum, Total	7429-90-5	0.200	U	0.200	0.200	0.100
Iron, Total	7439-89-6	2.74		0.100	0.100	0.0500
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: WG632208
 Analyst: ERP
 Spike Analyst: ERP
 Run Date: 10/03/2017 07:13
 Method: 3015A
 Balance: BAL019
 Instrument: MW-1
 Instrument Start: 10/03/2017 07:29

SOP: ME407 Revision 19
 Spike Solution: STD83991
 Spike Witness: VC
 HNO3 Lot #: COA19940
 HCL Lot #: COA20006
 40 & 50 ML. DIGESTION TU COA19932
 ICP FILTERS LOT# r7ha2443RGT40684

	SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG632208-02	BLANK	1	40 mL	50 mL	207.048 g	207.043 g		
2	WG632208-03	LCS	1	40 mL	50 mL	211.766 g	211.766 g	5 mL	
3	L17091450-16	SAMP	1	40 mL	50 mL	205.714 g	205.709 g		10/09/17
4	L17091647-01	SAMP	1	40 mL	50 mL	203.667 g	203.656 g		10/09/17
5	L17091648-01	SAMP	1	40 mL	50 mL	205.047 g	205.053 g		10/09/17
6	L17091745-01	SAMP	1	40 mL	50 mL	206.539 g	206.531 g		10/09/17
7	L17091745-02	SAMP	1	40 mL	50 mL	205.32 g	205.319 g		10/09/17
8	L17091745-03	SAMP	1	40 mL	50 mL	203.87 g	203.86 g		10/09/17
9	L17091745-04	SAMP	1	40 mL	50 mL	204.033 g	204.013 g		10/09/17
10	L17100008-01	SAMP	1	40 mL	50 mL	204.605 g	204.603 g		10/09/17
11	L17100008-02	SAMP	1	40 mL	50 mL	205.49 g	205.477 g		10/09/17
12	L17100008-03	SAMP	1	40 mL	50 mL	204.711 g	204.703 g		10/09/17
13	L17100008-04	SAMP	1	40 mL	50 mL	205.49 g	205.456 g		10/09/17
14	L17100011-01	SAMP	1	40 mL	50 mL	207.705 g	207.694 g		10/09/17
15	L17100011-02	SAMP	1	40 mL	50 mL	204.391 g	204.382 g		10/09/17
16	L17100033-01	SAMP	1	40 mL	50 mL	205.621 g	205.603 g		10/09/17
17	L17100074-01	SAMP	1	40 mL	50 mL	206.837 g	206.825 g		10/06/17
18	L17100074-02	SAMP	1	40 mL	50 mL	204.109 g	204.097 g		10/06/17
19	L17100074-03	SAMP	1	40 mL	50 mL	205.199 g	205.196 g		10/06/17
20	L17100074-04	SAMP	1	40 mL	50 mL	203.847 g	203.837 g		10/06/17
21	WG632208-01	REF	1	40 mL	50 mL	205.873 g	205.864 g		
22	L17100074-05	SAMP	1	40 mL	50 mL	205.873 g	205.864 g		10/06/17
23	L17100086-01	SAMP	1	40 mL	50 mL	206.642 g	206.634 g		10/05/17
24	WG632208-04	MS	1	40 mL	50 mL	212.414 g	212.415 g	5 mL	
25	WG632208-05	MSD	1	40 mL	50 mL	209.594 g	209.583 g	5 mL	

Analyst: Evan Pottin

Reviewer: Vicki Collier



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100517T4.2R.TXT

Analyst1: KKB Analyst2: N/A

Method: 200.7/6010B/6010C SOP: ME600G Rev: 9

Maintenance Log ID: _____

Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992

ICSA: STD84168 IC SAB: STD84169 Int. Std: RGT40895

CCV: STD83825 LLCCV: COA19621 Tuning Sol: _____

Stannous : _____ Hydroxylamine : _____

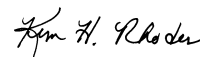
Workgroups: 632662,632104

Comments:

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Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	T4.100517.111302	WG632767-01	Calibration Point		1		10/05/17 11:13
2	T4.100517.111650	WG632767-02	Calibration Point		1		10/05/17 11:16
3	T4.100517.112037	WG632767-03	Calibration Point		1		10/05/17 11:20
4	T4.100517.112426	WG632767-04	Calibration Point		1		10/05/17 11:24
5	T4.100517.112756	WG632767-05	Calibration Point		1		10/05/17 11:27
6	T4.100517.113125	WG632767-06	Initial Calibration Verification		1		10/05/17 11:31
7	T4.100517.113457	WG632767-07	Initial Calib Blank		1		10/05/17 11:34
8	T4.100517.113845	WG632767-08	LLICV		1		10/05/17 11:38
9	T4.100517.114233	WG632767-09	LLICV		1		10/05/17 11:42
10	T4.100517.114621	WG632767-10	Low Level Initial Calibration V		1		10/05/17 11:46
11	T4.100517.115009	WG632767-11	Interference Check		1		10/05/17 11:50
12	T4.100517.115353	WG632767-12	Interference Check		1		10/05/17 11:53
13	T4.100517.115730	WG632767-13	CCV		1		10/05/17 11:57
14	T4.100517.120100	WG632767-14	CCB		1		10/05/17 12:01
15	T4.100517.120450	WG632208-02	Method/Prep Blank	40/50	1		10/05/17 12:04
16	T4.100517.120838	WG632208-03	Laboratory Control S	40/50	1		10/05/17 12:08
17	T4.100517.121213	L17091450-16	EQUIPMENT BLANK	40/50	1		10/05/17 12:12
18	T4.100517.121601	L17100074-05	81606-W01-WQ-W0002		1	WG632208-01	10/05/17 12:16
19	T4.100517.121949	WG632208-04	Matrix Spike	40/50	1	L17100074-05	10/05/17 12:19
20	T4.100517.122325	WG632208-05	Matrix Spike Duplica	40/50	1	L17100074-05	10/05/17 12:23
21	T4.100517.122700	L17100086-01	CLB-WWD-092917	40/50	1		10/05/17 12:27
22	T4.100517.123043	WG632662-01	Post Digestion Spike		1	L17100086-01	10/05/17 12:30
23	T4.100517.123417	WG632662-02	Serial Dilution		5	L17100086-01	10/05/17 12:34
24	T4.100517.123801	L17091368-13	MW-12DUP	40/50	10		10/05/17 12:38
25	T4.100517.124148	WG632767-15	CCV		1		10/05/17 12:41
26	T4.100517.124519	WG632767-16	CCB		1		10/05/17 12:45
27	T4.100517.124909	WG632767-17	Interference Check		1		10/05/17 12:49
28	T4.100517.125254	WG632767-18	Interference Check		1		10/05/17 12:52
29	T4.100517.125630	WG632767-19	CCV		1		10/05/17 12:56
30	T4.100517.130001	WG632767-20	CCB		1		10/05/17 13:00

Page: 1 Approved: October 05, 2017




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Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100517T4.3R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	T4.100517.163002	WG632900-01	Calibration Point		1		10/05/17 16:30
2	T4.100517.163350	WG632900-02	Calibration Point		1		10/05/17 16:33
3	T4.100517.163739	WG632900-03	Calibration Point		1		10/05/17 16:37
4	T4.100517.164129	WG632900-04	Calibration Point		1		10/05/17 16:41
5	T4.100517.164501	WG632900-05	Calibration Point		1		10/05/17 16:45
6	T4.100517.164830	WG632900-06	Initial Calibration Verification		1		10/05/17 16:48
7	T4.100517.165203	WG632900-07	Initial Calib Blank		1		10/05/17 16:52
8	T4.100517.165622	WG632900-08	Low Level Initial Calibration V		1		10/05/17 16:56
9	T4.100517.170010	WG632900-09	LLICV		1		10/05/17 17:00
10	T4.100517.170358	WG632900-10	Low Level Initial Calibration V		1		10/05/17 17:03
11	T4.100517.170745	WG632900-11	Interference Check		1		10/05/17 17:07
12	T4.100517.171130	WG632900-12	Interference Check		1		10/05/17 17:11
13	T4.100517.171507	WG632900-13	CCV		1		10/05/17 17:15
14	T4.100517.171838	WG632900-14	CCB		1		10/05/17 17:18
15	T4.100517.174731	WG632208-02	Method/Prep Blank	40/50	1		10/05/17 17:47
16	T4.100517.175118	WG632208-03	Laboratory Control S	40/50	1		10/05/17 17:51
17	T4.100517.175454	L17091647-01	LH18/24-SP140-7472-GRAB	40/50	1		10/05/17 17:54
18	T4.100517.175839	L17091648-01	LH18/24-SP650-6472-GRAB	40/50	1		10/05/17 17:58
19	T4.100517.180231	L17091745-01	MW-103	40/50	1		10/05/17 18:02
20	T4.100517.180615	L17091745-02	MW-103	40/50	1		10/05/17 18:06
21	T4.100517.180959	L17091745-03	MW-107	40/50	1		10/05/17 18:09
22	T4.100517.181343	L17091745-04	MW-107	40/50	1		10/05/17 18:13
23	T4.100517.181728	WG632662-03	Post Digestion Spike		1	L17091745-04	10/05/17 18:17
24	T4.100517.182102	WG632662-04	Serial Dilution		5	L17091745-04	10/05/17 18:21
25	T4.100517.182449	WG632900-15	CCV		1		10/05/17 18:24
26	T4.100517.182820	WG632900-16	CCB		1		10/05/17 18:28
27	T4.100517.183211	L17100008-01	27-2-2.01 W1	40/50	1		10/05/17 18:32
28	T4.100517.183556	L17100008-02	27-2-2.01 W1	40/50	1		10/05/17 18:35
29	T4.100517.183941	L17100008-03	27-2-2.05 W1	40/50	1		10/05/17 18:39
30	T4.100517.184326	L17100008-04	27-2-2.05 W1	40/50	1		10/05/17 18:43
31	T4.100517.184711	L17100011-01	45-16-2.01 W2	40/50	1		10/05/17 18:47
32	T4.100517.185057	L17100011-02	45-10-7 ES-1	40/50	1		10/05/17 18:50
33	T4.100517.185442	L17100033-01	1001-100 W1	40/50	1		10/05/17 18:54
34	T4.100517.185827	L17100074-01	81101-W15-WQ-W0031	40/50	1		10/05/17 18:58

Page: 1 Approved: October 06, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100517T4.3R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	T4.100517.190215	L17100074-02	81101-W15-WQ-W0058	40/50	1		10/05/17 19:02
36	T4.100517.190603	L17100074-03	81101-W19-WQ-W0050	40/50	1		10/05/17 19:06
37	T4.100517.190951	WG632900-17	CCV		1		10/05/17 19:09
38	T4.100517.191322	WG632900-18	CCB		1		10/05/17 19:13
39	T4.100517.191712	L17100074-04	81604-W07-WQ-W0027	40/50	1		10/05/17 19:17
40	T4.100517.192100	WG632208-01	Reference Sample		1	L17100074-05	10/05/17 19:21
41	T4.100517.192449	WG632208-04	Matrix Spike	40/50	1	L17100074-05	10/05/17 19:24
42	T4.100517.192824	WG632208-05	Matrix Spike Duplica	40/50	1	L17100074-05	10/05/17 19:28
43	T4.100517.193202	WG632900-19	CCV		1		10/05/17 19:32
44	T4.100517.193534	WG632900-20	CCB		1		10/05/17 19:35
45	T4.100517.193925	WG632900-21	Low Level Continuing Calibra		1		10/05/17 19:39
46	T4.100517.194313	WG632900-22	LLCCV		1		10/05/17 19:43
47	T4.100517.194701	WG632900-23	Low Level Continuing Calibra		1		10/05/17 19:47
48	T4.100517.195049	WG632044-02	Method/Prep Blank	40/50	1		10/05/17 19:50
49	T4.100517.195437	WG632044-03	Laboratory Control S	40/50	1		10/05/17 19:54
50	T4.100517.195813	L17091458-02	A11-MW04-Y3S2	40/50	2		10/05/17 19:58
51	T4.100517.200159	L17091645-02	A12-MW07-Y3S2	40/50	10		10/05/17 20:01
52	T4.100517.200548	WG632186-01	Post Digestion Spike		10	L17091645-02	10/05/17 20:05
53	T4.100517.200923	WG632186-02	Serial Dilution		50	L17091645-02	10/05/17 20:09
54	T4.100517.201311	L17091645-04	A12-FTBL-MW01-Y3S2	40/50	5		10/05/17 20:13
55	T4.100517.201700	L17091645-06	A11/A12-TM02-Y3S2	40/50	5		10/05/17 20:17
56	T4.100517.202047	L17091705-01	LH18/24-SP650-6474-GRAB	40/50	1		10/05/17 20:20
57	T4.100517.202442	L17091706-01	LH18/24-SP140-7474-GRAB	40/50	1		10/05/17 20:24
58	T4.100517.202828	WG632900-24	CCV		1		10/05/17 20:28
59	T4.100517.203158	WG632900-25	CCB		1		10/05/17 20:31
60	T4.100517.203549	L17091719-04	A11-MW02-Y3S2	40/50	5		10/05/17 20:35
61	T4.100517.203936	L17091741-03	#3-POST 1X COLUMNS		1	WG632044-01	10/05/17 20:39
62	T4.100517.204322	WG632044-04	Matrix Spike	40/50	1	L17091741-03	10/05/17 20:43
63	T4.100517.204657	WG632044-05	Matrix Spike Duplica	40/50	1	L17091741-03	10/05/17 20:46
64	T4.100517.205031	L17091768-01	17I2015-01	40/50	25		10/05/17 20:50
65	T4.100517.205426	L17091768-03	17I2015-02	40/50	25		10/05/17 20:54
66	T4.100517.205822	WG632900-26	CCV		1		10/05/17 20:58
67	T4.100517.210153	WG632900-27	CCB		1		10/05/17 21:01
68	T4.100517.210543	WG632900-28	Low Level Continuing Calibra		1		10/05/17 21:05

Page: 2 Approved: October 06, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

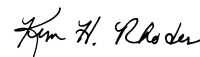
Instrument: ICP-THERMO4 Dataset: 100517T4.3R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol: _____
 Stannous: _____ Hydroxylamine: _____

Workgroups: 632662,632186,632810

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
69	T4.100517.210930	WG632900-29	LLCCV		1		10/05/17 21:09
70	T4.100517.211319	WG632900-30	Low Level Continuing Calibra		1		10/05/17 21:13
71	T4.100517.211708	WG632697-02	Method/Prep Blank	40/50	1		10/05/17 21:17
72	T4.100517.212057	WG632697-03	Laboratory Control S	40/50	1		10/05/17 21:20
73	T4.100517.212432	WG632462-01	Fluid Blank 1		1		10/05/17 21:24
74	T4.100517.212820	L17100159-01	T1360	40/50	1		10/05/17 21:28
75	T4.100517.213207	L17100159-02	T1362	40/50	1		10/05/17 21:32
76	T4.100517.213554	L17100159-03	T1363	40/50	1		10/05/17 21:35
77	T4.100517.213937	L17100159-04	T1365	40/50	1		10/05/17 21:39
78	T4.100517.214321	WG632697-01	Reference Sample		1	L17100170-02	10/05/17 21:43
79	T4.100517.214708	WG632697-04	Matrix Spike	5/50	1	L17100170-02	10/05/17 21:47
80	T4.100517.215043	WG632697-05	Matrix Spike Duplica	5/50	1	L17100170-02	10/05/17 21:50
81	T4.100517.215420	WG632900-31	CCV		1		10/05/17 21:54
82	T4.100517.215749	WG632900-32	CCB		1		10/05/17 21:57
83	T4.100517.220139	L17100173-02	POLY TANK 01-100317	5/50	1		10/05/17 22:01
84	T4.100517.220528	L17100265-01	STG VALVE GRIT	5/50	1		10/05/17 22:05
85	T4.100517.220915	L17100274-01	1001-136 S1	40/50	1		10/05/17 22:09
86	T4.100517.221259	L17100275-01	1001-135 W1	40/50	1		10/05/17 22:12
87	T4.100517.221643	L17100276-01	45-12-8 S8	40/50	1		10/05/17 22:16
88	T4.100517.222029	L17100277-01	1805-108 W1	40/50	1		10/05/17 22:20
89	T4.100517.222414	L17100277-02	1805-108 S1	40/50	1		10/05/17 22:24
90	T4.100517.222800	WG632900-33	CCV		1		10/05/17 22:28
91	T4.100517.223130	WG632900-34	CCB		1		10/05/17 22:31
92	T4.100517.223519	L17100277-03	1805-108 S4	40/50	1		10/05/17 22:35
93	T4.100517.223904	L17100277-04	1805-108 S3	40/50	1		10/05/17 22:39
94	T4.100517.224249	L17100278-01	2210-125 W1	40/50	1		10/05/17 22:42
95	T4.100517.224635	WG632810-01	Post Digestion Spike		1	L17100278-01	10/05/17 22:46
96	T4.100517.225009	WG632810-02	Serial Dilution		5	L17100278-01	10/05/17 22:50
97	T4.100517.225358	WG632900-35	Interference Check		1		10/05/17 22:53
98	T4.100517.225743	WG632900-36	Interference Check		1		10/05/17 22:57
99	T4.100517.230119	WG632900-37	CCV		1		10/05/17 23:01
100	T4.100517.230450	WG632900-38	CCB		1		10/05/17 23:04

Page: 3 Approved: October 06, 2017




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Instrument Run Log

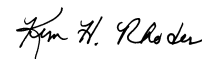
Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol: _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	T4.100617.123358	WG633026-01	Calibration Point		1		10/06/17 12:33
2	T4.100617.123746	WG633026-02	Calibration Point		1		10/06/17 12:37
3	T4.100617.124135	WG633026-03	Calibration Point		1		10/06/17 12:41
4	T4.100617.124525	WG633026-04	Calibration Point		1		10/06/17 12:45
5	T4.100617.124856	WG633026-05	Calibration Point		1		10/06/17 12:48
6	T4.100617.125226	WG633026-06	Initial Calibration Verification		1		10/06/17 12:52
7	T4.100617.130543	WG633026-07	Initial Calib Blank		1		10/06/17 13:05
8	T4.100617.130931	WG633026-08	Low Level Initial Calibration V		1		10/06/17 13:09
9	T4.100617.131319	WG633026-09	Low Level Initial Calibration V		1		10/06/17 13:13
10	T4.100617.131707	WG633026-10	LLICV		1		10/06/17 13:17
11	T4.100617.132055	WG633026-11	Interference Check		1		10/06/17 13:20
12	T4.100617.132439	WG633026-12	Interference Check		1		10/06/17 13:24
13	T4.100617.132814	WG633026-13	CCV		1		10/06/17 13:28
14	T4.100617.133144	WG633026-14	CCB		1		10/06/17 13:31
15	T4.100617.135225	WG632208-02	Method/Prep Blank	40/50	1		10/06/17 13:52
16	T4.100617.135612	WG632208-03	Laboratory Control S	40/50	1		10/06/17 13:56
17	T4.100617.135947	L17100074-01	81101-W15-WQ-W0031	40/50	1		10/06/17 13:59
18	T4.100617.140334	L17100074-02	81101-W15-WQ-W0058	40/50	1		10/06/17 14:03
19	T4.100617.140722	L17100074-03	81101-W19-WQ-W0050	40/50	1		10/06/17 14:07
20	T4.100617.141110	L17100074-04	81604-W07-WQ-W0027	40/50	1		10/06/17 14:11
21	T4.100617.141458	WG632662-05	Post Digestion Spike		1	L17100074-04	10/06/17 14:14
22	T4.100617.141834	WG632662-06	Serial Dilution		5	L17100074-04	10/06/17 14:18
23	T4.100617.142222	WG633026-15	CCV		1		10/06/17 14:22
24	T4.100617.142553	WG633026-16	CCB		1		10/06/17 14:25
25	T4.100617.142944	WG632208-01	Reference Sample		1	L17100074-05	10/06/17 14:29
26	T4.100617.143332	WG632208-04	Matrix Spike		1	L17100074-05	10/06/17 14:33
27	T4.100617.143707	WG632208-05	Matrix Spike Duplica	40/50	1	L17100074-05	10/06/17 14:37
28	T4.100617.144042	L17091768-01	1712015-01	40/50	100		10/06/17 14:40
29	T4.100617.144429	L17091768-03	1712015-02	40/50	100		10/06/17 14:44
30	T4.100617.144817	WG633026-17	CCV		1		10/06/17 14:48
31	T4.100617.150013	WG633026-18	CCV		1		10/06/17 15:00
32	T4.100617.150401	WG633026-19	CCB		1		10/06/17 15:04
33	T4.100617.150804	WG632208-04	Matrix Spike	40/50	1	L17100074-05	10/06/17 15:08
34	T4.100617.151143	WG633026-20	CCV		1		10/06/17 15:11

Page: 1 Approved: October 06, 2017




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Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	T4.100617.151513	WG633026-21	CCB		1		10/06/17 15:15
36	T4.100617.151904	WG633026-22	Low Level Continuing Calibra		1		10/06/17 15:19
37	T4.100617.152251	WG633026-23	Low Level Continuing Calibra		1		10/06/17 15:22
38	T4.100617.152639	WG633026-24	LLCCV		1		10/06/17 15:26
39	T4.100617.153027	WG632697-02	Method/Prep Blank	40/50	1		10/06/17 15:30
40	T4.100617.153415	WG632697-03	Laboratory Control S	40/50	1		10/06/17 15:34
41	T4.100617.153751	L17100159-01	T1360	40/50	1		10/06/17 15:37
42	T4.100617.154138	WG632810-03	Post Digestion Spike		1	L17100159-01	10/06/17 15:41
43	T4.100617.154519	WG632810-04	Serial Dilution		5	L17100159-01	10/06/17 15:45
44	T4.100617.154900	L17100159-02	T1362	40/50	1		10/06/17 15:49
45	T4.100617.155247	L17100159-03	T1363	40/50	1		10/06/17 15:52
46	T4.100617.155630	L17100159-04	T1365	40/50	1		10/06/17 15:56
47	T4.100617.160015	WG633026-25	CCV		1		10/06/17 16:00
48	T4.100617.160346	WG633026-26	CCB		1		10/06/17 16:03
49	T4.100617.160735	WG632697-01	Reference Sample		1	L17100170-02	10/06/17 16:07
50	T4.100617.161123	WG632697-04	Matrix Spike	5/50	1	L17100170-02	10/06/17 16:11
51	T4.100617.161457	WG632697-05	Matrix Spike Duplica	5/50	1	L17100170-02	10/06/17 16:14
52	T4.100617.161834	WG633026-27	CCV		1		10/06/17 16:18
53	T4.100617.162206	WG633026-28	CCB		1		10/06/17 16:22
54	T4.100617.165014	WG632441-02	Method/Prep Blank	40/50	1		10/06/17 16:50
55	T4.100617.165402	WG632441-03	Laboratory Control S	40/50	1		10/06/17 16:54
56	T4.100617.165737	WG632312-01	Fluid Blank 1		1		10/06/17 16:57
57	T4.100617.170125	WG632312-02	Fluid Blank 2		1		10/06/17 17:01
58	T4.100617.170513	L17091700-02	MW2B-337-14	40/50	1		10/06/17 17:05
59	T4.100617.170859	WG632981-01	Post Digestion Spike		1	L17091700-02	10/06/17 17:08
60	T4.100617.171235	WG632981-02	Serial Dilution		5	L17091700-02	10/06/17 17:12
61	T4.100617.171623	WG632441-01	Reference Sample		1	L17091700-07	10/06/17 17:16
62	T4.100617.172009	WG632441-04	Matrix Spike	40/50	1	L17091700-07	10/06/17 17:20
63	T4.100617.172345	WG632441-05	Matrix Spike Duplica	40/50	1	L17091700-07	10/06/17 17:23
64	T4.100617.172723	WG633026-29	CCV		1		10/06/17 17:27
65	T4.100617.173055	WG633026-30	CCB		1		10/06/17 17:30
66	T4.100617.173445	L17091700-14	MW4B-337-14	40/50	1		10/06/17 17:34
67	T4.100617.173833	L17091700-17	MW4B2-337-14	40/50	1		10/06/17 17:38
68	T4.100617.174219	L17091700-20	MW5A-337-14	40/50	1		10/06/17 17:42

Page: 2 Approved: October 06, 2017

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Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9

Maintenance Log ID: _____

Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
69	T4.100617.174606	L17091700-23	OW1B-337-14	40/50	1		10/06/17 17:46
70	T4.100617.174953	L17091700-26	OW2A-337-14	40/50	1		10/06/17 17:49
71	T4.100617.175341	L17091700-29	OW3A-337-14	40/50	1		10/06/17 17:53
72	T4.100617.175728	L17100060-02	FILTERCAKE-092917	5/50	1		10/06/17 17:57
73	T4.100617.180115	L17100087-01	30 AWV SAPA BAGS	5/50	1		10/06/17 18:01
74	T4.100617.180502	L17100088-01	ALAN BAGS 11 BAGS	5/50	1		10/06/17 18:05
75	T4.100617.180849	L17100089-01	PLEASANTS SAND BLAST	5/50	1		10/06/17 18:08
76	T4.100617.181238	WG633026-31	CCV		1		10/06/17 18:12
77	T4.100617.181609	WG633026-32	CCB		1		10/06/17 18:16
78	T4.100617.181958	L17100133-01	STEP 7 MIX-1 DAY 6	5/50	1		10/06/17 18:19
79	T4.100617.182343	L17100133-02	STEP 7 MIX-1 DAY 6	5/50	1		10/06/17 18:23
80	T4.100617.182730	L17100133-03	STEP 7 MIX-2 DAY 6	5/50	1		10/06/17 18:27
81	T4.100617.183116	L17100133-04	STEP 7 MIX-2 DAY 6	5/50	1		10/06/17 18:31
82	T4.100617.183504	L17100135-01	K7I1152-01	5/50	1		10/06/17 18:35
83	T4.100617.183852	L17100187-01	2403-201 W1	40/50	1		10/06/17 18:38
84	T4.100617.184238	WG633026-33	CCV		1		10/06/17 18:42
85	T4.100617.184608	WG633026-34	CCB		1		10/06/17 18:46
86	T4.100617.184956	WG633026-35	Low Level Continuing Calibra		1		10/06/17 18:49
87	T4.100617.185344	WG633026-36	Low Level Continuing Calibra		1		10/06/17 18:53
88	T4.100617.185732	WG633026-37	LLCCV		1		10/06/17 18:57
89	T4.100617.190120	WG632887-02	Method/Prep Blank	40/50	1		10/06/17 19:01
90	T4.100617.190508	WG632887-03	Laboratory Control S	40/50	1		10/06/17 19:05
91	T4.100617.190843	WG632700-01	Fluid Blank 1		1		10/06/17 19:08
92	T4.100617.191231	WG632887-01	Reference Sample		1	L17100279-02	10/06/17 19:12
93	T4.100617.191615	WG632887-04	Matrix Spike	5/50	1	L17100279-02	10/06/17 19:16
94	T4.100617.191950	WG632887-05	Matrix Spike Duplica	5/50	1	L17100279-02	10/06/17 19:19
95	T4.100617.192326	L17100319-01	H7J0347-01	5/50	1		10/06/17 19:23
96	T4.100617.192713	L17100319-02	H7J0347-02	5/50	1		10/06/17 19:27
97	T4.100617.193059	WG632983-01	Post Digestion Spike		1	L17100319-02	10/06/17 19:30
98	T4.100617.193435	WG632983-02	Serial Dilution		5	L17100319-02	10/06/17 19:34
99	T4.100617.193823	WG633026-38	CCV		1		10/06/17 19:38
100	T4.100617.194154	WG633026-39	CCB		1		10/06/17 19:41
101	T4.100617.194542	L17100388-01	2212-147 W1	40/50	1		10/06/17 19:45
102	T4.100617.194924	L17100389-01	2212-120 W1	40/50	1		10/06/17 19:49

Page: 3 Approved: October 06, 2017

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Instrument Run Log

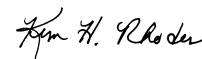
Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
103	T4.100617.195309	L17100389-02	2212-120 P1	40/50	1		10/06/17 19:53
104	T4.100617.195654	L17100390-01	1001-142-A W1	40/50	1		10/06/17 19:56
105	T4.100617.200039	L17100390-02	1001-142-A P1	40/50	1		10/06/17 20:00
106	T4.100617.200426	L17100391-01	2208-137C W1	40/50	1		10/06/17 20:04
107	T4.100617.200812	L17100399-01	15-10-11 W1	40/50	1		10/06/17 20:08
108	T4.100617.201156	L17100405-01	T7J0338-01	1/50	1		10/06/17 20:11
109	T4.100617.201540	L17100405-02	T7J0338-02	1/50	1		10/06/17 20:15
110	T4.100617.201924	L17100405-03	T7J0338-03	1/50	1		10/06/17 20:19
111	T4.100617.202309	WG633026-40	CCV		1		10/06/17 20:23
112	T4.100617.202640	WG633026-41	CCB		1		10/06/17 20:26
113	T4.100617.203029	L17100405-04	T7J0338-04	1/50	1		10/06/17 20:30
114	T4.100617.203413	L17100405-05	T7J0338-05	1/50	1		10/06/17 20:34
115	T4.100617.203757	L17100405-06	T7J0338-06	1/50	1		10/06/17 20:37
116	T4.100617.204142	WG633026-42	CCV		1		10/06/17 20:41
117	T4.100617.204515	WG633026-43	CCB		1		10/06/17 20:45
118	T4.100617.204906	WG632238-02	Method/Prep Blank	40/50	1		10/06/17 20:49
119	T4.100617.205254	WG632238-03	Laboratory Control S	40/50	1		10/06/17 20:52
120	T4.100617.205629	WG632238-01	Reference Sample		1	L17100385-01	10/06/17 20:56
121	T4.100617.210016	WG632238-04	Matrix Spike	5/50	1	L17100385-01	10/06/17 21:00
122	T4.100617.210352	WG632238-05	Matrix Spike Duplica	5/50	1	L17100385-01	10/06/17 21:03
123	T4.100617.210728	L17100030-01	0302-125 W1	40/50	1		10/06/17 21:07
124	T4.100617.211113	L17100030-02	0302-125 S1	40/50	1		10/06/17 21:11
125	T4.100617.211458	L17100030-03	0302-125 S2	40/50	1		10/06/17 21:14
126	T4.100617.211844	WG632342-03	Post Digestion Spike		1	L17100030-03	10/06/17 21:18
127	T4.100617.212219	WG632342-04	Serial Dilution		5	L17100030-03	10/06/17 21:22
128	T4.100617.212610	WG633026-44	CCV		1		10/06/17 21:26
129	T4.100617.212941	WG633026-45	CCB		1		10/06/17 21:29
130	T4.100617.213331	L17100030-04	0302-125 S3	40/50	1		10/06/17 21:33
131	T4.100617.213717	L17100030-05	0302-125 S4	40/50	1		10/06/17 21:37
132	T4.100617.214102	L17100034-01	1001-216 S1	40/50	1		10/06/17 21:41
133	T4.100617.214448	WG633026-46	CCV		1		10/06/17 21:44
134	T4.100617.214819	WG633026-47	CCB		1		10/06/17 21:48
135	T4.100617.215207	WG632265-02	Method/Prep Blank	40/50	1		10/06/17 21:52
136	T4.100617.215555	WG632265-03	Laboratory Control S	40/50	1		10/06/17 21:55

Page: 4 Approved: October 06, 2017




Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT

Analyst1: KKB Analyst2: N/A

Method: 200.7/6010B/6010C SOP: ME600G Rev: 9

Maintenance Log ID: _____

Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992

ICSA: STD84168 IC SAB: STD84169 Int. Std: RGT40895

CCV: STD83825 LLCCV: COA19621 Tuning Sol: _____

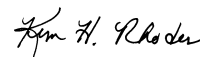
Stannous: _____ Hydroxylamine: _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
137	T4.100617.215931	L17100009-01	27-1-8.02 W1	40/50	1		10/06/17 21:59
138	T4.100617.220317	L17100009-02	27-1-8.02 W1	40/50	1		10/06/17 22:03
139	T4.100617.220702	L17100031-01	0302-126 W1	40/50	1		10/06/17 22:07
140	T4.100617.221047	L17100032-01	0302-112-L W1	40/50	1		10/06/17 22:10
141	T4.100617.221432	L17100032-02	0302-112-L W2	40/50	1		10/06/17 22:14
142	T4.100617.221817	L17100102-01	27-1-8 W1	40/50	1		10/06/17 22:18
143	T4.100617.222202	WG632984-01	Post Digestion Spike		1	L17100102-01	10/06/17 22:22
144	T4.100617.222537	WG632984-02	Serial Dilution		5	L17100102-01	10/06/17 22:25
145	T4.100617.222927	WG633026-48	CCV		1		10/06/17 22:29
146	T4.100617.223259	WG633026-49	CCB		1		10/06/17 22:32
147	T4.100617.223648	L17100102-02	6-8-20 W1	40/50	1		10/06/17 22:36
148	T4.100617.224033	L17100102-03	59-10-35 W1	40/50	1		10/06/17 22:40
149	T4.100617.224418	L17100102-04	6-8-25 W1	40/50	1		10/06/17 22:44
150	T4.100617.224804	L17100102-05	6-10-27.02 W1	40/50	1		10/06/17 22:48
151	T4.100617.225149	L17100102-06	59-5-2-4-2-4 W1	40/50	1		10/06/17 22:51
152	T4.100617.225535	L17100102-07	59-11-11.21 W1	40/50	1		10/06/17 22:55
153	T4.100617.225920	L17100102-08	59-11-11.21 P1	40/50	1		10/06/17 22:59
154	T4.100617.230306	L17100102-09	59-11-10.07 W1	40/50	1		10/06/17 23:03
155	T4.100617.230651	L17100102-10	59-11-10.08 W1	40/50	1		10/06/17 23:06
156	T4.100617.231035	L17100102-11	59-5-2-2-1 W1	40/50	1		10/06/17 23:10
157	T4.100617.231422	WG633026-50	CCV		1		10/06/17 23:14
158	T4.100617.231754	WG633026-51	CCB		1		10/06/17 23:17
159	T4.100617.232143	L17100102-12	59-5-2-1-6 W1	40/50	1		10/06/17 23:21
160	T4.100617.232527	L17100102-13	59-5-22 W1	40/50	1		10/06/17 23:25
161	T4.100617.232911	L17100102-14	59-11-10.10 W1	40/50	1		10/06/17 23:29
162	T4.100617.233257	WG632265-01	Reference Sample		1	L17100102-15	10/06/17 23:32
163	T4.100617.233642	WG632265-04	Matrix Spike	40/50	1	L17100102-15	10/06/17 23:36
164	T4.100617.234019	WG632265-05	Matrix Spike Duplica	40/50	1	L17100102-15	10/06/17 23:40
165	T4.100617.234355	WG633026-52	CCV		1		10/06/17 23:43
166	T4.100617.234725	WG633026-53	CCB		1		10/06/17 23:47
167	T4.100617.235114	WG632660-02	Method/Prep Blank	40/50	1		10/06/17 23:51
168	T4.100617.235503	WG632660-03	Laboratory Control S	40/50	1		10/06/17 23:55
169	T4.100617.235838	L17100267-01	204.00-6-11 RW2	40/50	1		10/06/17 23:58
170	T4.100717.000224	L17100267-02	204.00-6-11 RW2	40/50	1		10/07/17 00:02

Page: 5 Approved: October 06, 2017




Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

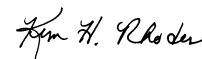
Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
171	T4.100717.000609	L17100268-01	15-11-7.1 W1	40/50	1		10/07/17 00:06
172	T4.100717.000954	L17100268-02	15-11-7.1 W1	40/50	1		10/07/17 00:09
173	T4.100717.001339	L17100269-01	45-11-14.05 W1	40/50	1		10/07/17 00:13
174	T4.100717.001726	L17100269-02	45-10-12.02 S1	40/50	1		10/07/17 00:17
175	T4.100717.002111	WG632985-01	Post Digestion Spike		1	L17100269-02	10/07/17 00:21
176	T4.100717.002446	WG632985-02	Serial Dilution		5	L17100269-02	10/07/17 00:24
177	T4.100717.002834	WG633026-54	CCV		1		10/07/17 00:28
178	T4.100717.003205	WG633026-55	CCB		1		10/07/17 00:32
179	T4.100717.003556	L17100269-03	45-10-12.01 W1	40/50	1		10/07/17 00:35
180	T4.100717.003941	L17100269-04	45-20-3.02 W1	40/50	1		10/07/17 00:39
181	T4.100717.004325	L17100269-05	45-20-3.02 S1	40/50	1		10/07/17 00:43
182	T4.100717.004710	L17100269-06	1803-126-D W1	40/50	1		10/07/17 00:47
183	T4.100717.005056	L17100269-07	1803-126-D W2	40/50	1		10/07/17 00:50
184	T4.100717.005441	L17100269-08	1803-126-D S1	40/50	1		10/07/17 00:54
185	T4.100717.005826	L17100269-09	45-11-15.01 S1	40/50	1		10/07/17 00:58
186	T4.100717.010212	L17100269-10	45-11-15.01 P3	40/50	1		10/07/17 01:02
187	T4.100717.010557	L17100269-11	45-11-15.01 P1	40/50	1		10/07/17 01:05
188	T4.100717.010944	L17100269-12	45-11-14.01 W1	40/50	1		10/07/17 01:09
189	T4.100717.011329	WG633026-56	CCV		1		10/07/17 01:13
190	T4.100717.011659	WG633026-57	CCB		1		10/07/17 01:16
191	T4.100717.012048	L17100270-01	59-9-1.09 RPW1 (POST)	40/50	1		10/07/17 01:20
192	T4.100717.012434	L17100270-02	59-9-1.09 RPW1 (PRE)	40/50	1		10/07/17 01:24
193	T4.100717.012820	L17100272-01	45-12-13 W1	40/50	1		10/07/17 01:28
194	T4.100717.013205	L17100273-01	0302-104 W1		1	WG632660-01	10/07/17 01:32
195	T4.100717.013550	WG632660-04	Matrix Spike	40/50	1	L17100273-01	10/07/17 01:35
196	T4.100717.013925	WG632660-05	Matrix Spike Duplica	40/50	1	L17100273-01	10/07/17 01:39
197	T4.100717.014300	WG633026-58	CCV		1		10/07/17 01:43
198	T4.100717.014631	WG633026-59	CCB		1		10/07/17 01:46

Comments

Seq.	Rerun	Dil.	Reason	Analytes
30			Instrument pump stopped turning. CCV was reanalyzed. --KKB--	

Page: 6 Approved: October 06, 2017




Microbac Laboratories Inc.

Data Checklist

Date: 05-OCT-2017
 Analyst: KKB
 Analyst: NA
 Method: 6010B/6010C/200.7
 Instrument: ICP-THERMO4
 Curve Workgroup: 632767
 Runlog ID: 85062
 Analytical Workgroups: 632662,632104

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	X
Client Forms	X
Level X	
Level 3	1450,0086
Level 4	
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:
05-OCT-2017

Secondary Reviewer:
05-OCT-2017

Ki K Beck

Lyn H. Rhodes



Microbac Laboratories Inc.

Data Checklist

Date: 05-OCT-2017
 Analyst: KKB
 Analyst: NA
 Method: 6010B/6010C/200.7
 Instrument: ICP-THERMO4
 Curve Workgroup: 632900
 Runlog ID: 85081
 Analytical Workgroups: 632662,632186,632810

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	X
Client Forms	X
Level X	
Level 3	0173
Level 4	1647,1648,0074,1458,1645,1719
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:
06-OCT-2017

Secondary Reviewer:
06-OCT-2017

Ki K Beck

Lyn H. Rhodes



Microbac Laboratories Inc.

Data Checklist

Date: 06-OCT-2017
 Analyst: KKB
 Analyst: NA
 Method: 6010B/6010C/200.7
 Instrument: ICP-THERMO4
 Curve Workgroup: 633026
 Runlog ID: 85101
 Analytical Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

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	X
Client Forms	X
Level X	
Level 3	
Level 4	0074,0060
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:
06-OCT-2017

Secondary Reviewer:
06-OCT-2017

Ki K Buck

Lyn H. Rhodes



Analytical Method:6010C
Login Number:L17091647

AAB#:WG632662

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-SP140-7472-GRAB	01	09/27/17					10/03/2017	5.7	180		10/05/17	8.1	180	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091647 Work Group: WG632662
 Blank File ID: T4.100517.174731 Blank Sample ID: WG632208-02
 Prep Date: 10/03/17 07:13 Instrument ID: ICP-THERMO4
 Analyzed Date: 10/05/17 17:47 Method: 6010C
 Analyst: KKB

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632208-03	T4.100517.120838	10/05/17 12:08	01
LCS	WG632208-03	T4.100517.175118	10/05/17 17:51	02
LH18/24-SP140-7472-GRAB	L17091647-01	T4.100517.175454	10/05/17 17:54	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5514104
 Report generated 10/06/2017 10:49



Login Number: L17091647 Prep Date: 10/03/17 07:13 Sample ID: WG632208-02
 Instrument ID: ICP-THERMO4 Run Date: 10/05/17 17:47 Prep Method: 3015A
 File ID: T4.100517.174731 Analyst: KKB Method: 6010C
 Workgroup (AAB#): WG632662 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: ICP-TH-05-OCT-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Aluminum, Total	0.100	0.200	0.100	1	U
Iron, Total	0.0500	0.100	0.0500	1	U
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: 5514105
 06-OCT-2017 10:49



Login Number: L17091647 Run Date: 10/05/2017 Sample ID: WG632208-03
 Instrument ID: ICP-THERMO4 Run Time: 17:51 Prep Method: 3015A
 File ID: T4.100517.175118 Analyst: KKB Method: 6010C
 Workgroup (AAB#): WG632662 Matrix: Water Units: mg/L
 QC Key: DOD4 Lot#: STD83991 Cal ID: ICP-TH-05-OCT-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Aluminum, Total	6.25	6.62	106	80 - 120	
Iron, Total	2.50	2.56	102	80 - 120	
Selenium, Total	0.250	0.236	94.3	80 - 120	

LCS - Modified 03/06/2008
 PDF File ID: 5514106
 Report generated: 10/06/2017 10:49



Loginnum: L17091647 Cal ID: ICP-THERMO4 - Worknum: WG632662
 Instrument ID: ICP-THERMO4 Contract #: _____ Method: 6010C
 Parent ID: WG632208-01 File ID: T4.100517.192100 Dil: 1 Matrix: WATER
 Sample ID: WG632208-04 MS File ID: T4.100517.192449 Dil: 1 Units: mg/L
 Sample ID: WG632208-05 MSD File ID: T4.100517.192824 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Aluminum, Total	ND	6.25	6.53	105	6.25	6.46	103	1.16	80 - 120	20	
Iron, Total	0.0603	2.50	2.61	102	2.50	2.62	102	0.129	80 - 120	20	
Selenium, Total	ND	0.250	0.223	89.2	0.250	0.222	88.6	0.607	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17091647 **Worknum:** WG632662
Instrument: ICP-THERMO4 **Method:** 6010C
Serial Dil: WG632662-04 **File ID:** T4.100517.182102 **Dil:** 5 **Units:** ug/L
Sample: L17091745-04 **File ID:** T4.100517.181343 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Aluminum	24.4		ND	U		
Iron	11100		11300		1.58	
Selenium	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 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: 5514101

10/06/2017 10:49



Sample Login ID: L17091647

Worknum: WG632662

Instrument ID: ICP-THERMO4

Method: 6010C

Post Spike ID: WG632662-03

File ID:T4.100517.181728

Dil:1

Units: ug/L

Sample ID: L17091745-04

File ID:T4.100517.181343

Dil:1

Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ALUMINUM	4990		0	U	5000	99.8	75 - 125	
IRON	12000		11100		2000	100.5	75 - 125	
SELENIUM	191		0	U	200	95.3	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

00862515

Login: L17091647 Workgroup (AAB#): WG632662
Analytical Method: 6010C Instrument ID: ICP-THERMO4
ICAL Worknum: WG632900 Initial Calibration Date: 05-OCT-2017 16:45

	WG632900-01		WG632900-02		WG632900-03		WG632900-04		WG632900-05		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
ALUMINUM	0	0.00152	.1	0.00221	.2	0.00292	10	0.0843	20	0.164	.999951	
IRON	0	0.000220	.04	0.000880	.08	0.00108	4	0.0609	8	0.122	.999796	
SELENIUM	0	-0.0000200	NA	NA	.008	0.0000600	.4	0.00264	.8	0.00521	.998172	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

INT_CAL_ICP - Modified 03/06/2008
PDF File ID: 5514110
Report generated: 06-OCT-2017 10:49



Login Number: L17091647 Run Date: 10/05/2017 Sample ID: WG632900-07
Instrument ID: ICP-THERMO4 Run Time: 16:52 Method: 6010C
File ID: T4.100517.165203 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG632662 Cal ID: ICP-THERI - 05-OCT-17
Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
ALUMINUM	.08	.16	.08	U
IRON	.04	.08	.04	U
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: L17091647 Run Date: 10/05/2017 Sample ID: WG632900-14
 Instrument ID: ICP-THERMO4 Run Time: 17:18 Method: 6010C
 File ID: T4.100517.171838 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Aluminum	0.0800	0.160	0.0800	U
Iron	0.0400	0.0800	0.0400	U
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: L17091647 Run Date: 10/05/2017 Sample ID: WG632900-16
 Instrument ID: ICP-THERMO4 Run Time: 18:28 Method: 6010C
 File ID: T4.100517.182820 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Aluminum	0.0800	0.160	0.0800	U
Iron	0.0400	0.0800	0.0400	U
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: L17091647 Run Date: 10/05/2017 Sample ID: WG632900-06
 Instrument ID: ICP-THERMO4 Run Time: 16:48 Method: 6010C
 File ID: T4.100517.164830 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Aluminum	10	10.0	100	90 - 110	
Iron	4	3.97	99.4	90 - 110	
Selenium	.4	0.397	99.2	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17091647 Run Date: 10/05/2017 Sample ID: WG632900-13
 Instrument ID: ICP-THERMO4 Run Time: 17:15 Method: 6010C
 File ID: T4.100517.171507 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Aluminum	10.0	10.2	mg/L	102	90 - 110	
Iron	4.00	4.03	mg/L	101	90 - 110	
Selenium	0.400	0.402	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091647 Run Date: 10/05/2017 Sample ID: WG632900-15
 Instrument ID: ICP-THERMO4 Run Time: 18:24 Method: 6010C
 File ID: T4.100517.182449 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Aluminum	10.0	10.1	mg/L	101	90 - 110	
Iron	4.00	4.00	mg/L	100	90 - 110	
Selenium	0.400	0.378	mg/L	94.5	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091647 Run Date: 10/05/2017 Sample ID: WG632900-10
 Instrument ID: ICP-THERMO4 Run Time: 17:03 Method: 6010C
 File ID: T4.100517.170358 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Aluminum	0.160	0.170	mg/L	106	70 - 130	
Iron	0.0800	0.0731	mg/L	91.4	70 - 130	
Selenium	0.0160	0.0172	mg/L	108	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091647 Run Date: 10/05/2017 Sample ID: WG632900-21
 Instrument ID: ICP-THERMO4 Run Time: 19:39 Method: 6010C
 File ID: T4.100517.193925 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Aluminum	0.160	0.168	mg/L	105	70 - 130	
Iron	0.0800	0.0681	mg/L	85.1	70 - 130	
Selenium	0.0160	0.0116	mg/L	72.3	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17091647
 Instrument ID: ICP-THERMO4
 Sol. A : WG632900-11
 Sol. AB : WG632900-12

File ID: T4.100517.170745
 File ID: T4.100517.171130

Workgroup (AAB#): WG632662
 Method: 6010C
 Units: mg/L
 Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Aluminum	250	248	99.2	250	248	99.2	
Iron	100	96.7	96.7	100	96.3	96.3	
Selenium	NS	-0.000300	NS	0.250	0.245	98.0	

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: L17091647
 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: 5514109
 Report generated: 10/06/2017 10:32



Login Number: L17091647
 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: 5514109
 Report generated: 10/06/2017 10:32



Login Number: L17091647
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 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: 5514109
 Report generated: 10/06/2017 10:32



Login Number: L17091647
 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: 5514109
 Report generated: 10/06/2017 10:32



Login Number: L17091647
 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

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5514109
 Report generated: 10/06/2017 10:32



Login Number: L17091647
 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: 5514109
 Report generated: 10/06/2017 10:32



Login Number: L17091647
 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: 5514109
 Report generated: 10/06/2017 10:32



Login Number: L17091647 Date: 07/17/2017
 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	3.6
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

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 07:12
Matrix: Water	Analytical Method: 6020A	Cal Date: 10/02/2017 12:02
Workgroup #: WG632098	Analyst: JYH	Run Date: 10/02/2017 13:27
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: NI.100217.132739
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Antimony, Total	7440-36-0	0.00100	U	0.00200	0.00100	0.000500
Arsenic, Total	7440-38-2	0.00300		0.00200	0.00100	0.000500
Cadmium, Total	7440-43-9	0.000600	U	0.00120	0.000600	0.000300
Chromium, Total	7440-47-3	0.00193	J	0.00400	0.00200	0.00100
Cobalt, Total	7440-48-4	0.0125		0.00200	0.00100	0.000500
Lead, Total	7439-92-1	0.00100	U	0.00200	0.00100	0.000500
Nickel, Total	7440-02-0	0.0135		0.00800	0.00400	0.00200
Silver, Total	7440-22-4	0.00100	U	0.00200	0.00100	0.000500
Thallium, Total	7440-28-0	0.000183	J	0.000400	0.000200	0.000100
Vanadium, Total	7440-62-2	0.00100	U	0.00200	0.00100	0.000500
Zinc, Total	7440-66-6	0.0136	J	0.0500	0.0250	0.0125

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

Lab Report #: L17091647

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 07:12
Matrix: Water	Analytical Method: 6020A	Cal Date: 10/02/2017 12:02
Workgroup #: WG632098	Analyst: JYH	Run Date: 10/02/2017 16:00
Collect Date: 09/27/2017 15:00	Dilution: 10	File ID: NI.100217.160020
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Barium, Total	7440-39-3	0.740		0.0600	0.0300	0.0150
Manganese, Total	7439-96-5	0.708		0.0400	0.0200	0.0100
J	Estimated value ; the analyte concentration was less than the LOQ.					
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: WG632048
 Analyst: VC
 Spike Analyst: VC
 Run Date: 10/02/2017 07:12
 Method: 3015A
 Balance: BAL016
 Instrument: MW-3
 Instrument Start: 10/02/2017 07:15

SOP: ME407 Revision 19
 Spike Solution: STD82887
 Spike Witness: ERP
 HNO3 Lot #: COA19940
 40 & 50 ML. DIGESTION TU COA19932
 MS Filters- fisher-Lot# rRGT40686

	SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG632048-02	BLANK	1	20 mL	50 mL	185.29 g	185.292 g		
2	WG632048-03	LCS	1	20 mL	50 mL	185.519 g	185.522 g	.25 mL	
3	L17091647-01	SAMP	1	20 mL	50 mL	183.509 g	183.497 g		10/09/17
4	L17091648-01	SAMP	1	20 mL	50 mL	183.833 g	183.815 g		10/09/17
5	L17091692-01	SAMP	1	20 mL	50 mL	184.386 g	184.377 g		10/05/17
6	L17091692-02	SAMP	1	20 mL	50 mL	184.501 g	184.495 g		10/05/17
7	L17091692-03	SAMP	1	20 mL	50 mL	182.45 g	182.449 g		10/05/17
8	L17091705-01	SAMP	1	20 mL	50 mL	181.582 g	181.566 g		10/10/17
9	L17091706-01	SAMP	1	20 mL	50 mL	183.32 g	183.302 g		10/10/17
10	L17091719-02	SAMP	1	20 mL	50 mL	184.102 g	184.093 g		10/10/17
11	L17091719-04	SAMP	1	20 mL	50 mL	184.295 g	184.289 g		10/10/17
12	L17091719-06	SAMP	1	20 mL	50 mL	181.947 g	181.938 g		10/10/17
13	L17091745-01	SAMP	1	20 mL	50 mL	183.499 g	183.484 g		10/09/17
14	L17091745-02	SAMP	1	20 mL	50 mL	181.599 g	181.577 g		10/09/17
15	L17091745-03	SAMP	1	20 mL	50 mL	182.646 g	182.592 g		10/09/17
16	WG632048-01	REF	1	20 mL	50 mL	182.623 g	182.612 g		
17	L17091745-04	SAMP	1	20 mL	50 mL	182.623 g	182.612 g		10/09/17
18	WG632048-04	MS	1	20 mL	50 mL	182.489 g	182.472 g	.25 mL	
19	WG632048-05	MSD	1	20 mL	50 mL	185.819 g	185.813 g	.25 mL	

Analyst: Vicki Collier

Reviewer: Erin Pottin



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 100217A.REP
 Analyst1: JYH Analyst2: N/A
 Method: 6020/6020A/200.8 SOP: ME700A Rev: 3
 Maintenance Log ID: _____

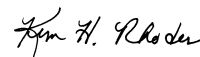
Calibration Std: STD83954 ICV Std: STD83787 Post Spike: STD83027
 ICSA: STD83784 ICSAB: STD83785 Int. Std: RG739344
 CCV: STD83955 LLCCV: STD83789 Tuning Sol : STD83790
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632103,632098

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	NI.100217.115019	Blank	Blank		1		10/02/17 11:50
2	NI.100217.115325	WG632169-01	Calibration Point		1		10/02/17 11:53
3	NI.100217.115630	WG632169-02	Calibration Point		1		10/02/17 11:56
4	NI.100217.115936	WG632169-03	Calibration Point		1		10/02/17 11:59
5	NI.100217.120241	WG632169-04	Calibration Point		1		10/02/17 12:02
6	NI.100217.120549	WG632169-05	Initial Calibration Verification		1		10/02/17 12:05
7	NI.100217.120855	WG632169-06	Initial Calib Blank		1		10/02/17 12:08
8	NI.100217.121202	WG632169-07	Low Level Continuing Calibra		1		10/02/17 12:12
9	NI.100217.121553	WG632169-08	Low Level Initial Calibration V		1		10/02/17 12:15
10	NI.100217.121858	WG632169-09	Interference Check		1		10/02/17 12:18
11	NI.100217.122204	WG632169-10	Interference Check		1		10/02/17 12:22
12	NI.100217.122511	WG632169-11	CCV		1		10/02/17 12:25
13	NI.100217.122816	WG632169-12	CCB		1		10/02/17 12:28
14	NI.100217.123123	WG632081-01	Method/Prep Blank	.25/100	1		10/02/17 12:31
15	NI.100217.123429	WG632081-02	Laboratory Control S	.25/100	1		10/02/17 12:34
16	NI.100217.123734	WG632081-03	Laboratory Control S	.25/100	1		10/02/17 12:37
17	NI.100217.124039	L17091426-01	K7I0761-01		1		10/02/17 12:40
18	NI.100217.124345	WG632103-01	Post Digestion Spike		1	L17091426-01	10/02/17 12:43
19	NI.100217.124650	WG632103-02	Serial Dilution		5	L17091426-01	10/02/17 12:46
20	NI.100217.124956	WG632103-02	Serial Dilution		25	L17091426-01	10/02/17 12:49
21	NI.100217.125304	WG632169-13	CCV		1		10/02/17 12:53
22	NI.100217.125609	WG632169-14	CCB		1		10/02/17 12:56
23	NI.100217.125916	WG632169-15	Low Level Continuing Calibra		1		10/02/17 12:59
24	NI.100217.130336	WG632169-16	CCV		1		10/02/17 13:03
25	NI.100217.130642	WG632169-17	CCB		1		10/02/17 13:06
26	NI.100217.131212	WG632048-02	Method/Prep Blank	20/50	1		10/02/17 13:12
27	NI.100217.131517	WG632048-03	Laboratory Control S	20/50	1		10/02/17 13:15
28	NI.100217.131823	WG632048-01	Reference Sample		1	L17091745-04	10/02/17 13:18
29	NI.100217.132128	WG632048-04	Matrix Spike	20/50	1	L17091745-04	10/02/17 13:21
30	NI.100217.132434	WG632048-05	Matrix Spike Duplica	20/50	1	L17091745-04	10/02/17 13:24
31	NI.100217.132739	L17091647-01	LH18/24-SP140-7472-GRAB	20/50	1		10/02/17 13:27
32	NI.100217.133044	L17091648-01	LH18/24-SP650-6472-GRAB	20/50	1		10/02/17 13:30
33	NI.100217.133350	WG632098-01	Post Digestion Spike		1	L17091648-01	10/02/17 13:33
34	NI.100217.133655	WG632098-02	Serial Dilution		5	L17091648-01	10/02/17 13:36

Page: 1 Approved: October 05, 2017




Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 100217A.REP
 Analyst1: JYH Analyst2: N/A
 Method: 6020/6020A/200.8 SOP: ME700A Rev: 3
 Maintenance Log ID: _____
 Calibration Std: STD83954 ICV Std: STD83787 Post Spike: STD83027
 ICSA: STD83784 ICSAB: STD83785 Int. Std: RGT39344
 CCV: STD83955 LLCV: STD83789 Tuning Sol : STD83790
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632103,632098

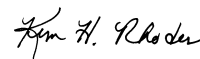
Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	NI.100217.134001	WG632098-02	Serial Dilution		25	L17091648-01	10/02/17 13:40
36	NI.100217.134308	WG632169-18	CCV		1		10/02/17 13:43
37	NI.100217.134613	WG632169-19	CCB		1		10/02/17 13:46
38	NI.100217.134920	L17091692-01	9274-B02-WQ-W0009	20/50	1		10/02/17 13:49
39	NI.100217.135226	L17091692-02	9274-B09-WQ-W0056	20/50	1		10/02/17 13:52
40	NI.100217.135531	L17091692-03	9274-B09-WQ-W0058	20/50	1		10/02/17 13:55
41	NI.100217.135837	L17091705-01	LH18/24-SP650-6474-GRAB	20/50	1		10/02/17 13:58
42	NI.100217.140142	L17091706-01	LH18/24-SP140-7474-GRAB	20/50	1		10/02/17 14:01
43	NI.100217.140447	L17091719-02	A11-MW08-Y3S2	20/50	1		10/02/17 14:04
44	NI.100217.140753	L17091719-04	A11-MW02-Y3S2	20/50	1		10/02/17 14:07
45	NI.100217.141059	L17091719-06	A11/A12-RB01-Y3S2	20/50	1		10/02/17 14:10
46	NI.100217.141405	L17091745-01	MW-103	20/50	1		10/02/17 14:14
47	NI.100217.141710	L17091745-02	MW-103	20/50	1		10/02/17 14:17
48	NI.100217.142017	WG632169-20	CCV		1		10/02/17 14:20
49	NI.100217.142323	WG632169-21	CCB		1		10/02/17 14:23
50	NI.100217.142630	L17091745-03	MW-107	20/50	1		10/02/17 14:26
51	NI.100217.142935	L17091613-12	GB5-S		2		10/02/17 14:29
52	NI.100217.143242	WG632169-22	CCV		1		10/02/17 14:32
53	NI.100217.143547	WG632169-23	CCB		1		10/02/17 14:35
54	NI.100217.143854	WG632169-24	Low Level Continuing Calibra		1		10/02/17 14:38
55	NI.100217.145202	WG632169-25	Low Level Continuing Calibra		1		10/02/17 14:52
56	NI.100217.155613	L17091613-12	GB5-S		2		10/02/17 15:56
57	NI.100217.160020	L17091647-01	LH18/24-SP140-7472-GRAB	20/50	10		10/02/17 16:00
58	NI.100217.160326	40 PPB SE	40 PPB SE		10		10/02/17 16:03
59	NI.100217.160632	WG632169-26	CCV		1		10/02/17 16:06
60	NI.100217.160938	WG632169-27	CCB		1		10/02/17 16:09
61	NI.100217.161245	WG632169-28	Low Level Continuing Calibra		1		10/02/17 16:12

Comments

Seq.	Rerun	Dil.	Reason	Analytes
8			Rerun to verify. JYH	
54			Insufficient volumn, rerun. JYH	

Page: 2 Approved: October 05, 2017




Microbac Laboratories Inc.

Data Checklist

Date: 02-OCT-2017
 Analyst: JYH
 Analyst: NA
 Method: 6020/6020A/200.8
 Instrument: ICP-MS
 Curve Workgroup: 632169
 Runlog ID: 84986
 Analytical Workgroups: 632103,632098

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	1647,1648,1692,1705,1706,1719
Client Forms	X
Level X	
Level 3	
Level 4	1647,1648,1692,1705,1706,1719
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	KHR
Comments	

Primary Reviewer:

Secondary Reviewer:
05-OCT-2017



Analytical Method:6020A
Login Number:L17091647

AAB#:WG632098

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-SP140-7472-GRAB	01	09/27/17					10/02/2017	4.7	180		10/02/17	4.9	180	
LH18/24-SP140-7472-GRAB	01	09/27/17					10/02/2017	4.7	180		10/02/17	5	180	

* = SEE PROJECT QAPP REQUIREMENTS

HOLD_TIMES - Modified 03/06/2008
PDF File ID: 5507590
Report generated 10/03/2017 12:38



METHOD BLANK SUMMARY

Login Number: L17091647 Work Group: WG632098
 Blank File ID: NI.100217.131212 Blank Sample ID: WG632048-02
 Prep Date: 10/02/17 07:12 Instrument ID: ICP-MS2
 Analyzed Date: 10/02/17 13:12 Method: 6020A
 Analyst: JYH

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632048-03	NI.100217.131517	10/02/17 13:15	01
LH18/24-SP140-7472-GRAB	L17091647-01	NI.100217.132739	10/02/17 13:27	01
LH18/24-SP140-7472-GRAB	L17091647-01	NI.100217.160020	10/02/17 16:00	DL01

Report Name: BLANK_SUMMARY
 PDF File ID: 5507591
 Report generated 10/03/2017 12:38



Login Number: L17091647 Prep Date: 10/02/17 07:12 Sample ID: WG632048-02
 Instrument ID: ICP-MS2 Run Date: 10/02/17 13:12 Prep Method: 3015A
 File ID: NI.100217.131212 Analyst: JYH Method: 6020A
 Workgroup (AAB#): WG632098 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: ICP-MS - 02-OCT-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Antimony, Total	0.000500	0.00200	0.000500	1	U
Arsenic, Total	0.000500	0.00200	0.000500	1	U
Barium, Total	0.00150	0.00600	0.00150	1	U
Cadmium, Total	0.000300	0.00120	0.000300	1	U
Chromium, Total	0.00100	0.00400	0.00100	1	U
Cobalt, Total	0.000500	0.00200	0.000500	1	U
Lead, Total	0.000500	0.00200	0.000500	1	U
Manganese, Total	0.00100	0.00400	0.00100	1	U
Nickel, Total	0.00200	0.00800	0.00200	1	U
Silver, Total	0.000500	0.00200	0.000500	1	U
Thallium, Total	0.000100	0.000400	0.000100	1	U
Vanadium, Total	0.000500	0.00200	0.000500	1	U
Zinc, Total	0.0125	0.0500	0.0125	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: 5507592
 03-OCT-2017 12:38



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632048-03
 Instrument ID: ICP-MS2 Run Time: 13:15 Prep Method: 3015A
 File ID: NI.100217.131517 Analyst: JYH Method: 6020A
 Workgroup (AAB#): WG632098 Matrix: Water Units: mg/L
 QC Key: DOD4 Lot#: STD82887 Cal ID: ICP-MS - 02-OCT-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Antimony, Total	0.125	0.127	101	80 - 120	
Arsenic, Total	0.125	0.126	101	80 - 120	
Barium, Total	0.125	0.123	98.7	80 - 120	
Cadmium, Total	0.125	0.127	101	80 - 120	
Chromium, Total	0.125	0.126	101	80 - 120	
Cobalt, Total	0.125	0.127	101	80 - 120	
Lead, Total	0.125	0.125	99.6	80 - 120	
Manganese, Total	0.125	0.126	100	80 - 120	
Nickel, Total	0.125	0.127	101	80 - 120	
Silver, Total	0.125	0.126	101	80 - 120	
Thallium, Total	0.125	0.124	99.6	80 - 120	
Vanadium, Total	0.125	0.123	98.5	80 - 120	
Zinc, Total	0.125	0.128	103	80 - 120	

LCS - Modified 03/06/2008
 PDF File ID: 5507593
 Report generated: 10/03/2017 12:39



Loginnum: L17091647 Cal ID: ICP-MS2- Worknum: WG632098
 Instrument ID: ICP-MS2 Contract #: _____ Method: 6020A
 Parent ID: WG632048-01 File ID: NI.100217.131823 Dil: 1 Matrix: WATER
 Sample ID: WG632048-04 MS File ID: NI.100217.132128 Dil: 1 Units: mg/L
 Sample ID: WG632048-05 MSD File ID: NI.100217.132434 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Antimony	0.000895	0.125	0.130	103	0.125	0.130	104	0.531	80 - 120	20	
Arsenic	0.00277	0.125	0.131	103	0.125	0.131	103	0.246	80 - 120	20	
Barium	0.0623	0.125	0.182	96.0	0.125	0.185	98.2	1.54	80 - 120	20	
Cadmium	ND	0.125	0.129	103	0.125	0.130	104	0.559	80 - 120	20	
Chromium	ND	0.125	0.121	96.7	0.125	0.121	96.7	0.0108	80 - 120	20	
Cobalt	0.00434	0.125	0.126	97.7	0.125	0.126	97.6	0.0212	80 - 120	20	
Lead	ND	0.125	0.126	101	0.125	0.126	101	0.173	80 - 120	20	
Nickel	0.0117	0.125	0.133	97.2	0.125	0.134	97.5	0.211	80 - 120	20	
Silver	ND	0.125	0.123	98.3	0.125	0.124	99.2	0.910	80 - 120	20	
Thallium	ND	0.125	0.125	100	0.125	0.125	99.7	0.440	80 - 120	20	
Vanadium	ND	0.125	0.121	97.0	0.125	0.121	96.5	0.534	80 - 120	20	
Zinc	ND	0.125	0.132	105	0.125	0.134	107	1.87	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17091647 **Worknum:** WG632098
Instrument: ICP-MS2 **Method:** 6020A
Serial Dil: WG632098-02 **File ID:** NI.100217.133655 **Dil:** 5 **Units:** ug/L
Sample: L17091648-01 **File ID:** NI.100217.133044 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Antimony	ND	U	1.31	F	753.00	
Arsenic	0.974	X	1.59	F	63.00	
Barium	38.6	X	39.3	X	1.88	
Cadmium	ND	U	ND	U		
Chromium	1.25	F	ND	U		
Cobalt	0.229	F	ND	U		
Lead	ND	U	ND	U		
Manganese	14.5	X	14.9	X	2.52	
Nickel	1.22	F	ND	U		
Silver	ND	U	ND	U		
Thallium	ND	U	ND	U		
Vanadium	ND	U	ND	U		
Zinc	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: 5507588

10/03/2017 12:38



Sample Login ID: L17091647

Worknum: WG632098

Instrument ID: ICP-MS2

Method: 6020A

Post Spike ID: WG632098-01

File ID: NI.100217.133350

Dil: 1

Units: ug/L

Sample ID: L17091648-01

File ID: NI.100217.133044

Dil: 1

Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ANTIMONY	52.6		0	U	50	105.3	75 - 125	
ARSENIC	54.2		0.974		50	106.4	75 - 125	
BARIUM	89.6		38.6		50	102.2	75 - 125	
CADMIUM	51.4		0	U	50	102.9	75 - 125	
CHROMIUM	52.7		1.25	F	50	103.0	75 - 125	
COBALT	50.7		0.229	F	50	101.0	75 - 125	
LEAD	52.9		0	U	50	105.9	75 - 125	
MANGANESE	65.5		14.5		50	102.1	75 - 125	
NICKEL	50.7		1.22	F	50	98.9	75 - 125	
SILVER	49.8		0	U	50	99.6	75 - 125	
THALLIUM	51.8		0	U	50	103.7	75 - 125	
VANADIUM	52.5		0	U	50	104.9	75 - 125	
ZINC	54.9		0	U	50	109.7	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

00862553

Login:	<u>L17091647</u>	Workgroup (AAB#):	<u>WG632098</u>
Analytical Method:	<u>6020A</u>	Instrument ID:	<u>ICP-MS2</u>
ICAL Worknum:	<u>WG632169</u>	Initial Calibration Date:	<u>02-OCT-2017 12:02</u>

	WG632169-01		WG632169-02		WG632169-03		WG632169-04		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
ANTIMONY	0	433	.4	538	50	330000	100	638000	.999945	
ARSENIC	0	-75.8	.4	-21.5	50	49600	100	97600	.99999	
BARIUM	0	49.7	.4	188	50	149000	100	288000	.999962	
CADMIUM	0	11.0	.4	150	50	126000	100	247000	.999993	
CHROMIUM	0	10100	.4	10500	50	405000	100	790000	.999982	
COBALT	0	423	.4	883	50	456000	100	894000	.999996	
LEAD	0	391	.4	674	50	309000	100	616000	.999949	
MANGANESE	0	2120	.4	2660	50	608000	100	1200000	.999965	
NICKEL	0	316	.4	408	50	98100	100	190000	.999995	
SILVER	0	123	.4	563	50	410000	100	795000	.999963	
THALLIUM	0	13.7	.4	621	50	595000	100	1160000	.999998	
VANADIUM	0	2240	.4	2730	50	454000	100	881000	.999999	
ZINC	0	511	.4	356	50	46200	100	90900	.999981	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-06
 Instrument ID: ICP-MS2 Run Time: 12:08 Method: 6020A
 File ID: NI.100217.120855 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS2 - 02-OCT-17
 Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
SILVER	.2	.8	.2	U
ARSENIC	.2	.8	.2	U
BARIIUM	.6	2.4	.6	U
CADMIUM	.12	.48	.12	U
COBALT	.2	.8	.2	U
CHROMIUM	.4	1.6	.4	U
MANGANESE	.4	1.6	.4	U
NICKEL	.8	3.2	.8	U
LEAD	.2	.8	.2	U
ANTIMONY	.2	.8	.2	U
THALLIUM	.04	.16	.04	U
VANADIUM	.2	.8	.2	U
ZINC	5	20	5	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: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-12
 Instrument ID: ICP-MS2 Run Time: 12:28 Method: 6020A
 File ID: NI.100217.122816 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Antimony	0.200	0.800	0.200	U
Arsenic	0.200	0.800	0.200	U
Barium	0.600	2.40	0.600	U
Cadmium	0.120	0.480	0.120	U
Chromium	0.400	1.60	0.400	U
Cobalt	0.200	0.800	0.200	U
Lead	0.200	0.800	0.200	U
Manganese	0.400	1.60	0.400	U
Nickel	0.800	3.20	0.800	U
Silver	0.200	0.800	0.200	U
Thallium	0.0400	0.160	0.0400	U
Vanadium	0.200	0.800	0.200	U
Zinc	5.00	20.0	5.00	U

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



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-17
Instrument ID: ICP-MS2 Run Time: 13:06 Method: 6020A
File ID: NI.100217.130642 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Antimony	0.200	0.800	0.200	U
Arsenic	0.200	0.800	0.200	U
Barium	0.600	2.40	0.600	U
Cadmium	0.120	0.480	0.120	U
Chromium	0.400	1.60	0.400	U
Cobalt	0.200	0.800	0.200	U
Lead	0.200	0.800	0.200	U
Manganese	0.400	1.60	0.400	U
Nickel	0.800	3.20	0.800	U
Silver	0.200	0.800	0.200	U
Thallium	0.0400	0.160	0.0400	U
Vanadium	0.200	0.800	0.200	U
Zinc	5.00	20.0	5.00	U

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



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-19
 Instrument ID: ICP-MS2 Run Time: 13:46 Method: 6020A
 File ID: NI.100217.134613 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Antimony	0.200	0.800	0.200	U
Arsenic	0.200	0.800	0.200	U
Barium	0.600	2.40	0.600	U
Cadmium	0.120	0.480	0.120	U
Chromium	0.400	1.60	0.400	U
Cobalt	0.200	0.800	0.200	U
Lead	0.200	0.800	0.200	U
Manganese	0.400	1.60	0.400	U
Nickel	0.800	3.20	0.800	U
Silver	0.200	0.800	0.200	U
Thallium	0.0400	0.160	0.0400	U
Vanadium	0.200	0.800	0.200	U
Zinc	5.00	20.0	5.00	U

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



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-23
 Instrument ID: ICP-MS2 Run Time: 14:35 Method: 6020A
 File ID: NI.100217.143547 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Antimony	0.200	0.800	0.200	U
Arsenic	0.200	0.800	0.200	U
Barium	0.600	2.40	0.600	U
Cadmium	0.120	0.480	0.120	U
Chromium	0.400	1.60	0.400	U
Cobalt	0.200	0.800	0.200	U
Lead	0.200	0.800	0.200	U
Manganese	0.400	1.60	0.400	U
Nickel	0.800	3.20	0.800	U
Silver	0.200	0.800	0.200	U
Thallium	0.0400	0.160	0.0400	U
Vanadium	0.200	0.800	0.200	U
Zinc	5.00	20.0	5.00	U

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



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-27
 Instrument ID: ICP-MS2 Run Time: 16:09 Method: 6020A
 File ID: NI.100217.160938 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Antimony	0.200	0.800	0.330	F
Arsenic	0.200	0.800	0.200	U
Barium	0.600	2.40	0.600	U
Cadmium	0.120	0.480	0.120	U
Chromium	0.400	1.60	0.400	U
Cobalt	0.200	0.800	0.200	U
Lead	0.200	0.800	0.200	U
Manganese	0.400	1.60	0.400	U
Nickel	0.800	3.20	0.800	U
Silver	0.200	0.800	0.200	U
Thallium	0.0400	0.160	0.0400	U
Vanadium	0.200	0.800	0.200	U
Zinc	5.00	20.0	5.00	U

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



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-05
Instrument ID: ICP-MS2 Run Time: 12:05 Method: 6020A
File ID: NI.100217.120549 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Antimony	50	50.9	102	90 - 110	
Arsenic	50	50.0	100	90 - 110	
Barium	50	49.1	98.3	90 - 110	
Cadmium	50	49.9	99.9	90 - 110	
Chromium	50	49.3	98.6	90 - 110	
Cobalt	50	50.0	100	90 - 110	
Lead	50	50.0	100	90 - 110	
Manganese	50	49.3	98.5	90 - 110	
Nickel	50	50.2	100	90 - 110	
Silver	50	49.9	99.8	90 - 110	
Thallium	50	49.7	99.3	90 - 110	
Vanadium	50	49.7	99.4	90 - 110	
Zinc	50	50.1	100	90 - 110	

* Exceeds LIMITS Limit

Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-11
Instrument ID: ICP-MS2 Run Time: 12:25 Method: 6020A
File ID: NI.100217.122511 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.0500	0.0510	mg/L	102	90 - 110	
Arsenic	0.0500	0.0499	mg/L	99.8	90 - 110	
Barium	0.0500	0.0488	mg/L	97.6	90 - 110	
Cadmium	0.0500	0.0498	mg/L	99.5	90 - 110	
Chromium	0.0500	0.0486	mg/L	97.2	90 - 110	
Cobalt	0.0500	0.0493	mg/L	98.6	90 - 110	
Lead	0.0500	0.0498	mg/L	99.5	90 - 110	
Manganese	0.0500	0.0494	mg/L	98.7	90 - 110	
Nickel	0.0500	0.0495	mg/L	98.9	90 - 110	
Silver	0.0500	0.0502	mg/L	100	90 - 110	
Thallium	0.0500	0.0492	mg/L	98.5	90 - 110	
Vanadium	0.0500	0.0491	mg/L	98.1	90 - 110	
Zinc	0.0500	0.0494	mg/L	98.8	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
PDF File ID: 5507601
Report generated 10/03/2017 12:39



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-16
Instrument ID: ICP-MS2 Run Time: 13:03 Method: 6020A
File ID: NI.100217.130336 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.0500	0.0503	mg/L	101	90 - 110	
Arsenic	0.0500	0.0502	mg/L	100	90 - 110	
Barium	0.0500	0.0485	mg/L	97.1	90 - 110	
Cadmium	0.0500	0.0501	mg/L	100	90 - 110	
Chromium	0.0500	0.0490	mg/L	98.0	90 - 110	
Cobalt	0.0500	0.0503	mg/L	101	90 - 110	
Lead	0.0500	0.0500	mg/L	100	90 - 110	
Manganese	0.0500	0.0495	mg/L	99.0	90 - 110	
Nickel	0.0500	0.0495	mg/L	99.0	90 - 110	
Silver	0.0500	0.0502	mg/L	100	90 - 110	
Thallium	0.0500	0.0493	mg/L	98.7	90 - 110	
Vanadium	0.0500	0.0498	mg/L	99.6	90 - 110	
Zinc	0.0500	0.0502	mg/L	100	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
PDF File ID: 5507601
Report generated 10/03/2017 12:39



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-18
 Instrument ID: ICP-MS2 Run Time: 13:43 Method: 6020A
 File ID: NI.100217.134308 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.0500	0.0503	mg/L	101	90 - 110	
Arsenic	0.0500	0.0503	mg/L	101	90 - 110	
Barium	0.0500	0.0490	mg/L	97.9	90 - 110	
Cadmium	0.0500	0.0509	mg/L	102	90 - 110	
Chromium	0.0500	0.0494	mg/L	98.8	90 - 110	
Cobalt	0.0500	0.0499	mg/L	99.8	90 - 110	
Lead	0.0500	0.0498	mg/L	99.6	90 - 110	
Manganese	0.0500	0.0493	mg/L	98.6	90 - 110	
Nickel	0.0500	0.0499	mg/L	99.8	90 - 110	
Silver	0.0500	0.0508	mg/L	102	90 - 110	
Thallium	0.0500	0.0491	mg/L	98.2	90 - 110	
Vanadium	0.0500	0.0496	mg/L	99.3	90 - 110	
Zinc	0.0500	0.0511	mg/L	102	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
 PDF File ID: 5507601
 Report generated 10/03/2017 12:39



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-22
Instrument ID: ICP-MS2 Run Time: 14:32 Method: 6020A
File ID: NI.100217.143242 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.0500	0.0510	mg/L	102	90 - 110	
Arsenic	0.0500	0.0510	mg/L	102	90 - 110	
Barium	0.0500	0.0490	mg/L	98.1	90 - 110	
Cadmium	0.0500	0.0514	mg/L	103	90 - 110	
Chromium	0.0500	0.0494	mg/L	98.8	90 - 110	
Cobalt	0.0500	0.0499	mg/L	99.9	90 - 110	
Lead	0.0500	0.0502	mg/L	100	90 - 110	
Manganese	0.0500	0.0493	mg/L	98.5	90 - 110	
Nickel	0.0500	0.0500	mg/L	100	90 - 110	
Silver	0.0500	0.0512	mg/L	102	90 - 110	
Thallium	0.0500	0.0495	mg/L	98.9	90 - 110	
Vanadium	0.0500	0.0495	mg/L	98.9	90 - 110	
Zinc	0.0500	0.0509	mg/L	102	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
PDF File ID: 5507601
Report generated 10/03/2017 12:39



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-26
Instrument ID: ICP-MS2 Run Time: 16:06 Method: 6020A
File ID: NI.100217.160632 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.0500	0.0496	mg/L	99.2	90 - 110	
Arsenic	0.0500	0.0501	mg/L	100	90 - 110	
Barium	0.0500	0.0482	mg/L	96.5	90 - 110	
Cadmium	0.0500	0.0505	mg/L	101	90 - 110	
Chromium	0.0500	0.0492	mg/L	98.4	90 - 110	
Cobalt	0.0500	0.0495	mg/L	99.1	90 - 110	
Lead	0.0500	0.0496	mg/L	99.2	90 - 110	
Manganese	0.0500	0.0491	mg/L	98.2	90 - 110	
Nickel	0.0500	0.0502	mg/L	100	90 - 110	
Silver	0.0500	0.0502	mg/L	100	90 - 110	
Thallium	0.0500	0.0492	mg/L	98.5	90 - 110	
Vanadium	0.0500	0.0496	mg/L	99.2	90 - 110	
Zinc	0.0500	0.0499	mg/L	99.9	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
PDF File ID: 5507601
Report generated 10/03/2017 12:39



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-08
 Instrument ID: ICP-MS2 Run Time: 12:15 Method: 6020A
 File ID: NI.100217.121553 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.400	0.478	ug/L	119	70 - 130	
Arsenic	0.400	0.392	ug/L	98.1	70 - 130	
Barium	0.750	0.710	ug/L	94.6	70 - 130	
Cadmium	0.240	0.238	ug/L	99.1	70 - 130	
Chromium	0.800	0.572	ug/L	71.5	70 - 130	
Cobalt	0.400	0.387	ug/L	96.7	70 - 130	
Lead	0.200	0.194	ug/L	97.2	70 - 130	
Manganese	0.500	0.500	ug/L	100	70 - 130	
Nickel	1.60	1.55	ug/L	96.7	70 - 130	
Silver	0.400	0.387	ug/L	96.7	70 - 130	
Thallium	0.0800	0.0854	ug/L	107	70 - 130	
Vanadium	0.400	0.368	ug/L	92.1	70 - 130	
Zinc	6.25	6.04	ug/L	96.7	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-15
 Instrument ID: ICP-MS2 Run Time: 12:59 Method: 6020A
 File ID: NI.100217.125916 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.400	0.484	ug/L	121	70 - 130	
Arsenic	0.400	0.385	ug/L	96.1	70 - 130	
Barium	0.750	0.693	ug/L	92.4	70 - 130	
Cadmium	0.240	0.228	ug/L	95.0	70 - 130	
Chromium	0.800	0.563	ug/L	70.4	70 - 130	
Cobalt	0.400	0.379	ug/L	94.7	70 - 130	
Lead	0.200	0.191	ug/L	95.4	70 - 130	
Manganese	0.500	0.481	ug/L	96.2	70 - 130	
Nickel	1.60	1.55	ug/L	97.0	70 - 130	
Silver	0.400	0.375	ug/L	93.9	70 - 130	
Thallium	0.0800	0.0738	ug/L	92.3	70 - 130	
Vanadium	0.400	0.360	ug/L	89.9	70 - 130	
Zinc	6.25	6.04	ug/L	96.7	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-25
 Instrument ID: ICP-MS2 Run Time: 14:52 Method: 6020A
 File ID: NI.100217.145202 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.400	0.458	ug/L	115	70 - 130	
Arsenic	0.400	0.408	ug/L	102	70 - 130	
Barium	0.750	0.692	ug/L	92.3	70 - 130	
Cadmium	0.240	0.225	ug/L	93.7	70 - 130	
Chromium	0.800	0.673	ug/L	84.1	70 - 130	
Cobalt	0.400	0.365	ug/L	91.3	70 - 130	
Lead	0.200	0.192	ug/L	96.1	70 - 130	
Manganese	0.500	0.464	ug/L	92.8	70 - 130	
Nickel	1.60	1.47	ug/L	91.9	70 - 130	
Silver	0.400	0.375	ug/L	93.9	70 - 130	
Thallium	0.0800	0.0732	ug/L	91.5	70 - 130	
Vanadium	0.400	0.388	ug/L	97.1	70 - 130	
Zinc	6.25	5.84	ug/L	93.4	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091647 Run Date: 10/02/2017 Sample ID: WG632169-28
 Instrument ID: ICP-MS2 Run Time: 16:12 Method: 6020A
 File ID: NI.100217.161245 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.400	0.421	ug/L	105	70 - 130	
Arsenic	0.400	0.386	ug/L	96.5	70 - 130	
Barium	0.750	0.683	ug/L	91.1	70 - 130	
Cadmium	0.240	0.222	ug/L	92.3	70 - 130	
Chromium	0.800	0.509	ug/L	63.6	70 - 130	*
Cobalt	0.400	0.371	ug/L	92.9	70 - 130	
Lead	0.200	0.185	ug/L	92.4	70 - 130	
Manganese	0.500	0.442	ug/L	88.4	70 - 130	
Nickel	1.60	1.45	ug/L	90.8	70 - 130	
Silver	0.400	0.371	ug/L	92.8	70 - 130	
Thallium	0.0800	0.0749	ug/L	93.6	70 - 130	
Vanadium	0.400	0.346	ug/L	86.4	70 - 130	
Zinc	6.25	5.89	ug/L	94.2	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17091647
Instrument ID: ICP-MS2
Sol. A: WG632169-09
Sol. AB: WG632169-10

File ID: NI.100217.121858
File ID: NI.100217.122204

Workgroup (AAB#): WG632098
Method: 6020A
Units: ug/L
Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Antimony	NS	0.00970	NS	100	100	100	
Arsenic	NS	0.0137	NS	100	105	105	
Barium	NS	0.0529	NS	100	97.1	97.1	
Cadmium	NS	-0.0516	NS	100	102	102	
Chromium	NS	-0.215	NS	100	97.6	97.6	
Cobalt	NS	0.00850	NS	100	98.1	98.1	
Lead	NS	0.0494	NS	100	98.8	98.8	
Manganese	NS	0.0914	NS	100	98.1	98.1	
Nickel	NS	0.301	NS	100	97.7	97.7	
Silver	NS	0.00660	NS	100	85.4	85.4	
Thallium	NS	0.0358	NS	100	96.2	96.2	
Vanadium	NS	-0.0495	NS	100	97.2	97.2	
Zinc	NS	0.646	NS	100	110	110	

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: L17091647 Analytical Method: 6020
 Analytical Workgroup: WG632098 Matrix: 1
 Instrument: ICP-MS2 Analyst: JYH
 ICAL Date: 02-OCT-2017 11:53

Sample	Type	Run Date	BISMUTH	GERMANIUM	INDIUM
			% Rec	% Rec	% Rec
L17091647-01	SAMP	02-OCT-2017 13:27	101.076	103.34	100.378
L17091647-01	SAMP	02-OCT-2017 16:00	102.87	100.57	98.057
L17091648-01	SAMP	02-OCT-2017 13:30	95.659	100.037	96.441
WG632048-02	BLANK	02-OCT-2017 13:12	103.343	101.756	100.559
WG632048-03	LCS	02-OCT-2017 13:15	105.257	103.295	101.656
WG632098-01	PSPK	02-OCT-2017 13:33	96.662	101.743	98.032
WG632098-02	SERIAL	02-OCT-2017 13:36	97.185	96.633	92.755
WG632169-05	ICV	02-OCT-2017 12:05	99.424	98.598	97.333
WG632169-06	ICB	02-OCT-2017 12:08	95.816	91.596	90.688
WG632169-08	LLICV	02-OCT-2017 12:15	100.163	98.216	96.423
WG632169-09	ICS	02-OCT-2017 12:18	92.942	91.001	88.259
WG632169-10	ICS	02-OCT-2017 12:22	97.67	95.054	93.687
WG632169-11	CCV	02-OCT-2017 12:25	104.166	103.625	101.681
WG632169-12	CCB	02-OCT-2017 12:28	97.351	94.148	92.677
WG632169-15	LLCCV	02-OCT-2017 12:59	103.532	100.295	99.354
WG632169-16	CCV	02-OCT-2017 13:03	102.941	102.226	101.341
WG632169-17	CCB	02-OCT-2017 13:06	93.341	90.651	87.855
WG632169-18	CCV	02-OCT-2017 13:43	104.562	105.411	101.711
WG632169-19	CCB	02-OCT-2017 13:46	99.321	96.723	94.999
WG632169-22	CCV	02-OCT-2017 14:32	105.059	104.803	101.628
WG632169-23	CCB	02-OCT-2017 14:35	102.588	98.774	95.873
WG632169-25	LLCCV	02-OCT-2017 14:52	102.86	103.838	100.899
WG632169-26	CCV	02-OCT-2017 16:06	110.29	111.721	109.047
WG632169-27	CCB	02-OCT-2017 16:09	108.083	107.09	103.915
WG632169-28	LLCCV	02-OCT-2017 16:12	112.037	109.424	108.766

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: 5507596
 Report generated: 10/03/2017 12:39



Login Number: L17091647 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 Method 9056

2.4.1.1 Summary Data

Lab Report #: L17091647

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: IC1
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 9056	Prep Date: 10/06/2017 15:09
Matrix: Water	Analytical Method: 9056	Cal Date: 08/30/2017 13:05
Workgroup #: WG633037	Analyst: CAS	Run Date: 10/06/2017 17:35
Collect Date: 09/27/2017 15:00	Dilution: 5	File ID: I1_100617-11
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfate	14808-79-8	45.1		10.0	5.00	2.50
J	Estimated value ; the analyte concentration was greater than the highest standard					

Lab Report #: L17091647

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: IC1
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 9056	Prep Date: 10/06/2017 15:09
Matrix: Water	Analytical Method: 9056	Cal Date: 08/30/2017 13:05
Workgroup #: WG633037	Analyst: CAS	Run Date: 10/06/2017 17:53
Collect Date: 09/27/2017 15:00	Dilution: 50	File ID: I1_100617-12
Sample Tag: DL02	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	425		20.0	10.0	5.00
J	Estimated value ; the analyte concentration was less than the LOQ.					

2.4.1.2 QC Summary Data

9056/300 Calculations

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: IC1 _____ Dataset: 083017 IC1 ICAL.SEQ _____
 Analyst1: CAS _____ Analyst2: NA _____
 Method: 300/9056 _____ SOP: IC01 _____ Rev: 19 _____

Maintenance Log ID: _____ Syringe Filter Lot#: 170105254 _____

Eluent ID#: RGT41111 _____

Workgroups: Column 1 ID: AG14A 4-MM _____ Column 2 ID: AS14A 4-MM _____

Internal STD: NA _____ Surrogate STD: NA _____ Calibration STD: STD81395(30-AUG-2017)

CCV STD: STD81395 _____ LCS STD: STD81396 _____ MS/MSD STD: STD81396 _____

Comments: ICAL WG627709 : Alternate Source STD81396
 Guard Column : Ionpac AG14A (4x50mm)
 Dionex S/N 013738
 Analytical Column : Ionpac AS14A (4x250mm)
 Dionex S/N 010890
 Cond Suppressor : AERS 500 (4mm)
 Dionex S/N 170116007
 System backpressure = 1588psi

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	I1_083017-01	ELUENT	1	1		08/30/17 10:57
2	I1_083017-02	DI WATER	1	1		08/30/17 11:16
3	I1_083017-03	WG627709-01 STD	1	1	STD81395	08/30/17 11:34
4	I1_083017-04	WG627709-02 STD	1	1	STD81395	08/30/17 11:52
5	I1_083017-05	WG627709-03 STD	1	1	STD81395	08/30/17 12:10
6	I1_083017-06	WG627709-04 STD	1	1	STD81395	08/30/17 12:28
7	I1_083017-07	WG627709-05 STD	1	1	STD81395	08/30/17 12:47
8	I1_083017-08	WG627709-06 STD	1	1	STD81395	08/30/17 13:05
9	I1_083017-09	WG627709-07 SSCV	1	1	STD81396	08/30/17 13:23
10	I1_083017-10	LCRV @Level-6	1	1	STD81396	08/30/17 13:41
11	I1_083017-11	LCRV @Level-4	1	1	STD81396	08/30/17 14:00
12	I1_083017-12	LCRV @Level-2	1	1	STD81396	08/30/17 14:18
13	I1_083017-13	LCRV @Level-0	1	1		08/30/17 14:36
14	I1_083017-14	END	1	1		08/30/17 14:54

Comments

Seq.	Rerun	Dil.	Reason	Analytes

Page: 1

Approved: 30-AUG-17

Eri C. Zimm



Microbac Laboratories Inc.
Instrument Run Log

Instrument: IC1 _____ Dataset: 100617 IC1.SEQ _____
 Analyst1: CAS _____ Analyst2: NA _____
 Method: 300/9056 _____ SOP: IC01 _____ Rev: 19 _____

Maintenance Log ID: _____ Syringe Filter Lot#: 170105254 _____
 Eluent ID#: RGT41497 _____

Workgroups: Column 1 ID: AG14A 4MM _____ Column 2 ID: AS14A 4MM _____
 Analytical WG633037 (Waters) _____
 Internal STD: NA _____ Surrogate STD: NA _____ Calibration STD STD81395(30-AUG-2017) _____
 CCV STD: STD84264 _____ LCS STD: STD84265 _____ MS/MSD STD: STD84265 _____

Comments: System Backpressure: 1678 psi

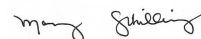
Samples L17091647-01, L17091648-01, L17100200-01, L17100201-01, L17100202-01, and L17100392-01 were analyzed at dilutions only due to their pre-run screen results for chloride, which were greater than 200 ppm.

Samples L17100141-01 and L17100384-01 were analyzed at dilutions only due to their pre-run screen results for sulfate, which were greater than the calibration maximum.

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	I1_100617-01	ELUENT	1	1		10/06/17 14:33
2	I1_100617-02	DI WATER	1	1		10/06/17 14:51
3	I1_100617-03	WG633039-01 ANION CCV	1	1	STD84264	10/06/17 15:09
4	I1_100617-04	WG633039-02 ANION CCB	1	1		10/06/17 15:27
5	I1_100617-05	WG633037-01 ANION BLANK	1	1		10/06/17 15:45
6	I1_100617-06	WG633037-02 ANION LCS	1	1	STD84265	10/06/17 16:04
7	I1_100617-07	L17091614-01 (SO4)	2	1		10/06/17 16:22
8	I1_100617-08	L17091620-01 (F,CL,SO4) REF	1	1		10/06/17 16:40
9	I1_100617-09	WG633037-04 DUP 1620-01	2	1		10/06/17 16:58
10	I1_100617-10	L17091620-02 (F,CL,SO4)	2	1		10/06/17 17:17
11	I1_100617-11	L17091647-01 (CL,SO4) 5x	1	5		10/06/17 17:35
12	I1_100617-12	L17091647-01 RR CL 50x	1	50		10/06/17 17:53
13	I1_100617-13	L17091648-01 (CL,SO4) 5x	1	5		10/06/17 18:11
14	I1_100617-14	L17091648-01 RR CL 50x	1	50		10/06/17 18:29
15	I1_100617-15	WG633039-03 ANION CCV	1	1	STD84264	10/06/17 18:48
16	I1_100617-16	WG633039-04 ANION CCB	1	1		10/06/17 19:06
17	I1_100617-17	L17100384-01 (SO4) 100x	2	100		10/06/17 19:24
18	I1_100617-18	L17100141-01 (SO4) 100x	2	100		10/06/17 19:42
19	I1_100617-19	L17091733-01 (F) REF	1	1		10/06/17 20:00
20	I1_100617-20	WG633037-06 DUP 1733-01	2	1		10/06/17 20:19
21	I1_100617-21	L17091733-02 (F) MS	1	1	STD84265	10/06/17 20:37
22	I1_100617-22	L17091733-03 (F) MSD	1	1	STD84265	10/06/17 20:55
23	I1_100617-23	L17100200-01 (CL,SO4) 5x	1	5		10/06/17 21:13
24	I1_100617-24	L17100200-01 RR CL 50x	1	50		10/06/17 21:31
25	I1_100617-25	L17100201-01 (CL,SO4) 100x	1	100		10/06/17 21:50
26	I1_100617-26	L17100201-01 RR CL 1000x	1	1000		10/06/17 22:08
27	I1_100617-27	WG633039-05 ANION CCV	1	1	STD84264	10/06/17 22:26
28	I1_100617-28	WG633039-06 ANION CCB	1	1		10/06/17 22:44
29	I1_100617-29	L17100202-01 (CL,SO4) 100x	1	100		10/06/17 23:03
30	I1_100617-30	L17100202-01 RR CL 1000x	1	1000		10/06/17 23:21

Page: 1

Approved: 09-OCT-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: IC1 _____ Dataset: 100617 IC1.SEQ _____
 Analyst1: CAS _____ Analyst2: NA _____
 Method: 300/9056 _____ SOP: IC01 _____ Rev: 19 _____

Maintenance Log ID: _____ Syringe Filter Lot#: 170105254 _____
 Eluent ID#: RGT41497 _____

Workgroups: Column 1 ID: AG14A 4MM _____ Column 2 ID: AS14A 4MM _____
 Analytical WG633037 (Waters) _____
 Internal STD: NA _____ Surrogate STD: NA _____ STD81395(30-AUG-2017) _____
 CCV STD: STD84264 _____ LCS STD: STD84265 _____ STD84265 _____

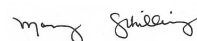
Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
31	I1_100617-31	L17100392-01 (CL,SO4) 100x	1	100		10/06/17 23:39
32	I1_100617-32	L17100392-01 RR CL 1000x	1	1000		10/06/17 23:57
33	I1_100617-33	WG633039-07 ANION CCV	1	1	STD84264	10/07/17 00:15
34	I1_100617-34	WG633039-08 ANION CCB	1	1		10/07/17 00:34
35	I1_100617-35	END	1	1		10/07/17 00:52

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Page: 2

Approved: 09-OCT-17




Microbac Laboratories Inc.

Data Checklist

Date: 30-AUG-2017
 Analyst: CAS
 Analyst: NA
 Method: 300/9056
 Instrument: IC1
 Curve Workgroup: WG627709
 Runlog ID: 84296
 Analytical Workgroups: ICAL ONLY

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)	1678 PSI
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)	NA
% D/% Drift	NA
Minimum response factors (MS)	NA
Continuing calibration blank (CCB) (IC)	NA
Special standards	NA
Blanks	NA
TCL hits	NA
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	NA
Recoveries	NA
Surrogate recoveries	NA
MS/MSD/Sample duplicates	NA
Recoveries	NA
%RPD	NA
Samples	NA
TCL hits	NA
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	NA
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:
30-AUG-2017



Secondary Reviewer:
30-AUG-2017



CHECKLIST1 - Modified 03/05/2008

Generated: AUG-30-2017 16:25:42



Microbac Laboratories Inc.

Data Checklist

Date: 06-OCT-2017
 Analyst: CAS
 Analyst: NA
 Method: 300/9056
 Instrument: IC1
 Curve Workgroup: NA
 Runlog ID: 85110
 Analytical Workgroups: L17091614,1620,1647,1648,1733,L17100141,0200,0201,0202,0384,039

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)	1678 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:
09-OCT-2017



Secondary Reviewer:
09-OCT-2017




Analytical Method:9056
Login Number:L17091647

AAB#:WG633037

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-SP140-7472-GRAB	01	09/27/17					10/06/2017	9	2	*	10/06/17	9.1	2	*
LH18/24-SP140-7472-GRAB	01	09/27/17					10/06/2017	9	2	*	10/06/17	9.1	2	*

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091647
 Blank File ID: I1_100617-05
 Prep Date: 10/06/17 15:09
 Analyzed Date: 10/06/17 15:45
 Analyst: CAS

Work Group: WG633037
 Blank Sample ID: WG633037-01
 Instrument ID: IC1
 Method: 9056

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG633037-02	I1_100617-06	10/06/17 16:04	01
DUP	WG633037-04	I1_100617-09	10/06/17 16:58	01
LH18/24-SP140-7472-GRAB	L17091647-01	I1_100617-11	10/06/17 17:35	DL01
LH18/24-SP140-7472-GRAB	L17091647-01	I1_100617-12	10/06/17 17:53	DL02
DUP	WG633037-06	I1_100617-20	10/06/17 20:19	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5515972
 Report generated 10/09/2017 13:28



Login Number: L17091647 Prep Date: 10/06/17 15:09 Sample ID: WG633037-01
 Instrument ID: IC1 Run Date: 10/06/17 15:45 Prep Method: 9056
 File ID: I1 100617-05 Analyst: CAS Method: 9056
 Workgroup (AAB#): WG633037 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: IC1-30-AUG-17

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: 5515973
 09-OCT-2017 13:28



Login Number: L17091647 Run Date: 10/06/2017 Sample ID: WG633037-02
Instrument ID: IC1 Run Time: 16:04 Prep Method: 9056
File ID: I1 100617-06 Analyst: CAS Method: 9056
Workgroup (AAB#): WG633037 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD84265 Cal ID: IC1-30-AUG-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Chloride	8.00	8.17	102	90 - 110	
Sulfate	40.0	41.6	104	90 - 110	

LCS - Modified 03/06/2008
PDF File ID: 5515974
Report generated: 10/09/2017 13:28



Login Number: L17091647
Analytical Method: 9056
ICAL Workgroup: WG627709

Instrument ID: IC1
Initial Calibration Date: 30-AUG-17 13:05
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
Chloride	5.705	6.21		0.99800
Sulfate	7.895	10.4		0.99700

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

INT_CAL - Modified 03/06/2008
PDF File ID: 5517269
Report generated 10/09/2017 13:28



Login Number: L17091647
 Analytical Method: 9056

Instrument ID: IC1
 Initial Calibration Date: 30-AUG-17 13:05
 Column ID: F

Analyte	WG627709-01			WG627709-02			WG627709-03		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Chloride	0.200	0.037000000 0	5.405	1.00	0.168000000	5.952	4.00	0.659000000	6.070
Sulfate	1.00	0.113000000	8.850	5.00	0.588000000	8.503	20.0	2.45200000	8.157

INT_CAL - Modified 03/06/2008
 PDF File ID: 5517269
 Report generated 10/09/2017 13:28



Login Number: L17091647
 Analytical Method: 9056

Instrument ID: IC1
 Initial Calibration Date: 30-AUG-17 13:05
 Column ID: F

Analyte	WG627709-04			WG627709-05			WG627709-06		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Chloride	8.00	1.36500000	5.861	12.0	2.08300000	5.761	24.0	4.63300000	5.180
Sulfate	40.0	5.18300000	7.718	60.0	8.02200000	7.479	120	18.01500000	6.661

INT_CAL - Modified 03/06/2008
 PDF File ID: 5517269
 Report generated 10/09/2017 13:28



Login Number: L17091647 Run Date: 08/30/2017 Sample ID: WG627709-07
 Instrument ID: IC1 Run Time: 13:23 Method: 9056
 File ID: I1 083017-09 Analyst: CAS QC Key: DOD4
 ICal Workgroup: WG627709 Cal ID: IC1 - 30-AUG-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
Chloride	8.00	8.25	mg/L	5.71	3.10	10	
Sulfate	40.0	41.3	mg/L	7.51	3.20	10	

* Exceeds %D Limit



Login Number: L17091647 Run Date: 10/06/2017 Sample ID: WG633039-02
 Instrument ID: IC1 Run Time: 15:27 Method: 9056
 File ID: I1 100617-04 Analyst: CAS Units: mg/L
 Workgroup (AAB#): WG633037 Cal ID: IC1 - 30-AUG-17
 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: L17091647 Run Date: 10/06/2017 Sample ID: WG633039-04
 Instrument ID: IC1 Run Time: 19:06 Method: 9056
 File ID: I1 100617-16 Analyst: CAS Units: mg/L
 Workgroup (AAB#): WG633037 Cal ID: IC1 - 30-AUG-17
 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: L17091647 Run Date: 10/06/2017 Sample ID: WG633039-01
 Instrument ID: IC1 Run Time: 15:09 Method: 9056
 File ID: I1 100617-03 Analyst: CAS QC Key: DOD4
 Workgroup (AAB#): WG633037 Cal ID: IC1 - 30-AUG-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Chloride	8.00	8.17	mg/L	5.77	2.11	10	
Sulfate	40.0	41.5	mg/L	7.46	3.84	10	

* Exceeds %D Criteria



Login Number: L17091647 Run Date: 10/06/2017 Sample ID: WG633039-03
Instrument ID: IC1 Run Time: 18:48 Method: 9056
File ID: I1 100617-15 Analyst: CAS QC Key: DOD4
Workgroup (AAB#): WG633037 Cal ID: IC1 - 30-AUG-17
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Chloride	8.00	8.21	mg/L	5.74	2.66	10	
Sulfate	40.0	41.7	mg/L	7.43	4.24	10	

* Exceeds %D Criteria



2.4 General Chemistry Data

2.4.2 COD Data

2.4.2.1 Summary Data

Lab Report #: L17091647

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: V-1200
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: METHOD	Prep Date: N/A
Matrix: Water	Analytical Method: 410.4 MOD	Cal Date: 08/29/2017 10:16
Workgroup #: WG632279	Analyst: DLP	Run Date: 10/03/2017 10:00
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: 00.1710031000-09
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chemical Oxygen Demand	COD	17.4	J	40.0	20.0	10.0
J	Estimated value ; the analyte concentration was less than the LOQ.					

2.4.2.2 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: 03-OCT-2017
 Analyst: DLP
 Analyst: NA
 Method: COD-LOW
 Instrument: V-1200
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG632279

Calibration/Linearity	08-29-17
Second Source Check	
ICV/CCV (std)	X
ICB/CCB	
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:
05-OCT-2017

Secondary Reviewer:
09-OCT-2017

Dwight Payne

Denna Johnson



Analytical Method: 410.4 MOD
Login Number: L17091647

AAB#: WG632279

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-SP140-7472-GRAB	01	09/27/17					10/03/2017	5.8	28		10/03/17	5.8	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091647 Work Group: WG632279
 Blank File ID: 00.1710031000-02 Blank Sample ID: WG632279-01
 Prep Date: 10/03/17 10:00 Instrument ID: V-1200
 Analyzed Date: 10/03/17 10:00 Method: 410.4 MOD
 Analyst: DLP

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632279-02	00.1710031000-03	10/03/17 10:00	
LCS2	WG632279-03	00.1710031000-04	10/03/17 10:00	
LH18/24-SP140-7472-GRAB	L17091647-01	00.1710031000-09	10/03/17 10:00	
DUP	WG632279-05	00.1710031000-13	10/03/17 10:00	

Report Name: BLANK_SUMMARY
 PDF File ID: 5511866
 Report generated 10/05/2017 10:53



Login Number: L17091647 Prep Date: 10/03/17 10:00 Sample ID: WG632279-01
 Instrument ID: V-1200 Run Date: 10/03/17 10:00 Prep Method: METHOD
 File ID: 00.1710031000-02 Analyst: DLP Method: 410.4 MOD
 Workgroup (AAB#): WG632279 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: V-1200-28-SEP-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Chemical Oxygen Demand	10.0	40.0	10.0	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: 5511867
 05-OCT-2017 10:53



Login Number: L17091647 Analyst: DLP Prep Method: METHOD
 Instrument ID: V-1200 Matrix: Water Method: 410.4 MOD
 Workgroup (AAB#): WG632279 Units: mg/L
 QC Key: DOD4 Lot #: STD83277
 Sample ID: WG632279-02 LCS File ID: 00.1710031000-03 Run Date: 10/03/2017 10:00
 Sample ID: WG632279-03 LCS2 File ID: 00.1710031000-04 Run Date: 10/03/2017 10:00

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Chemical Oxygen Demand	100	98.0	98.0	100	98.8	98.8	0.857	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5511868
 Report generated: 10/05/2017 10:53



2.4.2.3 Raw Data

Curves

WG 627639

Parameter: COD-LOW

Spectrophotometer: V-1200

Calibration (Curve) standard stock: STD 83440

Concentration: 10,000 mg/L

Recipe for preparation of curve standards found in:
 SOP: 4105 Revision: 17 Page: 10

Second Source Stock: STD83277 (concentration: 1000 mg/L)

Daily Preparation: $\frac{55,000}{120} \times 160 =$
 concentration = _____

Calibration Standards (mg/L)	Volume (mL)	Cell Size (cm)	Wavelength (nm)	Absorbance
STD 5	150	2	420	0.119 / 0.201
STD 6	100	1		0.323 / 0.321
STD 7	50	1		0.475 / 0.363
STD 8	30	1		0.484 / 0.483
STD 9	20	1		0.514 / 0.500
STD 10	5	1		0.546 / 0.546
STD 11	0	1		0.557 / 0.556
2nd source (100)	2	1		0.459 / 0.321 / 0.326

Analyst: Quinty Rapp

Date/Time: 08-29-17 1016

DCN#127947



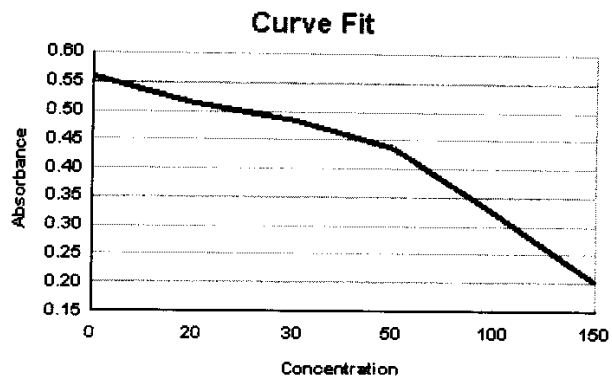
Microbac Laboratories Inc.
INITIAL CALIBRATION

Workgroup: WG627639
Analytical Method: 400
Instrument ID: V-1200

Analyst: DLP
Initial Calibration Date: 08/29/2017

Analyte: **CHEMICAL OXYGEN DEMAND**
Number of Points: 6
Slope: -0.00237041
Y-Intercept: 0.557274
Coef. Of Correlation (R^2): 0.999506
Coef. Of Correlation (R): 0.999753

Concentration X	Absorbance Y	X ²	X * Y	Y-Fitted (mX^2+B)
0.00	0.557	0.00	0.00	0.557274
20.0	0.514	400	10.3	0.509866
30.0	0.484	900	14.5	0.486162
50.0	0.435	2500	21.8	0.438753
100	0.323	10000	32.3	0.320233
150	0.201	22500	30.2	0.201712



WG_ICAL_CAL_WET - Modified 03/06/2008
Report generated 08/30/2017 08:33



Microbac Laboratories Inc.
ALTERNATE SOURCE REPORT

Workgroup #: WG627639

File ID: 00.1708291016-07

CCV ID: WG627639-07

Units: mg/L

Analyte: CHEMICAL OXYGEN DEMAND

Instrument ID: V-1200

Run Date: 08/29/2017

Run Time: 10:16

Analyst: DLP

Cal ID: V-1200 - 29-AUG-17 10:16:06

Analyte	Expected	Found	RF	%D	Q
Chemical Oxygen Demand	100	99.7	0.00321	0.3	

* Exceeds %D Limit

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

WET_WG_SSCV - Modified 03/06/2008
Report generated 08/30/2017 08:33



WORKGROUP: WG632279

COD LOW

EPA 410.4/SMS220D/HACH 8000

CCV: STD 83440

LCS: STD 83277

Spike: STD 83277

SOP K4105 Revision #: 17

Daily dilution: 2(10,000)/150 = 60

Daily dilution: 5(1000)/150 =

Daily dilution: 0.1(1000)/12 =

Curve ID: 627609

8-29-17

Wavelength (nm): 420

Daily dilution: 5(60)/150 = 60

Daily dilution: 100

Daily dilution: 50

Hot Block Temp: 48 C

Spectrophotometer: V-1200

All samples use 2ml

Hot Block ID: 500-3

COD vial Lot # A7102

SAMPLE	DILUTION	ABSORBANCE 1	ABSORBANCE 2
CCV: <u>60</u> mg/L		<u>0.418</u>	
BLANK:		<u>0.550</u>	
LCS: <u>100</u> mg/L		<u>0.328</u>	
LCS DUP: <u>100</u> mg/L		<u>0.323</u>	
<u>09-1614-01</u>		<u>0.540</u>	
<u>09-1620-01</u>		<u>0.520</u>	
<u>-02</u>		<u>0.512</u>	
<u>09-1636-07</u>		<u>0.540</u>	
<u>09-1647-01</u>		<u>0.516</u>	
<u>09-1648-01</u>		<u>0.335</u>	
<u>09-1736-01</u>		<u>0.554</u>	
<u>09-1727-01</u>		<u>0.293</u>	
DUP: <u>09-1614-01</u>		<u>0.540</u>	
MS: (<u>BL</u>) <u>1614-01</u>		<u>0.424</u>	
MDS: ()			
CCV: <u>60</u> mg/L		<u>0.416</u>	

ANALYST: Rosetta Ray

DATE/TIME: (on) 10-03-17/1000

DATE/TIME: (off) 10-03-17/1200

DCN#128676



Microbac Laboratories Inc.
SAMPLE REPORT

Workgroup: WG632279Analyst: DLPAnalyte: CHEMICAL OXYGEN DEMANDDate: 10/03/2017

Sample ID	I Vol	F Vol	Response	Slope	Y Intercept	Anal. Conc.	Rep. Conc.	Dil	Units
WG632279-01	2	2	0.550	-0.002370	0.5573	3.0686	3.0686	1	mg/L
WG632279-02	2	2	0.325	-0.002370	0.5573	97.989	97.989	1	mg/L
WG632279-03	2	2	0.323	-0.002370	0.5573	98.833	98.833	1	mg/L
L17091614-01	2	2	0.540	-0.002370	0.5573	7.2873	ND	1	mg/L
WG632279-04	2	2	0.540	-0.002370	0.5573	7.2873	7.2873	1	mg/L
L17091620-01	2	2	0.520	-0.002370	0.5573	15.725	15.725 F	1	mg/L
L17091620-02	2	2	0.512	-0.002370	0.5573	19.100	19.100 F	1	mg/L
L17091636-07	2	2	0.540	-0.002370	0.5573	7.2873	ND	1	mg/L
L17091647-01	2	2	0.516	-0.002370	0.5573	17.412	17.412 F	1	mg/L
L17091648-01	2	2	0.335	-0.002370	0.5573	93.770	93.770	1	mg/L
L17091736-01	2	2	0.554	-0.002370	0.5573	1.3811	ND	1	mg/L
L17091727-01	2	2	0.293	-0.002370	0.5573	111.49	111.49	1	mg/L
WG632279-05	2	2	0.540	-0.002370	0.5573	7.2873	7.2873	1	mg/L
WG632279-06	2	2	0.424	-0.002370	0.5573	56.224	56.224	1	mg/L

UV_SAMPLE_REPORT - Modified 03/06/2008

Report generated 10/05/2017 08:09

Workgroup #: WG632638 Instrument ID: V-1200
File ID: 00.1710031000-01 Run Date: 10/03/2017
CCV ID: WG632638-01 Run Time: 10:00
Units: mg/L Analyst: DLP
Analyte: CHEMICAL OXYGEN DEMAND Cal ID: V-1200 - 28-SEP-17

Analyte	Expected	Found	RF	%D	Q
Chemical Oxygen Demand	60	60.0	0.00692	0.0	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 10/05/2017 08:05



Workgroup #: WG632638 Instrument ID: V-1200
File ID: 00.1710031000-15 Run Date: 10/03/2017
CCV ID: WG632638-02 Run Time: 10:00
Units: mg/L Analyst: DLP
Analyte: CHEMICAL OXYGEN DEMAND Cal ID: V-1200 - 28-SEP-17

Analyte	Expected	Found	RF	%D	Q
Chemical Oxygen Demand	60	59.6	0.00693	0.7	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 10/05/2017 08:05



2.4 General Chemistry Data

2.4.3 Oil and Grease Data

2.4.3.1 Summary Data

Lab Report #: L17091647

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091647-01	PrePrep Method: N/A	Instrument: HORIZON
Client ID: LH18/24-SP140-7472-GRAB	Prep Method: 1664A	Prep Date: N/A
Matrix: Water	Analytical Method: 1664A	Cal Date:
Workgroup #: WG632290	Analyst: AWE	Run Date: 10/03/2017 12:40
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: ON.1710031240-14
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
n-Hexane Extractable Material (HEM)	OILGREASE	2.80	U	5.60	2.80	1.40
U	Analyte was not detected. The concentration is below the reported LOD.					

2.4.3.2 QC Summary Data

Example Oil and Grease - HEM Calculations

$$[(WT2 - WT1) * 1000000]/\text{volume} = \text{mg/L}$$

where:

WT1 = weight (grams) of empty container.

WT2 = weight (grams) of dried sample and container.

1000000 = factor to get to mg/L.

volume = mL of sample used.

The samples are not blank corrected.

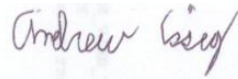
Microbac Laboratories Inc.

Data Checklist

Date: 03-OCT-2017
 Analyst: AWE
 Analyst: NA
 Method: HEM
 Instrument: HORIZON
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG632290

Calibration/Linearity	10/03/17
Second Source Check	
ICV/CCV (std)	
ICB/CCB	
Blank	X
LCS/LCS Dup	X
MS/MSD	
Duplicate	
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	AWE
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
04-OCT-2017



Secondary Reviewer:
09-OCT-2017




Analytical Method:1664A
Login Number:L17091647

AAB#:WG632290

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-SP140-7472-GRAB	01	09/27/17					10/03/2017	5.9	28		10/03/17	5.9	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091647 Work Group: WG632290
 Blank File ID: ON.1710031240-01 Blank Sample ID: WG632290-01
 Prep Date: 10/03/17 12:40 Instrument ID: HORIZON
 Analyzed Date: 10/03/17 12:40 Method: 1664A
 Analyst: AWE

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632290-02	ON.1710031240-02	10/03/17 12:40	
LCS2	WG632290-03	ON.1710031240-03	10/03/17 12:40	
LH18/24-SP140-7472-GRAB	L17091647-01	ON.1710031240-14	10/03/17 12:40	

Report Name: BLANK_SUMMARY
 PDF File ID: 5509409
 Report generated 10/04/2017 11:27



Login Number: L17091647 Prep Date: 10/03/17 12:40 Sample ID: WG632290-01
 Instrument ID: HORIZON Run Date: 10/03/17 12:40 Prep Method: 1664A
 File ID: ON.1710031240-01 Analyst: AWE Method: 1664A
 Workgroup (AAB#): WG632290 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: HORIZO-

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
n-Hexane Extractable Material (HEM)	1.40	5.60	1.40	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: 5509410
 04-OCT-2017 11:27



Login Number: L17091647 Analyst: AWE Prep Method: 1664A
 Instrument ID: HORIZON Matrix: Water Method: 1664A
 Workgroup (AAB#): WG632290 Units: mg/L
 QC Key: DOD4 Lot #: STD84125
 Sample ID: WG632290-02 LCS File ID: ON.1710031240-02 Run Date: 10/03/2017 12:40
 Sample ID: WG632290-03 LCS2 File ID: ON.1710031240-03 Run Date: 10/03/2017 12:40

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
n-Hexane Extractable Material (HEM)	40.0	37.7	94.3	40.0	38.6	96.5	2.36	78 - 114	18	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5509412
 Report generated: 10/04/2017 11:27



2.4.3.3 Raw Data

Hexane Extractable Material

SOP K1664 Revision #: 12
 EPA Method 1664A HEM or NPM

LCS: 57d 84125
 Daily Dilution: 5(8000)/1000 = 40
 Matrix Spike: _____
 Daily Dilution: _____
 All results are mg/L

Speed Vap Temperature: 40
 Balance: ANDGR-202 / other
 Instrument: Horizon 3000XL PP901

Sample	Disk Type	pH Check	EXT. #	Volume (mL)	Initial Weight WT1 (g)	Dry Weight WT2 (g)	Comments
BLANK	J	J	3	1000			Beginning weight check
LCS: _____ mg/L	J	J	1	1000			
LCSDUP: _____ mg/L	J	J	2	1000			
096002-13	J	J	1	1000			2 mg 0.0021
-14	J	J	2	1000			1 g 1.0000
091611-01	J	J	3	980			
-02	J	J	1	990			
091614-01	J	J	2	980			
091615-02	J	J	3	930			
-04	J	J	1	940			
-06	J	J	2	970			
091620-01	J	J	3	980			
-02	J	J	1	1000			
091647-01	J	J	2	1000			
091648-01	J	J	3	1000			
091649-01	J	J	1	880			Jars were composited
091743-01	J	J	2	1000			
100001-01	J	J	3	1000			
100003-01	J	J	1	1000			
100112-01	J	J	2	1000			
-02	J	J	3	1000			Ending weight check
							2 mg 0.0019
DUP							1 g 0.0019 ^{ave} 1.0002 ₁₀₋₃₁₇

Disk Type:			
P47 (Pacific 47mm)	P90 (Pacific 90mm)	PF (pre filter)	Hexane (0A1997)
Lot: _____	Lot: <u>510505</u>	Lot: <u>70610210</u>	Lot: <u>173326</u>
			Silica Gel: _____
pH paper <u>15A3951</u>	Lot #: _____		Lot: _____

Analyst: Andrew Eising Date / Time: 10-3-17 / 1240 Daily Maintenance Witness: EPT
 *Duplicates/MS/MSD are analyzed only if sufficient volume is submitted by the client.

$$MDL = \frac{10}{100} \left(\frac{8000}{4000} - 1 \right) = \frac{10}{100} \left(\frac{800}{1000} - 1 \right) = 4$$

$$LOD = \frac{10}{100} \left(\frac{8000}{4000} - 1 \right) = \frac{10}{100} \left(\frac{800}{1000} - 1 \right) = 2$$

$$LOQ = \frac{10}{100} \left(\frac{8000}{4000} - 1 \right) = \frac{10}{100} \left(\frac{800}{1000} - 1 \right) = 4$$

DCN#128677

$$MDL = \frac{10}{100} (8000) - \frac{10}{1000} (800)$$



Microbac Laboratories Inc.
GRAVIMETRIC REPORT

00862632

Workgroup (AAB#): WG632290
Analyst: AWE
Analyte: OIL & GREASE
Balance: BAL004

Method: 1664A
SOP: K1664 Revision 12
Spike Solution: STD84125
Daily Dilution: _____

SAMPLE ID	Measurement	HORIZONTAL VOL	INITIAL WT	DRY WT A	DRY WT B	DRY WT C	Anal. Conc	Rep. Conc.	Units
WG632290-01	B	1000	2.3402	2.3404	2.3403		0.1000	0.1000	mg/L
WG632290-02	L	1000	2.3154	2.353	2.3531		37.70	37.70	mg/L
WG632290-03	L2	1000	2.3082	2.3467	2.3468		38.60	38.60	mg/L
L17090002-13	1	1000	2.3479	2.3529	2.3528		4.900	4.900	mg/L
L17090002-14	2	1000	2.3067	2.3125	2.3128		6.100	6.100	mg/L
L17091611-01	3	980	2.3382	2.3383	2.3386		0.4082	ND	mg/L
L17091611-02	4	990	2.32	2.3206	2.3206		0.6061	ND	mg/L
L17091614-01	5	980	2.3374	2.3377	2.3375		0.1020	ND	mg/L
L17091615-02	6	930	2.286	2.2863	2.2863		0.3226	ND	mg/L
L17091615-04	7	940	2.3023	2.3031	2.3028		0.5319	ND	mg/L
L17091615-06	8	970	2.3224	2.3227	2.3228		0.4124	ND	mg/L
L17091620-01	9	980	2.3275	2.3279	2.3279		0.4082	ND	mg/L
L17091620-02	10	1000	2.2585	2.2588	2.2586		0.1000	ND	mg/L
L17091647-01	11	1000	2.2943	2.2947	2.2946		0.3000	ND	mg/L
L17091648-01	12	1000	2.2812	2.2816	2.2813		0.1000	ND	mg/L
L17091649-01	13	880	2.3296	2.3605	2.3602		34.77	34.77	mg/L
L17091743-01	14	1000	2.2607	2.261	2.261		0.3000	ND	mg/L
L17100001-01	15	1000	2.3414	2.3426	2.3425		1.100	1.100	mg/L
L17100003-01	16	1000	2.3479	2.3529	2.3528		4.900	4.900	mg/L
L17100112-01	17	1000	2.2935	2.2937	2.2937		0.2000	ND	mg/L
L17100112-02	18	1000	2.3829	2.383	2.383		0.1000	ND	mg/L

Analyst: Andrew Giesy

Date/Time (on) : 10/03/2017 12:40
Date/Time (off) : 10/03/2017 15:10
Date/Time (off) : 10/03/2017 15:40
Date/Time (off) : _____

*Duplicate required on 10% of samples

CONT_GRAV_REPORT - Modified 02/18/2011
PDF ID: 5507657
Report generated: 10/03/2017 17:04



Workgroup (AAB#): WG632290
 Analyst: AWE
 Analyte: OIL & GREASE
 Balance: BAL004

Method: 1664A
 SOP: K1664 Revision 12
 Spike Solution: STD84125
 Daily Dilution: _____

SAMPLE ID	Instrument#	HORIZONTAL VOL	INITIAL WT	DRY WT A	DRY WT B	DRY WT C	Anal. Conc	Rep. Conc.	Units
WG632290-01	B	1000	2.3402	2.3404	2.3403		0.1000	0.1000	mg/L
WG632290-02	L	1000	2.3154	2.353	2.3531		37.70	37.70	mg/L
WG632290-03	L2	1000	2.3082	2.3467	2.3468		38.60	38.60	mg/L
L17090002-13	1	1000	2.3479	2.3529	2.3528		4.900	4.900	mg/L
L17090002-14	2	1000	2.3067	2.3125	2.3128		6.100	6.100	mg/L
L17091611-01	3	980	2.3382	2.3383	2.3386		0.4082	ND	mg/L
L17091611-02	4	990	2.32	2.3206	2.3206		0.6061	ND	mg/L
L17091614-01	5	980	2.3374	2.3377	2.3375		0.1020	ND	mg/L
L17091615-02	6	930	2.286	2.2863	2.2863		0.3226	ND	mg/L
L17091615-04	7	940	2.3023	2.3031	2.3028		0.5319	ND	mg/L
L17091615-06	8	970	2.3224	2.3227	2.3228		0.4124	ND	mg/L
L17091620-01	9	980	2.3275	2.3279	2.3279		0.4082	ND	mg/L
L17091620-02	10	1000	2.2585	2.2588	2.2586		0.1000	ND	mg/L
L17091647-01	11	1000	2.2943	2.2947	2.2946		0.3000	ND	mg/L
L17091648-01	12	1000	2.2812	2.2816	2.2813		0.1000	ND	mg/L
L17091649-01	13	880	2.3296	2.3605	2.3602		34.77	34.77	mg/L
L17091743-01	14	1000	2.2607	2.261	2.261		0.3000	ND	mg/L
L17100001-01	15	1000	2.3414	2.3426	2.3425		1.100	1.100	mg/L
L17100003-01	16	1000	2.3479	2.3529	2.3528		4.900	4.900	mg/L
L17100112-01	17	1000	2.2935	2.2937	2.2937		0.2000	ND	mg/L
L17100112-02	18	1000	2.3829	2.383	2.383		0.1000	ND	mg/L

Analyst: Andrew Sieg

Date/Time (on) : 10/03/2017 12:40
 Date/Time (off) : 10/03/2017 15:10
 Date/Time (off) : 10/03/2017 15:40
 Date/Time (off) : _____

*Duplicate required on 10% of samples



3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
October 12, 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	BLR - BRANDON L. RICHARDS
BNB - Brandi N. Bentley	BRG - BRENDA R. GREGORY
CAS - Craig A. Smith	CEB - CHAD E. BARNES
CLC - CHRYS L. CRAWFORD	CLG - CARA L. GREENWOOD
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	RAF - REBEKAH A. FINN
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
ZTB - ZACH T. BARNES	

List of Valid Qualifiers

October 12, 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

October 12, 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.GWTPT
 HRUMART16

Job:
**GROUNDWATER TREATMENT PLANT
 QUARTERLY INFLUENT 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.#
			RDD Volatiles	Total Metals	Oil & Grease	Chemical Oxygen Demand	Chloride & Sulfate	1, 4 - DIOXANE		Perchlorate							
LH18/24-SP140-7472-GRAB	Water	09/27/17 / 15:00	3	2				5									HCL
LH18/24-SP140-7472-GRAB	Water	09/27/17 / 15:00	1					1									HNO3
LH18/24-SP140-7472-GRAB	Water	09/27/17 / 15:00	4						1	2	1						NONE
LH18/24-SP140-7472-GRAB	Water	09/27/17 / 15:00	1					1									H2SO4
Trip Blank	Water	09/27/17	2	2													HCL

STANDARD TURN AROUND TIME

Additional Remarks:	
Relinquished By: <i>Scott Beesinger</i>	Date: 09/27/17
Received By:	Date: 09/27/17
Relinquished By:	Date:
Received By:	Date:

For Lab Use Only

Received At Lab By: _____ **Date:** _____ **Time:** _____

Airbill No.: _____ **Date:** _____ **Time:** _____

Seal No.: _____ **Temp of Container:** _____ **Condition:** _____

Microbac OVD
 Received: 09/28/2017 10:01
 By: CARA STRICKLER

221000106688

Cara Strickler

(Word) S:\1-oss\Forms\Chain of Custody - BI\Weekly

COOLER TEMP >6° C LOG

Cooler ID 10688

SAMPLE ID	Bottle 1 °C	Bottle 2 °C	Bottle 3 °C	Bottle 4 °C	Bottle 5 °C	Bottle 6 °C

Handwritten: OAD 9/28/17

pH Exceptions

pH Lot # HCl 13805

SAMPLE ID	Bottle 1	Bottle 2	Bottle 3	Bottle 4	Bottle 5	Bottle 6

Handwritten: OAD 9/28/17

PRESERVATIVE EXCEPTIONS
✓ NONE
AS NOTED
Handwritten: OAD 9/28/17

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17091647

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 09-OCT-2017

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17091647-01	973003	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	28-SEP-2017 16:34	BRG		
2	ANALYZ	L1	ORG4	29-SEP-2017 10:12	JST	CLS	
3	STORE	ORG4	A1	12-OCT-2017 07:22	CLS	AWE	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	ORG4	28-SEP-2017 16:34	BRG		
2	STORE	ORG4	A1	12-OCT-2017 07:22	CLS	AWE	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	28-SEP-2017 16:34	BRG		
2	ANALYZ	L1	ORG4	29-SEP-2017 10:12	JST	CLS	
3	STORE	ORG4	A1	12-OCT-2017 07:22	CLS	AWE	

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17091647-01	973004	827-DIOXANE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	28-SEP-2017 16:34	BRG		
2	PREP	W1	EXT	02-OCT-2017 16:50	JDH	BRG	
3	ANALYZ*	EXT	SEMI	04-OCT-2017 11:42	SCB	JDH	

**Sample extract/digestate/leachate*

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER		28-SEP-2017 16:34	BRG		

**Sample extract/digestate/leachate*

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17091647-01	973005	9056

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER		28-SEP-2017 16:34	BRG		

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: L17091647

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 09-OCT-2017

Samplenum **Container ID** **Products**
L17091647-01 973006 6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	28-SEP-2017 16:34	BRG		
2	ANALYZ	W1	SEM	04-OCT-2017 15:10	JWR	CLS	
3	STORE	SEM	A1	05-OCT-2017 14:43	BRG	JWR	

Samplenum **Container ID** **Products**
L17091647-01 973007 COD-HIGH COD-LOW

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	28-SEP-2017 16:34	BRG		
2	ANALYZ	W1	WET	03-OCT-2017 08:20	DLP	CLS	
3	STORE	WET	A1	04-OCT-2017 08:18	CLS	DLP	

Samplenum **Container ID** **Products**
L17091647-01 973008 OG-HEM

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	28-SEP-2017 16:34	BRG		<2
2	ANALYZ	W1	WET	03-OCT-2017 10:53	AWE	CLS	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER		28-SEP-2017 16:34	BRG		<2

Samplenum **Container ID** **Products**
L17091647-01 973009 MN-MS NI-MS PB-MS SB-MS SE-AX TL-MS V-MS ZN-MS

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	28-SEP-2017 16:34	BRG		
2	PREP	W1	DIG	28-SEP-2017 17:21	AC	BRG	
3	ANALYZ*	DIG	METALS	02-OCT-2017 10:48	JYH	AC	
4	STORE	DIG	A1	03-OCT-2017 13:02	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: L17091647

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 09-OCT-2017

<u>Samplenum</u>	<u>Container ID</u>	<u>Products</u>
L17091647-02	973010	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	28-SEP-2017 16:34	BRG		
2	ANALYZ	L1	ORG4	29-SEP-2017 10:12	JST	CLS	
3	STORE	ORG4	A1	12-OCT-2017 07:22	CLS	AWE	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	28-SEP-2017 16:34	BRG		
2	ANALYZ	L1	ORG4	29-SEP-2017 10:12	JST	CLS	
3	STORE	ORG4	A1	12-OCT-2017 07:22	CLS	AWE	

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: L17091648

Linda Raabe
AECOM Technical Services, Inc.
112 East Pecan
San Antonio, TX 78205

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 October 12 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 #: L17091648

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.

The following discrepancies were noted:

Discrepancy	Resolution
Sample ID: LH18/24-SP650-6472-GRAB. COD out of the acceptable pH range (pH-6). BRG Added 1ML, H2SO4, RGT#40662 (9/28/17 @ 16:40). pH adjusted <2. BRG	Please attempt to adjust. ALS

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
0019819	I	4.0		J4616882096	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)	No
12	Were VOA samples free of headspace (less than 6mm)?	Yes

**Lab Report #:** L17091648**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-SP650-6472-GRAB	L17091648-01	09/27/2017 15:00	09/28/2017 09:49
TRIP BLANK	L17091648-02	09/27/2017 00:01	09/28/2017 09:49



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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>		2017-10-04 20:23:19



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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:	L17091648
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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:	L17091648
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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:	L17091648
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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:	L17091648
Project Name:		Method:	8260
Prep Batch Number(s):	631878	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-04 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:	L17091648
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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	2017-10-10 13:23:06



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091648
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091648
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091648
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091648
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091648
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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
Kerri Buck			2017-10-12 19:50:06



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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:	L17091648
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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:	L17091648
Project Name:		Method:	6010
Prep Batch Number(s):	WG632208	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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
Kerri Buck			2017-10-12 19:51:43



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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:	L17091648
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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:	L17091648
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-12 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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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	2017-10-09 17:42:02



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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:	L17091648
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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:	L17091648
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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:	L17091648
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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:	L17091648
Project Name:		Method:	9056
Prep Batch Number(s):	WG633037	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-09 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.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Laboratory Data Package Cover Page

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

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-10-05 13:18:06



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
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:	L17091648
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?	X				
Were analytical duplicates analyzed at the appropriate frequency?	X				
Were RPDs or relative standard deviations within the laboratory QC limits?	X				
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
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:	L17091648
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			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:	L17091648
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	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:	L17091648
Project Name:		Method:	COD
Prep Batch Number(s):	WG632279	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 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:	L17091648
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Laboratory Data Package Cover Page

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

Name (Printed)	Signature	Official Title (Printed)	Date
Deanna Hesson		Conventional Lab Supervisor	2017-10-05 13:17:30



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091648
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification					
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:	L17091648
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
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:	L17091648
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was the number of standards recommended in the method used for all analytes?			X		
Were all points generated between the lowest and highest standard used to calculate the curve?			X		
Are ICAL data available for all instruments used?			X		
Has the initial calibration curve been verified using an appropriate second source standard?			X		
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?			X		
Were percent differences for each analyte within the method-required QC limits?			X		
Was the ICAL curve verified for each analyte?			X		
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?			X		
Were ion abundance data within the method-required QC limits?			X		
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?			X		
Raw data (NELAC Section 5.5.10)			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:	L17091648
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)	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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3. NA = Not applicable;
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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:	L17091648
Project Name:		Method:	OG-HEM
Prep Batch Number(s):	WG632290	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-05 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 #: L17091648
 Lab Project #: 2551.096
 Project Name: Longhorn Army Ammunition
 Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: HPMS8
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 09/13/2017 19:41
Workgroup #: WG631878	Analyst: TMB	Run Date: 09/29/2017 22:03
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: 8M421799
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	6.73	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	0.381	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	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	1.33		1.00	0.500	0.250
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,2-Dichloroethane-d4	97.4	70	120			
4-Bromofluorobenzene	101	75	120			
Dibromofluoromethane	93.6	85	115			
Toluene-d8	101	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 #: L17091648
 Lab Project #: 2551.096
 Project Name: Longhorn Army Ammunition
 Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: HPMS15
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 3520C	Prep Date: 10/02/2017 18:00
Matrix: Water	Analytical Method: 8270D	Cal Date: 09/18/2017 12:55
Workgroup #: WG632529	Analyst: LJH	Run Date: 10/09/2017 14:05
Collect Date: 09/27/2017 15:00	Dilution: 5	File ID: 15M23018
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,4-Dioxane	123-91-1	16.2		10.0	5.00	2.50
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,4-Dioxane-d8	44.9	20	129			

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: ICP-THERMO4
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 3015A	Prep Date: 10/03/2017 07:13
Matrix: Water	Analytical Method: 6010C	Cal Date: 10/05/2017 16:45
Workgroup #: WG632662	Analyst: KKB	Run Date: 10/05/2017 17:58
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: T4.100517.175839
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Aluminum, Total	7429-90-5	0.200	U	0.200	0.200	0.100
Iron, Total	7439-89-6	0.100	U	0.100	0.100	0.0500
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 #: L17091648
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 07:12
Matrix: Water	Analytical Method: 6020A	Cal Date: 10/02/2017 12:02
Workgroup #: WG632098	Analyst: JYH	Run Date: 10/02/2017 13:30
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: NI.100217.133044
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Antimony, Total	7440-36-0	0.00100	U	0.00200	0.00100	0.000500
Arsenic, Total	7440-38-2	0.00243		0.00200	0.00100	0.000500
Barium, Total	7440-39-3	0.0964		0.00600	0.00300	0.00150
Cadmium, Total	7440-43-9	0.000600	U	0.00120	0.000600	0.000300
Chromium, Total	7440-47-3	0.00314	J	0.00400	0.00200	0.00100
Cobalt, Total	7440-48-4	0.000573	J	0.00200	0.00100	0.000500
Lead, Total	7439-92-1	0.00100	U	0.00200	0.00100	0.000500
Manganese, Total	7439-96-5	0.0362		0.00400	0.00200	0.00100
Nickel, Total	7440-02-0	0.00306	J	0.00800	0.00400	0.00200
Silver, Total	7440-22-4	0.00100	U	0.00200	0.00100	0.000500
Thallium, Total	7440-28-0	0.000200	U	0.000400	0.000200	0.000100
Vanadium, Total	7440-62-2	0.00100	U	0.00200	0.00100	0.000500
Zinc, Total	7440-66-6	0.0250	U	0.0500	0.0250	0.0125
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 #: L17091648
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: IC1
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 9056	Prep Date: 10/06/2017 15:09
Matrix: Water	Analytical Method: 9056	Cal Date: 08/30/2017 13:05
Workgroup #: WG633037	Analyst: CAS	Run Date: 10/06/2017 18:11
Collect Date: 09/27/2017 15:00	Dilution: 5	File ID: I1_100617-13
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfate	14808-79-8	136		10.0	5.00	2.50
J	Estimated value ; the analyte concentration was greater than the highest standard					

Lab Report #: L17091648
 Lab Project #: 2551.096
 Project Name: Longhorn Army Ammunition
 Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: IC1
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 9056	Prep Date: 10/06/2017 15:09
Matrix: Water	Analytical Method: 9056	Cal Date: 08/30/2017 13:05
Workgroup #: WG633037	Analyst: CAS	Run Date: 10/06/2017 18:29
Collect Date: 09/27/2017 15:00	Dilution: 50	File ID: I1_100617-14
Sample Tag: DL02	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	645		20.0	10.0	5.00

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: V-1200
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: METHOD	Prep Date: N/A
Matrix: Water	Analytical Method: 410.4 MOD	Cal Date: 08/29/2017 10:16
Workgroup #: WG632279	Analyst: DLP	Run Date: 10/03/2017 10:00
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: 00.1710031000-10
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chemical Oxygen Demand	COD	93.8		40.0	20.0	10.0

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: HORIZON
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 1664A	Prep Date: N/A
Matrix: Water	Analytical Method: 1664A	Cal Date:
Workgroup #: WG632290	Analyst: AWE	Run Date: 10/03/2017 12:40
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: ON.1710031240-15
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
n-Hexane Extractable Material (HEM)	OILGREASE	2.80	U	5.60	2.80	1.40
U	Analyte was not detected. The concentration is below the reported LOD.					

Certificate of Analysis

Sample #: L17091648-02	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: 09/13/2017 19:41
Workgroup #: WG631878	Analyst: TMB	Run Date: 09/29/2017 17:22
Collect Date: 09/27/2017 00:01	Dilution: 1	File ID: 8M421790
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	6.08	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	0.326	J	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	94.8	70	120	
4-Bromofluorobenzene	102	75	120	
Dibromofluoromethane	94.5	85	115	
Toluene-d8	101	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 #: L17091648-01	PrePrep Method: N/A	Instrument: HPMS8
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 09/13/2017 19:41
Workgroup #: WG631878	Analyst: TMB	Run Date: 09/29/2017 22:03
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: 8M421799
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	6.73	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	0.381	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	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	1.33		1.00	0.500	0.250
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,2-Dichloroethane-d4	97.4	70	120			
4-Bromofluorobenzene	101	75	120			
Dibromofluoromethane	93.6	85	115			
Toluene-d8	101	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 #: L17091648-02	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: 09/13/2017 19:41
Workgroup #: WG631878	Analyst: TMB	Run Date: 09/29/2017 17:22
Collect Date: 09/27/2017 00:01	Dilution: 1	File ID: 8M421790
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	6.08	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	0.326	J	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	94.8	70	120			
4-Bromofluorobenzene	102	75	120			
Dibromofluoromethane	94.5	85	115			
Toluene-d8	101	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.					

2.1.1.2 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: HPMS8 Dataset: 083117
 Analyst1: ADC Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT Rev: 18/1
 Maintenance Log ID: _____

Internal Standard: STD83648 Surrogate Standard: STD83648
 CCV: STD83554 LCS: STD83193 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG628027

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421173	WG628027-01 50ng BFB STD	NA	1	1	STD83478	08/31/17 13:56
8M421174	WG628027-01 50ng BFB STD	NA	1	1	STD83478	08/31/17 14:11
8M421175	RINSE	NA	1	1	STD83388	08/31/17 14:36
8M421176	WG628027-02 5ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 15:06
8M421177	WG628027-03 20ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 15:36
8M421178	WG628027-04 50ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 16:05
8M421179	WG628027-05 100ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 16:35
8M421180	WG628027-06 200ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 17:04
8M421181	WG628027-07 300ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 17:34
8M421182	WG628027-08 400ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 18:04
8M421183	WG628027-09 500ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 18:33
8M421184	RINSE	NA	1	1	STD83554	08/31/17 19:03
8M421185	WG628027-10 100ug/L A9FOO ALT SRC	NA	1	1	STD83193	08/31/17 19:33

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1	X			
File ID: 8M421173				
Tune failed, DNR.				

Approved: September 05, 2017

Page: 1

Cathy Carter



Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 091317
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 530B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54316

Internal Standard: STD83648 Surrogate Standard: STD83648
 CCV: STD83834 LCS: STD83830 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG629567

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421377	WG629567-01 50ng BFB STD 8260	NA	1	1	STD83478	09/13/17 14:18
8M421378	RINSE	NA	1	1	STD83478	09/13/17 14:44
8M421379	WG629567-02 0.3ug/L STD 8260	NA	1	1	STD83834	09/13/17 15:15
8M421380	WG629567-03 0.4ug/L STD 8260	NA	1	1	STD83834	09/13/17 15:44
8M421381	WG629567-04 1ug/L STD 8260	NA	1	1	STD83834	09/13/17 16:17
8M421382	WG629567-05 2ug/L STD 8260	NA	1	1	STD83834	09/13/17 16:49
8M421383	WG629567-06 5ug/L STD 8260	NA	1	1	STD83834	09/13/17 17:17
8M421384	WG629567-07 20ug/L STD 8260	NA	1	1	STD83834	09/13/17 17:46
8M421385	WG629567-08 50ug/L STD 8260	NA	1	1	STD83834	09/13/17 18:15
8M421386	WG629567-09 100ug/L STD 8260	NA	1	1	STD83834	09/13/17 18:44
8M421387	WG629567-10 200ug/L STD 8260	NA	1	1	STD83834	09/13/17 19:13
8M421388	WG629567-11 300ug/L STD 8260	NA	1	1	STD83834	09/13/17 19:41
8M421389	RINSE	NA	1	1		09/13/17 20:11
8M421390	RINSE	NA	1	1		09/13/17 20:40
8M421391	WG629567-12 50ug/L ALT SRC STD 8260	NA	1	1	STD83830	09/13/17 21:09
8M421392	CCV CHECK	NA	1	1	STD83834	09/13/17 21:38
8M421393	RINSE	NA	1	1		09/13/17 22:06

Approved: September 14, 2017

Page: 1

Cathy Carter



Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 092917
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54344

Internal Standard: STD84119 Surrogate Standard: STD84119
 CCV: STD83834 LCS: STD84126 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG631878

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421778	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 10:19
8M421779	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 10:32
8M421780	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 10:57
8M421781	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 12:56
8M421782	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 13:21
8M421783	WG631877-01 50ng BFB STD 8260	NA	1	1	STD84001	09/29/17 13:54
8M421784	WG631877-02 50ug/L CCV STD 8260	NA	1	1	STD83834	09/29/17 14:20
8M421785	WG000000-01 100ug/L A9 CCV STD 8260	NA	1	1	STD84099	09/29/17 14:50
8M421786	RINSE	NA	1	1		09/29/17 15:21
8M421787	WG631878-01 BLANK 0929 8260	NA	1	1		09/29/17 15:51
8M421788	WG631878-02 20ug/L LCS 0929 8260	NA	1	1	STD84126	09/29/17 16:21
8M421789	WG631878-03 20ug/L LCS2 8260	NA	1	1	STD84126	09/29/17 16:52
8M421790	L17091648-02 A TB 826-SPE	<2	1	1		09/29/17 17:22
8M421791	L17091647-02 A TB 826-SPE	NA	1	1		09/29/17 17:53
8M421792	L17091645-07 A TB 826-SPE	<2	1	1		09/29/17 18:22
8M421793	L17091458-06 A TB 826-SPE	<2	1	1		09/29/17 18:54
8M421794	L17091277-02 B TB 826-SPE	<2	1	1		09/29/17 19:26
8M421795	L17091719-07 A TB 826-SPE	<2	1	1		09/29/17 19:56
8M421796	L17091719-05 A RB 826-SPE	<2	1	1		09/29/17 20:26
8M421797	L17091458-03 A 826-SPE	<2	1	1		09/29/17 20:58
8M421798	L17091458-05 A 826-SPE	<2	1	1		09/29/17 21:28
8M421799	L17091648-01 A 826-SPE	<2	1	1		09/29/17 22:03
8M421800	L17091719-01 A 826-SPE	<2	1	1		09/29/17 22:33
8M421801	L17091719-03 A 826-SPE	<2	1	1		09/29/17 23:05
8M421802	L17091645-01 A 826-SPE	<2	1	1		09/29/17 23:38
8M421803	L17091277-01 B 200X 826-SPE	<2	1	200		09/30/17 00:08
8M421804	L17091647-01 50X A 826-SPE	<2	1	50		09/30/17 00:41
8M421805	L17091470-15 A 826-SPE	<2	1	1		09/30/17 01:13
8M421806	L17091458-01 A 826-SPE	<2	1	1		09/30/17 01:48
8M421807	L17091645-08 A 826-SPE	<2	1	1		09/30/17 02:20
8M421808	RINSE	NA	1	1		09/30/17 02:52
8M421809	WG631878-04 BLK0929 STD 624	NA	2	1		09/30/17 03:31
8M421810	L17091574-02 B 50X D1 624-SPE	<2	2	50		09/30/17 04:06
8M421811	L17091582-01 B 5X D1 624-SPE	7	2	5		09/30/17 04:45

Approved: October 03, 2017

Page: 1




Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 092917
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54344

Internal Standard: STD84119 Surrogate Standard: STD84119
 CCV: STD83834 LCS: STD84126 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG631878

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421812	CCV	NA	1	1		09/30/17 05:22
8M421813	RINSE	NA	1	1		09/30/17 05:58
8M421814	RINSE	NA	1	1		09/30/17 06:30

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1	X			
File ID: 8M421778				
Tune failed, DNR.				
2	X			
File ID: 8M421779				
Tune failed, DNR. Changed the septa, liner, and o-ring.				
3	X			
File ID: 8M421780				
Tune failed, DNR.				
4	X			
File ID: 8M421781				
Tune failed, DNR. Changed the gold seal.				
5	X			
File ID: 8M421782				
Baked the instrument. DNR.				
8				
File ID: 8M421785				
Not needed, DNR.				
30	X	1	Missed Tune	
File ID: 8M421807				
L17091645-08 DNR.				
34	X	5	Internal standard and surrogate standard failure	
File ID: 8M421811				
Sample foamed, DNR. L17091582-01				

Approved: October 03, 2017

Page: 2

Sarah Vandenberg



Microbac Laboratories Inc.

Data Checklist

Date: 31-AUG-2017
 Analyst: ADC
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 84380
 Analytical Workgroups: WG628027

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	ADC
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:
05-SEP-2017

Tiffany Bailey

Secondary Reviewer:
05-SEP-2017

Anthony Carter



Microbac Laboratories Inc.

Data Checklist

Date: 13-SEP-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 84588
 Analytical Workgroups: WG629567

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	ADC
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-SEP-2017

Tiffany Bailey

Secondary Reviewer:
14-SEP-2017

Aditya Carter



Microbac Laboratories Inc.

Data Checklist

Date: 29-SEP-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 84990
 Analytical Workgroups: WG631878

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:
02-OCT-2017

Tiffany Bailey

Secondary Reviewer:
03-OCT-2017

Sarah Vandenberg



Analytical Method:8260B
Login Number:L17091648

AAB#:WG631878

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-SP650-6472-GRAB	01	09/27/17					09/29/2017	2.3	14		09/29/17	2.3	14	
TRIP BLANK	02	09/27/17					09/29/2017	2.7	14		09/29/17	2.7	14	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17091648
 Instrument Id: HPMS8
 Workgroup (AAB#): WG631878

Method: 8260
 CAL ID: HPMS8-13-SEP-17
 Matrix: Water

Sample Number	Dilution	Tag	1	2	3	4
L17091648-01	1.00	01	97.4	93.6	101	101
L17091648-02	1.00	01	94.8	94.5	102	101
WG631878-01	1.00	01	96.3	94.4	102	101
WG631878-02	1.00	01	95.5	96.7	101	101
WG631878-03	1.00	01	95.3	94.9	101	101
WG631878-04	1.00	01	96.2	94.2	100	99.9

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: L17091648 Work Group: WG631878
Blank File ID: 8M421787 Blank Sample ID: WG631878-01
Prep Date: 09/29/17 15:51 Instrument ID: HPMS8
Analyzed Date: 09/29/17 15:51 Method: 8260B
Analyst: TMB

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG631878-02	8M421788	09/29/17 16:21	01
LCS2	WG631878-03	8M421789	09/29/17 16:52	01
TRIP BLANK	L17091648-02	8M421790	09/29/17 17:22	01
LH18/24-SP650-6472-GRAB	L17091648-01	8M421799	09/29/17 22:03	01

Report Name: BLANK_SUMMARY
PDF File ID: 5507731
Report generated 10/03/2017 13:52



Login Number: L17091648 Prep Date: 09/29/17 15:51 Sample ID: WG631878-01
 Instrument ID: HPMS8 Run Date: 09/29/17 15:51 Prep Method: 5030B/5030C/503
 File ID: 8M421787 Analyst: TMB Method: 8260B
 Workgroup (AAB#): WG631878 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS8-13-SEP-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	96.3	70 - 120	PASS
4-Bromofluorobenzene	102	75 - 120	PASS
Dibromofluoromethane	94.4	85 - 115	PASS
Toluene-d8	101	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: 5505637
 03-OCT-2017 13:52



Login Number: L17091648 Analyst: TMB Prep Method: 5030B/5030C/503
 Instrument ID: HPMS8 Matrix: Water Method: 8260B
 Workgroup (AAB#): WG631878 Units: ug/L
 QC Key: DOD4 Lot #: STD84126

Sample ID: WG631878-02 LCS File ID: 8M421788 Run Date: 09/29/2017 16:21
 Sample ID: WG631878-03 LCS2 File ID: 8M421789 Run Date: 09/29/2017 16:52

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
1,1,1-Trichloroethane	20.0	20.0	100	20.0	19.8	98.9	1.09	65 - 130	30	
1,1,2-Trichloroethane	20.0	21.0	105	20.0	21.2	106	0.998	75 - 125	30	
1,1-Dichloroethane	20.0	19.5	97.5	20.0	19.2	95.9	1.74	70 - 135	30	
1,1-Dichloroethene	20.0	20.1	101	20.0	19.6	98.2	2.48	70 - 130	30	
1,2-Dichloroethane	20.0	20.4	102	20.0	20.2	101	0.745	70 - 130	30	
Acetone	20.0	23.2	116	20.0	20.3	101	13.7	40 - 140	30	
Benzene	20.0	20.0	99.9	20.0	19.7	98.4	1.52	80 - 120	30	
Carbon tetrachloride	20.0	19.0	94.8	20.0	18.9	94.6	0.277	65 - 140	30	
Chloroform	20.0	18.8	94.2	20.0	18.7	93.7	0.489	65 - 135	30	
Ethylbenzene	20.0	19.9	99.7	20.0	19.7	98.4	1.39	75 - 125	30	
m,p-Xylene	40.0	40.5	101	40.0	40.6	102	0.339	75 - 130	30	
Methylene chloride	20.0	20.0	100	20.0	19.5	97.4	2.93	55 - 140	30	
o-Xylene	20.0	20.6	103	20.0	20.4	102	0.819	80 - 120	30	
Styrene	20.0	21.4	107	20.0	21.5	108	0.492	65 - 135	30	
Tetrachloroethene	20.0	20.3	101	20.0	19.9	99.4	2.09	45 - 150	30	
Toluene	20.0	20.2	101	20.0	20.0	100	1.07	75 - 120	30	
Trichloroethene	20.0	20.9	104	20.0	20.3	101	2.84	70 - 125	30	
Vinyl chloride	20.0	18.5	92.5	20.0	18.0	89.8	3.04	50 - 145	30	

Surogates	LCS	LCS2	Surrogate Limits	Qualifier
	% Recovery	% Recovery		
1,2-Dichloroethane-d4	95.5	95.3	70 - 120	PASS
Dibromofluoromethane	96.7	94.9	85 - 115	PASS
4-Bromofluorobenzene	101	101	75 - 120	PASS
Toluene-d8	101	101	85 - 120	PASS

* EXCEEDS %REC LIMIT
 # EXCEEDS RPD LIMIT



BFB

Login Number: L17091648 Tune ID: WG628027-01
 Instrument: HPMS8 Run Date: 08/31/2017
 Analyst: ADC Run Time: 14:11
 Workgroup: WG628027 File ID: 8M421174
 Cal ID: HPMS8-31-AUG-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	28.5	8248	PASS
75.0	95.0	30.0	60.0	48.8	14111	PASS
95.0	95.0	100	100	100	28896	PASS
96.0	95.0	5.00	9.00	5.97	1726	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	84.1	24314	PASS
175	174	5.00	9.00	7.59	1845	PASS
176	174	95.0	101	95.2	23149	PASS
177	176	5.00	9.00	6.57	1520	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG628027-02	STD	01	08/31/2017 15:06	
WG628027-03	STD	01	08/31/2017 15:36	
WG628027-04	STD	01	08/31/2017 16:05	
WG628027-05	STD-CCV	01	08/31/2017 16:35	
WG628027-06	STD	01	08/31/2017 17:04	
WG628027-07	STD	01	08/31/2017 17:34	
WG628027-08	STD	01	08/31/2017 18:04	
WG628027-09	STD	01	08/31/2017 18:33	
WG628027-10	SSCV	01	08/31/2017 19:33	

* Sample past 12 hour tune limit



BFB

Login Number: L17091648 Tune ID: WG629567-01
 Instrument: HPMS8 Run Date: 09/13/2017
 Analyst: TMB Run Time: 14:18
 Workgroup: WG629567 File ID: 8M421377
 Cal ID: HPMS8-13-SEP-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	28.0	11358	PASS
75.0	95.0	30.0	60.0	47.1	19109	PASS
95.0	95.0	100	100	100	40581	PASS
96.0	95.0	5.00	9.00	6.53	2650	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	82.9	33634	PASS
175	174	5.00	9.00	7.97	2681	PASS
176	174	95.0	101	99.2	33368	PASS
177	176	5.00	9.00	7.07	2359	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG629567-02	STD	01	09/13/2017 15:15	
WG629567-03	STD	01	09/13/2017 15:44	
WG629567-04	STD	01	09/13/2017 16:17	
WG629567-05	STD	01	09/13/2017 16:49	
WG629567-06	STD	01	09/13/2017 17:17	
WG629567-07	STD	01	09/13/2017 17:46	
WG629567-08	STD-CCV	01	09/13/2017 18:15	
WG629567-09	STD	01	09/13/2017 18:44	
WG629567-10	STD	01	09/13/2017 19:13	
WG629567-11	STD	01	09/13/2017 19:41	
WG629567-12	SSCV	01	09/13/2017 21:09	

* Sample past 12 hour tune limit



BFB

Login Number: L17091648 Tune ID: WG631877-01
 Instrument: HPMS8 Run Date: 09/29/2017
 Analyst: TMB Run Time: 13:54
 Workgroup: WG631877 File ID: 8M421783
 Cal ID: HPMS8-13-SEP-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	31.9	23970	PASS
75.0	95.0	30.0	60.0	46.9	35264	PASS
95.0	95.0	100	100	100	75237	PASS
96.0	95.0	5.00	9.00	7.20	5414	PASS
173	174	0	2.00	0.507	342	PASS
174	95.0	50.0	100	89.6	67429	PASS
175	174	5.00	9.00	7.44	5020	PASS
176	174	95.0	101	96.5	65056	PASS
177	176	5.00	9.00	7.64	4973	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG631877-02	CCV	01	09/29/2017 14:20	
WG631878-01	BLANK	01	09/29/2017 15:51	
WG631878-02	LCS	01	09/29/2017 16:21	
WG631878-03	LCS2	01	09/29/2017 16:52	
L17091648-02	TRIP BLANK	01	09/29/2017 17:22	
L17091648-01	LH18/24-SP650-6472-GRAB	01	09/29/2017 22:03	
WG631878-04	BLANK2	01	09/30/2017 03:31	*

* Sample past 12 hour tune limit



Calibration Table Report
 Method: A9FOOWTR.M
 Title: A9-FOO Water SOP:MSV01 08-31-17 HPMS8
 Last Calibration: Tue Sep 05 14:28:41 2017
 Curve: WG628027
 Calibration Files

Compound											Avg	%RSD
	5	20	50	100	200	300	400	500				
	8M421176.D	8M421177.D	8M421178.D	8M421179.D	8M421180.D	8M421181.D	8M421182.D	8M421183.D				
Fluorobenzene	ISTD											
Acetonitrile		0.029	0.031	0.029	0.028	0.030	0.030	0.031	0.030	3.362		
3-Chloro-1-propene	0.776	0.836	0.870	0.863	0.874	0.840	0.807	0.773	0.830	4.885		
2-Chloro-1,3-butadiene	0.670	0.740	0.785	0.794	0.804	0.769	0.737	0.700	0.750	6.291		
Ethyl Acetate		0.260	0.283	0.285	0.280	0.285	0.281	0.280	0.279	3.184		
Methacrylonitrile	0.069	0.078	0.083	0.085	0.083	0.085	0.085	0.086	0.082	6.972		
Isobutyl Alcohol			0.009	0.009	0.009	0.010	0.010	0.011	0.010	8.810		
1-Butanol									0.000	0.000		
Methyl methacrylate	0.282	0.290	0.314	0.318	0.318	0.319	0.311	0.310	0.308	4.536		
2-Nitropropane		0.092	0.099	0.101	0.101	0.103	0.101	0.103	0.100	3.821		
Chlorobenzene-d5	ISTD											
1,4-Dichlorobenzene-d4	ISTD											
Cyclohexanone			0.012	0.013	0.012	0.013	0.014	0.015	0.013	9.192		

Tue Sep 05 14:30:32 2017

Calibration Table Report

Method: 8260WT.M

Title: Method 8260B/624 WTR-SOP:OVLMSV01 09-13-17 HPMS8

Last Calibration: Thu Sep 14 08:56:14 2017

Curve: WG629567

Calibration Files

Compound	0.3 0.4 1 2 5 20 50 100 200 300										r ²	
	8M421379.D	8M421380.D	8M421381.D	8M421382.D	8M421383.D	8M421384.D	8M421385.D	8M421386.D	8M421387.D	8M421388.D		
	Avg	%RSD	Linear	Quad								
I Fluorobenzene	ISTD											
T Dichlorodifluoromethane		0.376	0.401	0.408	0.474	0.467	0.424	0.438	0.427	8.334		
P Chloromethane		0.839	0.710	0.706	0.717	0.693	0.638	0.623	0.704	9.986		
C Vinyl Chloride	0.363	0.340	0.345	0.340	0.345	0.336	0.314	0.327	0.339	4.229		
T 1,3-Butadiene		0.390	0.370	0.354	0.299	0.241	0.247	0.230	0.304	22.045	0.999	
T Bromomethane		0.213	0.231	0.246	0.238	0.244	0.241	0.256	0.238	5.729		
T Chloroethane	0.237	0.223	0.241	0.250	0.250	0.258	0.241	0.252	0.244	4.484		
T Trichlorofluoromethane	0.517	0.457	0.493	0.538	0.516	0.528	0.488	0.520	0.507	5.191		
T Diethyl ether		0.272	0.282	0.278	0.277	0.275	0.280	0.268	0.276	1.732		
T Isoprene				0.432	0.418	0.425	0.392	0.409	0.386	0.410	4.486	
T Acrolein	0.035	0.039	0.040	0.040	0.040	0.041	0.044	0.044	0.040	7.806		
T 1,1,2-Trichloro-1,2,2-Trifluoroethane		0.225	0.254	0.273	0.265	0.268	0.249	0.262	0.257	6.203		
T Acetone				0.116	0.084	0.080	0.087	0.090	0.082	0.090	14.764	
C 1,1-Dichloroethene	0.579	0.527	0.533	0.562	0.565	0.571	0.529	0.546	0.551	3.702		
T Tert-Butyl Alcohol			0.018	0.017	0.017	0.018	0.019	0.020	0.018	7.921		
T Dimethyl Sulfide				0.350	0.353	0.372	0.357	0.364	0.352	0.358	2.344	
T Iodomethane	0.253	0.258	0.297	0.297	0.309	0.295	0.307	0.279	0.287	7.504		
T Methyl acetate				0.271	0.266	0.269	0.277	0.277	0.266	0.271	1.772	
T Methylene Chloride		0.273	0.280	0.287	0.273	0.278	0.261	0.265	0.274	3.218		
T Carbon Disulfide		0.847	0.895	0.897	0.884	0.896	0.828	0.831	0.771	0.856	5.278	
T Acrylonitrile		0.105	0.112	0.111	0.117	0.122	0.129	0.119	0.116	6.683		
T Methyl Tert Butyl Ether		0.549	0.546	0.589	0.585	0.597	0.584	0.594	0.578	3.658		
T trans-1,2-Dichloroethene	0.543	0.495	0.501	0.538	0.537	0.538	0.507	0.513	0.521	3.715		
T n-Hexane				0.640	0.596	0.616	0.570	0.608	0.584	0.602	4.092	
T Diisopropyl ether		1.728	1.782	1.754	1.754	1.718	1.624	1.441	1.686	7.060		
T Vinyl Acetate				0.759	0.641	0.712	0.692	0.681	0.663	0.692	5.936	
P 1,1-Dichloroethane	0.613	0.610	0.630	0.653	0.643	0.642	0.601	0.602	0.624	3.263		
T Ethyl-Tert-Butyl ether		1.069	1.105	1.087	1.100	1.085	1.085	1.015	1.078	2.793		
T 2-Butanone				0.141	0.139	0.139	0.147	0.145	0.143	0.142	2.331	
T Propionitrile		0.036	0.039	0.038	0.039	0.040	0.042	0.043	0.040	6.030		
T 2,2-Dichloropropane	0.423	0.425	0.437	0.461	0.434	0.438	0.413	0.426	0.432	3.314		
T cis-1,2-Dichloroethene	0.343	0.306	0.285	0.315	0.308	0.313	0.293	0.296	0.307	5.757		
C Chloroform	0.568	0.572	0.499	0.526	0.525	0.505	0.513	0.477	0.474	0.518	6.741	
T 1-Bromopropane				0.050	0.058	0.057	0.061	0.058	0.058	0.057	5.742	
T Bromochloromethane	0.185	0.160	0.180	0.181	0.184	0.186	0.179	0.180	0.179	4.637		
T Tetrahydrofuran		0.097	0.093	0.089	0.093	0.093	0.099	0.094	0.094	3.181		
S Dibromofluoromethane				0.324	0.311	0.298	0.291	0.291	0.283	0.281	0.297	5.251
T 1,1,1-Trichloroethane	0.449	0.413	0.431	0.476	0.473	0.476	0.444	0.450	0.452	5.112		
T Cyclohexane		0.687	0.721	0.772	0.748	0.771	0.718	0.754	0.699	0.734	4.403	
T 1,1-Dichloropropene		0.352	0.369	0.386	0.393	0.395	0.371	0.380	0.378	4.111		
T Tert-Amyl-Methyl ether		0.604	0.645	0.639	0.650	0.641	0.652	0.616	0.635	2.869		
T Carbon Tetrachloride	0.466	0.401	0.429	0.469	0.462	0.466	0.43	0.443	0.4457	5.44121		
S 1,2-Dichloroethane-d4			0.368	0.347	0.335	0.324	0.329	0.318	0.31	0.3329	5.83484	
T Heptane									0	0		
T 1,2-Dichloroethane	0.465	0.412	0.453	0.476	0.459	0.465	0.441	0.441	0.4514	4.46079		
T Benzene	1.136	1.054	1.105	1.121	1.103	1.1	1.014	0.969	1.0753	5.39779		
T Trichloroethene	0.279	0.262	0.302	0.301	0.312	0.32	0.303	0.31	0.2987	6.35845		
T Methylcyclohexane				0.458	0.438	0.451	0.423	0.445	0.421	0.4394	3.44851	
C 1,2-Dichloropropane	0.315	0.322	0.355	0.365	0.362	0.366	0.347	0.356	0.3484	5.65905		
T Bromodichloromethane	0.352	0.371	0.359	0.377	0.386	0.398	0.38	0.382	0.3755	3.88984		
T 1,4-Dioxane			0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.0015	13.7848	
T Dibromomethane	0.165	0.149	0.146	0.156	0.158	0.164	0.156	0.158	0.1565	4.1959		
T 2-Chloroethyl Vinyl Ether		0.126	0.142	0.154	0.173	0.174	0.177	0.181	0.174	0.1628	12.2292	
T 4-Methyl-2-Pentanone				0.08	0.093	0.094	0.1	0.103	0.1	0.0951	8.75964	
T cis-1,3-Dichloropropene	0.403	0.384	0.428	0.442	0.446	0.463	0.44	0.444	0.4314	5.97072		

T	Dimethyl Disulfide				0.212	0.235	0.254	0.252	0.26	0.246	0.2429	7.21488
I	Chlorobenzene-d5	ISTD										
S	Toluene-d8			1.315	1.259	1.242	1.208	1.176	1.139	1.103	1.2059	6.04694
C	Toluene	1.506	1.416	1.422	1.502	1.462	1.466	1.313	1.23		1.4146	6.84092
T	Ethyl Methacrylate		0.227	0.262	0.29	0.307	0.322	0.323	0.327	0.321	0.2975	12.085
T	Paraldehyde										0	0
T	trans-1,3-Dichloropropene		0.43	0.427	0.466	0.466	0.479	0.46	0.464		0.4559	4.36352
T	1,1,2-Trichloroethane	0.241	0.236	0.231	0.247	0.25	0.254	0.242	0.246		0.2433	3.08076
T	2-Hexanone				0.091	0.099	0.104	0.11	0.113	0.114	0.1052	8.79897
T	1,3-Dichloropropane	0.418	0.424	0.439	0.445	0.44	0.443	0.42	0.424		0.4317	2.5632
T	Tetrachloroethene	0.296	0.292	0.31	0.329	0.319	0.326	0.304	0.316		0.3115	4.28753
T	Dibromochloromethane	0.331	0.303	0.304	0.344	0.348	0.36	0.35	0.361		0.3376	6.78962
T	1,2-Dibromoethane	0.215	0.224	0.23	0.251	0.254	0.258	0.249	0.257		0.2423	6.81501
T	1-Chlorohexane	0.408	0.441	0.44	0.48	0.483	0.502	0.465	0.479	0.451	0.4611	6.23991
P	Chlorobenzene	1.067	0.998	0.994	1.045	1.022	1.026	0.942	0.899		0.9992	5.54231
T	1,1,1,2-Tetrachloroethane	0.309	0.313	0.356	0.381	0.383	0.387	0.366	0.362		0.357	8.54005
C	Ethylbenzene		0.53	0.515	0.505	0.54	0.537	0.544	0.497	0.496	0.5204	3.8086
T	m-p-Xylene	0.659	0.612	0.62	0.666	0.654	0.655	0.592	0.545		0.6252	6.69883
T	o-Xylene		0.58	0.582	0.63	0.632	0.652	0.602	0.598		0.6108	4.5136
T	Styrene	0.898	0.942	0.928	1.049	1.078	1.092	1.002	0.951		0.9924	7.40772
P	Bromoform		0.163	0.182	0.207	0.217	0.23	0.227	0.236		0.209	13.0818
T	Isopropylbenzene	1.642	1.479	1.52	1.689	1.633	1.652	1.473	1.365		1.5568	7.31337
I	1,4-Dichlorobenzene-d4	ISTD										
P	1,1,2,2-Tetrachloroethane	0.451	0.445	0.473	0.498	0.499	0.501	0.493	0.502		0.4825	4.8626
S	p-Bromofluorobenzene			0.895	0.909	0.935	0.903	0.905	0.892	0.868	0.9011	2.22137
T	1,2,3-Trichloropropane		0.112	0.147	0.153	0.15	0.149	0.148	0.152		0.1444	10.0859
T	trans-1,4-Dichloro-2-Butene		0.191	0.24	0.261	0.262	0.271	0.28	0.287	0.246	0.2547	11.8469
T	n-Propylbenzene	3.708	3.33	3.494	3.824	3.738	3.615	3.211	2.811		3.4663	9.72764
T	Bromobenzene	0.766	0.779	0.729	0.786	0.8	0.798	0.795	0.759	0.766	0.7752	2.97971
T	1,3,5-Trimethylbenzene	2.484	2.27	2.367	2.576	2.587	2.529	2.342	2.171		2.4157	6.27806
T	2-Chlorotoluene	2.23	2.293	2.42	2.66	2.545	2.508	2.016	2.057		2.3413	9.93156
T	4-Chlorotoluene	2.217	2.006	2.056	2.115	2.088	1.993	2.046	1.76		2.0351	6.45972
T	a-Methylstyrene				1.351	1.435	1.471	1.389	1.37	1.213	1.3715	6.49608
T	tert-Butylbenzene		0.519	0.538	0.579	0.583	0.572	0.537	0.543		0.5531	4.46813
T	1,2,4-Trimethylbenzene	2.517	2.447	2.447	2.737	2.662	2.604	2.366	2.175		2.4944	7.15122
T	sec-Butylbenzene		2.911	2.968	3.279	3.226	3.12	2.828	2.558		2.9842	8.39029
T	p-Isopropyltoluene		2.459	2.557	2.814	2.824	2.778	2.525	2.308		2.6093	7.65785
T	1,3-Dichlorobenzene	1.616	1.485	1.556	1.627	1.597	1.583	1.479	1.442		1.5482	4.53513
T	1,4-Dichlorobenzene	1.683	1.627	1.507	1.533	1.626	1.584	1.56	1.462	1.416	1.5554	5.48999
T	n-Butylbenzene		2.382	2.431	2.692	2.626	2.538	2.286	2.098		2.436	8.40297
T	1,2-Dichlorobenzene	1.543	1.467	1.369	1.399	1.451	1.446	1.437	1.346	1.326	1.4205	4.77171
T	1,2-Dibromo-3-Chloropropane			0.077	0.097	0.094	0.095	0.098	0.101		0.0936	8.93058
T	1,2,4-Trichlorobenzene	1.129	0.997	1.028	1.062	1.067	1.074	1.008	1.012		1.0472	4.23768
T	Hexachlorobutadiene	0.469	0.419	0.455	0.457	0.47	0.472	0.454	0.459		0.457	3.74962
T	Naphthalene	1.489	1.352	1.515	1.682	1.727	1.723	1.547	1.589		1.5781	8.24736
T	1,2,3-Trichlorobenzene	0.826	0.919	0.883	0.899	0.95	0.952	0.947	0.885	0.893	0.906	4.53779

Thu Sep 14 09:01:55 2017

Login Number: L17091648 Run Date: 09/13/2017 Sample ID: WG629567-12
 Instrument ID: HPMS8 Run Time: 21:09 Method: 8260B
 File ID: 8M421391 Analyst: TMB QC Key: DOD4
 ICal Workgroup: WG629567 Cal ID: HPMS8 - 13-SEP-17

Analyte		Expected	Found	Units	RF	%D	UCL	Q
1,1-Dichloroethene	CCC	50.0	48.1	ug/L	0.531	3.70	20	
Chloroform	CCC	50.0	47.5	ug/L	0.492	5.00	20	
Ethylbenzene	CCC	50.0	50.8	ug/L	0.529	1.60	20	
Toluene	CCC	50.0	49.5	ug/L	1.40	1.10	20	
Vinyl Chloride	CCC	50.0	46.1	ug/L	0.312	7.80	20	
Bromoform	SPCC	50.0	51.8	ug/L	0.217	3.60	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	51.2	ug/L	0.494	2.40	20	
Chloromethane	SPCC	50.0	42.7	ug/L	0.601	14.6	20	
Chlorobenzene	SPCC	50.0	50.7	ug/L	1.01	1.30	20	
1,1-Dichloroethene	SPCC	50.0	48.1	ug/L	0.600	3.80	20	
1,1,1-Trichloroethane		50.0	49.9	ug/L	0.450	0.300	20	
1,1,2-Trichloroethane		50.0	50.8	ug/L	0.247	1.70	20	
1,2-Dichloroethane		50.0	50.1	ug/L	0.452	0.200	20	
Acetone		50.0	49.3	ug/L	0.0888	1.40	20	
Benzene		50.0	50.0	ug/L	1.07	0.100	20	
Carbon Tetrachloride		50.0	48.5	ug/L	0.432	3.00	20	
Methylene Chloride		50.0	48.9	ug/L	0.268	2.20	20	
m-,p-Xylene		100	103	ug/L	0.643	2.80	20	
o-Xylene		50.0	53.7	ug/L	0.656	7.30	20	
Styrene		50.0	54.3	ug/L	1.08	8.70	20	
Tetrachloroethene		50.0	50.0	ug/L	0.312	0	20	
Trichloroethene		50.0	51.5	ug/L	0.308	3.00	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17091648 Run Date: 09/29/2017 Sample ID: WG631877-02
Instrument ID: HPMS8 Run Time: 14:20 Method: 8260B
File ID: 8M421784 Analyst: TMB QC Key: DOD4
Workgroup (AAB#): WG631878 Cal ID: HPMS8 - 13-SEP-17
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
1,2-Dichloropropane	CCC	50.0	48.3	ug/L	0.337	3.33	20	
1,1-Dichloroethene	CCC	50.0	47.5	ug/L	0.524	4.94	20	
Chloroform	CCC	50.0	44.1	ug/L	0.456	11.9	20	
Ethylbenzene	CCC	50.0	46.9	ug/L	0.488	6.30	20	
Toluene	CCC	50.0	47.0	ug/L	1.33	6.01	20	
Vinyl Chloride	CCC	50.0	48.9	ug/L	0.332	2.13	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	51.2	ug/L	0.495	2.49	20	
Bromoform	SPCC	50.0	52.2	ug/L	0.218	4.42	20	
Chlorobenzene	SPCC	50.0	47.1	ug/L	0.941	5.82	20	
Chloromethane	SPCC	50.0	44.8	ug/L	0.630	10.5	20	
1,1-Dichloroethane	SPCC	50.0	47.4	ug/L	0.592	5.15	20	
Xylenes		150	143	ug/L	0.591	4.61	20	
1,1,1-Trichloroethane		50.0	47.1	ug/L	0.425	5.88	20	
1,1,2-Trichloroethane		50.0	48.9	ug/L	0.238	2.11	20	
1,2-Dichloroethane		50.0	47.1	ug/L	0.426	5.71	20	
Acetone		50.0	44.3	ug/L	0.0798	11.4	20	
Benzene		50.0	45.7	ug/L	0.982	8.67	20	
Carbon Tetrachloride		50.0	46.4	ug/L	0.413	7.27	20	
Methylene Chloride		50.0	46.5	ug/L	0.255	6.93	20	
m-,p-Xylene		100	95.0	ug/L	0.594	5.05	20	
o-Xylene		50.0	48.1	ug/L	0.588	3.73	20	
Styrene		50.0	49.9	ug/L	0.991	0.156	20	
Tetrachloroethene		50.0	47.9	ug/L	0.299	4.15	20	
Trichloroethene		50.0	48.9	ug/L	0.292	2.15	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

CCV - Modified 03/05/2008

PDF File ID: 5505641

Report generated 10/03/2017 13:52



Login Number: L17091648
Instrument ID: HPMS8
Workgroup (AAB#): WG631878

ICAL CCV Number: WG629567-08
CAL ID: HPMS8-13-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG629567-08	NA	NA	362138	640126	767485
Upper Limit	NA	NA	724276	1280252	1534970
Lower Limit	NA	NA	181069	320063	383743
<u>L17091648-01</u>	1.00	01	465616	843413	1052198
<u>L17091648-02</u>	1.00	01	476364	862917	1077452
WG631878-01	1.00	01	471410	854742	1072614
WG631878-02	1.00	01	485703	875230	1075317
WG631878-03	1.00	01	497035	883738	1083858

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)

00862728

Login Number: L17091648
Instrument ID: HPMS8
Workgroup (AAB#): WG631878

ICAL CCV Number: WG629567-08
CAL ID: HPMS8-13-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG629567-08	NA	NA	17.79	14.76	10.89
Upper Limit	NA	NA	18.29	15.26	11.39
Lower Limit	NA	NA	17.29	14.26	10.39
<u>L17091648-01</u>	1.00	01	17.73	14.72	10.85
L17091648-02	1.00	01	17.74	14.72	10.85
WG631878-01	1.00	01	17.73	14.71	10.85
WG631878-02	1.00	01	17.73	14.72	10.85
WG631878-03	1.00	01	17.74	14.72	10.84

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 #: L17091648

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: HPMS15
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 3520C	Prep Date: 10/02/2017 18:00
Matrix: Water	Analytical Method: 8270D	Cal Date: 09/18/2017 12:55
Workgroup #: WG632529	Analyst: LJH	Run Date: 10/09/2017 14:05
Collect Date: 09/27/2017 15:00	Dilution: 5	File ID: 15M23018
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,4-Dioxane	123-91-1	16.2		10.0	5.00	2.50
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,4-Dioxane-d8	44.9	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: WG632088 TIME ON: 18:30 OFF: 12:30 ON: _____ OFF: _____
 Analyst: JDH methylene chloride Lot #: COA20050
 Spike Analyst: JDH 1:1 H2SO4 Lot #: RGT40991
 Method: 3520C Sodium Sulfate , Anhydrous , Granul Lot # COA19381
 Run Date: 10/02/2017 18:00
 SOP: EXB01 Revision 20
 Spike Witness: JLD
 Surr Solution: STD83262

	SAMPLE #	Type	Reference	Prod	pH	Init Amnt	Surr Amnt	Spike Amnt	Spike Sol	Final Vol	Color
1	L17091647-01	SAMP		827-DIOXANE	<2	980 mL	.05 mL			1 mL	Transparent
2	L17091648-01	SAMP		827-DIOXANE	<2	1000 mL	.05 mL			1 mL	Transparent
3	L17091705-01	SAMP		827-DIOXANE	<2	980 mL	.05 mL			1 mL	Transparent
4	L17100001-01	ML01		827-DIOXANE	<2	1000 mL	.05 mL	.005 mL	STD77209	1 mL	Transparent
5	L17100003-01	ML01		827-DIOXANE	<2	1000 mL	.05 mL	.01 mL	STD77209	1 mL	Transparent
6	WG632088-01	BLANK		827-DIOXANE	<2	1000 mL	.05 mL			1 mL	Transparent
7	WG632088-02	LCS		827-DIOXANE	<2	1000 mL	.05 mL	.05 mL	STD77209	1 mL	Transparent
8	WG632088-03	LCS2		827-DIOXANE	<2	1000 mL	.05 mL	.05 mL	STD77209	1 mL	Transparent

Due to insufficient sample volume, this preparation batch failed to include the method prescribed MS and MSD.

Analyst: Justin Hussen

Reviewer: Julia DeLong



Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 091817
 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
WG632192, WG630010, WG630071 (ICAL)
 Internal STD: STD83628 Surrogate STD: NA Calibration STD: _____
 CCV STD: STD83050 LCS STD: _____ MS/MSD STD: _____

Comments: WG629653 MS/MSD failed the %REC limit.
 L17090697-04 to 07 reporting sample re-extracts only. Not reporting this analysis.

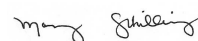
Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	15M22363	WG630071-01 5PPM DFTPP STD	1	1	STD83235	09/18/17 10:27
2	15M22364	WG630071-01 5PPM DFTPP STD	1	1	STD83235	09/18/17 10:44
3	15M22365	WG630071-02 5PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 11:01
4	15M22366	WG630071-03 10PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 11:24
5	15M22367	WG630071-04 7.5PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 11:47
6	15M22368	WG630071-05 2.5PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 12:10
7	15M22369	WG630071-06 1PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 12:32
8	15M22370	WG630071-07 0.4PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 12:55
9	15M22371	WG630071-08 5PPM 1,4-DIOX ALT SRC	1	1	STD83128	09/18/17 13:49
10	15M22372	WG629653-01 BLANK 9/14	7	1	SOIL	09/18/17 14:12
11	15M22373	WG629653-02 LCS 9/14	7	1	SOIL	09/18/17 14:35
12	15M22374	WG629658-01 BLANK 9/14	1	1		09/18/17 14:57
13	15M22375	WG629658-02 LCS 9/15	1	1		09/18/17 15:20
14	15M22376	WG629658-03 LCS2 9/16	1	1		09/18/17 15:43
15	15M22377	L17090697-09 827-DIOXANE	7	1	SOIL	09/18/17 16:05
16	15M22378	L17090697-10 827-DIOXANE	1	1		09/18/17 16:28
17	15M22379	L17090697-08 827-DIOXANE	7	1	SOIL	09/18/17 16:51
18	15M22380	L17090697-04 827-DIOXANE	7	1	SOIL	09/18/17 17:14
19	15M22381	L17090697-01 827-DIOXANE	7	1	SOIL	09/18/17 17:36
20	15M22382	L17090697-03 827-DIOXANE	7	1	SOIL	09/18/17 17:59
21	15M22383	L17090697-11 827-DIOXANE	1	1		09/18/17 18:22
22	15M22384	L17090697-02 827-DIOXANE	7	1	SOIL	09/18/17 18:45
34	15M22385	L17090697-06 MS 827-DIOXANE	7	1	SOIL	09/18/17 19:08
35	15M22386	L17090697-07 MSD 827-DIOXANE	7	1	SOIL	09/18/17 19:30
33	15M22387	L17090697-05 REF 827-DIOXANE	7	1		09/18/17 19:53
26	15M22388	L17090697-10 2X 827-DIOXANE	1	2		09/18/17 20:16
27	15M22389	L17090697-11 10X 827-DIOXANE	1	10		09/18/17 20:38
28	15M22390	BAKE OUT	1	1		09/18/17 21:01
29	15M22391	BAKE OUT	1	1		09/18/17 21:24
30	15M22392	BAKE OUT	1	1		09/18/17 21:46

Comments

Seq.	Rerun	Dil.	Reason	Analytes
------	-------	------	--------	----------

Page: 1

Approved: 19-SEP-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 091817
 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
WG632192, WG630010, WG630071 (ICAL)
 Internal STD: STD83628 Surrogate STD: NA
 CCV STD: STD83050 LCS STD: _____

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1				
			WG630071-01 5PPM DFTPP STD Ion failure, RR, NR.	
21	X	10	Over Calibration Range	1,4-DIOXANE
			L17090697-11 827-DIOXANE	
26				
			L17090697-10 2X 827-DIOXANE NR, unnecessary dilution.	

Page: 2

Approved: 19-SEP-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 100917
 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

WG632529

Internal STD: STD83628 Surrogate STD: NA Calibration STD: _____

CCV STD: STD83583 LCS STD: _____ MS/MSD STD: _____

Comments: Dilutions were made based on sample histories.

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	15M23005	BAKE OUT	1	1		10/09/17 08:42
2	15M23006	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 09:01
3	15M23007	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 09:17
4	15M23008	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 10:11
5	15M23009	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 10:34
6	15M23010	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 10:57
7	15M23011	WG633073-02 5PPM DIOXANE STD	1	1	STD83050	10/09/17 11:25
8	15M23012	WG632088-01 BLANK 827-DIOXANE	1	1		10/09/17 11:47
9	15M23013	WG632088-02 LCS 827-DIOXANE	1	1		10/09/17 12:10
10	15M23014	WG632088-03 LCS2 827-DIOXANE	1	1		10/09/17 12:33
11	15M23015	L17100001-01 827-DIOXANE	1	1		10/09/17 12:56
12	15M23016	L17100003-01 827-DIOXANE	1	1		10/09/17 13:19
13	15M23017	L17091647-01 5X 827-DIOXANE	1	5		10/09/17 13:42
14	15M23018	L17091648-01 5X 827-DIOXANE	1	5		10/09/17 14:05
15	15M23019	L17091705-01 5X 827-DIOXANE	1	5		10/09/17 14:28

Comments

Seq.	Rerun	Dil.	Reason	Analytes
2				
			WG633073-01 5PPM DFTPP STD Ion failure and Benzidine was greater than 2, RR, NR.	
3				
			WG633073-01 5PPM DFTPP STD Ion failure, change liner, RR, NR.	
4				
			WG633073-01 5PPM DFTPP STD Ion failure, changed the gold seal, RR, NR.	
5				
			WG633073-01 5PPM DFTPP STD Ion failure, quicktune, RR, NR.	
13			Surrogate standard failure	1
			L17091647-01 5X 827-DIOXANE surrogate failure is due to sample matrix interference. Previous sample history confirms that surrogates were affected by SMI.	

Page: 1

Approved: 09-OCT-17

Mary Schilling



Microbac Laboratories Inc.

Data Checklist

Date: 18-SEP-2017
 Analyst: LJH
 Analyst: NA
 Method: 827-DIOX
 Instrument: HPMS15
 Curve Workgroup: WG630071
 Runlog ID: 84667
 Analytical Workgroups: L17090697

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	NA
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	X
Recoveries	X
%RPD	X
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	NA
Manual integrations	X
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	MES

Primary Reviewer:
19-SEP-2017

Lacey J. Bendoric

Secondary Reviewer:
19-SEP-2017

Mary Schilling



Microbac Laboratories Inc.

Data Checklist

Date: 09-OCT-2017
 Analyst: LJH
 Analyst: NA
 Method: 827-DIOX
 Instrument: HPMS15
 Curve Workgroup: NA
 Runlog ID: 85130
 Analytical Workgroups: L17091647, -1648, -1705, L17100001, -0003

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	X
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	MES

Primary Reviewer:
09-OCT-2017

Randy J. Bendoric

Secondary Reviewer:
09-OCT-2017

Mary Schilling

CHECKLIST1 - Modified 03/05/2008

Generated: OCT-09-2017 15:29:58



Analytical Method:8270D
Login Number:L17091648

AAB#:WG632529

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-SP650-6472-GRAB	01	09/27/17					10/02/2017	5.1	7		10/09/17	6.8	40	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091648 Work Group: WG632529
 Blank File ID: 15M23012 Blank Sample ID: WG632088-01
 Prep Date: 10/02/17 18:00 Instrument ID: HPMS15
 Analyzed Date: 10/09/17 11:47 Method: 8270D
 Analyst: LJH

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632088-02	15M23013	10/09/17 12:10	01
LCS2	WG632088-03	15M23014	10/09/17 12:33	01
LH18/24-SP650-6472-GRAB	L17091648-01	15M23018	10/09/17 14:05	DL01

Report Name: BLANK_SUMMARY
 PDF File ID: 5518218
 Report generated 10/10/2017 08:29



Login Number: L17091648 Prep Date: 10/02/17 18:00 Sample ID: WG632088-01
 Instrument ID: HPMS15 Run Date: 10/09/17 11:47 Prep Method: 3520C
 File ID: 15M23012 Analyst: LJH Method: 8270D
 Workgroup (AAB#): WG632529 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS15-18-SEP-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	67.1	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: 5518219
 10-OCT-2017 08:29



Login Number: L17091648 Analyst: LJH Prep Method: 3520C
 Instrument ID: HPMS15 Matrix: Water Method: 8270D
 Workgroup (AAB#): WG632529 Units: ug/L
 QC Key: DOD4 Lot #: STD77209
 Sample ID: WG632088-02 LCS File ID: 15M23013 Run Date: 10/09/2017 12:10
 Sample ID: WG632088-03 LCS2 File ID: 15M23014 Run Date: 10/09/2017 12:33

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
1,4-Dioxane	5.00	2.98	59.6	5.00	2.56	51.2	15.1	30 - 104	30	

Surogates	LCS	LCS2	Surrogate Limits		Qualifier
	% Recovery	% Recovery			
1,4-Dioxane-d8	78.7	57.5	20	- 129	PASS

* EXCEEDS %REC LIMIT
EXCEEDS RPD LIMIT



DFTPP

Login Number: L17091648 Tune ID: WG630071-01
 Instrument: HPMS15 Run Date: 09/18/2017
 Analyst: SCB Run Time: 10:44
 Workgroup: WG630071 File ID: 15M22364
 Cal ID: HPMS15-18-SEP-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51.0	198	30.0	60.0	40.0	20820	PASS
68.0	69.0	0	2.00	0	0	PASS
69.0	198	0	100	43.4	22574	PASS
70.0	69.0	0	2.00	1.19	268	PASS
127	198	40.0	60.0	54.0	28131	PASS
197	198	0	1.00	0.803	418	PASS
198	198	100	100	100	52048	PASS
199	198	5.00	9.00	6.99	3637	PASS
275	198	10.0	30.0	26.2	13618	PASS
365	198	1.00	100	3.04	1581	PASS
441	443	0.0100	100	76.4	6552	PASS
442	198	40.0	100	83.0	43203	PASS
443	442	17.0	23.0	19.8	8575	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG630071-02	STD-CCV	01	09/18/2017 11:01	
WG630071-03	STD	01	09/18/2017 11:24	
WG630071-04	STD	01	09/18/2017 11:47	
WG630071-05	STD	01	09/18/2017 12:10	
WG630071-06	STD	01	09/18/2017 12:32	
WG630071-07	STD	01	09/18/2017 12:55	
WG630071-08	SSCV	01	09/18/2017 13:49	

* Sample past 12 hour tune limit



DFTPP

Login Number: L17091648 Tune ID: WG633073-01
 Instrument: HPMS15 Run Date: 10/09/2017
 Analyst: LJH Run Time: 10:57
 Workgroup: WG633073 File ID: 15M23010
 Cal ID: HPMS15-18-SEP-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51.0	198	30.0	60.0	50.4	32171	PASS
68.0	69.0	0	2.00	1.99	651	PASS
69.0	198	0	100	51.1	32675	PASS
70.0	69.0	0	2.00	0	0	PASS
127	198	40.0	60.0	57.3	36613	PASS
197	198	0	1.00	0.213	136	PASS
198	198	100	100	100	63891	PASS
199	198	5.00	9.00	6.30	4026	PASS
275	198	10.0	30.0	24.7	15772	PASS
365	198	1.00	100	3.28	2096	PASS
441	443	0.0100	100	67.5	5277	PASS
442	198	40.0	100	65.6	41931	PASS
443	442	17.0	23.0	18.7	7822	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG633073-02	CCV	01	10/09/2017 11:25	
WG632088-01	BLANK	01	10/09/2017 11:47	
WG632088-02	LCS	01	10/09/2017 12:10	
WG632088-03	LCS2	01	10/09/2017 12:33	
L17091648-01	LH18/24-SP650-6472-GRAB	DL01	10/09/2017 14:05	

* Sample past 12 hour tune limit



Login Number: L17091648
Analytical Method: 8270D
ICAL Workgroup: WG630071

Instrument ID: HPMS15
Initial Calibration Date: 18-SEP-17 12:55
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
1,4-Dioxane	0.3902	11.6		

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



Login Number: L17091648
Analytical Method: 8270D

Instrument ID: HPMS15
Initial Calibration Date: 18-SEP-17 12:55
Column ID: F

Analyte	WG630071-02			WG630071-03			WG630071-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
1,4-Dioxane	5.00	64441.0000	0.3384	10.0	127608.000	0.3767	7.50	112923.000	0.3838

INT_CAL - Modified 03/06/2008
PDF File ID: 5518221
Report generated 10/10/2017 08:29



Login Number: L17091648
Analytical Method: 8270D

Instrument ID: HPMS15
Initial Calibration Date: 18-SEP-17 12:55
Column ID: F

Analyte	WG630071-05			WG630071-06			WG630071-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
1,4-Dioxane	2.50	29846.0000	0.3551	1.00	15338.0000	0.4313	0.400	5774.00000	0.4559

INT_CAL - Modified 03/06/2008
PDF File ID: 5518221
Report generated 10/10/2017 08:29



Method Path : C:\msdchem\1\methods\

Method File : DIOXANE_D8.M

Title : OVD MSS01 SIM 1,4-dioxane ICAL 091817

Last Update : Mon Sep 18 13:46:16 2017

Response Via : Initial Calibration

Curve: WG630071

Calibration Files

10 =15M22366.D 7.5 =15M22367.D 5 =15M22365.D 2.5 =15M22368.D 1 =15M22369.D
 0.4 =15M22370.D

Compound	10	7.5	5	2.5	1	0.4	Avg	%RSD
1) I 1,4-Dichlorobenzen...								
2) 1,4-Dioxane	0.377	0.384	0.338	0.355	0.431	0.456	0.390	11.56
3) S 1,4-Dioxane-d8	0.473	0.481	0.423	0.443	0.530	0.520	0.478	8.78
4) S Nitrobenzene-d5	1.284	1.302	1.137	1.156	1.294	1.212	1.231	5.94
5) S 2-Fluorobiphenyl	2.573	2.615	2.339	2.482	2.903	2.842	2.626	8.16
6) S p-Terphenyl-d14	2.976	3.033	2.696	2.830	3.316	3.211	3.010	7.68

(#) = Out of Range

DIOXANE_D8.M Tue Sep 19 08:28:34 2017

Login Number: L17091648 Run Date: 09/18/2017 Sample ID: WG630071-08
 Instrument ID: HPMS15 Run Time: 13:49 Method: 8270D
 File ID: 15M22371 Analyst: SCB QC Key: DOD4
 ICal Workgroup: WG630071 Cal ID: HPMS15 - 18-SEP-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
1,4-Dioxane	5000	5000	ug/L	0.390	0	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17091648 Run Date: 10/09/2017 Sample ID: WG633073-02
 Instrument ID: HPMS15 Run Time: 11:25 Method: 8270D
 File ID: 15M23011 Analyst: LJH QC Key: DOD4
 Workgroup (AAB#): WG632529 Cal ID: HPMS15 - 18-SEP-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
1,4-Dioxane	5000	5080	ug/L	0.396	1.52	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17091648
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

CCV Number: WG633073-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG633073-02	NA	NA	44189
Upper Limit	NA	NA	88378
Lower Limit	NA	NA	22095
<u>L17091648-01</u>	5.00	DL01	42112
WG632088-01	1.00	01	36033
WG632088-02	1.00	01	42281
WG632088-03	1.00	01	33892

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



Login Number: L17091648
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

ICAL CCV Number: WG630071-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG630071-02	NA	NA	37725
Upper Limit	NA	NA	75450
Lower Limit	NA	NA	18863
<u>L17091648-01</u>	5.00	DL01	42112
WG632088-01	1.00	01	36033
WG632088-02	1.00	01	42281
WG632088-03	1.00	01	33892

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



Login Number: L17091648
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

CCV Number: WG633073-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG633073-02	NA	NA	7.1
Upper Limit	NA	NA	7.6
Lower Limit	NA	NA	6.6
<u>L17091648-01</u>	5.00	DL01	7.095
WG632088-01	1.00	01	7.095
WG632088-02	1.00	01	7.095
WG632088-03	1.00	01	7.095

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



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

00862758

Login Number: L17091648
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

ICAL CCV Number: WG630071-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG630071-02	NA	NA	7.12
Upper Limit	NA	NA	7.62
Lower Limit	NA	NA	6.62
<u>L17091648-01</u>	5.00	DL01	7.095
WG632088-01	1.00	01	7.095
WG632088-02	1.00	01	7.095
WG632088-03	1.00	01	7.095

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



2.3 Metals Data

2.3.1 Metals I C P Data

2.3.1.1 Summary Data

Lab Report #: L17091648

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: ICP-THERMO4
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 3015A	Prep Date: 10/03/2017 07:13
Matrix: Water	Analytical Method: 6010C	Cal Date: 10/05/2017 16:45
Workgroup #: WG632662	Analyst: KKB	Run Date: 10/05/2017 17:58
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: T4.100517.175839
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Aluminum, Total	7429-90-5	0.200	U	0.200	0.200	0.100
Iron, Total	7439-89-6	0.100	U	0.100	0.100	0.0500
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: WG632208
 Analyst: ERP
 Spike Analyst: ERP
 Run Date: 10/03/2017 07:13
 Method: 3015A
 Balance: BAL019
 Instrument: MW-1
 Instrument Start: 10/03/2017 07:29

SOP: ME407 Revision 19
 Spike Solution: STD83991
 Spike Witness: VC
 HNO3 Lot #: COA19940
 HCL Lot #: COA20006
 40 & 50 ML. DIGESTION TUCOA19932
 ICP FILTERS LOT#r7ha2443RGT40684

	SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG632208-02	BLANK	1	40 mL	50 mL	207.048 g	207.043 g		
2	WG632208-03	LCS	1	40 mL	50 mL	211.766 g	211.766 g	5 mL	
3	L17091450-16	SAMP	1	40 mL	50 mL	205.714 g	205.709 g		10/09/17
4	L17091647-01	SAMP	1	40 mL	50 mL	203.667 g	203.656 g		10/09/17
5	L17091648-01	SAMP	1	40 mL	50 mL	205.047 g	205.053 g		10/09/17
6	L17091745-01	SAMP	1	40 mL	50 mL	206.539 g	206.531 g		10/09/17
7	L17091745-02	SAMP	1	40 mL	50 mL	205.32 g	205.319 g		10/09/17
8	L17091745-03	SAMP	1	40 mL	50 mL	203.87 g	203.86 g		10/09/17
9	L17091745-04	SAMP	1	40 mL	50 mL	204.033 g	204.013 g		10/09/17
10	L17100008-01	SAMP	1	40 mL	50 mL	204.605 g	204.603 g		10/09/17
11	L17100008-02	SAMP	1	40 mL	50 mL	205.49 g	205.477 g		10/09/17
12	L17100008-03	SAMP	1	40 mL	50 mL	204.711 g	204.703 g		10/09/17
13	L17100008-04	SAMP	1	40 mL	50 mL	205.49 g	205.456 g		10/09/17
14	L17100011-01	SAMP	1	40 mL	50 mL	207.705 g	207.694 g		10/09/17
15	L17100011-02	SAMP	1	40 mL	50 mL	204.391 g	204.382 g		10/09/17
16	L17100033-01	SAMP	1	40 mL	50 mL	205.621 g	205.603 g		10/09/17
17	L17100074-01	SAMP	1	40 mL	50 mL	206.837 g	206.825 g		10/06/17
18	L17100074-02	SAMP	1	40 mL	50 mL	204.109 g	204.097 g		10/06/17
19	L17100074-03	SAMP	1	40 mL	50 mL	205.199 g	205.196 g		10/06/17
20	L17100074-04	SAMP	1	40 mL	50 mL	203.847 g	203.837 g		10/06/17
21	WG632208-01	REF	1	40 mL	50 mL	205.873 g	205.864 g		
22	L17100074-05	SAMP	1	40 mL	50 mL	205.873 g	205.864 g		10/06/17
23	L17100086-01	SAMP	1	40 mL	50 mL	206.642 g	206.634 g		10/05/17
24	WG632208-04	MS	1	40 mL	50 mL	212.414 g	212.415 g	5 mL	
25	WG632208-05	MSD	1	40 mL	50 mL	209.594 g	209.583 g	5 mL	

Analyst: Evan Patten

Reviewer: Vicki Collier



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100517T4.2R.TXT

Analyst1: KKB Analyst2: N/A

Method: 200.7/6010B/6010C SOP: ME600G Rev: 9

Maintenance Log ID: _____

Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992

ICSA: STD84168 IC SAB: STD84169 Int. Std: RGT40895

CCV: STD83825 LLCCV: COA19621 Tuning Sol: _____

Stannous : _____ Hydroxylamine : _____

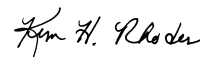
Workgroups: 632662,632104

Comments:

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Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	T4.100517.111302	WG632767-01	Calibration Point		1		10/05/17 11:13
2	T4.100517.111650	WG632767-02	Calibration Point		1		10/05/17 11:16
3	T4.100517.112037	WG632767-03	Calibration Point		1		10/05/17 11:20
4	T4.100517.112426	WG632767-04	Calibration Point		1		10/05/17 11:24
5	T4.100517.112756	WG632767-05	Calibration Point		1		10/05/17 11:27
6	T4.100517.113125	WG632767-06	Initial Calibration Verification		1		10/05/17 11:31
7	T4.100517.113457	WG632767-07	Initial Calib Blank		1		10/05/17 11:34
8	T4.100517.113845	WG632767-08	LLICV		1		10/05/17 11:38
9	T4.100517.114233	WG632767-09	LLICV		1		10/05/17 11:42
10	T4.100517.114621	WG632767-10	Low Level Initial Calibration V		1		10/05/17 11:46
11	T4.100517.115009	WG632767-11	Interference Check		1		10/05/17 11:50
12	T4.100517.115353	WG632767-12	Interference Check		1		10/05/17 11:53
13	T4.100517.115730	WG632767-13	CCV		1		10/05/17 11:57
14	T4.100517.120100	WG632767-14	CCB		1		10/05/17 12:01
15	T4.100517.120450	WG632208-02	Method/Prep Blank	40/50	1		10/05/17 12:04
16	T4.100517.120838	WG632208-03	Laboratory Control S	40/50	1		10/05/17 12:08
17	T4.100517.121213	L17091450-16	EQUIPMENT BLANK	40/50	1		10/05/17 12:12
18	T4.100517.121601	L17100074-05	81606-W01-WQ-W0002		1	WG632208-01	10/05/17 12:16
19	T4.100517.121949	WG632208-04	Matrix Spike	40/50	1	L17100074-05	10/05/17 12:19
20	T4.100517.122325	WG632208-05	Matrix Spike Duplica	40/50	1	L17100074-05	10/05/17 12:23
21	T4.100517.122700	L17100086-01	CLB-WWD-092917	40/50	1		10/05/17 12:27
22	T4.100517.123043	WG632662-01	Post Digestion Spike		1	L17100086-01	10/05/17 12:30
23	T4.100517.123417	WG632662-02	Serial Dilution		5	L17100086-01	10/05/17 12:34
24	T4.100517.123801	L17091368-13	MW-12DUP	40/50	10		10/05/17 12:38
25	T4.100517.124148	WG632767-15	CCV		1		10/05/17 12:41
26	T4.100517.124519	WG632767-16	CCB		1		10/05/17 12:45
27	T4.100517.124909	WG632767-17	Interference Check		1		10/05/17 12:49
28	T4.100517.125254	WG632767-18	Interference Check		1		10/05/17 12:52
29	T4.100517.125630	WG632767-19	CCV		1		10/05/17 12:56
30	T4.100517.130001	WG632767-20	CCB		1		10/05/17 13:00

Page: 1 Approved: October 05, 2017




Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100517T4.3R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	T4.100517.163002	WG632900-01	Calibration Point		1		10/05/17 16:30
2	T4.100517.163350	WG632900-02	Calibration Point		1		10/05/17 16:33
3	T4.100517.163739	WG632900-03	Calibration Point		1		10/05/17 16:37
4	T4.100517.164129	WG632900-04	Calibration Point		1		10/05/17 16:41
5	T4.100517.164501	WG632900-05	Calibration Point		1		10/05/17 16:45
6	T4.100517.164830	WG632900-06	Initial Calibration Verification		1		10/05/17 16:48
7	T4.100517.165203	WG632900-07	Initial Calib Blank		1		10/05/17 16:52
8	T4.100517.165622	WG632900-08	Low Level Initial Calibration V		1		10/05/17 16:56
9	T4.100517.170010	WG632900-09	LLICV		1		10/05/17 17:00
10	T4.100517.170358	WG632900-10	Low Level Initial Calibration V		1		10/05/17 17:03
11	T4.100517.170745	WG632900-11	Interference Check		1		10/05/17 17:07
12	T4.100517.171130	WG632900-12	Interference Check		1		10/05/17 17:11
13	T4.100517.171507	WG632900-13	CCV		1		10/05/17 17:15
14	T4.100517.171838	WG632900-14	CCB		1		10/05/17 17:18
15	T4.100517.174731	WG632208-02	Method/Prep Blank	40/50	1		10/05/17 17:47
16	T4.100517.175118	WG632208-03	Laboratory Control S	40/50	1		10/05/17 17:51
17	T4.100517.175454	L17091647-01	LH18/24-SP140-7472-GRAB	40/50	1		10/05/17 17:54
18	T4.100517.175839	L17091648-01	LH18/24-SP650-6472-GRAB	40/50	1		10/05/17 17:58
19	T4.100517.180231	L17091745-01	MW-103	40/50	1		10/05/17 18:02
20	T4.100517.180615	L17091745-02	MW-103	40/50	1		10/05/17 18:06
21	T4.100517.180959	L17091745-03	MW-107	40/50	1		10/05/17 18:09
22	T4.100517.181343	L17091745-04	MW-107	40/50	1		10/05/17 18:13
23	T4.100517.181728	WG632662-03	Post Digestion Spike		1	L17091745-04	10/05/17 18:17
24	T4.100517.182102	WG632662-04	Serial Dilution		5	L17091745-04	10/05/17 18:21
25	T4.100517.182449	WG632900-15	CCV		1		10/05/17 18:24
26	T4.100517.182820	WG632900-16	CCB		1		10/05/17 18:28
27	T4.100517.183211	L17100008-01	27-2-2.01 W1	40/50	1		10/05/17 18:32
28	T4.100517.183556	L17100008-02	27-2-2.01 W1	40/50	1		10/05/17 18:35
29	T4.100517.183941	L17100008-03	27-2-2.05 W1	40/50	1		10/05/17 18:39
30	T4.100517.184326	L17100008-04	27-2-2.05 W1	40/50	1		10/05/17 18:43
31	T4.100517.184711	L17100011-01	45-16-2.01 W2	40/50	1		10/05/17 18:47
32	T4.100517.185057	L17100011-02	45-10-7 ES-1	40/50	1		10/05/17 18:50
33	T4.100517.185442	L17100033-01	1001-100 W1	40/50	1		10/05/17 18:54
34	T4.100517.185827	L17100074-01	81101-W15-WQ-W0031	40/50	1		10/05/17 18:58

Page: 1 Approved: October 06, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100517T4.3R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	T4.100517.190215	L17100074-02	81101-W15-WQ-W0058	40/50	1		10/05/17 19:02
36	T4.100517.190603	L17100074-03	81101-W19-WQ-W0050	40/50	1		10/05/17 19:06
37	T4.100517.190951	WG632900-17	CCV		1		10/05/17 19:09
38	T4.100517.191322	WG632900-18	CCB		1		10/05/17 19:13
39	T4.100517.191712	L17100074-04	81604-W07-WQ-W0027	40/50	1		10/05/17 19:17
40	T4.100517.192100	WG632208-01	Reference Sample		1	L17100074-05	10/05/17 19:21
41	T4.100517.192449	WG632208-04	Matrix Spike	40/50	1	L17100074-05	10/05/17 19:24
42	T4.100517.192824	WG632208-05	Matrix Spike Duplica	40/50	1	L17100074-05	10/05/17 19:28
43	T4.100517.193202	WG632900-19	CCV		1		10/05/17 19:32
44	T4.100517.193534	WG632900-20	CCB		1		10/05/17 19:35
45	T4.100517.193925	WG632900-21	Low Level Continuing Calibra		1		10/05/17 19:39
46	T4.100517.194313	WG632900-22	LLCCV		1		10/05/17 19:43
47	T4.100517.194701	WG632900-23	Low Level Continuing Calibra		1		10/05/17 19:47
48	T4.100517.195049	WG632044-02	Method/Prep Blank	40/50	1		10/05/17 19:50
49	T4.100517.195437	WG632044-03	Laboratory Control S	40/50	1		10/05/17 19:54
50	T4.100517.195813	L17091458-02	A11-MW04-Y3S2	40/50	2		10/05/17 19:58
51	T4.100517.200159	L17091645-02	A12-MW07-Y3S2	40/50	10		10/05/17 20:01
52	T4.100517.200548	WG632186-01	Post Digestion Spike		10	L17091645-02	10/05/17 20:05
53	T4.100517.200923	WG632186-02	Serial Dilution		50	L17091645-02	10/05/17 20:09
54	T4.100517.201311	L17091645-04	A12-FTBL-MW01-Y3S2	40/50	5		10/05/17 20:13
55	T4.100517.201700	L17091645-06	A11/A12-TM02-Y3S2	40/50	5		10/05/17 20:17
56	T4.100517.202047	L17091705-01	LH18/24-SP650-6474-GRAB	40/50	1		10/05/17 20:20
57	T4.100517.202442	L17091706-01	LH18/24-SP140-7474-GRAB	40/50	1		10/05/17 20:24
58	T4.100517.202828	WG632900-24	CCV		1		10/05/17 20:28
59	T4.100517.203158	WG632900-25	CCB		1		10/05/17 20:31
60	T4.100517.203549	L17091719-04	A11-MW02-Y3S2	40/50	5		10/05/17 20:35
61	T4.100517.203936	L17091741-03	#3-POST 1X COLUMNS		1	WG632044-01	10/05/17 20:39
62	T4.100517.204322	WG632044-04	Matrix Spike	40/50	1	L17091741-03	10/05/17 20:43
63	T4.100517.204657	WG632044-05	Matrix Spike Duplica	40/50	1	L17091741-03	10/05/17 20:46
64	T4.100517.205031	L17091768-01	17I2015-01	40/50	25		10/05/17 20:50
65	T4.100517.205426	L17091768-03	17I2015-02	40/50	25		10/05/17 20:54
66	T4.100517.205822	WG632900-26	CCV		1		10/05/17 20:58
67	T4.100517.210153	WG632900-27	CCB		1		10/05/17 21:01
68	T4.100517.210543	WG632900-28	Low Level Continuing Calibra		1		10/05/17 21:05

Page: 2 Approved: October 06, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100517T4.3R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol: _____
 Stannous: _____ Hydroxylamine: _____

Workgroups: 632662,632186,632810

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
69	T4.100517.210930	WG632900-29	LLCCV		1		10/05/17 21:09
70	T4.100517.211319	WG632900-30	Low Level Continuing Calibra		1		10/05/17 21:13
71	T4.100517.211708	WG632697-02	Method/Prep Blank	40/50	1		10/05/17 21:17
72	T4.100517.212057	WG632697-03	Laboratory Control S	40/50	1		10/05/17 21:20
73	T4.100517.212432	WG632462-01	Fluid Blank 1		1		10/05/17 21:24
74	T4.100517.212820	L17100159-01	T1360	40/50	1		10/05/17 21:28
75	T4.100517.213207	L17100159-02	T1362	40/50	1		10/05/17 21:32
76	T4.100517.213554	L17100159-03	T1363	40/50	1		10/05/17 21:35
77	T4.100517.213937	L17100159-04	T1365	40/50	1		10/05/17 21:39
78	T4.100517.214321	WG632697-01	Reference Sample		1	L17100170-02	10/05/17 21:43
79	T4.100517.214708	WG632697-04	Matrix Spike	5/50	1	L17100170-02	10/05/17 21:47
80	T4.100517.215043	WG632697-05	Matrix Spike Duplica	5/50	1	L17100170-02	10/05/17 21:50
81	T4.100517.215420	WG632900-31	CCV		1		10/05/17 21:54
82	T4.100517.215749	WG632900-32	CCB		1		10/05/17 21:57
83	T4.100517.220139	L17100173-02	POLY TANK 01-100317	5/50	1		10/05/17 22:01
84	T4.100517.220528	L17100265-01	STG VALVE GRIT	5/50	1		10/05/17 22:05
85	T4.100517.220915	L17100274-01	1001-136 S1	40/50	1		10/05/17 22:09
86	T4.100517.221259	L17100275-01	1001-135 W1	40/50	1		10/05/17 22:12
87	T4.100517.221643	L17100276-01	45-12-8 S8	40/50	1		10/05/17 22:16
88	T4.100517.222029	L17100277-01	1805-108 W1	40/50	1		10/05/17 22:20
89	T4.100517.222414	L17100277-02	1805-108 S1	40/50	1		10/05/17 22:24
90	T4.100517.222800	WG632900-33	CCV		1		10/05/17 22:28
91	T4.100517.223130	WG632900-34	CCB		1		10/05/17 22:31
92	T4.100517.223519	L17100277-03	1805-108 S4	40/50	1		10/05/17 22:35
93	T4.100517.223904	L17100277-04	1805-108 S3	40/50	1		10/05/17 22:39
94	T4.100517.224249	L17100278-01	2210-125 W1	40/50	1		10/05/17 22:42
95	T4.100517.224635	WG632810-01	Post Digestion Spike		1	L17100278-01	10/05/17 22:46
96	T4.100517.225009	WG632810-02	Serial Dilution		5	L17100278-01	10/05/17 22:50
97	T4.100517.225358	WG632900-35	Interference Check		1		10/05/17 22:53
98	T4.100517.225743	WG632900-36	Interference Check		1		10/05/17 22:57
99	T4.100517.230119	WG632900-37	CCV		1		10/05/17 23:01
100	T4.100517.230450	WG632900-38	CCB		1		10/05/17 23:04

Page: 3 Approved: October 06, 2017

Sam H. Rhodes

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Instrument Run Log

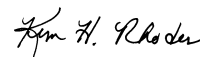
Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol: _____
 Stannous: _____ Hydroxylamine: _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	T4.100617.123358	WG633026-01	Calibration Point		1		10/06/17 12:33
2	T4.100617.123746	WG633026-02	Calibration Point		1		10/06/17 12:37
3	T4.100617.124135	WG633026-03	Calibration Point		1		10/06/17 12:41
4	T4.100617.124525	WG633026-04	Calibration Point		1		10/06/17 12:45
5	T4.100617.124856	WG633026-05	Calibration Point		1		10/06/17 12:48
6	T4.100617.125226	WG633026-06	Initial Calibration Verification		1		10/06/17 12:52
7	T4.100617.130543	WG633026-07	Initial Calib Blank		1		10/06/17 13:05
8	T4.100617.130931	WG633026-08	Low Level Initial Calibration V		1		10/06/17 13:09
9	T4.100617.131319	WG633026-09	Low Level Initial Calibration V		1		10/06/17 13:13
10	T4.100617.131707	WG633026-10	LLICV		1		10/06/17 13:17
11	T4.100617.132055	WG633026-11	Interference Check		1		10/06/17 13:20
12	T4.100617.132439	WG633026-12	Interference Check		1		10/06/17 13:24
13	T4.100617.132814	WG633026-13	CCV		1		10/06/17 13:28
14	T4.100617.133144	WG633026-14	CCB		1		10/06/17 13:31
15	T4.100617.135225	WG632208-02	Method/Prep Blank	40/50	1		10/06/17 13:52
16	T4.100617.135612	WG632208-03	Laboratory Control S	40/50	1		10/06/17 13:56
17	T4.100617.135947	L17100074-01	81101-W15-WQ-W0031	40/50	1		10/06/17 13:59
18	T4.100617.140334	L17100074-02	81101-W15-WQ-W0058	40/50	1		10/06/17 14:03
19	T4.100617.140722	L17100074-03	81101-W19-WQ-W0050	40/50	1		10/06/17 14:07
20	T4.100617.141110	L17100074-04	81604-W07-WQ-W0027	40/50	1		10/06/17 14:11
21	T4.100617.141458	WG632662-05	Post Digestion Spike		1	L17100074-04	10/06/17 14:14
22	T4.100617.141834	WG632662-06	Serial Dilution		5	L17100074-04	10/06/17 14:18
23	T4.100617.142222	WG633026-15	CCV		1		10/06/17 14:22
24	T4.100617.142553	WG633026-16	CCB		1		10/06/17 14:25
25	T4.100617.142944	WG632208-01	Reference Sample		1	L17100074-05	10/06/17 14:29
26	T4.100617.143332	WG632208-04	Matrix Spike		1	L17100074-05	10/06/17 14:33
27	T4.100617.143707	WG632208-05	Matrix Spike Duplica	40/50	1	L17100074-05	10/06/17 14:37
28	T4.100617.144042	L17091768-01	17I2015-01	40/50	100		10/06/17 14:40
29	T4.100617.144429	L17091768-03	17I2015-02	40/50	100		10/06/17 14:44
30	T4.100617.144817	WG633026-17	CCV		1		10/06/17 14:48
31	T4.100617.150013	WG633026-18	CCV		1		10/06/17 15:00
32	T4.100617.150401	WG633026-19	CCB		1		10/06/17 15:04
33	T4.100617.150804	WG632208-04	Matrix Spike	40/50	1	L17100074-05	10/06/17 15:08
34	T4.100617.151143	WG633026-20	CCV		1		10/06/17 15:11

Page: 1 Approved: October 06, 2017




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Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RG40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	T4.100617.151513	WG633026-21	CCB		1		10/06/17 15:15
36	T4.100617.151904	WG633026-22	Low Level Continuing Calibra		1		10/06/17 15:19
37	T4.100617.152251	WG633026-23	Low Level Continuing Calibra		1		10/06/17 15:22
38	T4.100617.152639	WG633026-24	LLCCV		1		10/06/17 15:26
39	T4.100617.153027	WG632697-02	Method/Prep Blank	40/50	1		10/06/17 15:30
40	T4.100617.153415	WG632697-03	Laboratory Control S	40/50	1		10/06/17 15:34
41	T4.100617.153751	L17100159-01	T1360	40/50	1		10/06/17 15:37
42	T4.100617.154138	WG632810-03	Post Digestion Spike		1	L17100159-01	10/06/17 15:41
43	T4.100617.154519	WG632810-04	Serial Dilution		5	L17100159-01	10/06/17 15:45
44	T4.100617.154900	L17100159-02	T1362	40/50	1		10/06/17 15:49
45	T4.100617.155247	L17100159-03	T1363	40/50	1		10/06/17 15:52
46	T4.100617.155630	L17100159-04	T1365	40/50	1		10/06/17 15:56
47	T4.100617.160015	WG633026-25	CCV		1		10/06/17 16:00
48	T4.100617.160346	WG633026-26	CCB		1		10/06/17 16:03
49	T4.100617.160735	WG632697-01	Reference Sample		1	L17100170-02	10/06/17 16:07
50	T4.100617.161123	WG632697-04	Matrix Spike	5/50	1	L17100170-02	10/06/17 16:11
51	T4.100617.161457	WG632697-05	Matrix Spike Duplica	5/50	1	L17100170-02	10/06/17 16:14
52	T4.100617.161834	WG633026-27	CCV		1		10/06/17 16:18
53	T4.100617.162206	WG633026-28	CCB		1		10/06/17 16:22
54	T4.100617.165014	WG632441-02	Method/Prep Blank	40/50	1		10/06/17 16:50
55	T4.100617.165402	WG632441-03	Laboratory Control S	40/50	1		10/06/17 16:54
56	T4.100617.165737	WG632312-01	Fluid Blank 1		1		10/06/17 16:57
57	T4.100617.170125	WG632312-02	Fluid Blank 2		1		10/06/17 17:01
58	T4.100617.170513	L17091700-02	MW2B-337-14	40/50	1		10/06/17 17:05
59	T4.100617.170859	WG632981-01	Post Digestion Spike		1	L17091700-02	10/06/17 17:08
60	T4.100617.171235	WG632981-02	Serial Dilution		5	L17091700-02	10/06/17 17:12
61	T4.100617.171623	WG632441-01	Reference Sample		1	L17091700-07	10/06/17 17:16
62	T4.100617.172009	WG632441-04	Matrix Spike	40/50	1	L17091700-07	10/06/17 17:20
63	T4.100617.172345	WG632441-05	Matrix Spike Duplica	40/50	1	L17091700-07	10/06/17 17:23
64	T4.100617.172723	WG633026-29	CCV		1		10/06/17 17:27
65	T4.100617.173055	WG633026-30	CCB		1		10/06/17 17:30
66	T4.100617.173445	L17091700-14	MW4B-337-14	40/50	1		10/06/17 17:34
67	T4.100617.173833	L17091700-17	MW4B2-337-14	40/50	1		10/06/17 17:38
68	T4.100617.174219	L17091700-20	MW5A-337-14	40/50	1		10/06/17 17:42

Page: 2 Approved: October 06, 2017

Sam H. Rhodes

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Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol: _____
 Stannous: _____ Hydroxylamine: _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
69	T4.100617.174606	L17091700-23	OW1B-337-14	40/50	1		10/06/17 17:46
70	T4.100617.174953	L17091700-26	OW2A-337-14	40/50	1		10/06/17 17:49
71	T4.100617.175341	L17091700-29	OW3A-337-14	40/50	1		10/06/17 17:53
72	T4.100617.175728	L17100060-02	FILTERCAKE-092917	5/50	1		10/06/17 17:57
73	T4.100617.180115	L17100087-01	30 AWV SAPA BAGS	5/50	1		10/06/17 18:01
74	T4.100617.180502	L17100088-01	ALAN BAGS 11 BAGS	5/50	1		10/06/17 18:05
75	T4.100617.180849	L17100089-01	PLEASANTS SAND BLAST	5/50	1		10/06/17 18:08
76	T4.100617.181238	WG633026-31	CCV		1		10/06/17 18:12
77	T4.100617.181609	WG633026-32	CCB		1		10/06/17 18:16
78	T4.100617.181958	L17100133-01	STEP 7 MIX-1 DAY 6	5/50	1		10/06/17 18:19
79	T4.100617.182343	L17100133-02	STEP 7 MIX-1 DAY 6	5/50	1		10/06/17 18:23
80	T4.100617.182730	L17100133-03	STEP 7 MIX-2 DAY 6	5/50	1		10/06/17 18:27
81	T4.100617.183116	L17100133-04	STEP 7 MIX-2 DAY 6	5/50	1		10/06/17 18:31
82	T4.100617.183504	L17100135-01	K7I1152-01	5/50	1		10/06/17 18:35
83	T4.100617.183852	L17100187-01	2403-201 W1	40/50	1		10/06/17 18:38
84	T4.100617.184238	WG633026-33	CCV		1		10/06/17 18:42
85	T4.100617.184608	WG633026-34	CCB		1		10/06/17 18:46
86	T4.100617.184956	WG633026-35	Low Level Continuing Calibra		1		10/06/17 18:49
87	T4.100617.185344	WG633026-36	Low Level Continuing Calibra		1		10/06/17 18:53
88	T4.100617.185732	WG633026-37	LLCCV		1		10/06/17 18:57
89	T4.100617.190120	WG632887-02	Method/Prep Blank	40/50	1		10/06/17 19:01
90	T4.100617.190508	WG632887-03	Laboratory Control S	40/50	1		10/06/17 19:05
91	T4.100617.190843	WG632700-01	Fluid Blank 1		1		10/06/17 19:08
92	T4.100617.191231	WG632887-01	Reference Sample		1	L17100279-02	10/06/17 19:12
93	T4.100617.191615	WG632887-04	Matrix Spike	5/50	1	L17100279-02	10/06/17 19:16
94	T4.100617.191950	WG632887-05	Matrix Spike Duplica	5/50	1	L17100279-02	10/06/17 19:19
95	T4.100617.192326	L17100319-01	H7J0347-01	5/50	1		10/06/17 19:23
96	T4.100617.192713	L17100319-02	H7J0347-02	5/50	1		10/06/17 19:27
97	T4.100617.193059	WG632983-01	Post Digestion Spike		1	L17100319-02	10/06/17 19:30
98	T4.100617.193435	WG632983-02	Serial Dilution		5	L17100319-02	10/06/17 19:34
99	T4.100617.193823	WG633026-38	CCV		1		10/06/17 19:38
100	T4.100617.194154	WG633026-39	CCB		1		10/06/17 19:41
101	T4.100617.194542	L17100388-01	2212-147 W1	40/50	1		10/06/17 19:45
102	T4.100617.194924	L17100389-01	2212-120 W1	40/50	1		10/06/17 19:49

Page: 3 Approved: October 06, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
103	T4.100617.195309	L17100389-02	2212-120 P1	40/50	1		10/06/17 19:53
104	T4.100617.195654	L17100390-01	1001-142-A W1	40/50	1		10/06/17 19:56
105	T4.100617.200039	L17100390-02	1001-142-A P1	40/50	1		10/06/17 20:00
106	T4.100617.200426	L17100391-01	2208-137C W1	40/50	1		10/06/17 20:04
107	T4.100617.200812	L17100399-01	15-10-11 W1	40/50	1		10/06/17 20:08
108	T4.100617.201156	L17100405-01	T7J0338-01	1/50	1		10/06/17 20:11
109	T4.100617.201540	L17100405-02	T7J0338-02	1/50	1		10/06/17 20:15
110	T4.100617.201924	L17100405-03	T7J0338-03	1/50	1		10/06/17 20:19
111	T4.100617.202309	WG633026-40	CCV		1		10/06/17 20:23
112	T4.100617.202640	WG633026-41	CCB		1		10/06/17 20:26
113	T4.100617.203029	L17100405-04	T7J0338-04	1/50	1		10/06/17 20:30
114	T4.100617.203413	L17100405-05	T7J0338-05	1/50	1		10/06/17 20:34
115	T4.100617.203757	L17100405-06	T7J0338-06	1/50	1		10/06/17 20:37
116	T4.100617.204142	WG633026-42	CCV		1		10/06/17 20:41
117	T4.100617.204515	WG633026-43	CCB		1		10/06/17 20:45
118	T4.100617.204906	WG632238-02	Method/Prep Blank	40/50	1		10/06/17 20:49
119	T4.100617.205254	WG632238-03	Laboratory Control S	40/50	1		10/06/17 20:52
120	T4.100617.205629	WG632238-01	Reference Sample		1	L17100385-01	10/06/17 20:56
121	T4.100617.210016	WG632238-04	Matrix Spike	5/50	1	L17100385-01	10/06/17 21:00
122	T4.100617.210352	WG632238-05	Matrix Spike Duplica	5/50	1	L17100385-01	10/06/17 21:03
123	T4.100617.210728	L17100030-01	0302-125 W1	40/50	1		10/06/17 21:07
124	T4.100617.211113	L17100030-02	0302-125 S1	40/50	1		10/06/17 21:11
125	T4.100617.211458	L17100030-03	0302-125 S2	40/50	1		10/06/17 21:14
126	T4.100617.211844	WG632342-03	Post Digestion Spike		1	L17100030-03	10/06/17 21:18
127	T4.100617.212219	WG632342-04	Serial Dilution		5	L17100030-03	10/06/17 21:22
128	T4.100617.212610	WG633026-44	CCV		1		10/06/17 21:26
129	T4.100617.212941	WG633026-45	CCB		1		10/06/17 21:29
130	T4.100617.213331	L17100030-04	0302-125 S3	40/50	1		10/06/17 21:33
131	T4.100617.213717	L17100030-05	0302-125 S4	40/50	1		10/06/17 21:37
132	T4.100617.214102	L17100034-01	1001-216 S1	40/50	1		10/06/17 21:41
133	T4.100617.214448	WG633026-46	CCV		1		10/06/17 21:44
134	T4.100617.214819	WG633026-47	CCB		1		10/06/17 21:48
135	T4.100617.215207	WG632265-02	Method/Prep Blank	40/50	1		10/06/17 21:52
136	T4.100617.215555	WG632265-03	Laboratory Control S	40/50	1		10/06/17 21:55

Page: 4 Approved: October 06, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol: _____
 Stannous: _____ Hydroxylamine: _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
137	T4.100617.215931	L17100009-01	27-1-8.02 W1	40/50	1		10/06/17 21:59
138	T4.100617.220317	L17100009-02	27-1-8.02 W1	40/50	1		10/06/17 22:03
139	T4.100617.220702	L17100031-01	0302-126 W1	40/50	1		10/06/17 22:07
140	T4.100617.221047	L17100032-01	0302-112-L W1	40/50	1		10/06/17 22:10
141	T4.100617.221432	L17100032-02	0302-112-L W2	40/50	1		10/06/17 22:14
142	T4.100617.221817	L17100102-01	27-1-8 W1	40/50	1		10/06/17 22:18
143	T4.100617.222202	WG632984-01	Post Digestion Spike		1	L17100102-01	10/06/17 22:22
144	T4.100617.222537	WG632984-02	Serial Dilution		5	L17100102-01	10/06/17 22:25
145	T4.100617.222927	WG633026-48	CCV		1		10/06/17 22:29
146	T4.100617.223259	WG633026-49	CCB		1		10/06/17 22:32
147	T4.100617.223648	L17100102-02	6-8-20 W1	40/50	1		10/06/17 22:36
148	T4.100617.224033	L17100102-03	59-10-35 W1	40/50	1		10/06/17 22:40
149	T4.100617.224418	L17100102-04	6-8-25 W1	40/50	1		10/06/17 22:44
150	T4.100617.224804	L17100102-05	6-10-27.02 W1	40/50	1		10/06/17 22:48
151	T4.100617.225149	L17100102-06	59-5-2-4-2-4 W1	40/50	1		10/06/17 22:51
152	T4.100617.225535	L17100102-07	59-11-11.21 W1	40/50	1		10/06/17 22:55
153	T4.100617.225920	L17100102-08	59-11-11.21 P1	40/50	1		10/06/17 22:59
154	T4.100617.230306	L17100102-09	59-11-10.07 W1	40/50	1		10/06/17 23:03
155	T4.100617.230651	L17100102-10	59-11-10.08 W1	40/50	1		10/06/17 23:06
156	T4.100617.231035	L17100102-11	59-5-2-2-1 W1	40/50	1		10/06/17 23:10
157	T4.100617.231422	WG633026-50	CCV		1		10/06/17 23:14
158	T4.100617.231754	WG633026-51	CCB		1		10/06/17 23:17
159	T4.100617.232143	L17100102-12	59-5-2-1-6 W1	40/50	1		10/06/17 23:21
160	T4.100617.232527	L17100102-13	59-5-22 W1	40/50	1		10/06/17 23:25
161	T4.100617.232911	L17100102-14	59-11-10.10 W1	40/50	1		10/06/17 23:29
162	T4.100617.233257	WG632265-01	Reference Sample		1	L17100102-15	10/06/17 23:32
163	T4.100617.233642	WG632265-04	Matrix Spike	40/50	1	L17100102-15	10/06/17 23:36
164	T4.100617.234019	WG632265-05	Matrix Spike Duplica	40/50	1	L17100102-15	10/06/17 23:40
165	T4.100617.234355	WG633026-52	CCV		1		10/06/17 23:43
166	T4.100617.234725	WG633026-53	CCB		1		10/06/17 23:47
167	T4.100617.235114	WG632660-02	Method/Prep Blank	40/50	1		10/06/17 23:51
168	T4.100617.235503	WG632660-03	Laboratory Control S	40/50	1		10/06/17 23:55
169	T4.100617.235838	L17100267-01	204.00-6-11 RW2	40/50	1		10/06/17 23:58
170	T4.100717.000224	L17100267-02	204.00-6-11 RW2	40/50	1		10/07/17 00:02

Page: 5 Approved: October 06, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO4 Dataset: 100617T4.1R.TXT
 Analyst1: KKB Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 9
 Maintenance Log ID: _____
 Calibration Std: STD83953 ICV Std: STD83952 Post Spike: STD83992
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD83825 LLCCV: COA19621 Tuning Sol : _____
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

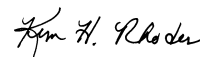
Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
171	T4.100717.000609	L17100268-01	15-11-7.1 W1	40/50	1		10/07/17 00:06
172	T4.100717.000954	L17100268-02	15-11-7.1 W1	40/50	1		10/07/17 00:09
173	T4.100717.001339	L17100269-01	45-11-14.05 W1	40/50	1		10/07/17 00:13
174	T4.100717.001726	L17100269-02	45-10-12.02 S1	40/50	1		10/07/17 00:17
175	T4.100717.002111	WG632985-01	Post Digestion Spike		1	L17100269-02	10/07/17 00:21
176	T4.100717.002446	WG632985-02	Serial Dilution		5	L17100269-02	10/07/17 00:24
177	T4.100717.002834	WG633026-54	CCV		1		10/07/17 00:28
178	T4.100717.003205	WG633026-55	CCB		1		10/07/17 00:32
179	T4.100717.003556	L17100269-03	45-10-12.01 W1	40/50	1		10/07/17 00:35
180	T4.100717.003941	L17100269-04	45-20-3.02 W1	40/50	1		10/07/17 00:39
181	T4.100717.004325	L17100269-05	45-20-3.02 S1	40/50	1		10/07/17 00:43
182	T4.100717.004710	L17100269-06	1803-126-D W1	40/50	1		10/07/17 00:47
183	T4.100717.005056	L17100269-07	1803-126-D W2	40/50	1		10/07/17 00:50
184	T4.100717.005441	L17100269-08	1803-126-D S1	40/50	1		10/07/17 00:54
185	T4.100717.005826	L17100269-09	45-11-15.01 S1	40/50	1		10/07/17 00:58
186	T4.100717.010212	L17100269-10	45-11-15.01 P3	40/50	1		10/07/17 01:02
187	T4.100717.010557	L17100269-11	45-11-15.01 P1	40/50	1		10/07/17 01:05
188	T4.100717.010944	L17100269-12	45-11-14.01 W1	40/50	1		10/07/17 01:09
189	T4.100717.011329	WG633026-56	CCV		1		10/07/17 01:13
190	T4.100717.011659	WG633026-57	CCB		1		10/07/17 01:16
191	T4.100717.012048	L17100270-01	59-9-1.09 RPW1 (POST)	40/50	1		10/07/17 01:20
192	T4.100717.012434	L17100270-02	59-9-1.09 RPW1 (PRE)	40/50	1		10/07/17 01:24
193	T4.100717.012820	L17100272-01	45-12-13 W1	40/50	1		10/07/17 01:28
194	T4.100717.013205	L17100273-01	0302-104 W1		1	WG632660-01	10/07/17 01:32
195	T4.100717.013550	WG632660-04	Matrix Spike	40/50	1	L17100273-01	10/07/17 01:35
196	T4.100717.013925	WG632660-05	Matrix Spike Duplica	40/50	1	L17100273-01	10/07/17 01:39
197	T4.100717.014300	WG633026-58	CCV		1		10/07/17 01:43
198	T4.100717.014631	WG633026-59	CCB		1		10/07/17 01:46

Comments

Seq.	Rerun	Dil.	Reason	Analytes
30			Instrument pump stopped turning. CCV was reanalyzed. --KKB--	

Page: 6 Approved: October 06, 2017




Microbac Laboratories Inc.

Data Checklist

Date: 05-OCT-2017
 Analyst: KKB
 Analyst: NA
 Method: 6010B/6010C/200.7
 Instrument: ICP-THERMO4
 Curve Workgroup: 632767
 Runlog ID: 85062
 Analytical Workgroups: 632662,632104

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	X
Client Forms	X
Level X	
Level 3	1450,0086
Level 4	
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:
05-OCT-2017

Secondary Reviewer:
05-OCT-2017

Ki K Beck

Lyn H. Rhodes



Microbac Laboratories Inc.

Data Checklist

Date: 05-OCT-2017
 Analyst: KKB
 Analyst: NA
 Method: 6010B/6010C/200.7
 Instrument: ICP-THERMO4
 Curve Workgroup: 632900
 Runlog ID: 85081
 Analytical Workgroups: 632662,632186,632810

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	X
Client Forms	X
Level X	
Level 3	0173
Level 4	1647,1648,0074,1458,1645,1719
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:
06-OCT-2017

Secondary Reviewer:
06-OCT-2017

Ki K Beck

Lyn H. Rhodes



Microbac Laboratories Inc.

Data Checklist

Date: 06-OCT-2017
 Analyst: KKB
 Analyst: NA
 Method: 6010B/6010C/200.7
 Instrument: ICP-THERMO4
 Curve Workgroup: 633026
 Runlog ID: 85101
 Analytical Workgroups: 632662,632186,632810,632981,632983,632342,632984,632985

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	X
Client Forms	X
Level X	
Level 3	
Level 4	0074,0060
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:
06-OCT-2017

Secondary Reviewer:
06-OCT-2017

Ki K Buck

Lyn H. Rhodes



Analytical Method:6010C
Login Number:L17091648

AAB#:WG632662

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-SP650-6472-GRAB	01	09/27/17					10/03/2017	5.7	180		10/05/17	8.1	180	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091648 Work Group: WG632662
 Blank File ID: T4.100517.174731 Blank Sample ID: WG632208-02
 Prep Date: 10/03/17 07:13 Instrument ID: ICP-THERMO4
 Analyzed Date: 10/05/17 17:47 Method: 6010C
 Analyst: KKB

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632208-03	T4.100517.120838	10/05/17 12:08	01
LCS	WG632208-03	T4.100517.175118	10/05/17 17:51	02
LH18/24-SP650-6472-GRAB	L17091648-01	T4.100517.175839	10/05/17 17:58	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5514120
 Report generated 10/06/2017 10:41



Login Number: L17091648 Prep Date: 10/03/17 07:13 Sample ID: WG632208-02
 Instrument ID: ICP-THERMO4 Run Date: 10/05/17 17:47 Prep Method: 3015A
 File ID: T4.100517.174731 Analyst: KKB Method: 6010C
 Workgroup (AAB#): WG632662 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: ICP-TH-05-OCT-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Aluminum, Total	0.100	0.200	0.100	1	U
Iron, Total	0.0500	0.100	0.0500	1	U
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: 5514121
 06-OCT-2017 10:43



Login Number: L17091648 Run Date: 10/05/2017 Sample ID: WG632208-03
 Instrument ID: ICP-THERMO4 Run Time: 17:51 Prep Method: 3015A
 File ID: T4.100517.175118 Analyst: KKB Method: 6010C
 Workgroup (AAB#): WG632662 Matrix: Water Units: mg/L
 QC Key: DOD4 Lot#: STD83991 Cal ID: ICP-TH-05-OCT-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Aluminum, Total	6.25	6.62	106	80 - 120	
Iron, Total	2.50	2.56	102	80 - 120	
Selenium, Total	0.250	0.236	94.3	80 - 120	

LCS - Modified 03/06/2008
 PDF File ID: 5514122
 Report generated: 10/06/2017 10:43



Loginnum: L17091648 Cal ID: ICP-THERMO4 - Worknum: WG632662
 Instrument ID: ICP-THERMO4 Contract #: _____ Method: 6010C
 Parent ID: WG632208-01 File ID: T4.100517.192100 Dil: 1 Matrix: WATER
 Sample ID: WG632208-04 MS File ID: T4.100517.192449 Dil: 1 Units: mg/L
 Sample ID: WG632208-05 MSD File ID: T4.100517.192824 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Aluminum, Total	ND	6.25	6.53	105	6.25	6.46	103	1.16	80 - 120	20	
Iron, Total	0.0603	2.50	2.61	102	2.50	2.62	102	0.129	80 - 120	20	
Selenium, Total	ND	0.250	0.223	89.2	0.250	0.222	88.6	0.607	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17091648 **Worknum:** WG632662
Instrument: ICP-THERMO4 **Method:** 6010C
Serial Dil: WG632662-04 **File ID:** T4.100517.182102 **Dil:** 5 **Units:** ug/L
Sample: L17091745-04 **File ID:** T4.100517.181343 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Aluminum	24.4		ND	U		
Iron	11100		11300		1.58	
Selenium	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 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: 5514117

10/06/2017 10:41



Sample Login ID: L17091648

Worknum: WG632662

Instrument ID: ICP-THERMO4

Method: 6010C

Post Spike ID: WG632662-03

File ID: T4.100517.181728

Dil: 1

Units: ug/L

Sample ID: L17091745-04

File ID: T4.100517.181343

Dil: 1

Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ALUMINUM	4990		0	U	5000	99.8	75 - 125	
IRON	12000		11100		2000	100.5	75 - 125	
SELENIUM	191		0	U	200	95.3	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

00862788

Login: L17091648 Workgroup (AAB#): WG632662
Analytical Method: 6010C Instrument ID: ICP-THERMO4
ICAL Worknum: WG632900 Initial Calibration Date: 05-OCT-2017 16:45

	WG632900-01		WG632900-02		WG632900-03		WG632900-04		WG632900-05		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
ALUMINUM	0	0.00152	.1	0.00221	.2	0.00292	10	0.0843	20	0.164	.999951	
IRON	0	0.000220	.04	0.000880	.08	0.00108	4	0.0609	8	0.122	.999796	
SELENIUM	0	-0.0000200	NA	NA	.008	0.0000600	.4	0.00264	.8	0.00521	.998172	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

INT_CAL_ICP - Modified 03/06/2008
PDF File ID: 5514126
Report generated: 06-OCT-2017 10:43



Login Number: L17091648 Run Date: 10/05/2017 Sample ID: WG632900-07
Instrument ID: ICP-THERMO4 Run Time: 16:52 Method: 6010C
File ID: T4.100517.165203 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG632662 Cal ID: ICP-THERI - 05-OCT-17
Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
ALUMINUM	.08	.16	.08	U
IRON	.04	.08	.04	U
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: L17091648 Run Date: 10/05/2017 Sample ID: WG632900-14
 Instrument ID: ICP-THERMO4 Run Time: 17:18 Method: 6010C
 File ID: T4.100517.171838 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Aluminum	0.0800	0.160	0.0800	U
Iron	0.0400	0.0800	0.0400	U
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: 5514131
 Report generated 10/06/2017 10:44



Login Number: L17091648 Run Date: 10/05/2017 Sample ID: WG632900-16
 Instrument ID: ICP-THERMO4 Run Time: 18:28 Method: 6010C
 File ID: T4.100517.182820 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Aluminum	0.0800	0.160	0.0800	U
Iron	0.0400	0.0800	0.0400	U
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: L17091648 Run Date: 10/05/2017 Sample ID: WG632900-06
 Instrument ID: ICP-THERMO4 Run Time: 16:48 Method: 6010C
 File ID: T4.100517.164830 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Aluminum	10	10.0	100	90 - 110	
Iron	4	3.97	99.4	90 - 110	
Selenium	.4	0.397	99.2	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17091648 Run Date: 10/05/2017 Sample ID: WG632900-13
Instrument ID: ICP-THERMO4 Run Time: 17:15 Method: 6010C
File ID: T4.100517.171507 Analyst: KKB QC Key: DOD4
Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Aluminum	10.0	10.2	mg/L	102	90 - 110	
Iron	4.00	4.03	mg/L	101	90 - 110	
Selenium	0.400	0.402	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091648 Run Date: 10/05/2017 Sample ID: WG632900-15
 Instrument ID: ICP-THERMO4 Run Time: 18:24 Method: 6010C
 File ID: T4.100517.182449 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Aluminum	10.0	10.1	mg/L	101	90 - 110	
Iron	4.00	4.00	mg/L	100	90 - 110	
Selenium	0.400	0.378	mg/L	94.5	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091648 Run Date: 10/05/2017 Sample ID: WG632900-10
 Instrument ID: ICP-THERMO4 Run Time: 17:03 Method: 6010C
 File ID: T4.100517.170358 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Aluminum	0.160	0.170	mg/L	106	70 - 130	
Iron	0.0800	0.0731	mg/L	91.4	70 - 130	
Selenium	0.0160	0.0172	mg/L	108	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091648 Run Date: 10/05/2017 Sample ID: WG632900-21
 Instrument ID: ICP-THERMO4 Run Time: 19:39 Method: 6010C
 File ID: T4.100517.193925 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632662 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Aluminum	0.160	0.168	mg/L	105	70 - 130	
Iron	0.0800	0.0681	mg/L	85.1	70 - 130	
Selenium	0.0160	0.0116	mg/L	72.3	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17091648
Instrument ID: ICP-THERMO4
Sol. A : WG632900-11
Sol. AB : WG632900-12

File ID: T4.100517.170745
File ID: T4.100517.171130

Workgroup (AAB#): WG632662
Method: 6010C
Units: mg/L
Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Aluminum	250	248	99.2	250	248	99.2	
Iron	100	96.7	96.7	100	96.3	96.3	
Selenium	NS	-0.000300	NS	0.250	0.245	98.0	

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: L17091648
 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: 5514125
 Report generated: 10/06/2017 10:32



Login Number: L17091648
 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: 5514125
 Report generated: 10/06/2017 10:32



Login Number: L17091648
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 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: 5514125
 Report generated: 10/06/2017 10:32



Login Number: L17091648
 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: 5514125
 Report generated: 10/06/2017 10:32



Login Number: L17091648

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: 5514125
 Report generated: 10/06/2017 10:32



Login Number: L17091648
 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: 5514125
 Report generated: 10/06/2017 10:32



Login Number: L17091648
 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: 5514125
 Report generated: 10/06/2017 10:32



Login Number: L17091648 Date: 07/17/2017
 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	3.6
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

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 07:12
Matrix: Water	Analytical Method: 6020A	Cal Date: 10/02/2017 12:02
Workgroup #: WG632098	Analyst: JYH	Run Date: 10/02/2017 13:30
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: NI.100217.133044
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Antimony, Total	7440-36-0	0.00100	U	0.00200	0.00100	0.000500
Arsenic, Total	7440-38-2	0.00243		0.00200	0.00100	0.000500
Barium, Total	7440-39-3	0.0964		0.00600	0.00300	0.00150
Cadmium, Total	7440-43-9	0.000600	U	0.00120	0.000600	0.000300
Chromium, Total	7440-47-3	0.00314	J	0.00400	0.00200	0.00100
Cobalt, Total	7440-48-4	0.000573	J	0.00200	0.00100	0.000500
Lead, Total	7439-92-1	0.00100	U	0.00200	0.00100	0.000500
Manganese, Total	7439-96-5	0.0362		0.00400	0.00200	0.00100
Nickel, Total	7440-02-0	0.00306	J	0.00800	0.00400	0.00200
Silver, Total	7440-22-4	0.00100	U	0.00200	0.00100	0.000500
Thallium, Total	7440-28-0	0.000200	U	0.000400	0.000200	0.000100
Vanadium, Total	7440-62-2	0.00100	U	0.00200	0.00100	0.000500
Zinc, Total	7440-66-6	0.0250	U	0.0500	0.0250	0.0125

J	Estimated value ; the analyte concentration was less than the LOQ.
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: WG632048
 Analyst: VC
 Spike Analyst: VC
 Run Date: 10/02/2017 07:12
 Method: 3015A
 Balance: BAL016
 Instrument: MW-3
 Instrument Start: 10/02/2017 07:15

SOP: ME407 Revision 19
 Spike Solution: STD82887
 Spike Witness: ERP
 HNO3 Lot #: COA19940
 40 & 50 ML. DIGESTION TU COA19932
 MS Filters- fisher-Lot# rRGT40686

	SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG632048-02	BLANK	1	20 mL	50 mL	185.29 g	185.292 g		
2	WG632048-03	LCS	1	20 mL	50 mL	185.519 g	185.522 g	.25 mL	
3	L17091647-01	SAMP	1	20 mL	50 mL	183.509 g	183.497 g		10/09/17
4	L17091648-01	SAMP	1	20 mL	50 mL	183.833 g	183.815 g		10/09/17
5	L17091692-01	SAMP	1	20 mL	50 mL	184.386 g	184.377 g		10/05/17
6	L17091692-02	SAMP	1	20 mL	50 mL	184.501 g	184.495 g		10/05/17
7	L17091692-03	SAMP	1	20 mL	50 mL	182.45 g	182.449 g		10/05/17
8	L17091705-01	SAMP	1	20 mL	50 mL	181.582 g	181.566 g		10/10/17
9	L17091706-01	SAMP	1	20 mL	50 mL	183.32 g	183.302 g		10/10/17
10	L17091719-02	SAMP	1	20 mL	50 mL	184.102 g	184.093 g		10/10/17
11	L17091719-04	SAMP	1	20 mL	50 mL	184.295 g	184.289 g		10/10/17
12	L17091719-06	SAMP	1	20 mL	50 mL	181.947 g	181.938 g		10/10/17
13	L17091745-01	SAMP	1	20 mL	50 mL	183.499 g	183.484 g		10/09/17
14	L17091745-02	SAMP	1	20 mL	50 mL	181.599 g	181.577 g		10/09/17
15	L17091745-03	SAMP	1	20 mL	50 mL	182.646 g	182.592 g		10/09/17
16	WG632048-01	REF	1	20 mL	50 mL	182.623 g	182.612 g		
17	L17091745-04	SAMP	1	20 mL	50 mL	182.623 g	182.612 g		10/09/17
18	WG632048-04	MS	1	20 mL	50 mL	182.489 g	182.472 g	.25 mL	
19	WG632048-05	MSD	1	20 mL	50 mL	185.819 g	185.813 g	.25 mL	

Analyst: Vicki Collier

Reviewer: Erin Pottin



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 100217A.REP
 Analyst1: JYH Analyst2: N/A
 Method: 6020/6020A/200.8 SOP: ME700A Rev: 3
 Maintenance Log ID: _____

Calibration Std: STD83954 ICV Std: STD83787 Post Spike: STD83027
 ICSA: STD83784 ICSAB: STD83785 Int. Std: RG739344
 CCV: STD83955 LLCCV: STD83789 Tuning Sol : STD83790
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632103,632098

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	NI.100217.115019	Blank	Blank		1		10/02/17 11:50
2	NI.100217.115325	WG632169-01	Calibration Point		1		10/02/17 11:53
3	NI.100217.115630	WG632169-02	Calibration Point		1		10/02/17 11:56
4	NI.100217.115936	WG632169-03	Calibration Point		1		10/02/17 11:59
5	NI.100217.120241	WG632169-04	Calibration Point		1		10/02/17 12:02
6	NI.100217.120549	WG632169-05	Initial Calibration Verification		1		10/02/17 12:05
7	NI.100217.120855	WG632169-06	Initial Calib Blank		1		10/02/17 12:08
8	NI.100217.121202	WG632169-07	Low Level Continuing Calibra		1		10/02/17 12:12
9	NI.100217.121553	WG632169-08	Low Level Initial Calibration V		1		10/02/17 12:15
10	NI.100217.121858	WG632169-09	Interference Check		1		10/02/17 12:18
11	NI.100217.122204	WG632169-10	Interference Check		1		10/02/17 12:22
12	NI.100217.122511	WG632169-11	CCV		1		10/02/17 12:25
13	NI.100217.122816	WG632169-12	CCB		1		10/02/17 12:28
14	NI.100217.123123	WG632081-01	Method/Prep Blank	.25/100	1		10/02/17 12:31
15	NI.100217.123429	WG632081-02	Laboratory Control S	.25/100	1		10/02/17 12:34
16	NI.100217.123734	WG632081-03	Laboratory Control S	.25/100	1		10/02/17 12:37
17	NI.100217.124039	L17091426-01	K7I0761-01		1		10/02/17 12:40
18	NI.100217.124345	WG632103-01	Post Digestion Spike		1	L17091426-01	10/02/17 12:43
19	NI.100217.124650	WG632103-02	Serial Dilution		5	L17091426-01	10/02/17 12:46
20	NI.100217.124956	WG632103-02	Serial Dilution		25	L17091426-01	10/02/17 12:49
21	NI.100217.125304	WG632169-13	CCV		1		10/02/17 12:53
22	NI.100217.125609	WG632169-14	CCB		1		10/02/17 12:56
23	NI.100217.125916	WG632169-15	Low Level Continuing Calibra		1		10/02/17 12:59
24	NI.100217.130336	WG632169-16	CCV		1		10/02/17 13:03
25	NI.100217.130642	WG632169-17	CCB		1		10/02/17 13:06
26	NI.100217.131212	WG632048-02	Method/Prep Blank	20/50	1		10/02/17 13:12
27	NI.100217.131517	WG632048-03	Laboratory Control S	20/50	1		10/02/17 13:15
28	NI.100217.131823	WG632048-01	Reference Sample		1	L17091745-04	10/02/17 13:18
29	NI.100217.132128	WG632048-04	Matrix Spike	20/50	1	L17091745-04	10/02/17 13:21
30	NI.100217.132434	WG632048-05	Matrix Spike Duplica	20/50	1	L17091745-04	10/02/17 13:24
31	NI.100217.132739	L17091647-01	LH18/24-SP140-7472-GRAB	20/50	1		10/02/17 13:27
32	NI.100217.133044	L17091648-01	LH18/24-SP650-6472-GRAB	20/50	1		10/02/17 13:30
33	NI.100217.133350	WG632098-01	Post Digestion Spike		1	L17091648-01	10/02/17 13:33
34	NI.100217.133655	WG632098-02	Serial Dilution		5	L17091648-01	10/02/17 13:36

Page: 1 Approved: October 05, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 100217A.REP
 Analyst1: JYH Analyst2: N/A
 Method: 6020/6020A/200.8 SOP: ME700A Rev: 3
 Maintenance Log ID: _____
 Calibration Std: STD83954 ICV Std: STD83787 Post Spike: STD83027
 ICSA: STD83784 ICSAB: STD83785 Int. Std: RGT39344
 CCV: STD83955 LLCV: STD83789 Tuning Sol : STD83790
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632103,632098

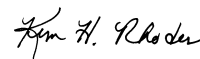
Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	NI.100217.134001	WG632098-02	Serial Dilution		25	L17091648-01	10/02/17 13:40
36	NI.100217.134308	WG632169-18	CCV		1		10/02/17 13:43
37	NI.100217.134613	WG632169-19	CCB		1		10/02/17 13:46
38	NI.100217.134920	L17091692-01	9274-B02-WQ-W0009	20/50	1		10/02/17 13:49
39	NI.100217.135226	L17091692-02	9274-B09-WQ-W0056	20/50	1		10/02/17 13:52
40	NI.100217.135531	L17091692-03	9274-B09-WQ-W0058	20/50	1		10/02/17 13:55
41	NI.100217.135837	L17091705-01	LH18/24-SP650-6474-GRAB	20/50	1		10/02/17 13:58
42	NI.100217.140142	L17091706-01	LH18/24-SP140-7474-GRAB	20/50	1		10/02/17 14:01
43	NI.100217.140447	L17091719-02	A11-MW08-Y3S2	20/50	1		10/02/17 14:04
44	NI.100217.140753	L17091719-04	A11-MW02-Y3S2	20/50	1		10/02/17 14:07
45	NI.100217.141059	L17091719-06	A11/A12-RB01-Y3S2	20/50	1		10/02/17 14:10
46	NI.100217.141405	L17091745-01	MW-103	20/50	1		10/02/17 14:14
47	NI.100217.141710	L17091745-02	MW-103	20/50	1		10/02/17 14:17
48	NI.100217.142017	WG632169-20	CCV		1		10/02/17 14:20
49	NI.100217.142323	WG632169-21	CCB		1		10/02/17 14:23
50	NI.100217.142630	L17091745-03	MW-107	20/50	1		10/02/17 14:26
51	NI.100217.142935	L17091613-12	GB5-S		2		10/02/17 14:29
52	NI.100217.143242	WG632169-22	CCV		1		10/02/17 14:32
53	NI.100217.143547	WG632169-23	CCB		1		10/02/17 14:35
54	NI.100217.143854	WG632169-24	Low Level Continuing Calibra		1		10/02/17 14:38
55	NI.100217.145202	WG632169-25	Low Level Continuing Calibra		1		10/02/17 14:52
56	NI.100217.155613	L17091613-12	GB5-S		2		10/02/17 15:56
57	NI.100217.160020	L17091647-01	LH18/24-SP140-7472-GRAB	20/50	10		10/02/17 16:00
58	NI.100217.160326	40 PPB SE	40 PPB SE		10		10/02/17 16:03
59	NI.100217.160632	WG632169-26	CCV		1		10/02/17 16:06
60	NI.100217.160938	WG632169-27	CCB		1		10/02/17 16:09
61	NI.100217.161245	WG632169-28	Low Level Continuing Calibra		1		10/02/17 16:12

Comments

Seq.	Rerun	Dil.	Reason	Analytes
8			Rerun to verify. JYH	
54			Insufficient volumn, rerun. JYH	

Page: 2 Approved: October 05, 2017




Microbac Laboratories Inc.

Data Checklist

Date: 02-OCT-2017
 Analyst: JYH
 Analyst: NA
 Method: 6020/6020A/200.8
 Instrument: ICP-MS
 Curve Workgroup: 632169
 Runlog ID: 84986
 Analytical Workgroups: 632103,632098

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	1647,1648,1692,1705,1706,1719
Client Forms	X
Level X	
Level 3	
Level 4	1647,1648,1692,1705,1706,1719
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	KHR
Comments	

Primary Reviewer:

Secondary Reviewer:
05-OCT-2017



Analytical Method:6020A
Login Number:L17091648

AAB#:WG632098

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-SP650-6472-GRAB	01	09/27/17					10/02/2017	4.7	180		10/02/17	4.9	180	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091648
 Blank File ID: NI.100217.131212
 Prep Date: 10/02/17 07:12
 Analyzed Date: 10/02/17 13:12
 Analyst: JYH

Work Group: WG632098
 Blank Sample ID: WG632048-02
 Instrument ID: ICP-MS2
 Method: 6020A

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632048-03	NI.100217.131517	10/02/17 13:15	01
LH18/24-SP650-6472-GRAB	L17091648-01	NI.100217.133044	10/02/17 13:30	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5505809
 Report generated 10/03/2017 12:39



Login Number: L17091648 Prep Date: 10/02/17 07:12 Sample ID: WG632048-02
 Instrument ID: ICP-MS2 Run Date: 10/02/17 13:12 Prep Method: 3015A
 File ID: NI.100217.131212 Analyst: JYH Method: 6020A
 Workgroup (AAB#): WG632098 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: ICP-MS - 02-OCT-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Antimony, Total	0.000500	0.00200	0.000500	1	U
Arsenic, Total	0.000500	0.00200	0.000500	1	U
Barium, Total	0.00150	0.00600	0.00150	1	U
Cadmium, Total	0.000300	0.00120	0.000300	1	U
Chromium, Total	0.00100	0.00400	0.00100	1	U
Cobalt, Total	0.000500	0.00200	0.000500	1	U
Lead, Total	0.000500	0.00200	0.000500	1	U
Manganese, Total	0.00100	0.00400	0.00100	1	U
Nickel, Total	0.00200	0.00800	0.00200	1	U
Silver, Total	0.000500	0.00200	0.000500	1	U
Thallium, Total	0.000100	0.000400	0.000100	1	U
Vanadium, Total	0.000500	0.00200	0.000500	1	U
Zinc, Total	0.0125	0.0500	0.0125	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: 5505810
 03-OCT-2017 12:39



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632048-03
 Instrument ID: ICP-MS2 Run Time: 13:15 Prep Method: 3015A
 File ID: NI.100217.131517 Analyst: JYH Method: 6020A
 Workgroup (AAB#): WG632098 Matrix: Water Units: mg/L
 QC Key: DOD4 Lot#: STD82887 Cal ID: ICP-MS - 02-OCT-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Antimony, Total	0.125	0.127	101	80 - 120	
Arsenic, Total	0.125	0.126	101	80 - 120	
Barium, Total	0.125	0.123	98.7	80 - 120	
Cadmium, Total	0.125	0.127	101	80 - 120	
Chromium, Total	0.125	0.126	101	80 - 120	
Cobalt, Total	0.125	0.127	101	80 - 120	
Lead, Total	0.125	0.125	99.6	80 - 120	
Manganese, Total	0.125	0.126	100	80 - 120	
Nickel, Total	0.125	0.127	101	80 - 120	
Silver, Total	0.125	0.126	101	80 - 120	
Thallium, Total	0.125	0.124	99.6	80 - 120	
Vanadium, Total	0.125	0.123	98.5	80 - 120	
Zinc, Total	0.125	0.128	103	80 - 120	

LCS - Modified 03/06/2008
 PDF File ID: 5507603
 Report generated: 10/03/2017 12:39



LCS_LCS2 - Modified 03/06/2008
PDF File ID: 5505811
Report generated: 10/02/2017 16:01



Loginnum: L17091648 Cal ID: ICP-MS2- Worknum: WG632098
 Instrument ID: ICP-MS2 Contract #: _____ Method: 6020A
 Parent ID: WG632048-01 File ID: NI.100217.131823 Dil: 1 Matrix: WATER
 Sample ID: WG632048-04 MS File ID: NI.100217.132128 Dil: 1 Units: mg/L
 Sample ID: WG632048-05 MSD File ID: NI.100217.132434 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Antimony	0.000895	0.125	0.130	103	0.125	0.130	104	0.531	80 - 120	20	
Arsenic	0.00277	0.125	0.131	103	0.125	0.131	103	0.246	80 - 120	20	
Barium	0.0623	0.125	0.182	96.0	0.125	0.185	98.2	1.54	80 - 120	20	
Cadmium	ND	0.125	0.129	103	0.125	0.130	104	0.559	80 - 120	20	
Chromium	ND	0.125	0.121	96.7	0.125	0.121	96.7	0.0108	80 - 120	20	
Cobalt	0.00434	0.125	0.126	97.7	0.125	0.126	97.6	0.0212	80 - 120	20	
Lead	ND	0.125	0.126	101	0.125	0.126	101	0.173	80 - 120	20	
Nickel	0.0117	0.125	0.133	97.2	0.125	0.134	97.5	0.211	80 - 120	20	
Silver	ND	0.125	0.123	98.3	0.125	0.124	99.2	0.910	80 - 120	20	
Thallium	ND	0.125	0.125	100	0.125	0.125	99.7	0.440	80 - 120	20	
Vanadium	ND	0.125	0.121	97.0	0.125	0.121	96.5	0.534	80 - 120	20	
Zinc	ND	0.125	0.132	105	0.125	0.134	107	1.87	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17091648 **Worknum:** WG632098
Instrument: ICP-MS2 **Method:** 6020A
Serial Dil: WG632098-02 **File ID:** NI.100217.133655 **Dil:** 5 **Units:** ug/L
Sample: L17091648-01 **File ID:** NI.100217.133044 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Antimony	ND	U	1.31	F	753.00	
Arsenic	0.974	X	1.59	F	63.00	
Barium	38.6	X	39.3	X	1.88	
Cadmium	ND	U	ND	U		
Chromium	1.25	F	ND	U		
Cobalt	0.229	F	ND	U		
Lead	ND	U	ND	U		
Manganese	14.5	X	14.9	X	2.52	
Nickel	1.22	F	ND	U		
Silver	ND	U	ND	U		
Thallium	ND	U	ND	U		
Vanadium	ND	U	ND	U		
Zinc	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: 5505806

10/03/2017 12:39



Sample Login ID: L17091648
Instrument ID: ICP-MS2
Post Spike ID: WG632098-01
Sample ID: L17091648-01

Worknum: WG632098
Method: 6020A
Units: ug/L
Matrix: Water

File ID: NI.100217.133350 Dil: 1
File ID: NI.100217.133044 Dil: 1

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
ANTIMONY	52.6		0	U	50	105.3	75 - 125	
ARSENIC	54.2		0.974		50	106.4	75 - 125	
BARIUM	89.6		38.6		50	102.2	75 - 125	
CADMIUM	51.4		0	U	50	102.9	75 - 125	
CHROMIUM	52.7		1.25	F	50	103.0	75 - 125	
COBALT	50.7		0.229	F	50	101.0	75 - 125	
LEAD	52.9		0	U	50	105.9	75 - 125	
MANGANESE	65.5		14.5		50	102.1	75 - 125	
NICKEL	50.7		1.22	F	50	98.9	75 - 125	
SILVER	49.8		0	U	50	99.6	75 - 125	
THALLIUM	51.8		0	U	50	103.7	75 - 125	
VANADIUM	52.5		0	U	50	104.9	75 - 125	
ZINC	54.9		0	U	50	109.7	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

00862826

Login: L17091648 Workgroup (AAB#): WG632098
 Analytical Method: 6020A Instrument ID: ICP-MS2
 ICAL Worknum: WG632169 Initial Calibration Date: 02-OCT-2017 12:02

	WG632169-01		WG632169-02		WG632169-03		WG632169-04		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
ANTIMONY	0	433	.4	538	50	330000	100	638000	.999945	
ARSENIC	0	-75.8	.4	-21.5	50	49600	100	97600	.99999	
BARIUM	0	49.7	.4	188	50	149000	100	288000	.999962	
CADMIUM	0	11.0	.4	150	50	126000	100	247000	.999993	
CHROMIUM	0	10100	.4	10500	50	405000	100	790000	.999982	
COBALT	0	423	.4	883	50	456000	100	894000	.999996	
LEAD	0	391	.4	674	50	309000	100	616000	.999949	
MANGANESE	0	2120	.4	2660	50	608000	100	1200000	.999965	
NICKEL	0	316	.4	408	50	98100	100	190000	.999995	
SILVER	0	123	.4	563	50	410000	100	795000	.999963	
THALLIUM	0	13.7	.4	621	50	595000	100	1160000	.999998	
VANADIUM	0	2240	.4	2730	50	454000	100	881000	.999999	
ZINC	0	511	.4	356	50	46200	100	90900	.999981	

INT = Instrument intensity
 R = Coefficient of correlation
 Q = Data Qualifier
 * = Out of Compliance; R < 0.995

INT_CAL_ICP - Modified 03/06/2008
 PDF File ID: 5505815
 Report generated: 02-OCT-2017 16:01



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-06
 Instrument ID: ICP-MS2 Run Time: 12:08 Method: 6020A
 File ID: NI.100217.120855 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS2 - 02-OCT-17
 Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
SILVER	.2	.8	.2	U
ARSENIC	.2	.8	.2	U
BARIIUM	.6	2.4	.6	U
CADMIUM	.12	.48	.12	U
COBALT	.2	.8	.2	U
CHROMIUM	.4	1.6	.4	U
MANGANESE	.4	1.6	.4	U
NICKEL	.8	3.2	.8	U
LEAD	.2	.8	.2	U
ANTIMONY	.2	.8	.2	U
THALLIUM	.04	.16	.04	U
VANADIUM	.2	.8	.2	U
ZINC	5	20	5	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: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-12
 Instrument ID: ICP-MS2 Run Time: 12:28 Method: 6020A
 File ID: NI.100217.122816 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Antimony	0.200	0.800	0.200	U
Arsenic	0.200	0.800	0.200	U
Barium	0.600	2.40	0.600	U
Cadmium	0.120	0.480	0.120	U
Chromium	0.400	1.60	0.400	U
Cobalt	0.200	0.800	0.200	U
Lead	0.200	0.800	0.200	U
Manganese	0.400	1.60	0.400	U
Nickel	0.800	3.20	0.800	U
Silver	0.200	0.800	0.200	U
Thallium	0.0400	0.160	0.0400	U
Vanadium	0.200	0.800	0.200	U
Zinc	5.00	20.0	5.00	U

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



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-17
 Instrument ID: ICP-MS2 Run Time: 13:06 Method: 6020A
 File ID: NI.100217.130642 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Antimony	0.200	0.800	0.200	U
Arsenic	0.200	0.800	0.200	U
Barium	0.600	2.40	0.600	U
Cadmium	0.120	0.480	0.120	U
Chromium	0.400	1.60	0.400	U
Cobalt	0.200	0.800	0.200	U
Lead	0.200	0.800	0.200	U
Manganese	0.400	1.60	0.400	U
Nickel	0.800	3.20	0.800	U
Silver	0.200	0.800	0.200	U
Thallium	0.0400	0.160	0.0400	U
Vanadium	0.200	0.800	0.200	U
Zinc	5.00	20.0	5.00	U

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



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-19
 Instrument ID: ICP-MS2 Run Time: 13:46 Method: 6020A
 File ID: NI.100217.134613 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Antimony	0.200	0.800	0.200	U
Arsenic	0.200	0.800	0.200	U
Barium	0.600	2.40	0.600	U
Cadmium	0.120	0.480	0.120	U
Chromium	0.400	1.60	0.400	U
Cobalt	0.200	0.800	0.200	U
Lead	0.200	0.800	0.200	U
Manganese	0.400	1.60	0.400	U
Nickel	0.800	3.20	0.800	U
Silver	0.200	0.800	0.200	U
Thallium	0.0400	0.160	0.0400	U
Vanadium	0.200	0.800	0.200	U
Zinc	5.00	20.0	5.00	U

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



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-05
 Instrument ID: ICP-MS2 Run Time: 12:05 Method: 6020A
 File ID: NI.100217.120549 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Antimony	50	50.9	102	90 - 110	
Arsenic	50	50.0	100	90 - 110	
Barium	50	49.1	98.3	90 - 110	
Cadmium	50	49.9	99.9	90 - 110	
Chromium	50	49.3	98.6	90 - 110	
Cobalt	50	50.0	100	90 - 110	
Lead	50	50.0	100	90 - 110	
Manganese	50	49.3	98.5	90 - 110	
Nickel	50	50.2	100	90 - 110	
Silver	50	49.9	99.8	90 - 110	
Thallium	50	49.7	99.3	90 - 110	
Vanadium	50	49.7	99.4	90 - 110	
Zinc	50	50.1	100	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-11
Instrument ID: ICP-MS2 Run Time: 12:25 Method: 6020A
File ID: NI.100217.122511 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.0500	0.0510	mg/L	102	90 - 110	
Arsenic	0.0500	0.0499	mg/L	99.8	90 - 110	
Barium	0.0500	0.0488	mg/L	97.6	90 - 110	
Cadmium	0.0500	0.0498	mg/L	99.5	90 - 110	
Chromium	0.0500	0.0486	mg/L	97.2	90 - 110	
Cobalt	0.0500	0.0493	mg/L	98.6	90 - 110	
Lead	0.0500	0.0498	mg/L	99.5	90 - 110	
Manganese	0.0500	0.0494	mg/L	98.7	90 - 110	
Nickel	0.0500	0.0495	mg/L	98.9	90 - 110	
Silver	0.0500	0.0502	mg/L	100	90 - 110	
Thallium	0.0500	0.0492	mg/L	98.5	90 - 110	
Vanadium	0.0500	0.0491	mg/L	98.1	90 - 110	
Zinc	0.0500	0.0494	mg/L	98.8	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
PDF File ID: 5505819
Report generated 10/02/2017 16:01



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-16
Instrument ID: ICP-MS2 Run Time: 13:03 Method: 6020A
File ID: NI.100217.130336 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.0500	0.0503	mg/L	101	90 - 110	
Arsenic	0.0500	0.0502	mg/L	100	90 - 110	
Barium	0.0500	0.0485	mg/L	97.1	90 - 110	
Cadmium	0.0500	0.0501	mg/L	100	90 - 110	
Chromium	0.0500	0.0490	mg/L	98.0	90 - 110	
Cobalt	0.0500	0.0503	mg/L	101	90 - 110	
Lead	0.0500	0.0500	mg/L	100	90 - 110	
Manganese	0.0500	0.0495	mg/L	99.0	90 - 110	
Nickel	0.0500	0.0495	mg/L	99.0	90 - 110	
Silver	0.0500	0.0502	mg/L	100	90 - 110	
Thallium	0.0500	0.0493	mg/L	98.7	90 - 110	
Vanadium	0.0500	0.0498	mg/L	99.6	90 - 110	
Zinc	0.0500	0.0502	mg/L	100	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
PDF File ID: 5505819
Report generated 10/02/2017 16:01



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-18
Instrument ID: ICP-MS2 Run Time: 13:43 Method: 6020A
File ID: NI.100217.134308 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.0500	0.0503	mg/L	101	90 - 110	
Arsenic	0.0500	0.0503	mg/L	101	90 - 110	
Barium	0.0500	0.0490	mg/L	97.9	90 - 110	
Cadmium	0.0500	0.0509	mg/L	102	90 - 110	
Chromium	0.0500	0.0494	mg/L	98.8	90 - 110	
Cobalt	0.0500	0.0499	mg/L	99.8	90 - 110	
Lead	0.0500	0.0498	mg/L	99.6	90 - 110	
Manganese	0.0500	0.0493	mg/L	98.6	90 - 110	
Nickel	0.0500	0.0499	mg/L	99.8	90 - 110	
Silver	0.0500	0.0508	mg/L	102	90 - 110	
Thallium	0.0500	0.0491	mg/L	98.2	90 - 110	
Vanadium	0.0500	0.0496	mg/L	99.3	90 - 110	
Zinc	0.0500	0.0511	mg/L	102	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
PDF File ID: 5505819
Report generated 10/02/2017 16:01



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-08
 Instrument ID: ICP-MS2 Run Time: 12:15 Method: 6020A
 File ID: NI.100217.121553 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.400	0.478	ug/L	119	70 - 130	
Arsenic	0.400	0.392	ug/L	98.1	70 - 130	
Barium	0.750	0.710	ug/L	94.6	70 - 130	
Cadmium	0.240	0.238	ug/L	99.1	70 - 130	
Chromium	0.800	0.572	ug/L	71.5	70 - 130	
Cobalt	0.400	0.387	ug/L	96.7	70 - 130	
Lead	0.200	0.194	ug/L	97.2	70 - 130	
Manganese	0.500	0.500	ug/L	100	70 - 130	
Nickel	1.60	1.55	ug/L	96.7	70 - 130	
Silver	0.400	0.387	ug/L	96.7	70 - 130	
Thallium	0.0800	0.0854	ug/L	107	70 - 130	
Vanadium	0.400	0.368	ug/L	92.1	70 - 130	
Zinc	6.25	6.04	ug/L	96.7	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-15
 Instrument ID: ICP-MS2 Run Time: 12:59 Method: 6020A
 File ID: NI.100217.125916 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.400	0.484	ug/L	121	70 - 130	
Arsenic	0.400	0.385	ug/L	96.1	70 - 130	
Barium	0.750	0.693	ug/L	92.4	70 - 130	
Cadmium	0.240	0.228	ug/L	95.0	70 - 130	
Chromium	0.800	0.563	ug/L	70.4	70 - 130	
Cobalt	0.400	0.379	ug/L	94.7	70 - 130	
Lead	0.200	0.191	ug/L	95.4	70 - 130	
Manganese	0.500	0.481	ug/L	96.2	70 - 130	
Nickel	1.60	1.55	ug/L	97.0	70 - 130	
Silver	0.400	0.375	ug/L	93.9	70 - 130	
Thallium	0.0800	0.0738	ug/L	92.3	70 - 130	
Vanadium	0.400	0.360	ug/L	89.9	70 - 130	
Zinc	6.25	6.04	ug/L	96.7	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091648 Run Date: 10/02/2017 Sample ID: WG632169-25
 Instrument ID: ICP-MS2 Run Time: 14:52 Method: 6020A
 File ID: NI.100217.145202 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Antimony	0.400	0.458	ug/L	115	70 - 130	
Arsenic	0.400	0.408	ug/L	102	70 - 130	
Barium	0.750	0.692	ug/L	92.3	70 - 130	
Cadmium	0.240	0.225	ug/L	93.7	70 - 130	
Chromium	0.800	0.673	ug/L	84.1	70 - 130	
Cobalt	0.400	0.365	ug/L	91.3	70 - 130	
Lead	0.200	0.192	ug/L	96.1	70 - 130	
Manganese	0.500	0.464	ug/L	92.8	70 - 130	
Nickel	1.60	1.47	ug/L	91.9	70 - 130	
Silver	0.400	0.375	ug/L	93.9	70 - 130	
Thallium	0.0800	0.0732	ug/L	91.5	70 - 130	
Vanadium	0.400	0.388	ug/L	97.1	70 - 130	
Zinc	6.25	5.84	ug/L	93.4	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17091648
Instrument ID: ICP-MS2
Sol. A: WG632169-09
Sol. AB: WG632169-10

File ID: NI.100217.121858
File ID: NI.100217.122204

Workgroup (AAB#): WG632098
Method: 6020A
Units: ug/L
Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Antimony	NS	0.00970	NS	100	100	100	
Arsenic	NS	0.0137	NS	100	105	105	
Barium	NS	0.0529	NS	100	97.1	97.1	
Cadmium	NS	-0.0516	NS	100	102	102	
Chromium	NS	-0.215	NS	100	97.6	97.6	
Cobalt	NS	0.00850	NS	100	98.1	98.1	
Lead	NS	0.0494	NS	100	98.8	98.8	
Manganese	NS	0.0914	NS	100	98.1	98.1	
Nickel	NS	0.301	NS	100	97.7	97.7	
Silver	NS	0.00660	NS	100	85.4	85.4	
Thallium	NS	0.0358	NS	100	96.2	96.2	
Vanadium	NS	-0.0495	NS	100	97.2	97.2	
Zinc	NS	0.646	NS	100	110	110	

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: L17091648 Analytical Method: 6020
 Analytical Workgroup: WG632098 Matrix: 1
 Instrument: ICP-MS2 Analyst: JYH
 ICAL Date: 02-OCT-2017 11:53

Sample	Type	Run Date	BISMUTH	GERMANIUM	INDIUM
			% Rec	% Rec	% Rec
L17091648-01	SAMP	02-OCT-2017 13:30	95.659	100.037	96.441
WG632048-02	BLANK	02-OCT-2017 13:12	103.343	101.756	100.559
WG632048-03	LCS	02-OCT-2017 13:15	105.257	103.295	101.656
WG632098-01	PSPK	02-OCT-2017 13:33	96.662	101.743	98.032
WG632098-02	SERIAL	02-OCT-2017 13:36	97.185	96.633	92.755
WG632169-05	ICV	02-OCT-2017 12:05	99.424	98.598	97.333
WG632169-06	ICB	02-OCT-2017 12:08	95.816	91.596	90.688
WG632169-08	LLICV	02-OCT-2017 12:15	100.163	98.216	96.423
WG632169-09	ICS	02-OCT-2017 12:18	92.942	91.001	88.259
WG632169-10	ICS	02-OCT-2017 12:22	97.67	95.054	93.687
WG632169-11	CCV	02-OCT-2017 12:25	104.166	103.625	101.681
WG632169-12	CCB	02-OCT-2017 12:28	97.351	94.148	92.677
WG632169-15	LLCCV	02-OCT-2017 12:59	103.532	100.295	99.354
WG632169-16	CCV	02-OCT-2017 13:03	102.941	102.226	101.341
WG632169-17	CCB	02-OCT-2017 13:06	93.341	90.651	87.855
WG632169-18	CCV	02-OCT-2017 13:43	104.562	105.411	101.711
WG632169-19	CCB	02-OCT-2017 13:46	99.321	96.723	94.999
WG632169-25	LLCCV	02-OCT-2017 14:52	102.86	103.838	100.899

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: 5505814
 Report generated: 10/03/2017 12:39



Login Number: L17091648 Date: 04/12/2017
Insturment 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 Method 9056

2.4.1.1 Summary Data

Lab Report #: L17091648

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: IC1
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 9056	Prep Date: 10/06/2017 15:09
Matrix: Water	Analytical Method: 9056	Cal Date: 08/30/2017 13:05
Workgroup #: WG633037	Analyst: CAS	Run Date: 10/06/2017 18:11
Collect Date: 09/27/2017 15:00	Dilution: 5	File ID: I1_100617-13
Sample Tag: DL01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Sulfate	14808-79-8	136		10.0	5.00	2.50
J	Estimated value ; the analyte concentration was greater than the highest standard					

Lab Report #: L17091648

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: IC1
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 9056	Prep Date: 10/06/2017 15:09
Matrix: Water	Analytical Method: 9056	Cal Date: 08/30/2017 13:05
Workgroup #: WG633037	Analyst: CAS	Run Date: 10/06/2017 18:29
Collect Date: 09/27/2017 15:00	Dilution: 50	File ID: I1_100617-14
Sample Tag: DL02	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chloride	16887-00-6	645		20.0	10.0	5.00

2.4.1.2 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: IC1 _____ Dataset: 083017 IC1 ICAL.SEQ _____
 Analyst1: CAS _____ Analyst2: NA _____
 Method: 300/9056 _____ SOP: IC01 _____ Rev: 19 _____

Maintenance Log ID: _____ Syringe Filter Lot#: 170105254 _____

Eluent ID#: RGT41111 _____

Workgroups: Column 1 ID: AG14A 4-MM _____ Column 2 ID: AS14A 4-MM _____

Internal STD: NA _____ Surrogate STD: NA _____ Calibration STD: STD81395(30-AUG-2017)

CCV STD: STD81395 _____ LCS STD: STD81396 _____ MS/MSD STD: STD81396 _____

Comments: ICAL WG627709 : Alternate Source STD81396
 Guard Column : Ionpac AG14A (4x50mm)
 Dionex S/N 013738
 Analytical Column : Ionpac AS14A (4x250mm)
 Dionex S/N 010890
 Cond Suppressor : AERS 500 (4mm)
 Dionex S/N 170116007
 System backpressure = 1588psi

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	I1_083017-01	ELUENT	1	1		08/30/17 10:57
2	I1_083017-02	DI WATER	1	1		08/30/17 11:16
3	I1_083017-03	WG627709-01 STD	1	1	STD81395	08/30/17 11:34
4	I1_083017-04	WG627709-02 STD	1	1	STD81395	08/30/17 11:52
5	I1_083017-05	WG627709-03 STD	1	1	STD81395	08/30/17 12:10
6	I1_083017-06	WG627709-04 STD	1	1	STD81395	08/30/17 12:28
7	I1_083017-07	WG627709-05 STD	1	1	STD81395	08/30/17 12:47
8	I1_083017-08	WG627709-06 STD	1	1	STD81395	08/30/17 13:05
9	I1_083017-09	WG627709-07 SSCV	1	1	STD81396	08/30/17 13:23
10	I1_083017-10	LCRV @Level-6	1	1	STD81396	08/30/17 13:41
11	I1_083017-11	LCRV @Level-4	1	1	STD81396	08/30/17 14:00
12	I1_083017-12	LCRV @Level-2	1	1	STD81396	08/30/17 14:18
13	I1_083017-13	LCRV @Level-0	1	1		08/30/17 14:36
14	I1_083017-14	END	1	1		08/30/17 14:54

Comments

Seq.	Rerun	Dil.	Reason	Analytes

Page: 1

Approved: 30-AUG-17

Eri C. Zimm



Microbac Laboratories Inc.
Instrument Run Log

Instrument: IC1 Dataset: 100617 IC1.SEQ
 Analyst1: CAS Analyst2: NA
 Method: 300/9056 SOP: IC01 Rev: 19

Maintenance Log ID: _____ Syringe Filter Lot#: 170105254
 Eluent ID#: RGT41497

Workgroups: Column 1 ID: AG14A 4MM Column 2 ID: AS14A 4MM
 Analytical WG633037 (Waters)
 Internal STD: NA Surrogate STD: NA Calibration STD STD81395(30-AUG-2017)
 CCV STD: STD84264 LCS STD: STD84265 MS/MSD STD: STD84265

Comments: System Backpressure: 1678 psi

Samples L17091647-01, L17091648-01, L17100200-01, L17100201-01, L17100202-01, and L17100392-01 were analyzed at dilutions only due to their pre-run screen results for chloride, which were greater than 200 ppm.

Samples L17100141-01 and L17100384-01 were analyzed at dilutions only due to their pre-run screen results for sulfate, which were greater than the calibration maximum.

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	I1_100617-01	ELUENT	1	1		10/06/17 14:33
2	I1_100617-02	DI WATER	1	1		10/06/17 14:51
3	I1_100617-03	WG633039-01 ANION CCV	1	1	STD84264	10/06/17 15:09
4	I1_100617-04	WG633039-02 ANION CCB	1	1		10/06/17 15:27
5	I1_100617-05	WG633037-01 ANION BLANK	1	1		10/06/17 15:45
6	I1_100617-06	WG633037-02 ANION LCS	1	1	STD84265	10/06/17 16:04
7	I1_100617-07	L17091614-01 (SO4)	2	1		10/06/17 16:22
8	I1_100617-08	L17091620-01 (F,CL,SO4) REF	1	1		10/06/17 16:40
9	I1_100617-09	WG633037-04 DUP 1620-01	2	1		10/06/17 16:58
10	I1_100617-10	L17091620-02 (F,CL,SO4)	2	1		10/06/17 17:17
11	I1_100617-11	L17091647-01 (CL,SO4) 5x	1	5		10/06/17 17:35
12	I1_100617-12	L17091647-01 RR CL 50x	1	50		10/06/17 17:53
13	I1_100617-13	L17091648-01 (CL,SO4) 5x	1	5		10/06/17 18:11
14	I1_100617-14	L17091648-01 RR CL 50x	1	50		10/06/17 18:29
15	I1_100617-15	WG633039-03 ANION CCV	1	1	STD84264	10/06/17 18:48
16	I1_100617-16	WG633039-04 ANION CCB	1	1		10/06/17 19:06
17	I1_100617-17	L17100384-01 (SO4) 100x	2	100		10/06/17 19:24
18	I1_100617-18	L17100141-01 (SO4) 100x	2	100		10/06/17 19:42
19	I1_100617-19	L17091733-01 (F) REF	1	1		10/06/17 20:00
20	I1_100617-20	WG633037-06 DUP 1733-01	2	1		10/06/17 20:19
21	I1_100617-21	L17091733-02 (F) MS	1	1	STD84265	10/06/17 20:37
22	I1_100617-22	L17091733-03 (F) MSD	1	1	STD84265	10/06/17 20:55
23	I1_100617-23	L17100200-01 (CL,SO4) 5x	1	5		10/06/17 21:13
24	I1_100617-24	L17100200-01 RR CL 50x	1	50		10/06/17 21:31
25	I1_100617-25	L17100201-01 (CL,SO4) 100x	1	100		10/06/17 21:50
26	I1_100617-26	L17100201-01 RR CL 1000x	1	1000		10/06/17 22:08
27	I1_100617-27	WG633039-05 ANION CCV	1	1	STD84264	10/06/17 22:26
28	I1_100617-28	WG633039-06 ANION CCB	1	1		10/06/17 22:44
29	I1_100617-29	L17100202-01 (CL,SO4) 100x	1	100		10/06/17 23:03
30	I1_100617-30	L17100202-01 RR CL 1000x	1	1000		10/06/17 23:21

Page: 1

Approved: 09-OCT-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: IC1 Dataset: 100617 IC1.SEQ
 Analyst1: CAS Analyst2: NA
 Method: 300/9056 SOP: IC01 Rev: 19

Maintenance Log ID: _____ Syringe Filter Lot#: 170105254
 Eluent ID#: RGT41497

Workgroups: Column 1 ID: AG14A 4MM Column 2 ID: AS14A 4MM
 Analytical WG633037 (Waters)
 Internal STD: NA Surrogate STD: NA STD81395(30-AUG-2017)
 CCV STD: STD84264 LCS STD: STD84265 STD84265

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
31	I1_100617-31	L17100392-01 (CL,SO4) 100x	1	100		10/06/17 23:39
32	I1_100617-32	L17100392-01 RR CL 1000x	1	1000		10/06/17 23:57
33	I1_100617-33	WG633039-07 ANION CCV	1	1	STD84264	10/07/17 00:15
34	I1_100617-34	WG633039-08 ANION CCB	1	1		10/07/17 00:34
35	I1_100617-35	END	1	1		10/07/17 00:52

Comments

Seq.	Rerun	Dil.	Reason	Analytes
------	-------	------	--------	----------

Page: 2

Approved: 09-OCT-17




Microbac Laboratories Inc.

Data Checklist


Date: 30-AUG-2017
 Analyst: CAS
 Analyst: NA
 Method: 300/9056
 Instrument: IC1
 Curve Workgroup: WG627709
 Runlog ID: 84296
 Analytical Workgroups: ICAL ONLY

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)	1678 PSI
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)	NA
% D/% Drift	NA
Minimum response factors (MS)	NA
Continuing calibration blank (CCB) (IC)	NA
Special standards	NA
Blanks	NA
TCL hits	NA
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	NA
Recoveries	NA
Surrogate recoveries	NA
MS/MSD/Sample duplicates	NA
Recoveries	NA
%RPD	NA
Samples	NA
TCL hits	NA
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	NA
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:
30-AUG-2017



Secondary Reviewer:
30-AUG-2017




Microbac Laboratories Inc.

Data Checklist

Date: 06-OCT-2017
 Analyst: CAS
 Analyst: NA
 Method: 300/9056
 Instrument: IC1
 Curve Workgroup: NA
 Runlog ID: 85110
 Analytical Workgroups: L17091614,1620,1647,1648,1733,L17100141,0200,0201,0202,0384,039

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)	1678 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:
09-OCT-2017



Secondary Reviewer:
09-OCT-2017



CHECKLIST1 - Modified 03/05/2008

Generated: OCT-09-2017 11:09:10



Analytical Method: 9056
Login Number: L17091648

AAB#: WG633037

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-SP650-6472-GRAB	01	09/27/17					10/06/2017	9	2	*	10/06/17	9.1	2	*
LH18/24-SP650-6472-GRAB	01	09/27/17					10/06/2017	9	2	*	10/06/17	9.1	2	*

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091648 Work Group: WG633037
 Blank File ID: I1_100617-05 Blank Sample ID: WG633037-01
 Prep Date: 10/06/17 15:09 Instrument ID: IC1
 Analyzed Date: 10/06/17 15:45 Method: 9056
 Analyst: CAS

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG633037-02	I1_100617-06	10/06/17 16:04	01
DUP	WG633037-04	I1_100617-09	10/06/17 16:58	01
LH18/24-SP650-6472-GRAB	L17091648-01	I1_100617-13	10/06/17 18:11	DL01
LH18/24-SP650-6472-GRAB	L17091648-01	I1_100617-14	10/06/17 18:29	DL02
DUP	WG633037-06	I1_100617-20	10/06/17 20:19	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5515980
 Report generated 10/09/2017 13:28



Login Number: L17091648 Prep Date: 10/06/17 15:09 Sample ID: WG633037-01
Instrument ID: IC1 Run Date: 10/06/17 15:45 Prep Method: 9056
File ID: I1 100617-05 Analyst: CAS Method: 9056
Workgroup (AAB#): WG633037 Matrix: Water Units: mg/L
Contract #: Cal ID: IC1-30-AUG-17

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: 5515981
09-OCT-2017 13:28



Login Number: L17091648 Run Date: 10/06/2017 Sample ID: WG633037-02
Instrument ID: IC1 Run Time: 16:04 Prep Method: 9056
File ID: I1 100617-06 Analyst: CAS Method: 9056
Workgroup (AAB#): WG633037 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD84265 Cal ID: IC1-30-AUG-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Chloride	8.00	8.17	102	90 - 110	
Sulfate	40.0	41.6	104	90 - 110	

LCS - Modified 03/06/2008
PDF File ID: 5515982
Report generated: 10/09/2017 13:28



Login Number: L17091648
Analytical Method: 9056
ICAL Workgroup: WG627709

Instrument ID: IC1
Initial Calibration Date: 30-AUG-17 13:05
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
Chloride	5.705	6.21		0.99800
Sulfate	7.895	10.4		0.99700

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

INT_CAL - Modified 03/06/2008
PDF File ID: 5517271
Report generated 10/09/2017 13:28



Login Number: L17091648
 Analytical Method: 9056

Instrument ID: IC1
 Initial Calibration Date: 30-AUG-17 13:05
 Column ID: F

Analyte	WG627709-01			WG627709-02			WG627709-03		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Chloride	0.200	0.037000000 0	5.405	1.00	0.168000000	5.952	4.00	0.659000000	6.070
Sulfate	1.00	0.113000000	8.850	5.00	0.588000000	8.503	20.0	2.45200000	8.157

INT_CAL - Modified 03/06/2008
 PDF File ID: 5517271
 Report generated 10/09/2017 13:28



Login Number: L17091648
 Analytical Method: 9056

Instrument ID: IC1
 Initial Calibration Date: 30-AUG-17 13:05
 Column ID: F

Analyte	WG627709-04			WG627709-05			WG627709-06		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Chloride	8.00	1.36500000	5.861	12.0	2.08300000	5.761	24.0	4.63300000	5.180
Sulfate	40.0	5.18300000	7.718	60.0	8.02200000	7.479	120	18.01500000	6.661

INT_CAL - Modified 03/06/2008
 PDF File ID: 5517271
 Report generated 10/09/2017 13:28



Login Number: L17091648 Run Date: 08/30/2017 Sample ID: WG627709-07
 Instrument ID: IC1 Run Time: 13:23 Method: 9056
 File ID: I1 083017-09 Analyst: CAS QC Key: DOD4
 ICal Workgroup: WG627709 Cal ID: IC1 - 30-AUG-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
Chloride	8.00	8.25	mg/L	5.71	3.10	10	
Sulfate	40.0	41.3	mg/L	7.51	3.20	10	

* Exceeds %D Limit



Login Number: L17091648 Run Date: 10/06/2017 Sample ID: WG633039-02
 Instrument ID: IC1 Run Time: 15:27 Method: 9056
 File ID: I1 100617-04 Analyst: CAS Units: mg/L
 Workgroup (AAB#): WG633037 Cal ID: IC1 - 30-AUG-17
 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: L17091648 Run Date: 10/06/2017 Sample ID: WG633039-04
 Instrument ID: IC1 Run Time: 19:06 Method: 9056
 File ID: I1 100617-16 Analyst: CAS Units: mg/L
 Workgroup (AAB#): WG633037 Cal ID: IC1 - 30-AUG-17
 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: L17091648 Run Date: 10/06/2017 Sample ID: WG633039-01
 Instrument ID: IC1 Run Time: 15:09 Method: 9056
 File ID: I1 100617-03 Analyst: CAS QC Key: DOD4
 Workgroup (AAB#): WG633037 Cal ID: IC1 - 30-AUG-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Chloride	8.00	8.17	mg/L	5.77	2.11	10	
Sulfate	40.0	41.5	mg/L	7.46	3.84	10	

* Exceeds %D Criteria



Login Number: L17091648 Run Date: 10/06/2017 Sample ID: WG633039-03
Instrument ID: IC1 Run Time: 18:48 Method: 9056
File ID: I1 100617-15 Analyst: CAS QC Key: DOD4
Workgroup (AAB#): WG633037 Cal ID: IC1 - 30-AUG-17
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Chloride	8.00	8.21	mg/L	5.74	2.66	10	
Sulfate	40.0	41.7	mg/L	7.43	4.24	10	

* Exceeds %D Criteria



2.4 General Chemistry Data

2.4.2 COD Data

2.4.2.1 Summary Data

Lab Report #: L17091648

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: V-1200
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: METHOD	Prep Date: N/A
Matrix: Water	Analytical Method: 410.4 MOD	Cal Date: 08/29/2017 10:16
Workgroup #: WG632279	Analyst: DLP	Run Date: 10/03/2017 10:00
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: 00.1710031000-10
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Chemical Oxygen Demand	COD	93.8		40.0	20.0	10.0

2.4.2.2 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: 03-OCT-2017
 Analyst: DLP
 Analyst: NA
 Method: COD-LOW
 Instrument: V-1200
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG632279

Calibration/Linearity	08-29-17
Second Source Check	
ICV/CCV (std)	X
ICB/CCB	
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:
05-OCT-2017

Secondary Reviewer:
09-OCT-2017

Dwight Payne

Denna Johnson



Analytical Method: 410.4 MOD
Login Number: L17091648

AAB#: WG632279

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-SP650-6472-GRAB	01	09/27/17					10/03/2017	5.8	28		10/03/17	5.8	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number:L17091648
 Blank File ID:00.1710031000-02
 Prep Date:10/03/17 10:00
 Analyzed Date:10/03/17 10:00
 Analyst:DLP

Work Group:WG632279
 Blank Sample ID:WG632279-01
 Instrument ID:V-1200
 Method:410.4 MOD

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632279-02	00.1710031000-03	10/03/17 10:00	
LCS2	WG632279-03	00.1710031000-04	10/03/17 10:00	
LH18/24-SP650-6472-GRAB	L17091648-01	00.1710031000-10	10/03/17 10:00	
DUP	WG632279-05	00.1710031000-13	10/03/17 10:00	

Report Name: BLANK_SUMMARY
 PDF File ID: 5511870
 Report generated 10/05/2017 10:53



Login Number: L17091648 Prep Date: 10/03/17 10:00 Sample ID: WG632279-01
 Instrument ID: V-1200 Run Date: 10/03/17 10:00 Prep Method: METHOD
 File ID: 00.1710031000-02 Analyst: DLP Method: 410.4 MOD
 Workgroup (AAB#): WG632279 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: V-1200-28-SEP-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Chemical Oxygen Demand	10.0	40.0	10.0	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: 5511871
 05-OCT-2017 10:53



Login Number: L17091648 Analyst: DLP Prep Method: METHOD
 Instrument ID: V-1200 Matrix: Water Method: 410.4 MOD
 Workgroup (AAB#): WG632279 Units: mg/L
 QC Key: DOD4 Lot #: STD83277
 Sample ID: WG632279-02 LCS File ID: 00.1710031000-03 Run Date: 10/03/2017 10:00
 Sample ID: WG632279-03 LCS2 File ID: 00.1710031000-04 Run Date: 10/03/2017 10:00

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Chemical Oxygen Demand	100	98.0	98.0	100	98.8	98.8	0.857	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5511872
 Report generated: 10/05/2017 10:53



2.4.2.3 Raw Data

Curves

WG 627639

Parameter: COD-LOW

Spectrophotometer: V-1200

Calibration (Curve) standard stock: STD 83440

Concentration: 10,000 mg/L

Recipe for preparation of curve standards found in:
 SOP: 4105 Revision: 17 Page: 10

Second Source Stock: STD83277 (concentration: 1000 mg/L)

Daily Preparation: $\frac{55,000}{120} \times 160 =$
 concentration = _____

Calibration Standards (mg/L)	Volume (mL)	Cell Size (cm)	Wavelength (nm)	Absorbance
STD 5	150	2	420	0.119 / 0.201
STD 6	100	1 cm		0.323 / 0.321
STD 7	50			0.475 / 0.363
STD 8	30			0.484 / 0.483
STD 9	20			0.514 / 0.500
STD 10	5			0.546 / 0.546
STD 11	0			0.557 / 0.556
2nd source (100)	2		420	0.459 / 0.321 / 0.326

Analyst: Quetta Kiper

Date/Time: 08-29-17 1016

DCN#127947



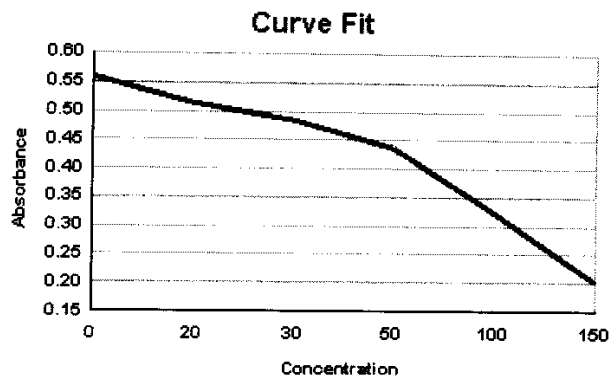
Microbac Laboratories Inc.
INITIAL CALIBRATION

Workgroup: WG627639
Analytical Method: 400
Instrument ID: V-1200

Analyst: DLP
Initial Calibration Date: 08/29/2017

Analyte: **CHEMICAL OXYGEN DEMAND**
Number of Points: 6
Slope: -0.00237041
Y-Intercept: 0.557274
Coef. Of Correlation (R^2): 0.999506
Coef. Of Correlation (R): 0.999753

Concentration X	Absorbance Y	X ²	X * Y	Y-Fitted (mX^2+B)
0.00	0.557	0.00	0.00	0.557274
20.0	0.514	400	10.3	0.509866
30.0	0.484	900	14.5	0.486162
50.0	0.435	2500	21.8	0.438753
100	0.323	10000	32.3	0.320233
150	0.201	22500	30.2	0.201712



WG_ICAL_CAL_WET - Modified 03/06/2008
Report generated 08/30/2017 08:33



Microbac Laboratories Inc.
ALTERNATE SOURCE REPORT

Workgroup #: WG627639

File ID: 00.1708291016-07

CCV ID: WG627639-07

Units: mg/L

Analyte: CHEMICAL OXYGEN DEMAND

Instrument ID: V-1200

Run Date: 08/29/2017

Run Time: 10:16

Analyst: DLP

Cal ID: V-1200 - 29-AUG-17 10:16:06

Analyte	Expected	Found	RF	%D	Q
Chemical Oxygen Demand	100	99.7	0.00321	0.3	

* Exceeds %D Limit

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

WET_WG_SSCV - Modified 03/06/2008
Report generated 08/30/2017 08:33



COD LOW

EPA 410.4/SM5220D/HACH 8000

CCV: 51083440 LCS: 51083277 Spike: 51083277

SOP K4105 Revision #: 17

Daily dilution 2(10,000)150 = 60 Daily dilution 5(1000)150 = Daily dilution 0.1(1000)12 =

Curve ID: 627609

Daily dilution 5(60)150 = 60 Daily dilution: 100 Daily dilution: 50

Wavelength (nm): 420

Hot Block Temp: 48 C Spectrophotometer: V-1200

All samples use 2ml

Hot Block ID: 500-3 COD vial Lot # A7102

SAMPLE	DILUTION	ABSORBANCE 1	ABSORBANCE 2
CCV: <u>60</u> mg/L		<u>0.418</u>	
BLANK:		<u>0.550</u>	
LCS: <u>100</u> mg/L		<u>0.328</u>	
LCS DUP: <u>100</u> mg/L		<u>0.323</u>	
<u>09-1614-01</u>		<u>0.540</u>	
<u>09-1620-01</u>		<u>0.520</u>	
<u>-02</u>		<u>0.512</u>	
<u>09-1636-07</u>		<u>0.540</u>	
<u>09-1647-01</u>		<u>0.516</u>	
<u>09-1648-01</u>		<u>0.335</u>	
<u>09-1736-01</u>		<u>0.554</u>	
<u>09-1727-01</u>		<u>0.293</u>	
DUP: <u>09-1614-01</u>		<u>0.540</u>	
MS: <u>(50) 1614-01</u>		<u>0.424</u>	
MDS: ()			
CCV: <u>60</u> mg/L		<u>0.416</u>	

ANALYST: Quentin Payne

DATE/TIME: (on) 10-03-17/1000

DATE/TIME: (off) 10-03-17/1200

DCN#128676



Microbac Laboratories Inc.
SAMPLE REPORT

Workgroup: WG632279Analyst: DLPAnalyte: CHEMICAL OXYGEN DEMANDDate: 10/03/2017

Sample ID	I Vol	F Vol	Response	Slope	Y Intercept	Anal. Conc.	Rep. Conc.	Dil	Units
WG632279-01	2	2	0.550	-0.002370	0.5573	3.0686	3.0686	1	mg/L
WG632279-02	2	2	0.325	-0.002370	0.5573	97.989	97.989	1	mg/L
WG632279-03	2	2	0.323	-0.002370	0.5573	98.833	98.833	1	mg/L
L17091614-01	2	2	0.540	-0.002370	0.5573	7.2873	ND	1	mg/L
WG632279-04	2	2	0.540	-0.002370	0.5573	7.2873	7.2873	1	mg/L
L17091620-01	2	2	0.520	-0.002370	0.5573	15.725	15.725 F	1	mg/L
L17091620-02	2	2	0.512	-0.002370	0.5573	19.100	19.100 F	1	mg/L
L17091636-07	2	2	0.540	-0.002370	0.5573	7.2873	ND	1	mg/L
L17091647-01	2	2	0.516	-0.002370	0.5573	17.412	17.412 F	1	mg/L
L17091648-01	2	2	0.335	-0.002370	0.5573	93.770	93.770	1	mg/L
L17091736-01	2	2	0.554	-0.002370	0.5573	1.3811	ND	1	mg/L
L17091727-01	2	2	0.293	-0.002370	0.5573	111.49	111.49	1	mg/L
WG632279-05	2	2	0.540	-0.002370	0.5573	7.2873	7.2873	1	mg/L
WG632279-06	2	2	0.424	-0.002370	0.5573	56.224	56.224	1	mg/L

UV_SAMPLE_REPORT - Modified 03/06/2008

Report generated 10/05/2017 08:09

Workgroup #: WG632638 Instrument ID: V-1200
File ID: 00.1710031000-01 Run Date: 10/03/2017
CCV ID: WG632638-01 Run Time: 10:00
Units: mg/L Analyst: DLP
Analyte: CHEMICAL OXYGEN DEMAND Cal ID: V-1200 - 28-SEP-17

Analyte	Expected	Found	RF	%D	Q
Chemical Oxygen Demand	60	60.0	0.00692	0.0	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 10/05/2017 08:05



Workgroup #: WG632638 Instrument ID: V-1200
File ID: 00.1710031000-15 Run Date: 10/03/2017
CCV ID: WG632638-02 Run Time: 10:00
Units: mg/L Analyst: DLP
Analyte: CHEMICAL OXYGEN DEMAND Cal ID: V-1200 - 28-SEP-17

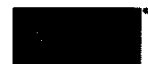
Analyte	Expected	Found	RF	%D	Q
Chemical Oxygen Demand	60	59.6	0.00693	0.7	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 10/05/2017 08:05



2.4 General Chemistry Data

2.4.3 Oil and Grease Data

2.4.3.1 Summary Data

Lab Report #: L17091648
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091648-01	PrePrep Method: N/A	Instrument: HORIZON
Client ID: LH18/24-SP650-6472-GRAB	Prep Method: 1664A	Prep Date: N/A
Matrix: Water	Analytical Method: 1664A	Cal Date:
Workgroup #: WG632290	Analyst: AWE	Run Date: 10/03/2017 12:40
Collect Date: 09/27/2017 15:00	Dilution: 1	File ID: ON.1710031240-15
Sample Tag:	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
n-Hexane Extractable Material (HEM)	OILGREASE	2.80	U	5.60	2.80	1.40
U	Analyte was not detected. The concentration is below the reported LOD.					

2.4.3.2 QC Summary Data

Example Oil and Grease - HEM Calculations

$$[(WT2 - WT1) * 1000000]/\text{volume} = \text{mg/L}$$

where:

WT1 = weight (grams) of empty container.

WT2 = weight (grams) of dried sample and container.

1000000 = factor to get to mg/L.

volume = mL of sample used.

The samples are not blank corrected.

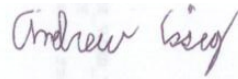
Microbac Laboratories Inc.

Data Checklist

Date: 03-OCT-2017
 Analyst: AWE
 Analyst: NA
 Method: HEM
 Instrument: HORIZON
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG632290

Calibration/Linearity	10/03/17
Second Source Check	
ICV/CCV (std)	
ICB/CCB	
Blank	X
LCS/LCS Dup	X
MS/MSD	
Duplicate	
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	AWE
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
04-OCT-2017



Secondary Reviewer:
09-OCT-2017




Analytical Method:1664A
Login Number:L17091648

AAB#:WG632290

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-SP650-6472-GRAB	01	09/27/17					10/03/2017	5.9	28		10/03/17	5.9	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091648 Work Group: WG632290
 Blank File ID: ON.1710031240-01 Blank Sample ID: WG632290-01
 Prep Date: 10/03/17 12:40 Instrument ID: HORIZON
 Analyzed Date: 10/03/17 12:40 Method: 1664A
 Analyst: AWE

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632290-02	ON.1710031240-02	10/03/17 12:40	
LCS2	WG632290-03	ON.1710031240-03	10/03/17 12:40	
LH18/24-SP650-6472-GRAB	L17091648-01	ON.1710031240-15	10/03/17 12:40	

Report Name: BLANK_SUMMARY
 PDF File ID: 5509417
 Report generated 10/04/2017 11:27



Login Number: L17091648 Prep Date: 10/03/17 12:40 Sample ID: WG632290-01
Instrument ID: HORIZON Run Date: 10/03/17 12:40 Prep Method: 1664A
File ID: ON.1710031240-01 Analyst: AWE Method: 1664A
Workgroup (AAB#): WG632290 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: HORIZO-

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
n-Hexane Extractable Material (HEM)	1.40	5.60	1.40	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: 5509419
04-OCT-2017 11:27



Login Number: L17091648 Analyst: AWE Prep Method: 1664A
 Instrument ID: HORIZON Matrix: Water Method: 1664A
 Workgroup (AAB#): WG632290 Units: mg/L
 QC Key: DOD4 Lot #: STD84125
 Sample ID: WG632290-02 LCS File ID: ON.1710031240-02 Run Date: 10/03/2017 12:40
 Sample ID: WG632290-03 LCS2 File ID: ON.1710031240-03 Run Date: 10/03/2017 12:40

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
n-Hexane Extractable Material (HEM)	40.0	37.7	94.3	40.0	38.6	96.5	2.36	78 - 114	18	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5509421
 Report generated: 10/04/2017 11:27



2.4.3.3 Raw Data

Hexane Extractable Material

SOP K1664 Revision #: 12
 EPA Method 1664A HEM or NPM

LCS: 57d 84125
 Daily Dilution: 5(8000)/1000 = 40
 Matrix Spike: _____
 Daily Dilution: _____
 All results are mg/L

Speed Vap Temperature: 40
 Balance: ANDGR-202 / other
 Instrument: Horizon 3000XL PP901

Sample	Disk Type	pH Check	EXT. #	Volume (mL)	Initial Weight WT1 (g)	Dry Weight WT2 (g)	Comments
BLANK	J	J	3	1000			Beginning weight check
LCS: _____ mg/L	J	J	1	1000			
LCSDUP: _____ mg/L	J	J	2	1000			
096002-13	J	J	1	1000			2 mg 0.0021
-14	J	J	2	1000			1 g 1.0000
091611-01	J	J	3	980			
-02	J	J	1	990			
091614-01	J	J	2	980			
091615-02	J	J	3	930			
-04	J	J	1	940			
-06	J	J	2	970			
091620-01	J	J	3	980			
-02	J	J	1	1000			
091647-01	J	J	2	1000			
091648-01	J	J	3	1000			
091649-01	J	J	1	880			Jars were composited
091743-01	J	J	2	1000			
100001-01	J	J	3	1000			
100003-01	J	J	1	1000			
100112-01	J	J	2	1000			
-02	J	J	3	1000			Ending weight check
							2 mg 0.0019
DUP							1 g 0.0019 ^{ave} 1.0002 ₁₀₋₃₋₁₇

Disk Type:			
P47 (Pacific 47mm)	P90 (Pacific 90mm)	PF (pre filter)	Hexane (0A1997)
Lot: _____	Lot: <u>510505</u>	Lot: <u>70610210</u>	Lot: <u>173326</u>
			Silica Gel: _____
pH paper <u>15A3951</u>	Lot #: _____		Lot: _____

Analyst: Andrew Eising Date / Time: 10-3-17 / 1240 Daily Maintenance Witness: EPT
 *Duplicates/MS/MSD are analyzed only if sufficient volume is submitted by the client.

$$MDL = \frac{10}{100} \left(\frac{8000}{4000} \right) = \frac{10}{100} \left(\frac{800}{1000} \right) = \frac{10}{100} (400) = 4$$

$$LOD = \frac{10}{100} \left(\frac{8000}{4000} \right) = \frac{10}{100} \left(\frac{800}{1000} \right) = \frac{10}{100} (400) = 4$$

$$LOQ = \frac{10}{100} \left(\frac{8000}{4000} \right) = \frac{10}{100} \left(\frac{800}{1000} \right) = \frac{10}{100} (400) = 4$$

DCN#128677

$$MDL = \frac{10}{100} (8000) - \frac{10}{1000} (800)$$

$$LOQ = \frac{10}{100} (8000) - \frac{10}{1000} (800)$$



Microbac Laboratories Inc.
GRAVIMETRIC REPORT

00862898

Workgroup (AAB#): WG632290
Analyst: AWE
Analyte: OIL & GREASE
Balance: BAL004

Method: 1664A
SOP: K1664 Revision 12
Spike Solution: STD84125
Daily Dilution: _____

SAMPLE ID	Element	HORZONTAL VOL	INITIAL WT	DRY WT A	DRY WT B	DRY WT C	Anal. Conc	Rep. Conc.	Units
WG632290-01	B	1000	2.3402	2.3404	2.3403		0.1000	0.1000	mg/L
WG632290-02	L	1000	2.3154	2.353	2.3531		37.70	37.70	mg/L
WG632290-03	L2	1000	2.3082	2.3467	2.3468		38.60	38.60	mg/L
L17090002-13	1	1000	2.3479	2.3529	2.3528		4.900	4.900	mg/L
L17090002-14	2	1000	2.3067	2.3125	2.3128		6.100	6.100	mg/L
L17091611-01	3	980	2.3382	2.3383	2.3386		0.4082	ND	mg/L
L17091611-02	4	990	2.32	2.3206	2.3206		0.6061	ND	mg/L
L17091614-01	5	980	2.3374	2.3377	2.3375		0.1020	ND	mg/L
L17091615-02	6	930	2.286	2.2863	2.2863		0.3226	ND	mg/L
L17091615-04	7	940	2.3023	2.3031	2.3028		0.5319	ND	mg/L
L17091615-06	8	970	2.3224	2.3227	2.3228		0.4124	ND	mg/L
L17091620-01	9	980	2.3275	2.3279	2.3279		0.4082	ND	mg/L
L17091620-02	10	1000	2.2585	2.2588	2.2586		0.1000	ND	mg/L
L17091647-01	11	1000	2.2943	2.2947	2.2946		0.3000	ND	mg/L
L17091648-01	12	1000	2.2812	2.2816	2.2813		0.1000	ND	mg/L
L17091649-01	13	880	2.3296	2.3605	2.3602		34.77	34.77	mg/L
L17091743-01	14	1000	2.2607	2.261	2.261		0.3000	ND	mg/L
L17100001-01	15	1000	2.3414	2.3426	2.3425		1.100	1.100	mg/L
L17100003-01	16	1000	2.3479	2.3529	2.3528		4.900	4.900	mg/L
L17100112-01	17	1000	2.2935	2.2937	2.2937		0.2000	ND	mg/L
L17100112-02	18	1000	2.3829	2.383	2.383		0.1000	ND	mg/L

Analyst: Andrew Giesy

Date/Time (on) : 10/03/2017 12:40
Date/Time (off) : 10/03/2017 15:10
Date/Time (off) : 10/03/2017 15:40
Date/Time (off) : _____

*Duplicate required on 10% of samples

CONT_GRAV_REPORT - Modified 02/18/2011
PDF ID: 5507657
Report generated: 10/03/2017 17:04



Workgroup (AAB#): WG632290
 Analyst: AWE
 Analyte: OIL & GREASE
 Balance: BAL004

Method: 1664A
 SOP: K1664 Revision 12
 Spike Solution: STD84125
 Daily Dilution: _____

SAMPLE ID	Instrument#	HORIZONTAL VOL	INITIAL WT	DRY WT A	DRY WT B	DRY WT C	Anal. Conc	Rep. Conc.	Units
WG632290-01	B	1000	2.3402	2.3404	2.3403		0.1000	0.1000	mg/L
WG632290-02	L	1000	2.3154	2.353	2.3531		37.70	37.70	mg/L
WG632290-03	L2	1000	2.3082	2.3467	2.3468		38.60	38.60	mg/L
L17090002-13	1	1000	2.3479	2.3529	2.3528		4.900	4.900	mg/L
L17090002-14	2	1000	2.3067	2.3125	2.3128		6.100	6.100	mg/L
L17091611-01	3	980	2.3382	2.3383	2.3386		0.4082	ND	mg/L
L17091611-02	4	990	2.32	2.3206	2.3206		0.6061	ND	mg/L
L17091614-01	5	980	2.3374	2.3377	2.3375		0.1020	ND	mg/L
L17091615-02	6	930	2.286	2.2863	2.2863		0.3226	ND	mg/L
L17091615-04	7	940	2.3023	2.3031	2.3028		0.5319	ND	mg/L
L17091615-06	8	970	2.3224	2.3227	2.3228		0.4124	ND	mg/L
L17091620-01	9	980	2.3275	2.3279	2.3279		0.4082	ND	mg/L
L17091620-02	10	1000	2.2585	2.2588	2.2586		0.1000	ND	mg/L
L17091647-01	11	1000	2.2943	2.2947	2.2946		0.3000	ND	mg/L
L17091648-01	12	1000	2.2812	2.2816	2.2813		0.1000	ND	mg/L
L17091649-01	13	880	2.3296	2.3605	2.3602		34.77	34.77	mg/L
L17091743-01	14	1000	2.2607	2.261	2.261		0.3000	ND	mg/L
L17100001-01	15	1000	2.3414	2.3426	2.3425		1.100	1.100	mg/L
L17100003-01	16	1000	2.3479	2.3529	2.3528		4.900	4.900	mg/L
L17100112-01	17	1000	2.2935	2.2937	2.2937		0.2000	ND	mg/L
L17100112-02	18	1000	2.3829	2.383	2.383		0.1000	ND	mg/L

Analyst: Andrew Sieg

Date/Time (on) : 10/03/2017 12:40
 Date/Time (off) : 10/03/2017 15:10
 Date/Time (off) : 10/03/2017 15:40
 Date/Time (off) : _____

*Duplicate required on 10% of samples



3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
October 12, 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	BLR - BRANDON L. RICHARDS
BNB - Brandi N. Bentley	BRG - BRENDA R. GREGORY
CAS - Craig A. Smith	CEB - CHAD E. BARNES
CLC - CHRYS L. CRAWFORD	CLG - CARA L. GREENWOOD
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	RAF - REBEKAH A. FINN
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
ZTB - ZACH T. BARNES	

List of Valid Qualifiers

October 12, 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

October 12, 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
 QUARTERLY EFFLUENT 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.#
			MS	MSD	ROD Volatiles	Total Metals	Oil & Grease		Chemical Oxygen Demand	Chloride & Sulfate	1, 4 - DIOXANE				
LH18/24-SP650-6472-GRAB	Water	09/27/17 / 15:00			3	2	5							HCL	
LH18/24-SP650-6472-GRAB	Water	09/27/17 / 15:00			1		1							HNO3	
LH18/24-SP650-6472-GRAB	Water	09/27/17 / 15:00			3					1	2			NONE	
LH18/24-SP650-6472-GRAB	Water	09/27/17 / 15:00			1		1							H2SO4	
Trip Blank	Water	09/27/17			2	2								HCL	

STANDARD TURN AROUND TIME

Additional Remarks:		Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
		<i>Scott Beesinger</i>	09/27/17	15:45									

For Lab Use Only

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

Microbac OVD
 Received: 09/28/2017 09:49
 By: CARA STRICKLER

221000106685



Cara Strickler

COOLER TEMP >6° C LOG

Cooler ID 6685

SAMPLE ID	Bottle 1 °C	Bottle 2 °C	Bottle 3 °C	Bottle 4 °C	Bottle 5 °C	Bottle 6 °C

pH Lot # HCC013865

pH Exceptions

SAMPLE ID	Bottle 1	Bottle 2	Bottle 3	Bottle 4	Bottle 5	Bottle 6
LH 18124-SP650-6472	COD - pH 6					

PRESERVATIVE EXCEPTIONS

NONE

AS NOTED

Document Control # 1957
Last 10-07-2016

Issued to: Document Master File

Bq 9/28/17

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17091648

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 09-OCT-2017

Samplenum Container ID Products

L17091648-01 973011

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	28-SEP-2017 16:40	BRG		
2	ANALYZ	L1	ORG4	29-SEP-2017 10:12	JST	CLS	

Comments:Products cancelled.

3	STORE	ORG4	A1	12-OCT-2017 07:22	CLS	AWE	
---	-------	------	----	-------------------	-----	-----	--

Comments:Products cancelled.

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	28-SEP-2017 16:40	BRG		
2	ANALYZ	L1	ORG4	29-SEP-2017 10:12	JST	CLS	

Comments:Products cancelled.

3	STORE	ORG4	A1	12-OCT-2017 07:22	CLS	AWE	
---	-------	------	----	-------------------	-----	-----	--

Comments:Products cancelled.

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	28-SEP-2017 16:40	BRG		
2	ANALYZ	L1	ORG4	29-SEP-2017 10:12	JST	CLS	

Comments:Products cancelled.

3	STORE	ORG4	A1	12-OCT-2017 07:22	CLS	AWE	
---	-------	------	----	-------------------	-----	-----	--

Comments:Products cancelled.

Samplenum Container ID Products

L17091648-01 973012

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	28-SEP-2017 16:40	BRG		
2	PREP	W1	EXT	02-OCT-2017 16:50	JDH	BRG	

Comments:Products cancelled.

3	DISP	EXT	DISP	03-OCT-2017 07:35	BJO	BJO	
---	------	-----	------	-------------------	-----	-----	--

Comments:Products cancelled.

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER		28-SEP-2017 16:40	BRG		

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: L17091648

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 09-OCT-2017

Samplenum Container ID Products

L17091648-01 973013

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER		28-SEP-2017 16:40	BRG		

Samplenum Container ID Products

L17091648-01 973014

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	28-SEP-2017 16:40	BRG		

Samplenum Container ID Products

L17091648-01 973015 COD-HIGH COD-LOW

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	28-SEP-2017 16:40	BRG		
2	ANALYZ	W1	WET	03-OCT-2017 08:20	DLP	CLS	
3	STORE	WET	A1	04-OCT-2017 08:18	CLS	DLP	

Samplenum Container ID Products

L17091648-01 973016 826-SPE 827-DIOXANE 9056 OG-HEM

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	28-SEP-2017 16:40	BRG		<2
2	ANALYZ	W1	WET	03-OCT-2017 10:53	AWE	CLS	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER		28-SEP-2017 16:40	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



Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17091648

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 09-OCT-2017

Samplenum **Container ID** **Products**
L17091648-01 973017 AG-MS AL AS-MS BA-MS CD-MS CO-MS CR-MS FE MN-N

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	28-SEP-2017 16:40	BRG		
2	PREP	W1	DIG	28-SEP-2017 17:21	AC	BRG	
3	ANALYZ*	DIG	METALS	02-OCT-2017 10:48	JYH	AC	
4	STORE	DIG	A1	03-OCT-2017 13:02	BRG	ERP	

*Sample extract/digestate/leachate

Samplenum **Container ID** **Products**
L17091648-02 973018 826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	28-SEP-2017 16:40	BRG		
2	ANALYZ	L1	ORG4	29-SEP-2017 10:12	JST	CLS	
3	STORE	ORG4	A1	12-OCT-2017 07:22	CLS	AWE	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	28-SEP-2017 16:40	BRG		
2	ANALYZ	L1	ORG4	29-SEP-2017 10:12	JST	CLS	
3	STORE	ORG4	A1	12-OCT-2017 07:22	CLS	AWE	

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: L17091705

Linda Raabe
AECOM Technical Services, Inc.
112 East Pecan
San Antonio, TX 78205

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 October 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



Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com

Lab Report #: L17091705

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?
00113329	I	5.0		J4616879751	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 #:** L17091705**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-SP650-6474-GRAB	L17091705-01	09/28/2017 15:00	09/29/2017 10:11
TRIP BLANK	L17091705-02	09/28/2017 00:01	09/29/2017 10:11



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	8260
Prep Batch Number(s):	632680	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-10 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>		2017-10-10 20:29:53



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	8260
Prep Batch Number(s):	632680	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	8260
Prep Batch Number(s):	632680	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	8260
Prep Batch Number(s):	632680	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-10 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			1
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:	L17091705
Project Name:		Method:	8260
Prep Batch Number(s):	632680	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	8260
Prep Batch Number(s):	632680	Reviewer Name:	Sarah Vandenberg
LRC Date:	2017-10-10 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)Acetone was below the LCL in the CCV WG632679-02 analyzed 10/05/2017 on HPMS8.




Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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	2017-10-10 13:24:54



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	827-DIOXANE
Prep Batch Number(s):	WG632088	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

Laboratory Data Package Cover Page

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

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2017-10-05 18:49:10



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
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:	L17091705
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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

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

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

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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

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

Exceptions Report

There are no exceptions.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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
Kerri Buck			2017-10-13 18:12:45



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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	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:	L17091705
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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:	L17091705
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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?					
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				ER#1
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:	L17091705
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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)					
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:	L17091705
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 00:00:00		

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

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

Exceptions Report

ER#1 - Due to continuing calibration verification failure for selenium on 02-OCT-2017 at 21:15, client sample 01 along with the batch QA/QC samples was reanalyzed on a later calibration which was compliant for selenium.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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
Kerri Buck			2017-10-13 18:17:30



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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	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:	L17091705
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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:	L17091705
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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?					
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:	L17091705
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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)					
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:	L17091705
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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:	L17091705
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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	2017-10-10 14:20:05



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091705
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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:	L17091705
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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 #: L17091705

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: HPMS8
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 09/13/2017 19:41
Workgroup #: WG632680	Analyst: HRF	Run Date: 10/05/2017 19:30
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: 8M421965
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	4.69	Q	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	0.396	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	1.27		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	1.21		1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	90.9	70	120	
4-Bromofluorobenzene	98.9	75	120	
Dibromofluoromethane	91.9	85	115	
Toluene-d8	95.6	85	120	
J	Estimated value ; the analyte concentration was less than the LOQ.			
Q	One or more quality control criteria failed. See narrative.			
U	Analyte was not detected. The concentration is below the reported LOD.			

Lab Report #: L17091705
 Lab Project #: 2551.096
 Project Name: Longhorn Army Ammunition
 Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: HPMS15
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 3520C	Prep Date: 10/02/2017 18:00
Matrix: Water	Analytical Method: 8270D	Cal Date: 09/18/2017 12:55
Workgroup #: WG632529	Analyst: LJH	Run Date: 10/09/2017 14:28
Collect Date: 09/28/2017 15:00	Dilution: 5	File ID: 15M23019
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,4-Dioxane	123-91-1	25.4		10.2	5.10	2.55
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,4-Dioxane-d8	70.3	20	129			

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 6850	Prep Date: 10/04/2017 13:00
Matrix: Water	Analytical Method: 6850	Cal Date: 09/08/2017 16:52
Workgroup #: WG632566	Analyst: JWR	Run Date: 10/04/2017 19:24
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: 1LM.LM40641
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.667		0.400	0.200	0.100

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: ICP-THERMO3
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 06:40
Matrix: Water	Analytical Method: 6010C	Cal Date: 10/10/2017 12:23
Workgroup #: WG632186	Analyst: JYH	Run Date: 10/10/2017 13:23
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: T3.101017.132308
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Selenium, Total	7782-49-2	0.0100	U	0.0200	0.0100	0.00500
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17091705
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 07:12
Matrix: Water	Analytical Method: 6020A	Cal Date: 10/02/2017 12:02
Workgroup #: WG632098	Analyst: JYH	Run Date: 10/02/2017 13:58
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: NI.100217.135837
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Barium, Total	7440-39-3	0.0973		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 #: L17091705
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: UV-2600
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 7196A	Prep Date: N/A
Matrix: Water	Analytical Method: 7196A	Cal Date: 09/05/2017 15:26
Workgroup #: WG631899	Analyst: SDC	Run Date: 09/29/2017 11:42
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: 00.1709291142-06
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 #: L17091705-02	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: 09/13/2017 19:41
Workgroup #: WG632680	Analyst: HRF	Run Date: 10/05/2017 18:30
Collect Date: 09/28/2017 00:01	Dilution: 1	File ID: 8M421963
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	3.47	Q	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	0.278	J	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	92.9	70	120	
4-Bromofluorobenzene	97.5	75	120	
Dibromofluoromethane	93.6	85	115	
Toluene-d8	95.6	85	120	
J	Estimated value ; the analyte concentration was less than the LOQ.			
Q	One or more quality control criteria failed. See narrative.			
U	Analyte was not detected. The concentration is below the reported LOD.			

2.1 Volatiles Data

2.1.1 Volatiles GCMS Data (8260)

2.1.1.1 Summary Data

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: HPMS8
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 5030B/5030C/5035A	Prep Date: N/A
Matrix: Water	Analytical Method: 8260B	Cal Date: 09/13/2017 19:41
Workgroup #: WG632680	Analyst: HRF	Run Date: 10/05/2017 19:30
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: 8M421965
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	4.69	Q	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	0.396	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	1.27		1.00	0.500	0.250
Toluene	108-88-3	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	1.21		1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	90.9	70	120	
4-Bromofluorobenzene	98.9	75	120	
Dibromofluoromethane	91.9	85	115	
Toluene-d8	95.6	85	120	

J	Estimated value ; the analyte concentration was less than the LOQ.
Q	One or more quality control criteria failed. See narrative.
U	Analyte was not detected. The concentration is below the reported LOD.

Certificate of Analysis

Sample #: L17091705-02	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: 09/13/2017 19:41
Workgroup #: WG632680	Analyst: HRF	Run Date: 10/05/2017 18:30
Collect Date: 09/28/2017 00:01	Dilution: 1	File ID: 8M421963
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	3.47	Q	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	0.278	J	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	92.9	70	120			
4-Bromofluorobenzene	97.5	75	120			
Dibromofluoromethane	93.6	85	115			
Toluene-d8	95.6	85	120			
J	Estimated value ; the analyte concentration was less than the LOQ.					
Q	One or more quality control criteria failed. See narrative.					
U	Analyte was not detected. The concentration is below the reported LOD.					

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: HPMS8 Dataset: 083117
 Analyst1: ADC Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT Rev: 18/1
 Maintenance Log ID: _____

Internal Standard: STD83648 Surrogate Standard: STD83648
 CCV: STD83554 LCS: STD83193 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG628027

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421173	WG628027-01 50ng BFB STD	NA	1	1	STD83478	08/31/17 13:56
8M421174	WG628027-01 50ng BFB STD	NA	1	1	STD83478	08/31/17 14:11
8M421175	RINSE	NA	1	1	STD83388	08/31/17 14:36
8M421176	WG628027-02 5ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 15:06
8M421177	WG628027-03 20ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 15:36
8M421178	WG628027-04 50ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 16:05
8M421179	WG628027-05 100ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 16:35
8M421180	WG628027-06 200ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 17:04
8M421181	WG628027-07 300ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 17:34
8M421182	WG628027-08 400ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 18:04
8M421183	WG628027-09 500ug/L A9FOO STD	NA	1	1	STD83554	08/31/17 18:33
8M421184	RINSE	NA	1	1	STD83554	08/31/17 19:03
8M421185	WG628027-10 100ug/L A9FOO ALT SRC	NA	1	1	STD83193	08/31/17 19:33

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1	X			
File ID: 8M421173				
Tune failed, DNR.				

Approved: September 05, 2017

Page: 1




Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 091317
 Analyst1: TMB Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 530B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: 54316

Internal Standard: STD83648 Surrogate Standard: STD83648
 CCV: STD83834 LCS: STD83830 MS/MSD: NA
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG629567

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421377	WG629567-01 50ng BFB STD 8260	NA	1	1	STD83478	09/13/17 14:18
8M421378	RINSE	NA	1	1	STD83478	09/13/17 14:44
8M421379	WG629567-02 0.3ug/L STD 8260	NA	1	1	STD83834	09/13/17 15:15
8M421380	WG629567-03 0.4ug/L STD 8260	NA	1	1	STD83834	09/13/17 15:44
8M421381	WG629567-04 1ug/L STD 8260	NA	1	1	STD83834	09/13/17 16:17
8M421382	WG629567-05 2ug/L STD 8260	NA	1	1	STD83834	09/13/17 16:49
8M421383	WG629567-06 5ug/L STD 8260	NA	1	1	STD83834	09/13/17 17:17
8M421384	WG629567-07 20ug/L STD 8260	NA	1	1	STD83834	09/13/17 17:46
8M421385	WG629567-08 50ug/L STD 8260	NA	1	1	STD83834	09/13/17 18:15
8M421386	WG629567-09 100ug/L STD 8260	NA	1	1	STD83834	09/13/17 18:44
8M421387	WG629567-10 200ug/L STD 8260	NA	1	1	STD83834	09/13/17 19:13
8M421388	WG629567-11 300ug/L STD 8260	NA	1	1	STD83834	09/13/17 19:41
8M421389	RINSE	NA	1	1		09/13/17 20:11
8M421390	RINSE	NA	1	1		09/13/17 20:40
8M421391	WG629567-12 50ug/L ALT SRC STD 8260	NA	1	1	STD83830	09/13/17 21:09
8M421392	CCV CHECK	NA	1	1	STD83834	09/13/17 21:38
8M421393	RINSE	NA	1	1		09/13/17 22:06

Approved: September 14, 2017

Page: 1

Cathy Carter



Microbac Laboratories Inc.

Instrument Run Log

Instrument: HPMS8 Dataset: 100517
 Analyst1: HRF Analyst2: NA
 Method: 8260B SOP: MSV01/OVAP MSV01 Rev: 25/0
 Method: 624 SOP: MSV10 Rev: 15
 Method: 5030B/5030C/5035A SOP: PAT01/OVAP PAT01 Rev: 18/1
 Maintenance Log ID: _____

Internal Standard: STD84119 Surrogate Standard: STD84119
 CCV: STD84172 LCS: STD84177 MS/MSD: STD84177
 Column 1 ID: RTX502.2 Column 2 ID: NA
 Workgroups: WG632680

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M421945	WG632679-01 50ng BFB STD 8260	NA	1	1	STD84001	10/05/17 09:35
8M421946	WG632679-02 50ug/L CCV STD 8260	NA	1	1	STD84172	10/05/17 10:00
8M421947	WG000000-01 100ug/L A9 CCV STD 8260	NA	1	1	STD84099	10/05/17 10:31
8M421948	RINSE	NA	1	1		10/05/17 11:01
8M421949	WG632680-01 BLK1004 STD 8260	NA	1	1		10/05/17 11:31
8M421950	WG632680-02 20ug/L LCS STD 8260	NA	1	1	STD84177	10/05/17 12:00
8M421951	L17091702-04 B MS 20ug/L 826-SPE	<2	1	1	STD84177	10/05/17 12:31
8M421952	L17091702-05 B MSD 20ug/L 826-SPE	<2	1	1	STD84177	10/05/17 13:02
8M421953	L17091752-60 B 10X 826-SPE	6	1	10		10/05/17 13:32
8M421954	L17091702-03 B REF 826-SPE	<2	1	1		10/05/17 14:02
8M421955	L17091752-61 B 826-SPE	6	1	1		10/05/17 14:32
8M421956	L17091702-01 B 826-SPE	<2	1	1		10/05/17 15:02
8M421957	L17091702-02 B 826-SPE	<2	1	1		10/05/17 15:33
8M421958	L17091702-06 B 826-SPE	<2	1	1		10/05/17 16:02
8M421959	L17091702-07 B 826-SPE	<2	1	1		10/05/17 16:32
8M421960	L17091702-08 B 826-SPE	<2	1	1		10/05/17 17:01
8M421961	L17091702-09 B 826-SPE	<2	1	1		10/05/17 17:31
8M421962	L17091702-10 B 826-SPE	<2	1	1		10/05/17 18:00
8M421963	L17091705-02 A TB 826-SPE	<2	1	1		10/05/17 18:30
8M421964	L17100068-04 A 826-SPE	<2	1	1		10/05/17 19:00
8M421965	L17091705-01 A 826-SPE	<2	1	1		10/05/17 19:30
8M421966	L17100068-01 A 826-SPE	<2	1	1		10/05/17 20:00
8M421967	L17100068-02 A 826-SPE	<2	1	1		10/05/17 20:30
8M421968	L17100068-03 A 826-SPE	<2	1	1		10/05/17 21:01
8M421969	CCV	NA	1	1		10/05/17 21:33
8M421970	RINSE	NA	1	1		10/05/17 22:03
8M421971	RINSE	NA	1	1		10/05/17 22:34

Comments

Seq.	Rerun	Dil.	Reason	Analytes
3				
File ID: 8M421947				
Not needed, DNR.				

Approved: October 09, 2017

Page: 1

Cathy Carter



Microbac Laboratories Inc.

Data Checklist

Date: 31-AUG-2017
 Analyst: ADC
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 84380
 Analytical Workgroups: WG628027

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	ADC
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:
05-SEP-2017

Tiffany Bailey

Secondary Reviewer:
05-SEP-2017

Anthony Carter



Microbac Laboratories Inc.

Data Checklist

Date: 13-SEP-2017
 Analyst: TMB
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 84588
 Analytical Workgroups: WG629567

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	ADC
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-SEP-2017

Tiffany Bailey

Secondary Reviewer:
14-SEP-2017

Aditya Carter



Microbac Laboratories Inc.

Data Checklist

Date: 05-OCT-2017
 Analyst: HRF
 Analyst: NA
 Method: 8260B/624/OVAP
 Instrument: HPMS8
 Curve Workgroup: NA
 Runlog ID: 85121
 Analytical Workgroups: WG632680

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	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	ADC
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:
09-OCT-2017

Tiffany Bailey

Secondary Reviewer:
09-OCT-2017

Aditya Carter



Analytical Method:8260B
Login Number:L17091705

AAB#:WG632680

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-SP650-6474-GRAB	01	09/28/17					10/05/2017	7.2	14		10/05/17	7.2	14	
TRIP BLANK	02	09/28/17					10/05/2017	7.8	14		10/05/17	7.8	14	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number:L17091705
 Instrument Id:HPMS8
 Workgroup (AAB#):WG632680

Method:8260
 CAL ID: HPMS8-13-SEP-17
 Matrix:Water

Sample Number	Dilution	Tag	1	2	3	4
L17091705-01	1.00	01	90.9	91.9	98.9	95.6
L17091705-02	1.00	01	92.9	93.6	97.5	95.6
WG632680-01	1.00	01	95.1	93.0	98.9	94.5
WG632680-02	1.00	01	93.4	93.7	98.5	97.4

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: L17091705
 Blank File ID: 8M421949
 Prep Date: 10/05/17 11:31
 Analyzed Date: 10/05/17 11:31
 Analyst: HRF

Work Group: WG632680
 Blank Sample ID: WG632680-01
 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	WG632680-02	8M421950	10/05/17 12:00	01
TRIP BLANK	L17091705-02	8M421963	10/05/17 18:30	01
LH18/24-SP650-6474-GRAB	L17091705-01	8M421965	10/05/17 19:30	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5518100
 Report generated 10/09/2017 14:20



Login Number: L17091705 Prep Date: 10/05/17 11:31 Sample ID: WG632680-01
 Instrument ID: HPMS8 Run Date: 10/05/17 11:31 Prep Method: 5030B/5030C/503
 File ID: 8M421949 Analyst: HRF Method: 8260B
 Workgroup (AAB#): WG632680 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS8-13-SEP-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	95.1	70 - 120	PASS
4-Bromofluorobenzene	98.9	75 - 120	PASS
Dibromofluoromethane	93.0	85 - 115	PASS
Toluene-d8	94.5	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: 5517720
 09-OCT-2017 12:30



Login Number: L17091705 Run Date: 10/05/2017 Sample ID: WG632680-02
 Instrument ID: HPMS8 Run Time: 12:00 Prep Method: 5030B/5030C/503
 File ID: 8M421950 Analyst: HRF Method: 8260B
 Workgroup (AAB#): WG632680 Matrix: Water Units: ug/L
 QC Key: DOD4 Lot#: STD84177 Cal ID: HPMS8-13-SEP-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
1,1,1-Trichloroethane	20.0	20.3	102	65 - 130	
1,1,2-Trichloroethane	20.0	19.9	99.7	75 - 125	
1,1-Dichloroethane	20.0	18.9	94.3	70 - 135	
1,1-Dichloroethene	20.0	19.4	97.1	70 - 130	
1,2-Dichloroethane	20.0	19.7	98.4	70 - 130	
Acetone	20.0	18.0	90.2	40 - 140	
Benzene	20.0	20.1	101	80 - 120	
Carbon tetrachloride	20.0	20.0	100	65 - 140	
Chloroform	20.0	18.8	94.0	65 - 135	
Ethylbenzene	20.0	19.5	97.4	75 - 125	
Methylene chloride	20.0	19.5	97.4	55 - 140	
m,p-Xylene	40.0	39.6	99.1	75 - 130	
o-Xylene	20.0	20.1	101	80 - 120	
Styrene	20.0	21.1	105	65 - 135	
Tetrachloroethene	20.0	19.0	94.9	45 - 150	
Trichloroethene	20.0	20.7	104	70 - 125	
Toluene	20.0	19.5	97.7	75 - 120	
Vinyl chloride	20.0	24.1	121	50 - 145	

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	93.4	70 - 120	PASS
4-Bromofluorobenzene	98.5	75 - 120	PASS
Dibromofluoromethane	93.7	85 - 115	PASS
Toluene-d8	97.4	85 - 120	PASS

* EXCEEDS %REC LIMIT

LCS - Modified 03/06/2008
 PDF File ID: 5517721
 Report generated: 10/09/2017 12:30



BFB

Login Number: L17091705 _____ Tune ID: WG628027-01 _____
 Instrument: HPMS8 _____ Run Date: 08/31/2017 _____
 Analyst: ADC _____ Run Time: 14:11 _____
 Workgroup: WG628027 _____ File ID: 8M421174 _____
 Cal ID: HPMS8-31-AUG-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	28.5	8248	PASS
75.0	95.0	30.0	60.0	48.8	14111	PASS
95.0	95.0	100	100	100	28896	PASS
96.0	95.0	5.00	9.00	5.97	1726	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	84.1	24314	PASS
175	174	5.00	9.00	7.59	1845	PASS
176	174	95.0	101	95.2	23149	PASS
177	176	5.00	9.00	6.57	1520	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG628027-02	STD	01	08/31/2017 15:06	
WG628027-03	STD	01	08/31/2017 15:36	
WG628027-04	STD	01	08/31/2017 16:05	
WG628027-05	STD-CCV	01	08/31/2017 16:35	
WG628027-06	STD	01	08/31/2017 17:04	
WG628027-07	STD	01	08/31/2017 17:34	
WG628027-08	STD	01	08/31/2017 18:04	
WG628027-09	STD	01	08/31/2017 18:33	
WG628027-10	SSCV	01	08/31/2017 19:33	

* Sample past 12 hour tune limit



BFB

Login Number: L17091705 Tune ID: WG629567-01
 Instrument: HPMS8 Run Date: 09/13/2017
 Analyst: TMB Run Time: 14:18
 Workgroup: WG629567 File ID: 8M421377
 Cal ID: HPMS8-13-SEP-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	28.0	11358	PASS
75.0	95.0	30.0	60.0	47.1	19109	PASS
95.0	95.0	100	100	100	40581	PASS
96.0	95.0	5.00	9.00	6.53	2650	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	82.9	33634	PASS
175	174	5.00	9.00	7.97	2681	PASS
176	174	95.0	101	99.2	33368	PASS
177	176	5.00	9.00	7.07	2359	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG629567-02	STD	01	09/13/2017 15:15	
WG629567-03	STD	01	09/13/2017 15:44	
WG629567-04	STD	01	09/13/2017 16:17	
WG629567-05	STD	01	09/13/2017 16:49	
WG629567-06	STD	01	09/13/2017 17:17	
WG629567-07	STD	01	09/13/2017 17:46	
WG629567-08	STD-CCV	01	09/13/2017 18:15	
WG629567-09	STD	01	09/13/2017 18:44	
WG629567-10	STD	01	09/13/2017 19:13	
WG629567-11	STD	01	09/13/2017 19:41	
WG629567-12	SSCV	01	09/13/2017 21:09	

* Sample past 12 hour tune limit



BFB

Login Number: L17091705 Tune ID: WG632679-01
 Instrument: HPMS8 Run Date: 10/05/2017
 Analyst: HRF Run Time: 09:35
 Workgroup: WG632679 File ID: 8M421945
 Cal ID: HPMS8-13-SEP-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	29.3	9562	PASS
75.0	95.0	30.0	60.0	47.9	15641	PASS
95.0	95.0	100	100	100	32634	PASS
96.0	95.0	5.00	9.00	6.01	1962	PASS
173	174	0	2.00	0.714	205	PASS
174	95.0	50.0	100	87.9	28701	PASS
175	174	5.00	9.00	6.95	1995	PASS
176	174	95.0	101	99.0	28421	PASS
177	176	5.00	9.00	7.01	1993	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG632679-02	CCV	01	10/05/2017 10:00	
WG632680-01	BLANK	01	10/05/2017 11:31	
WG632680-02	LCS	01	10/05/2017 12:00	
L17091705-02	TRIP BLANK	01	10/05/2017 18:30	
L17091705-01	LH18/24-SP650-6474-GRAB	01	10/05/2017 19:30	

* Sample past 12 hour tune limit



Calibration Table Report
 Method: A9FOOWTR.M
 Title: A9-FOO Water SOP:MSV01 08-31-17 HPMS8
 Last Calibration: Tue Sep 05 14:28:41 2017
 Curve: WG628027
 Calibration Files

Compound										Avg	%RSD
	5	20	50	100	200	300	400	500			
	8M421176.D	8M421177.D	8M421178.D	8M421179.D	8M421180.D	8M421181.D	8M421182.D	8M421183.D			
Fluorobenzene	ISTD										
Acetonitrile		0.029	0.031	0.029	0.028	0.030	0.030	0.031	0.030	3.362	
3-Chloro-1-propene	0.776	0.836	0.870	0.863	0.874	0.840	0.807	0.773	0.830	4.885	
2-Chloro-1,3-butadiene	0.670	0.740	0.785	0.794	0.804	0.769	0.737	0.700	0.750	6.291	
Ethyl Acetate		0.260	0.283	0.285	0.280	0.285	0.281	0.280	0.279	3.184	
Methacrylonitrile	0.069	0.078	0.083	0.085	0.083	0.085	0.085	0.086	0.082	6.972	
Isobutyl Alcohol			0.009	0.009	0.009	0.010	0.010	0.011	0.010	8.810	
1-Butanol									0.000	0.000	
Methyl methacrylate	0.282	0.290	0.314	0.318	0.318	0.319	0.311	0.310	0.308	4.536	
2-Nitropropane		0.092	0.099	0.101	0.101	0.103	0.101	0.103	0.100	3.821	
Chlorobenzene-d5	ISTD										
1,4-Dichlorobenzene-d4	ISTD										
Cyclohexanone			0.012	0.013	0.012	0.013	0.014	0.015	0.013	9.192	

Tue Sep 05 14:30:32 2017

Calibration Table Report

Method: 8260WT.M

Title: Method 8260B/624 WTR-SOP:OVLMSV01 09-13-17 HPMS8

Last Calibration: Thu Sep 14 08:56:14 2017

Curve: WG629567

Calibration Files

		0.3	0.4	1	2	5	20	50	100	200	300	r ²	
		8M421379.D	8M421380.D	8M421381.D	8M421382.D	8M421383.D	8M421384.D	8M421385.D	8M421386.D	8M421387.D	8M421388.D		
Compound		Avg %RSD Linear Quad											
I	Fluorobenzene	ISTD											
T	Dichlorodifluoromethane		0.376	0.401	0.408	0.474	0.467	0.424	0.438		0.427	8.334	
P	Chloromethane		0.839	0.710	0.706	0.717	0.693	0.638	0.623		0.704	9.986	
C	Vinyl Chloride	0.363	0.340	0.345	0.340	0.345	0.336	0.314	0.327		0.339	4.229	
T	1,3-Butadiene		0.390	0.370	0.354	0.299	0.241	0.247	0.230	0.230	0.304	22.045	0.999
T	Bromomethane		0.213	0.231	0.246	0.238	0.244	0.241	0.256		0.238	5.729	
T	Chloroethane	0.237	0.223	0.241	0.250	0.250	0.258	0.241	0.252		0.244	4.484	
T	Trichlorofluoromethane	0.517	0.457	0.493	0.538	0.516	0.528	0.488	0.520		0.507	5.191	
T	Diethyl ether		0.272	0.282	0.278	0.277	0.275	0.280		0.268	0.276	1.732	
T	Isoprene				0.432	0.418	0.425	0.392	0.409	0.386	0.410	4.486	
T	Acrolein		0.035	0.039	0.040	0.040	0.041	0.044		0.044	0.040	7.806	
T	1,1,2-Trichloro-1,2,2-Trifluoroethane		0.225	0.254	0.273	0.265	0.268	0.249	0.262		0.257	6.203	
T	Acetone				0.116	0.084	0.080	0.087	0.090	0.082	0.090	14.764	
C	1,1-Dichloroethene	0.579	0.527	0.533	0.562	0.565	0.571	0.529	0.546		0.551	3.702	
T	Tert-Butyl Alcohol			0.018	0.017	0.017	0.018	0.019		0.020	0.018	7.921	
T	Dimethyl Sulfide				0.350	0.353	0.372	0.357	0.364	0.352	0.358	2.344	
T	Iodomethane		0.253	0.258	0.297	0.297	0.309	0.295	0.307	0.279	0.287	7.504	
T	Methyl acetate				0.271	0.266	0.269	0.277	0.277	0.266	0.271	1.772	
T	Methylene Chloride		0.273	0.280	0.287	0.273	0.278	0.261	0.265		0.274	3.218	
T	Carbon Disulfide		0.847	0.895	0.897	0.884	0.896	0.828	0.831	0.771	0.856	5.278	
T	Acrylonitrile		0.105	0.112	0.111	0.117	0.122	0.129		0.119	0.116	6.683	
T	Methyl Tert Butyl Ether		0.549	0.546	0.589	0.585	0.597	0.584	0.594		0.578	3.658	
T	trans-1,2-Dichloroethene	0.543	0.495	0.501	0.538	0.537	0.538	0.507	0.513		0.521	3.715	
T	n-Hexane				0.640	0.596	0.616	0.570	0.608	0.584	0.602	4.092	
T	Diisopropyl ether		1.728	1.782	1.754	1.754	1.718	1.624		1.441	1.686	7.060	
T	Vinyl Acetate				0.759	0.641	0.712	0.692	0.681	0.663	0.692	5.936	
P	1,1-Dichloroethane	0.613	0.610	0.630	0.653	0.643	0.642	0.601	0.602		0.624	3.263	
T	Ethyl-Tert-Butyl ether		1.069	1.105	1.087	1.100	1.085	1.085		1.015	1.078	2.793	
T	2-Butanone				0.141	0.139	0.139	0.147	0.145	0.143	0.142	2.331	
T	Propionitrile		0.036	0.039	0.038	0.039	0.040	0.042		0.043	0.040	6.030	
T	2,2-Dichloropropane	0.423	0.425	0.437	0.461	0.434	0.438	0.413	0.426		0.432	3.314	
T	cis-1,2-Dichloroethene	0.343	0.306	0.285	0.315	0.308	0.313	0.293	0.296		0.307	5.757	
C	Chloroform	0.568	0.572	0.499	0.526	0.525	0.505	0.513	0.477	0.474	0.518	6.741	
T	1-Bromopropane			0.050	0.058	0.057	0.061	0.058	0.058	0.058	0.057	5.742	
T	Bromochloromethane	0.185	0.160	0.180	0.181	0.184	0.186	0.179	0.180		0.179	4.637	
T	Tetrahydrofuran		0.097	0.093	0.089	0.093	0.093	0.099		0.094	0.094	3.181	
S	Dibromofluoromethane			0.324	0.311	0.298	0.291	0.291	0.283	0.281	0.297	5.251	
T	1,1,1-Trichloroethane	0.449	0.413	0.431	0.476	0.473	0.476	0.444	0.450		0.452	5.112	
T	Cyclohexane		0.687	0.721	0.772	0.748	0.771	0.718	0.754	0.699	0.734	4.403	
T	1,1-Dichloropropene		0.352	0.369	0.386	0.393	0.395	0.371	0.380		0.378	4.111	
T	Tert-Amyl-Methyl ether		0.604	0.645	0.639	0.650	0.641	0.652		0.616	0.635	2.869	
T	Carbon Tetrachloride	0.466	0.401	0.429	0.469	0.462	0.466	0.43	0.443		0.4457	5.44121	
S	1,2-Dichloroethane-d4			0.368	0.347	0.335	0.324	0.329	0.318	0.31	0.3329	5.83484	
T	Heptane										0	0	
T	1,2-Dichloroethane	0.465	0.412	0.453	0.476	0.459	0.465	0.441	0.441		0.4514	4.46079	
T	Benzene	1.136	1.054	1.105	1.121	1.103	1.1	1.014	0.969		1.0753	5.39779	
T	Trichloroethene	0.279	0.262	0.302	0.301	0.312	0.32	0.303	0.31		0.2987	6.35845	
T	Methylcyclohexane				0.458	0.438	0.451	0.423	0.445	0.421	0.4394	3.44851	
C	1,2-Dichloropropane	0.315	0.322	0.355	0.365	0.362	0.366	0.347	0.356		0.3484	5.65905	
T	Bromodichloromethane	0.352	0.371	0.359	0.377	0.386	0.398	0.38	0.382		0.3755	3.88984	
T	1,4-Dioxane			0.001	0.001	0.001	0.002	0.002		0.002	0.0015	13.7848	
T	Dibromomethane	0.165	0.149	0.146	0.156	0.158	0.164	0.156	0.158		0.1565	4.1959	
T	2-Chloroethyl Vinyl Ether		0.126	0.142	0.154	0.173	0.174	0.177	0.181	0.174	0.1628	12.2292	
T	4-Methyl-2-Pentanone				0.08	0.093	0.094	0.1	0.103	0.1	0.0951	8.75964	
T	cis-1,3-Dichloropropene	0.403	0.384	0.428	0.442	0.446	0.463	0.44	0.444		0.4314	5.97072	

T	Dimethyl Disulfide				0.212	0.235	0.254	0.252	0.26	0.246	0.2429	7.21488
I	Chlorobenzene-d5	ISTD										
S	Toluene-d8			1.315	1.259	1.242	1.208	1.176	1.139	1.103	1.2059	6.04694
C	Toluene	1.506	1.416	1.422	1.502	1.462	1.466	1.313	1.23		1.4146	6.84092
T	Ethyl Methacrylate		0.227	0.262	0.29	0.307	0.322	0.323	0.327	0.321	0.2975	12.085
T	Paraldehyde										0	0
T	trans-1,3-Dichloropropene		0.43	0.427	0.466	0.466	0.479	0.46	0.464		0.4559	4.36352
T	1,1,2-Trichloroethane	0.241	0.236	0.231	0.247	0.25	0.254	0.242	0.246		0.2433	3.08076
T	2-Hexanone				0.091	0.099	0.104	0.11	0.113	0.114	0.1052	8.79897
T	1,3-Dichloropropane	0.418	0.424	0.439	0.445	0.44	0.443	0.42	0.424		0.4317	2.5632
T	Tetrachloroethene	0.296	0.292	0.31	0.329	0.319	0.326	0.304	0.316		0.3115	4.28753
T	Dibromochloromethane	0.331	0.303	0.304	0.344	0.348	0.36	0.35	0.361		0.3376	6.78962
T	1,2-Dibromoethane	0.215	0.224	0.23	0.251	0.254	0.258	0.249	0.257		0.2423	6.81501
T	1-Chlorohexane	0.408	0.441	0.44	0.48	0.483	0.502	0.465	0.479	0.451	0.4611	6.23991
P	Chlorobenzene	1.067	0.998	0.994	1.045	1.022	1.026	0.942	0.899		0.9992	5.54231
T	1,1,1,2-Tetrachloroethane	0.309	0.313	0.356	0.381	0.383	0.387	0.366	0.362		0.357	8.54005
C	Ethylbenzene		0.53	0.515	0.505	0.54	0.537	0.544	0.497	0.496	0.5204	3.8086
T	m-p-Xylene	0.659	0.612	0.62	0.666	0.654	0.655	0.592	0.545		0.6252	6.69883
T	o-Xylene			0.58	0.582	0.63	0.632	0.652	0.602	0.598	0.6108	4.5136
T	Styrene	0.898	0.942	0.928	1.049	1.078	1.092	1.002	0.951		0.9924	7.40772
P	Bromoform			0.163	0.182	0.207	0.217	0.23	0.227	0.236	0.209	13.0818
T	Isopropylbenzene	1.642	1.479	1.52	1.689	1.633	1.652	1.473	1.365		1.5568	7.31337
I	1,4-Dichlorobenzene-d4	ISTD										
P	1,1,2,2-Tetrachloroethane	0.451	0.445	0.473	0.498	0.499	0.501	0.493	0.502		0.4825	4.8626
S	p-Bromofluorobenzene			0.895	0.909	0.935	0.903	0.905	0.892	0.868	0.9011	2.22137
T	1,2,3-Trichloropropane		0.112	0.147	0.153	0.15	0.149	0.148	0.152		0.1444	10.0859
T	trans-1,4-Dichloro-2-Butene		0.191	0.24	0.261	0.262	0.271	0.28	0.287	0.246	0.2547	11.8469
T	n-Propylbenzene	3.708	3.33	3.494	3.824	3.738	3.615	3.211	2.811		3.4663	9.72764
T	Bromobenzene	0.766	0.779	0.729	0.786	0.8	0.798	0.795	0.759	0.766	0.7752	2.97971
T	1,3,5-Trimethylbenzene	2.484	2.27	2.367	2.576	2.587	2.529	2.342	2.171		2.4157	6.27806
T	2-Chlorotoluene	2.23	2.293	2.42	2.66	2.545	2.508	2.016	2.057		2.3413	9.93156
T	4-Chlorotoluene	2.217	2.006	2.056	2.115	2.088	1.993	2.046	1.76		2.0351	6.45972
T	a-Methylstyrene				1.351	1.435	1.471	1.389	1.37	1.213	1.3715	6.49608
T	tert-Butylbenzene		0.519	0.538	0.579	0.583	0.572	0.537	0.543		0.5531	4.46813
T	1,2,4-Trimethylbenzene	2.517	2.447	2.447	2.737	2.662	2.604	2.366	2.175		2.4944	7.15122
T	sec-Butylbenzene		2.911	2.968	3.279	3.226	3.12	2.828	2.558		2.9842	8.39029
T	p-Isopropyltoluene		2.459	2.557	2.814	2.824	2.778	2.525	2.308		2.6093	7.65785
T	1,3-Dichlorobenzene	1.616	1.485	1.556	1.627	1.597	1.583	1.479	1.442		1.5482	4.53513
T	1,4-Dichlorobenzene	1.683	1.627	1.507	1.533	1.626	1.584	1.56	1.462	1.416	1.5554	5.48999
T	n-Butylbenzene		2.382	2.431	2.692	2.626	2.538	2.286	2.098		2.436	8.40297
T	1,2-Dichlorobenzene	1.543	1.467	1.369	1.399	1.451	1.446	1.437	1.346	1.326	1.4205	4.77171
T	1,2-Dibromo-3-Chloropropane			0.077	0.097	0.094	0.095	0.098	0.101		0.0936	8.93058
T	1,2,4-Trichlorobenzene	1.129	0.997	1.028	1.062	1.067	1.074	1.008	1.012		1.0472	4.23768
T	Hexachlorobutadiene	0.469	0.419	0.455	0.457	0.47	0.472	0.454	0.459		0.457	3.74962
T	Naphthalene	1.489	1.352	1.515	1.682	1.727	1.723	1.547	1.589		1.5781	8.24736
T	1,2,3-Trichlorobenzene	0.826	0.919	0.883	0.899	0.95	0.952	0.947	0.885	0.893	0.906	4.53779

Thu Sep 14 09:01:55 2017

Login Number: L17091705 Run Date: 08/31/2017 Sample ID: WG628027-10
Instrument ID: HPMS8 Run Time: 19:33 Method: 8260B
File ID: 8M421185 Analyst: ADC QC Key: DOD4
ICal Workgroup: WG628027 Cal ID: HPMS8 - 31-AUG-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: L17091705 Run Date: 09/13/2017 Sample ID: WG629567-12
 Instrument ID: HPMS8 Run Time: 21:09 Method: 8260B
 File ID: 8M421391 Analyst: TMB QC Key: DOD4
 ICal Workgroup: WG629567 Cal ID: HPMS8 - 13-SEP-17

Analyte		Expected	Found	Units	RF	%D	UCL	Q
1,1-Dichloroethene	CCC	50.0	48.1	ug/L	0.531	3.70	20	
Chloroform	CCC	50.0	47.5	ug/L	0.492	5.00	20	
Ethylbenzene	CCC	50.0	50.8	ug/L	0.529	1.60	20	
Toluene	CCC	50.0	49.5	ug/L	1.40	1.10	20	
Vinyl Chloride	CCC	50.0	46.1	ug/L	0.312	7.80	20	
Bromoform	SPCC	50.0	51.8	ug/L	0.217	3.60	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	51.2	ug/L	0.494	2.40	20	
Chloromethane	SPCC	50.0	42.7	ug/L	0.601	14.6	20	
Chlorobenzene	SPCC	50.0	50.7	ug/L	1.01	1.30	20	
1,1-Dichloroethane	SPCC	50.0	48.1	ug/L	0.600	3.80	20	
1,1,1-Trichloroethane		50.0	49.9	ug/L	0.450	0.300	20	
1,1,2-Trichloroethane		50.0	50.8	ug/L	0.247	1.70	20	
1,2-Dichloroethane		50.0	50.1	ug/L	0.452	0.200	20	
Acetone		50.0	49.3	ug/L	0.0888	1.40	20	
Benzene		50.0	50.0	ug/L	1.07	0.100	20	
Carbon Tetrachloride		50.0	48.5	ug/L	0.432	3.00	20	
Methylene Chloride		50.0	48.9	ug/L	0.268	2.20	20	
m-,p-Xylene		100	103	ug/L	0.643	2.80	20	
o-Xylene		50.0	53.7	ug/L	0.656	7.30	20	
Styrene		50.0	54.3	ug/L	1.08	8.70	20	
Tetrachloroethene		50.0	50.0	ug/L	0.312	0	20	
Trichloroethene		50.0	51.5	ug/L	0.308	3.00	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17091705 Run Date: 10/05/2017 Sample ID: WG632679-02
Instrument ID: HPMS8 Run Time: 10:00 Method: 8260B
File ID: 8M421946 Analyst: HRF QC Key: DOD4
Workgroup (AAB#): WG632680 Cal ID: HPMS8 - 13-SEP-17
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
1,2-Dichloropropane	CCC	50.0	51.0	ug/L	0.356	2.09	20	
1,1-Dichloroethene	CCC	50.0	48.5	ug/L	0.534	3.09	20	
Chloroform	CCC	50.0	48.0	ug/L	0.497	4.05	20	
Ethylbenzene	CCC	50.0	49.4	ug/L	0.514	1.22	20	
Toluene	CCC	50.0	49.4	ug/L	1.40	1.11	20	
Vinyl Chloride	CCC	50.0	52.8	ug/L	0.358	5.64	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	51.4	ug/L	0.496	2.80	20	
Bromoform	SPCC	50.0	49.9	ug/L	0.208	0.299	20	
Chlorobenzene	SPCC	50.0	47.8	ug/L	0.955	4.39	20	
Chloromethane	SPCC	50.0	47.4	ug/L	0.667	5.19	20	
1,1-Dichloroethane	SPCC	50.0	49.1	ug/L	0.613	1.77	20	
Xylenes		150	150	ug/L	0.619	0.0421	20	
1,1,1-Trichloroethane		50.0	52.3	ug/L	0.472	4.62	20	
1,1,2-Trichloroethane		50.0	49.3	ug/L	0.240	1.49	20	
1,2-Dichloroethane		50.0	49.1	ug/L	0.443	1.89	20	
Acetone		50.0	38.6	ug/L	0.0696	22.8	20	*
Benzene		50.0	51.3	ug/L	1.10	2.51	20	
Carbon Tetrachloride		50.0	52.6	ug/L	0.469	5.23	20	
Methylene Chloride		50.0	48.7	ug/L	0.267	2.67	20	
m-,p-Xylene		100	99.7	ug/L	0.624	0.278	20	
o-Xylene		50.0	50.2	ug/L	0.614	0.429	20	
Styrene		50.0	53.2	ug/L	1.06	6.42	20	
Tetrachloroethene		50.0	47.6	ug/L	0.297	4.81	20	
Trichloroethene		50.0	53.9	ug/L	0.322	7.89	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

CCV - Modified 03/05/2008
PDF File ID: 5517725
Report generated 10/09/2017 12:30



Login Number: L17091705
Instrument ID: HPMS8
Workgroup (AAB#): WG632680

ICAL CCV Number: WG629567-08
CAL ID: HPMS8-13-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG629567-08	NA	NA	362138	640126	767485
Upper Limit	NA	NA	724276	1280252	1534970
Lower Limit	NA	NA	181069	320063	383743
<u>L17091705-01</u>	1.00	01	251480	464130	547687
<u>L17091705-02</u>	1.00	01	256546	466839	544763
<u>WG632680-01</u>	1.00	01	252775	464581	545260
<u>WG632680-02</u>	1.00	01	256996	463559	548171

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)

00862987

Login Number: L17091705
Instrument ID: HPMS8
Workgroup (AAB#): WG632680

ICAL CCV Number: WG629567-08
CAL ID: HPMS8-13-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG629567-08	NA	NA	17.79	14.76	10.89
Upper Limit	NA	NA	18.29	15.26	11.39
Lower Limit	NA	NA	17.29	14.26	10.39
<u>L17091705-01</u>	1.00	01	17.74	14.72	10.85
<u>L17091705-02</u>	1.00	01	17.73	14.71	10.85
<u>WG632680-01</u>	1.00	01	17.74	14.72	10.85
<u>WG632680-02</u>	1.00	01	17.74	14.71	10.84

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

Underline = Response outside limits



2.2 General Chromatography Data

2.2.1 LC/MS Data (6850)

2.2.1.1 Summary Data

Lab Report #: L17091705

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 6850	Prep Date: 10/04/2017 13:00
Matrix: Water	Analytical Method: 6850	Cal Date: 09/08/2017 16:52
Workgroup #: WG632566	Analyst: JWR	Run Date: 10/04/2017 19:24
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: 1LM.LM40641
Sample Tag: 01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.667		0.400	0.200	0.100

2.2.1.2 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: 090817_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 WG628979 (waters)
 Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (09/08/2017)
 CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: NA

Comments: ICAL WG628977 : 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.LM40484	WG628977-01 CCB	1	1		09/08/17 14:40
2	1LM.LM40485	WG628977-02 STD (0.1 ug/L)	1	1	STD80232	09/08/17 14:59
3	1LM.LM40486	WG628977-03 STD (0.2 ug/L)	1	1	STD80232	09/08/17 15:18
4	1LM.LM40487	WG628977-04 STD (0.5 ug/L)	1	1	STD80232	09/08/17 15:37
5	1LM.LM40488	WG628977-05 STD (1.0 ug/L)	1	1	STD80232	09/08/17 15:56
6	1LM.LM40489	WG628977-06 STD (2.0 ug/L)	1	1	STD80232	09/08/17 16:15
7	1LM.LM40490	WG628977-07 STD (5.0 ug/L)	1	1	STD80232	09/08/17 16:34
8	1LM.LM40491	WG628977-08 STD (10 ug/L)	1	1	STD80232	09/08/17 16:52
9	1LM.LM40492	WG628977-09 SSCV (1.0 ug/L)	1	1	STD80234	09/08/17 17:11
10	1LM.LM40493	WG628984-01 CCB	1	1		09/08/17 17:30
11	1LM.LM40494	WG628984-02 CCV (1.0ug/L)	1	1	STD80232	09/08/17 17:49
12	1LM.LM40495	WG628979-05 MRL (0.2ug/L)	1	1	STD80232	09/08/17 18:08
13	1LM.LM40496	WG628979-01 MCT (0.2ug/L)	1	1	STD80234	09/08/17 18:27
14	1LM.LM40497	WG628979-02 BLANK	1	1		09/08/17 18:46
15	1LM.LM40498	WG628979-03 LCS (0.2ug/L)	1	1	STD80234	09/08/17 19:05
16	1LM.LM40499	WG628979-04 LCS2 (0.2ug/L)	1	1	STD80234	09/08/17 19:24
17	1LM.LM40500	L17081653-01	1	1		09/08/17 19:43
18	1LM.LM40501	L17081653-01 (10x) (NR)	1	10		09/08/17 20:02
19	1LM.LM40502	L17081653-01 (100x) (NR)	1	100		09/08/17 20:21
20	1LM.LM40503	L17090079-01	1	1		09/08/17 20:40
21	1LM.LM40504	L17090079-02	1	1		09/08/17 20:59
22	1LM.LM40505	L17090079-03	1	1		09/08/17 21:18
23	1LM.LM40506	WG628984-03 CCV (1.0ug/L)	1	1	STD80232	09/08/17 21:37
24	1LM.LM40507	WG628979-06 MRL (0.2ug/L)	1	1	STD80232	09/08/17 21:56
25	1LM.LM40508	WG628984-04 CCB	1	1		09/08/17 22:15

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Page: 1

Approved: 11-SEP-17

Eiv C. J. J.



Microbac Laboratories Inc.
Instrument Run Log

Instrument: LCMS1 Dataset: 100417_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 WG632566 (waters)
 Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (09/08/2017)
 CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: NA

Comments:

Samples L17091609-01 and L17091705-01 were analyzed neat and at multiple dilutions based on their range of historical results. Samples L17091647-01 and L17091706-01 were analyzed at dilutions only based on their historical results.
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Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	1LM.LM40625	WG632570-01 CCB	1	1		10/04/17 14:21
2	1LM.LM40626	WG632570-02 CCV (1.0ug/L)	1	1	STD80232	10/04/17 14:40
3	1LM.LM40627	WG632566-05 MRL (0.2ug/L)	1	1	STD80232	10/04/17 14:58
4	1LM.LM40628	WG632566-01 MCT (0.2ug/L)	1	1	STD80234	10/04/17 15:17
5	1LM.LM40629	WG632566-02 BLANK	1	1		10/04/17 15:36
6	1LM.LM40630	WG632566-03 LCS (0.2ug/L)	1	1	STD80234	10/04/17 15:55
7	1LM.LM40631	WG632566-04 LCS2 (0.2ug/L)	1	1	STD80234	10/04/17 16:14
8	1LM.LM40632	L17100003-01 LOQ (0.20ug/L)	1	1	STD80234	10/04/17 16:33
9	1LM.LM40633	L17100001-01 LOD (0.10ug/L)	1	1	STD80234	10/04/17 16:52
10	1LM.LM40634	L17091609-01	1	1		10/04/17 17:11
11	1LM.LM40635	L17091609-01 (10x) (NR)	1	10		10/04/17 17:30
12	1LM.LM40636	L17091609-01 (100x) (NR)	1	100		10/04/17 17:49
13	1LM.LM40637	L17091647-01 (10,000x)	1	10000		10/04/17 18:08
14	1LM.LM40638	WG632570-03 CCV (1.0ug/L)	1	1	STD80232	10/04/17 18:27
15	1LM.LM40639	WG632566-06 MRL (0.2ug/L)	1	1	STD80232	10/04/17 18:46
16	1LM.LM40640	WG632570-04 CCB	1	1		10/04/17 19:05
17	1LM.LM40641	L17091705-01	1	1		10/04/17 19:24
18	1LM.LM40642	L17091705-01 (10x) (NR)	1	10		10/04/17 19:42
19	1LM.LM40643	L17091705-01 (100x) (NR)	1	100		10/04/17 20:01
20	1LM.LM40644	L17091706-01 (10,000x)	1	10000		10/04/17 20:20
21	1LM.LM40645	WG632570-05 CCV (1.0ug/L)	1	1	STD80232	10/04/17 20:39
22	1LM.LM40646	WG632566-07 MRL (0.2ug/L)	1	1	STD80232	10/04/17 20:58
23	1LM.LM40647	WG632570-06 CCB	1	1		10/04/17 21:17

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Page: 1

Approved: 05-OCT-17




Microbac Laboratories Inc.

Data Checklist

Date: 08-SEP-2017
 Analyst: JWR
 Analyst: NA
 Method: 6850
 Instrument: LCMS1
 Curve Workgroup: WG628977
 Runlog ID: 84489
 Analytical Workgroups: L17081653, L17090079

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	NA
Recoveries	NA
%RPD	NA
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	ECL

Primary Reviewer:
11-SEP-2017



Secondary Reviewer:
11-SEP-2017




Microbac Laboratories Inc.

Data Checklist

Date: 04-OCT-2017
 Analyst: JWR
 Analyst: NA
 Method: 6850
 Instrument: LCMS1
 Curve Workgroup: NA
 Runlog ID: 85061
 Analytical Workgroups: L17091609, L17091647, L17091705, 091706 L17100001, 100003

ANALYTICAL	
System Performance Check	X
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	NA
Recoveries	NA
%RPD	NA
Interference check sample (ICS) (LCMS)	MCT
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	X
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	TRRP
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:
05-OCT-2017



Secondary Reviewer:
05-OCT-2017




Analytical Method:6850
Login Number:L17091705

AAB#:WG632566

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-SP650-6474-GRAB	01	09/28/17					10/04/2017	5.9	28		10/04/17	.3	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091705
 Blank File ID: 1LM.LM40629
 Prep Date: 10/04/17 13:00
 Analyzed Date: 10/04/17 15:36
 Analyst: JWR

Work Group: WG632566
 Blank Sample ID: WG632566-02
 Instrument ID: LCMS1
 Method: 6850

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
QCMRL	WG632566-05	1LM.LM40627	10/04/17 14:58	01
MCT	WG632566-01	1LM.LM40628	10/04/17 15:17	01
LCS	WG632566-03	1LM.LM40630	10/04/17 15:55	01
LCS2	WG632566-04	1LM.LM40631	10/04/17 16:14	01
QCMRL	WG632566-06	1LM.LM40639	10/04/17 18:46	01
LH18/24-SP650-6474-GRAB	L17091705-01	1LM.LM40641	10/04/17 19:24	01
QCMRL	WG632566-07	1LM.LM40646	10/04/17 20:58	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5512538
 Report generated 10/09/2017 08:37



Login Number: L17091705 Prep Date: 10/04/17 13:00 Sample ID: WG632566-02
 Instrument ID: LCMS1 Run Date: 10/04/17 15:36 Prep Method: 6850
 File ID: 1LM.LM40629 Analyst: JWR Method: 6850
 Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: LCMS1-08-SEP-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: 5512539
 09-OCT-2017 08:37



Login Number: L17091705 Analyst: JWR Prep Method: 6850
 Instrument ID: LCMS1 Matrix: Water Method: 6850
 Workgroup (AAB#): WG632566 Units: ug/L
 QC Key: DOD4 Lot #: STD80234
 Sample ID: WG632566-03 LCS File ID: 1LM.LM40630 Run Date: 10/04/2017 15:55
 Sample ID: WG632566-04 LCS2 File ID: 1LM.LM40631 Run Date: 10/04/2017 16:14

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Perchlorate	0.200	0.193	96.5	0.200	0.197	98.5	2.05	80 - 120	15	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5512540
 Report generated: 10/09/2017 08:37



Login Number: L17091705
Analytical Method: 6850
ICAL Workgroup: WG628977

Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
Perchlorate	1.469	6.88	1.00000	

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

INT_CAL - Modified 03/06/2008
PDF File ID: 5515817
Report generated 10/09/2017 08:37



Login Number: L17091705
 Analytical Method: 6850

Instrument ID: LCMS1
 Initial Calibration Date: 08-SEP-17 16:52
 Column ID: F

Analyte	WG628977-02			WG628977-03			WG628977-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	0.100	52500.0000	1.681	0.200	93400.0000	1.487	0.500	233000.000	1.445

INT_CAL - Modified 03/06/2008
 PDF File ID: 5515817
 Report generated 10/09/2017 08:37



Login Number: L17091705
 Analytical Method: 6850

Instrument ID: LCMS1
 Initial Calibration Date: 08-SEP-17 16:52
 Column ID: F

Analyte	WG628977-05			WG628977-06			WG628977-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	1.00	460000.000	1.440	2.00	925000.000	1.444	5.00	2230000.00	1.418

INT_CAL - Modified 03/06/2008
 PDF File ID: 5515817
 Report generated 10/09/2017 08:37



Login Number: L17091705
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	WG628977-08		
	CONC	RESP	RF
Perchlorate	10.0	4190000.00	1.371

INT_CAL - Modified 03/06/2008
PDF File ID: 5515817
Report generated 10/09/2017 08:37



Login Number: L17091705 Run Date: 09/08/2017 Sample ID: WG628977-09
 Instrument ID: LCMS1 Run Time: 17:11 Method: 6850
 File ID: 1LM.LM40492 Analyst: JWR QC Key: DOD4
 ICal Workgroup: WG628977 Cal ID: LCMS1 - 08-SEP-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
Perchlorate	1.00	1.04	ug/L	1.48	4.00	15	

* Exceeds %D Limit



Login Number: L17091705 Run Date: 10/04/2017 Sample ID: WG632570-01
Instrument ID: LCMS1 Run Time: 14:21 Method: 6850
File ID: LLM.LM40625 Analyst: JWR Units: ug/L
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-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: 5512543
Report generated 10/09/2017 08:38



Login Number: L17091705 Run Date: 10/04/2017 Sample ID: WG632570-04
Instrument ID: LCMS1 Run Time: 19:05 Method: 6850
File ID: LLM.LM40640 Analyst: JWR Units: ug/L
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-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: 5512543
Report generated 10/09/2017 08:38



Login Number: L17091705 Run Date: 10/04/2017 Sample ID: WG632570-06
Instrument ID: LCMS1 Run Time: 21:17 Method: 6850
File ID: LLM.LM40647 Analyst: JWR Units: ug/L
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-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: 5512543
Report generated 10/09/2017 08:38



Login Number: L17091705 Run Date: 10/04/2017 Sample ID: WG632570-02
Instrument ID: LCMS1 Run Time: 14:40 Method: 6850
File ID: 1LM.LM40626 Analyst: JWR QC Key: DOD4
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-17
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.12	ug/L	1.58	12.0	15	

* Exceeds %D Criteria



Login Number: L17091705 Run Date: 10/04/2017 Sample ID: WG632570-03
Instrument ID: LCMS1 Run Time: 18:27 Method: 6850
File ID: 1LM.LM40638 Analyst: JWR QC Key: DOD4
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-17
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.05	ug/L	1.48	5.00	15	

* Exceeds %D Criteria



Login Number: L17091705 Run Date: 10/04/2017 Sample ID: WG632570-05
Instrument ID: LCMS1 Run Time: 20:39 Method: 6850
File ID: 1LM.LM40645 Analyst: JWR QC Key: DOD4
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-17
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.07	ug/L	1.52	7.00	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008
PDF File ID: 5512542
Report generated 10/09/2017 08:37



Login Number: L17091705 Run Date: 10/04/2017 Sample ID: WG632566-05
Instrument ID: LCMS1 Run Time: 14:58 Prep Method: 6850
File ID: 1LM.LM40627 Analyst: JWR Method: 6850
Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
Contract #: _____ Cal ID: LCMS1-08-SEP-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.200	100	70 - 130	



Login Number: L17091705 Run Date: 10/04/2017 Sample ID: WG632566-06
Instrument ID: LCMS1 Run Time: 18:46 Prep Method: 6850
File ID: 1LM.LM40639 Analyst: JWR Method: 6850
Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
Contract #: _____ Cal ID: LCMS1-08-SEP-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.204	102	70 - 130	



Login Number: L17091705 Run Date: 10/04/2017 Sample ID: WG632566-07
Instrument ID: LCMS1 Run Time: 20:58 Prep Method: 6850
File ID: 1LM.LM40646 Analyst: JWR Method: 6850
Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
Contract #: _____ Cal ID: LCMS1-08-SEP-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.197	98.5	70 - 130	



Login Number: L17091705
Instrument ID: LCMS1
Workgroup (AAB#): WG632566

ICAL CCV Number: WG628977-05
CAL ID: LCMS1-08-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG628977	NA	NA	1580000
Upper Limit	NA	NA	2370000
Lower Limit	NA	NA	790000
<u>L17091705-01</u>	1.00	01	1560000
WG632566-02	1.00	01	1650000
WG632566-03	1.00	01	1670000
WG632566-04	1.00	01	1700000

IS-1 - 018LP

Underline = Response outside limits



Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: 6850	Samplenum: L17091705-01
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40641
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 19:24	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	298000	102000	2.92	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG628977-02
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40485
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 14:59	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	52500	17500	3.00	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: _____
Prep Date: _____
Anal Method: 6850
Analysis Date: 09/08/2017 15:18

Samplenum: WG628977-03
File ID: 1LM.LM40486
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	93400	29500	3.17	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG628977-04
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40487
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 15:37	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	233000	79100	2.95	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG628977-05
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40488
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 15:56	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	460000	150000	3.07	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method:
Prep Date:
Anal Method: 6850
Analysis Date: 09/08/2017 16:15

Samplenum: WG628977-06
File ID: 1LM.LM40489
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	925000	303000	3.05	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG628977-07
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40490
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 16:34	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	2230000	745000	2.99	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG628977-08
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40491
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 16:52	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	4190000	1390000	3.01	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG628977-09
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40492
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 17:11	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	478000	152000	3.14	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: 6850	Samplenum: WG632566-01
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40628
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 15:17	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	102000	34000	3.00	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: 6850	Samplenum: WG632566-02
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40629
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 15:36	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	2230	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: 6850	Samplenum: WG632566-03
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40630
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 15:55	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	100000	34100	2.93	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: 6850
Prep Date: 10/04/2017 13:00
Anal Method: 6850
Analysis Date: 10/04/2017 16:14

Samplenum: WG632566-04
File ID: 1LM.LM40631
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	103000	32500	3.17	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: 6850	Samplenum: WG632566-05
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40627
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 14:58	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	98100	32300	3.04	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: 6850	Samplenum: WG632566-06
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40639
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 18:46	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	116000	37600	3.09	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: 6850
Prep Date: 10/04/2017 13:00
Anal Method: 6850
Analysis Date: 10/04/2017 20:58

Samplenum: WG632566-07
File ID: 1LM.LM40646
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	116000	40300	2.88	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG632570-01
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40625
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 14:21	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	1420	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG632570-02
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40626
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 14:40	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	490000	156000	3.14	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG632570-03
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40638
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 18:27	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	547000	183000	2.99	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG632570-04
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40640
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 19:05	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	1690	1440	1.17	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG632570-05
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40645
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 20:39	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	579000	190000	3.05	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091705	Prep Method: _____	Samplenum: WG632570-06
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40647
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 21:17	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	2310	1310	1.76	2.3	3.8	*

2.2 Semivolatiles Data

2.2.2 GC/MS Semivolatiles Data (827 Dioxane)

2.2.2.1 Summary Data

Lab Report #: L17091705

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: HPMS15
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 3520C	Prep Date: 10/02/2017 18:00
Matrix: Water	Analytical Method: 8270D	Cal Date: 09/18/2017 12:55
Workgroup #: WG632529	Analyst: LJH	Run Date: 10/09/2017 14:28
Collect Date: 09/28/2017 15:00	Dilution: 5	File ID: 15M23019
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,4-Dioxane	123-91-1	25.4		10.2	5.10	2.55
Surrogate	Recovery	Lower Limit	Upper Limit	Q		
1,4-Dioxane-d8	70.3	20	129			

2.2.2.2 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: WG632088 TIME ON: 18:30 OFF: 12:30 ON: _____ OFF: _____
 Analyst: JDH methylene chloride Lot #: COA20050
 Spike Analyst: JDH 1:1 H2SO4 Lot #: RGT40991
 Method: 3520C Sodium Sulfate , Anhydrous , Granul Lot # COA19381
 Run Date: 10/02/2017 18:00
 SOP: EXB01 Revision 20
 Spike Witness: JLD
 Surr Solution: STD83262

	SAMPLE #	Type	Reference	Prod	pH	Init Amnt	Surr Amnt	Spike Amnt	Spike Sol	Final Vol	Color
1	L17091647-01	SAMP		827-DIOXANE	<2	980 mL	.05 mL			1 mL	Transparent
2	L17091648-01	SAMP		827-DIOXANE	<2	1000 mL	.05 mL			1 mL	Transparent
3	L17091705-01	SAMP		827-DIOXANE	<2	980 mL	.05 mL			1 mL	Transparent
4	L17100001-01	ML01		827-DIOXANE	<2	1000 mL	.05 mL	.005 mL	STD77209	1 mL	Transparent
5	L17100003-01	ML01		827-DIOXANE	<2	1000 mL	.05 mL	.01 mL	STD77209	1 mL	Transparent
6	WG632088-01	BLANK		827-DIOXANE	<2	1000 mL	.05 mL			1 mL	Transparent
7	WG632088-02	LCS		827-DIOXANE	<2	1000 mL	.05 mL	.05 mL	STD77209	1 mL	Transparent
8	WG632088-03	LCS2		827-DIOXANE	<2	1000 mL	.05 mL	.05 mL	STD77209	1 mL	Transparent

Due to insufficient sample volume, this preparation batch failed to include the method prescribed MS and MSD.

Analyst: Justin Hussen

Reviewer: Julia DeLong



Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 091817
 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
WG632192, WG630010, WG630071 (ICAL)
 Internal STD: STD83628 Surrogate STD: NA Calibration STD: _____
 CCV STD: STD83050 LCS STD: _____ MS/MSD STD: _____

Comments: WG629653 MS/MSD failed the %REC limit.
 L17090697-04 to 07 reporting sample re-extracts only. Not reporting this analysis.

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	15M22363	WG630071-01 5PPM DFTPP STD	1	1	STD83235	09/18/17 10:27
2	15M22364	WG630071-01 5PPM DFTPP STD	1	1	STD83235	09/18/17 10:44
3	15M22365	WG630071-02 5PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 11:01
4	15M22366	WG630071-03 10PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 11:24
5	15M22367	WG630071-04 7.5PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 11:47
6	15M22368	WG630071-05 2.5PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 12:10
7	15M22369	WG630071-06 1PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 12:32
8	15M22370	WG630071-07 0.4PPM 1,4-DIOX STD	1	1	STD83050	09/18/17 12:55
9	15M22371	WG630071-08 5PPM 1,4-DIOX ALT SRC	1	1	STD83128	09/18/17 13:49
10	15M22372	WG629653-01 BLANK 9/14	7	1	SOIL	09/18/17 14:12
11	15M22373	WG629653-02 LCS 9/14	7	1	SOIL	09/18/17 14:35
12	15M22374	WG629658-01 BLANK 9/14	1	1		09/18/17 14:57
13	15M22375	WG629658-02 LCS 9/15	1	1		09/18/17 15:20
14	15M22376	WG629658-03 LCS2 9/16	1	1		09/18/17 15:43
15	15M22377	L17090697-09 827-DIOXANE	7	1	SOIL	09/18/17 16:05
16	15M22378	L17090697-10 827-DIOXANE	1	1		09/18/17 16:28
17	15M22379	L17090697-08 827-DIOXANE	7	1	SOIL	09/18/17 16:51
18	15M22380	L17090697-04 827-DIOXANE	7	1	SOIL	09/18/17 17:14
19	15M22381	L17090697-01 827-DIOXANE	7	1	SOIL	09/18/17 17:36
20	15M22382	L17090697-03 827-DIOXANE	7	1	SOIL	09/18/17 17:59
21	15M22383	L17090697-11 827-DIOXANE	1	1		09/18/17 18:22
22	15M22384	L17090697-02 827-DIOXANE	7	1	SOIL	09/18/17 18:45
34	15M22385	L17090697-06 MS 827-DIOXANE	7	1	SOIL	09/18/17 19:08
35	15M22386	L17090697-07 MSD 827-DIOXANE	7	1	SOIL	09/18/17 19:30
33	15M22387	L17090697-05 REF 827-DIOXANE	7	1		09/18/17 19:53
26	15M22388	L17090697-10 2X 827-DIOXANE	1	2		09/18/17 20:16
27	15M22389	L17090697-11 10X 827-DIOXANE	1	10		09/18/17 20:38
28	15M22390	BAKE OUT	1	1		09/18/17 21:01
29	15M22391	BAKE OUT	1	1		09/18/17 21:24
30	15M22392	BAKE OUT	1	1		09/18/17 21:46

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Page: 1

Approved: 19-SEP-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 091817
 Analyst1: LJH Analyst2: NA
 Method: 8270C/D SOP: MSS01 Rev: 28

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

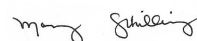
Workgroups: Column 1 ID: RXI-5MS Column 2 ID: NA
WG632192, WG630010, WG630071 (ICAL)
 Internal STD: STD83628 Surrogate STD: NA
 CCV STD: STD83050 LCS STD: _____

Comments

Seq.	Rerun	Dil.	Reason	Analytes
1				
			WG630071-01 5PPM DFTPP STD Ion failure, RR, NR.	
21	X	10	Over Calibration Range	1,4-DIOXANE
			L17090697-11 827-DIOXANE	
26				
			L17090697-10 2X 827-DIOXANE NR, unnecessary dilution.	

Page: 2

Approved: 19-SEP-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: HPMS15 Dataset: 100917
 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
WG632529

Internal STD: STD83628 Surrogate STD: NA Calibration STD: _____

CCV STD: STD83583 LCS STD: _____ MS/MSD STD: _____

Comments: Dilutions were made based on sample histories.

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	15M23005	BAKE OUT	1	1		10/09/17 08:42
2	15M23006	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 09:01
3	15M23007	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 09:17
4	15M23008	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 10:11
5	15M23009	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 10:34
6	15M23010	WG633073-01 5PPM DFTPP STD	1	1	STD83235	10/09/17 10:57
7	15M23011	WG633073-02 5PPM DIOXANE STD	1	1	STD83050	10/09/17 11:25
8	15M23012	WG632088-01 BLANK 827-DIOXANE	1	1		10/09/17 11:47
9	15M23013	WG632088-02 LCS 827-DIOXANE	1	1		10/09/17 12:10
10	15M23014	WG632088-03 LCS2 827-DIOXANE	1	1		10/09/17 12:33
11	15M23015	L17100001-01 827-DIOXANE	1	1		10/09/17 12:56
12	15M23016	L17100003-01 827-DIOXANE	1	1		10/09/17 13:19
13	15M23017	L17091647-01 5X 827-DIOXANE	1	5		10/09/17 13:42
14	15M23018	L17091648-01 5X 827-DIOXANE	1	5		10/09/17 14:05
15	15M23019	L17091705-01 5X 827-DIOXANE	1	5		10/09/17 14:28

Comments

Seq.	Rerun	Dil.	Reason	Analytes
2				
			WG633073-01 5PPM DFTPP STD Ion failure and Benzidine was greater than 2, RR, NR.	
3				
			WG633073-01 5PPM DFTPP STD Ion failure, change liner, RR, NR.	
4				
			WG633073-01 5PPM DFTPP STD Ion failure, changed the gold seal, RR, NR.	
5				
			WG633073-01 5PPM DFTPP STD Ion failure, quicktune, RR, NR.	
13			Surrogate standard failure	1
			L17091647-01 5X 827-DIOXANE surrogate failure is due to sample matrix interference. Previous sample history confirms that surrogates were affected by SMI.	

Page: 1

Approved: 09-OCT-17

Mary Schilling



Microbac Laboratories Inc.

Data Checklist

Date: 18-SEP-2017
 Analyst: LJH
 Analyst: NA
 Method: 827-DIOX
 Instrument: HPMS15
 Curve Workgroup: WG630071
 Runlog ID: 84667
 Analytical Workgroups: L17090697

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	NA
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	X
Recoveries	X
%RPD	X
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	NA
Manual integrations	X
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	MES

Primary Reviewer:
19-SEP-2017

Lacey J. Bendoric

Secondary Reviewer:
19-SEP-2017

Mary Schilling



Microbac Laboratories Inc.

Data Checklist

Date: 09-OCT-2017
 Analyst: LJH
 Analyst: NA
 Method: 827-DIOX
 Instrument: HPMS15
 Curve Workgroup: NA
 Runlog ID: 85130
 Analytical Workgroups: L17091647, -1648, -1705, L17100001, -0003

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	X
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	MES

Primary Reviewer:
09-OCT-2017

Randy J. Bendoric

Secondary Reviewer:
09-OCT-2017

Mary Schilling

CHECKLIST1 - Modified 03/05/2008

Generated: OCT-09-2017 15:29:58



Analytical Method:8270D
 Login Number:L17091705

AAB#:WG632529

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-SP650-6474-GRAB	01	09/28/17					10/02/2017	4.1	7		10/09/17	6.9	40	

* = SEE PROJECT QAPP REQUIREMENTS



Login Number: L17091705
 Instrument Id: HPMS15
 Workgroup (AAB#): WG632529

Method: 827-DIOXANE
 CAL ID: HPMS15-18-SEP-17
 Matrix: Water

Sample Number	Dilution	Tag	1
L17091705-01	5.00	DL01	70.3
WG632088-01	1.00	01	67.1
WG632088-02	1.00	01	78.7
WG632088-03	1.00	01	57.5

Surrogates	Surrogate Limits
1 - 1,4-Dioxane-d8	20 - 129

Underline = Result out of surrogate limits

DL = surrogate diluted out

ND = surrogate not detected



METHOD BLANK SUMMARY

Login Number: L17091705 Work Group: WG632529
Blank File ID: 15M23012 Blank Sample ID: WG632088-01
Prep Date: 10/02/17 18:00 Instrument ID: HPMS15
Analyzed Date: 10/09/17 11:47 Method: 8270D
Analyst: LJH

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632088-02	15M23013	10/09/17 12:10	01
LCS2	WG632088-03	15M23014	10/09/17 12:33	01
LH18/24-SP650-6474-GRAB	L17091705-01	15M23019	10/09/17 14:28	DL01

Report Name: BLANK_SUMMARY
PDF File ID: 5518229
Report generated 10/10/2017 08:31



Login Number: L17091705 Prep Date: 10/02/17 18:00 Sample ID: WG632088-01
 Instrument ID: HPMS15 Run Date: 10/09/17 11:47 Prep Method: 3520C
 File ID: 15M23012 Analyst: LJH Method: 8270D
 Workgroup (AAB#): WG632529 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: HPMS15-18-SEP-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	67.1	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: 5518230
 10-OCT-2017 08:31



Login Number: L17091705 Analyst: LJH Prep Method: 3520C
 Instrument ID: HPMS15 Matrix: Water Method: 8270D
 Workgroup (AAB#): WG632529 Units: ug/L
 QC Key: DOD4 Lot #: STD77209
 Sample ID: WG632088-02 LCS File ID: 15M23013 Run Date: 10/09/2017 12:10
 Sample ID: WG632088-03 LCS2 File ID: 15M23014 Run Date: 10/09/2017 12:33

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
1,4-Dioxane	5.00	2.98	59.6	5.00	2.56	51.2	15.1	30 - 104	30	

Surogates	LCS	LCS2	Surrogate Limits	Qualifier
	% Recovery	% Recovery		
1,4-Dioxane-d8	78.7	57.5	20 - 129	PASS

* EXCEEDS %REC LIMIT
EXCEEDS RPD LIMIT



DFTPP

Login Number: L17091705 Tune ID: WG630071-01
 Instrument: HPMS15 Run Date: 09/18/2017
 Analyst: SCB Run Time: 10:44
 Workgroup: WG630071 File ID: 15M22364
 Cal ID: HPMS15-18-SEP-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51.0	198	30.0	60.0	40.0	20820	PASS
68.0	69.0	0	2.00	0	0	PASS
69.0	198	0	100	43.4	22574	PASS
70.0	69.0	0	2.00	1.19	268	PASS
127	198	40.0	60.0	54.0	28131	PASS
197	198	0	1.00	0.803	418	PASS
198	198	100	100	100	52048	PASS
199	198	5.00	9.00	6.99	3637	PASS
275	198	10.0	30.0	26.2	13618	PASS
365	198	1.00	100	3.04	1581	PASS
441	443	0.0100	100	76.4	6552	PASS
442	198	40.0	100	83.0	43203	PASS
443	442	17.0	23.0	19.8	8575	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG630071-02	STD-CCV	01	09/18/2017 11:01	
WG630071-03	STD	01	09/18/2017 11:24	
WG630071-04	STD	01	09/18/2017 11:47	
WG630071-05	STD	01	09/18/2017 12:10	
WG630071-06	STD	01	09/18/2017 12:32	
WG630071-07	STD	01	09/18/2017 12:55	
WG630071-08	SSCV	01	09/18/2017 13:49	

* Sample past 12 hour tune limit



DFTPP

Login Number: L17091705 Tune ID: WG633073-01
 Instrument: HPMS15 Run Date: 10/09/2017
 Analyst: LJH Run Time: 10:57
 Workgroup: WG633073 File ID: 15M23010
 Cal ID: HPMS15-18-SEP-17

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51.0	198	30.0	60.0	50.4	32171	PASS
68.0	69.0	0	2.00	1.99	651	PASS
69.0	198	0	100	51.1	32675	PASS
70.0	69.0	0	2.00	0	0	PASS
127	198	40.0	60.0	57.3	36613	PASS
197	198	0	1.00	0.213	136	PASS
198	198	100	100	100	63891	PASS
199	198	5.00	9.00	6.30	4026	PASS
275	198	10.0	30.0	24.7	15772	PASS
365	198	1.00	100	3.28	2096	PASS
441	443	0.0100	100	67.5	5277	PASS
442	198	40.0	100	65.6	41931	PASS
443	442	17.0	23.0	18.7	7822	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG633073-02	CCV	01	10/09/2017 11:25	
WG632088-01	BLANK	01	10/09/2017 11:47	
WG632088-02	LCS	01	10/09/2017 12:10	
WG632088-03	LCS2	01	10/09/2017 12:33	
L17091705-01	LH18/24-SP650-6474-GRAB	DL01	10/09/2017 14:28	

* Sample past 12 hour tune limit



Login Number: L17091705
Analytical Method: 8270D
ICAL Workgroup: WG630071

Instrument ID: HPMS15
Initial Calibration Date: 18-SEP-17 12:55
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
1,4-Dioxane	0.3902	11.6		

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

INT_CAL - Modified 03/06/2008
PDF File ID: 5518232
Report generated 10/10/2017 08:31



Login Number: L17091705
Analytical Method: 8270D

Instrument ID: HPMS15
Initial Calibration Date: 18-SEP-17 12:55
Column ID: F

Analyte	WG630071-02			WG630071-03			WG630071-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
1,4-Dioxane	5.00	64441.0000	0.3384	10.0	127608.000	0.3767	7.50	112923.000	0.3838

INT_CAL - Modified 03/06/2008
PDF File ID: 5518232
Report generated 10/10/2017 08:31



Login Number: L17091705
Analytical Method: 8270D

Instrument ID: HPMS15
Initial Calibration Date: 18-SEP-17 12:55
Column ID: F

Analyte	WG630071-05			WG630071-06			WG630071-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
1,4-Dioxane	2.50	29846.0000	0.3551	1.00	15338.0000	0.4313	0.400	5774.00000	0.4559

INT_CAL - Modified 03/06/2008
PDF File ID: 5518232
Report generated 10/10/2017 08:31



Method Path : C:\msdchem\1\methods\

Method File : DIOXANE_D8.M

Title : OVD MSS01 SIM 1,4-dioxane ICAL 091817

Last Update : Mon Sep 18 13:46:16 2017

Response Via : Initial Calibration

Curve: WG630071

Calibration Files

10 =15M22366.D 7.5 =15M22367.D 5 =15M22365.D 2.5 =15M22368.D 1 =15M22369.D
 0.4 =15M22370.D

Compound	10	7.5	5	2.5	1	0.4	Avg	%RSD
1) I 1,4-Dichlorobenzen...	-----ISTD-----							
2) 1,4-Dioxane	0.377	0.384	0.338	0.355	0.431	0.456	0.390	11.56
3) S 1,4-Dioxane-d8	0.473	0.481	0.423	0.443	0.530	0.520	0.478	8.78
4) S Nitrobenzene-d5	1.284	1.302	1.137	1.156	1.294	1.212	1.231	5.94
5) S 2-Fluorobiphenyl	2.573	2.615	2.339	2.482	2.903	2.842	2.626	8.16
6) S p-Terphenyl-d14	2.976	3.033	2.696	2.830	3.316	3.211	3.010	7.68

(#) = Out of Range

DIOXANE_D8.M Tue Sep 19 08:28:34 2017

Login Number: L17091705 Run Date: 09/18/2017 Sample ID: WG630071-08
 Instrument ID: HPMS15 Run Time: 13:49 Method: 8270D
 File ID: 15M22371 Analyst: SCB QC Key: DOD4
 ICal Workgroup: WG630071 Cal ID: HPMS15 - 18-SEP-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
1,4-Dioxane	5000	5000	ug/L	0.390	0	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds



Login Number: L17091705 Run Date: 10/09/2017 Sample ID: WG633073-02
 Instrument ID: HPMS15 Run Time: 11:25 Method: 8270D
 File ID: 15M23011 Analyst: LJH QC Key: DOD4
 Workgroup (AAB#): WG632529 Cal ID: HPMS15 - 18-SEP-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
1,4-Dioxane	5000	5080	ug/L	0.396	1.52	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds
 SPCC System Performance Check Compounds

CCV - Modified 03/05/2008
 PDF File ID: 5518235
 Report generated 10/10/2017 08:31



Login Number: L17091705
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

CCV Number: WG633073-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG633073-02	NA	NA	44189
Upper Limit	NA	NA	88378
Lower Limit	NA	NA	22095
<u>L17091705-01</u>	5.00	DL01	45276
WG632088-01	1.00	01	36033
WG632088-02	1.00	01	42281
WG632088-03	1.00	01	33892

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



Login Number: L17091705
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

ICAL CCV Number: WG630071-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG630071-02	NA	NA	37725
Upper Limit	NA	NA	75450
Lower Limit	NA	NA	18863
<u>L17091705-01</u>	5.00	DL01	45276
WG632088-01	1.00	01	36033
WG632088-02	1.00	01	42281
WG632088-03	1.00	01	33892

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



Login Number: L17091705
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

CCV Number: WG633073-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG633073-02	NA	NA	7.1
Upper Limit	NA	NA	7.6
Lower Limit	NA	NA	6.6
<u>L17091705-01</u>	5.00	DL01	7.095
WG632088-01	1.00	01	7.095
WG632088-02	1.00	01	7.095
WG632088-03	1.00	01	7.095

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits



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

00863068

Login Number: L17091705
Instrument ID: HPMS15
Workgroup (AAB#): WG632529

ICAL CCV Number: WG630071-02
CAL ID: HPMS15-18-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG630071-02	NA	NA	7.12
Upper Limit	NA	NA	7.62
Lower Limit	NA	NA	6.62
<u>L17091705-01</u>	5.00	DL01	7.095
WG632088-01	1.00	01	7.095
WG632088-02	1.00	01	7.095
WG632088-03	1.00	01	7.095

IS-1 - 1,4-Dichlorobenzene-d4

Underline = Response outside limits

INTERNAL_STD_RT_ICAL - Modified 03/06/2008
PDF File ID: 5518814
Report generated: 10/10/2017 08:31



2.3 Metals Data

2.3.1 Metals I C P Data

2.3.1.1 Summary Data

Lab Report #: L17091705

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: ICP-THERMO3
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 06:40
Matrix: Water	Analytical Method: 6010C	Cal Date: 10/10/2017 12:23
Workgroup #: WG632186	Analyst: JYH	Run Date: 10/10/2017 13:23
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: T3.101017.132308
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Selenium, Total	7782-49-2	0.0100	U	0.0200	0.0100	0.00500
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: WG632044
 Analyst: ERP
 Spike Analyst: ERP
 Run Date: 10/02/2017 06:40
 Method: 3015A
 Balance: BAL019
 Instrument: MW-1
 Instrument Start: 10/02/2017 07:09

SOP: ME407 Revision 19
 Spike Solution: STD83991
 Spike Witness: VC
 HNO3 Lot #: COA19940
 HCL Lot #: COA20006
 40 & 50 ML. DIGESTION TUCOA19932
 ICP FILTERS LOT#r7ha2443RGT40684

SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG632044-02	BLANK	1	40 mL	50 mL	204.418 g	204.408 g	
2	WG632044-03	LCS	1	40 mL	50 mL	212.505 g	212.498 g	5 mL
3	L17091458-02	SAMP	1	40 mL	50 mL	204.378 g	204.37 g	10/06/17
4	L17091458-04	SAMP	1	40 mL	50 mL	205.84 g	205.821 g	10/06/17
5	L17091532-02	SAMP	1	1 mL	50 mL	202.956 g	202.932 g	10/06/17
6	L17091532-04	SAMP	1	1 mL	50 mL	204.309 g	204.295 g	10/06/17
7	L17091532-06	SAMP	1	1 mL	50 mL	207.01 g	206.98 g	10/06/17
8	L17091645-02	SAMP	1	40 mL	50 mL	205.084 g	205.069 g	10/09/17
9	L17091645-04	SAMP	1	40 mL	50 mL	206.635 g	206.628 g	10/09/17
10	L17091645-06	SAMP	1	40 mL	50 mL	204.463 g	204.449 g	10/09/17
11	L17091691-01	SAMP	1	40 mL	50 mL	205.321 g	205.307 g	10/06/17
12	L17091691-02	SAMP	1	40 mL	50 mL	205.295 g	205.283 g	10/06/17
13	L17091705-01	SAMP	1	40 mL	50 mL	206.56 g	206.546 g	10/10/17
14	L17091706-01	SAMP	1	40 mL	50 mL	203.231 g	203.218 g	10/10/17
15	L17091719-02	SAMP	1	40 mL	50 mL	206.011 g	205.983 g	10/10/17
16	L17091719-04	SAMP	1	40 mL	50 mL	202.673 g	202.641 g	10/10/17
17	L17091719-06	SAMP	1	40 mL	50 mL	205.81 g	205.793 g	10/10/17
18	L17091741-01	SAMP	1	40 mL	50 mL	204.296 g	204.276 g	10/04/17
19	L17091741-02	SAMP	1	40 mL	50 mL	204.663 g	204.647 g	10/04/17
20	WG632044-01	REF	1	40 mL	50 mL	205.91 g	205.869 g	
21	L17091741-03	SAMP	1	40 mL	50 mL	205.91 g	205.869 g	10/04/17
22	L17091768-01	SAMP	1	40 mL	50 mL	208.465 g	208.442 g	10/06/17
23	L17091768-03	SAMP	1	40 mL	50 mL	209.442 g	209.427 g	10/06/17
24	WG632044-04	MS	1	40 mL	50 mL	211.027 g	211.007 g	5 mL
25	WG632044-05	MSD	1	40 mL	50 mL	210.873 g	210.849 g	5 mL

L17091532-04	Filtered digestate
L17091691-02	FILTERED DIGESTATE

Analyst: Evan Potten

Reviewer: Vicki Collier



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO3 Dataset: 101017T3.3R.TXT
 Analyst1: JYH Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 8

Maintenance Log ID: _____

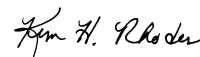
Calibration Std: STD84303 ICV Std: STD84302 Post Spike: STD80131
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD84304 LLCCV: _____ Tuning Sol: _____
 Stannous: _____ Hydroxylamine: _____

Workgroups: 632186,633277,632298,633392

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	T3.101017.120638	WG633389-01	Calibration Point		1		10/10/17 12:06
2	T3.101017.121051	WG633389-02	Calibration Point		1		10/10/17 12:10
3	T3.101017.121503	WG633389-03	Calibration Point		1		10/10/17 12:15
4	T3.101017.121915	WG633389-04	Calibration Point		1		10/10/17 12:19
5	T3.101017.122306	WG633389-05	Calibration Point		1		10/10/17 12:23
6	T3.101017.122646	WG633389-06	Initial Calibration Verification		1		10/10/17 12:26
7	T3.101017.123038	WG633389-07	Initial Calib Blank		1		10/10/17 12:30
8	T3.101017.123450	WG633389-08	LLICV		1		10/10/17 12:34
9	T3.101017.124246	WG633389-09	Low Level Initial Calibration V		1		10/10/17 12:42
10	T3.101017.124655	WG633389-10	Interference Check		1		10/10/17 12:46
11	T3.101017.125103	WG633389-11	Interference Check		1		10/10/17 12:51
12	T3.101017.125500	WG633389-12	CCV		1		10/10/17 12:55
13	T3.101017.125851	WG633389-13	CCB		1		10/10/17 12:58
14	T3.101017.130304	WG632044-02	Method/Prep Blank	40/50	1		10/10/17 13:03
15	T3.101017.130716	WG632044-03	Laboratory Control S	40/50	1		10/10/17 13:07
16	T3.101017.131111	WG632044-01	Reference Sample		1	L17091741-03	10/10/17 13:11
17	T3.101017.131519	WG632044-04	Matrix Spike	40/50	1	L17091741-03	10/10/17 13:15
18	T3.101017.131913	WG632044-05	Matrix Spike Duplica	40/50	1	L17091741-03	10/10/17 13:19
19	T3.101017.132308	L17091705-01	LH18/24-SP650-6474-GRAB	40/50	1		10/10/17 13:23
20	T3.101017.132725	L17091706-01	LH18/24-SP140-7474-GRAB	40/50	1		10/10/17 13:27
21	T3.101017.133133	WG632186-05	Post Digestion Spike		1	L17091706-01	10/10/17 13:31
22	T3.101017.133516	WG632186-06	Serial Dilution		5	L17091706-01	10/10/17 13:35
23	T3.101017.133925	WG633389-14	CCV		1		10/10/17 13:39
24	T3.101017.134316	WG633389-15	CCB		1		10/10/17 13:43
25	T3.101017.134728	WG633389-16	Low Level Continuing Calibra		1		10/10/17 13:47
26	T3.101017.135139	PBW 91	PBW 91	40/50	1		10/10/17 13:51
27	T3.101017.135540	LC-SW	LCSW 91	40/50	1		10/10/17 13:55
28	T3.101017.135934	L17100001-01	MDL-1	40/50	1		10/10/17 13:59
29	T3.101017.140346	L17100003-01	LOQ-1		1		10/10/17 14:03
30	T3.101017.140753	WG633389-17	CCV		1		10/10/17 14:07
31	T3.101017.141144	WG633389-18	CCB		1		10/10/17 14:11
32	T3.101017.141557	L17100003-01	LOQ-1	40/50	1		10/10/17 14:15
33	T3.101017.142007	WG632441-02	Method/Prep Blank	40/50	1		10/10/17 14:20
34	T3.101017.142419	WG632441-03	Laboratory Control S	40/50	1		10/10/17 14:24

Page: 1 Approved: October 12, 2017




Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO3 Dataset: 101017T3.3R.TXT
 Analyst1: JYH Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 8
 Maintenance Log ID: _____
 Calibration Std: STD84303 ICV Std: STD84302 Post Spike: STD80131
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD84304 LLCCV: _____ Tuning Sol: _____
 Stannous: _____ Hydroxylamine: _____

Workgroups: 632186,633277,632298,633392

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	T3.101017.142813	WG632312-01	Fluid Blank 1		1		10/10/17 14:28
36	T3.101017.143225	WG632312-02	Fluid Blank 2		1		10/10/17 14:32
37	T3.101017.143636	WG632441-01	Reference Sample		1	L17091700-07	10/10/17 14:36
38	T3.101017.144046	WG632441-04	Matrix Spike	40/50	1	L17091700-07	10/10/17 14:40
39	T3.101017.144441	WG632441-05	Matrix Spike Duplica	40/50	1	L17091700-07	10/10/17 14:44
40	T3.101017.144834	L17100060-02	FILTERCAKE-092917	5/50	1		10/10/17 14:48
41	T3.101017.145244	WG632981-03	Post Digestion Spike		1	L17100060-02	10/10/17 14:52
42	T3.101017.145638	WG633389-19	CCV		1		10/10/17 14:56
43	T3.101017.150030	WG633389-20	CCB		1		10/10/17 15:00
44	T3.101017.150443	L17100135-01	K711152-01	5/50	1		10/10/17 15:04
45	T3.101017.150854	WG632981-04	Serial Dilution		5	L17100060-02	10/10/17 15:08
46	T3.101017.151305	WG633389-21	CCV		1		10/10/17 15:13
47	T3.101017.151657	WG633389-22	CCB		1		10/10/17 15:16
48	T3.101017.152058	WG633389-23	Low Level Continuing Calibra		1		10/10/17 15:20
49	T3.101017.161118	L17100012-89	T2		1		10/10/17 16:11
50	T3.101017.161700	L17100012-89	T2		1		10/10/17 16:17
51	T3.101017.162119	WG633389-24	CCV		1		10/10/17 16:21
52	T3.101017.162511	WG633389-25	CCB		1		10/10/17 16:25
53	T3.101017.162924	WG633253-01	Method/Prep Blank	1/50	1		10/10/17 16:29
54	T3.101017.163343	WG633253-02	Laboratory Control S	1/50	1		10/10/17 16:33
55	T3.101017.163757	WG633253-03	Laboratory Control S	1/50	1		10/10/17 16:37
56	T3.101017.164205	L17100508-41	16600-WP01-WP003	1/50	1		10/10/17 16:42
57	T3.101017.164613	L17100508-42	16600-WP01-WP004	1/50	1		10/10/17 16:46
58	T3.101017.165022	L17100508-43	16600-WP01-WP005	1/50	1		10/10/17 16:50
59	T3.101017.165428	L17100508-44	16600-WP01-WP006	1/50	1		10/10/17 16:54
60	T3.101017.165836	L17100508-45	16600-WP01-WP007	1/50	1		10/10/17 16:58
61	T3.101017.170243	L17100508-46	16600-WP01-WP008	1/50	1		10/10/17 17:02
62	T3.101017.170652	L17100508-47	16600-WP01-WP009	1/50	1		10/10/17 17:06
63	T3.101017.171102	WG633389-26	CCV		1		10/10/17 17:11
64	T3.101017.171454	WG633389-27	CCB		1		10/10/17 17:14
65	T3.101017.171910	L17100508-48	16600-WP01-WP010	1/50	1		10/10/17 17:19
66	T3.101017.172318	L17100508-49	16600-WP01-WP011	1/50	1		10/10/17 17:23
67	T3.101017.172728	L17100508-50	16600-WP01-WP012	1/50	1		10/10/17 17:27
68	T3.101017.173136	L17100508-51	16600-WP01-WP013	1/50	1		10/10/17 17:31

Page: 2 Approved: October 12, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO3 Dataset: 101017T3.3R.TXT
 Analyst1: JYH Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 8
 Maintenance Log ID: _____

Calibration Std: STD84303 ICV Std: STD84302 Post Spike: STD80131
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RG40895
 CCV: STD84304 LLCCV: _____ Tuning Sol: _____
 Stannous: _____ Hydroxylamine: _____

Workgroups: 632186,633277,632298,633392

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
69	T3.101017.173544	L17100508-52	16600-WP01-WP014	1/50	1		10/10/17 17:35
70	T3.101017.173942	L17100508-53	16600-WP01-WP015	1/50	1		10/10/17 17:39
71	T3.101017.174351	L17100508-54	16600-WP01-WP016	1/50	1		10/10/17 17:43
72	T3.101017.174759	WG633392-01	Post Digestion Spike		1	L17100508-54	10/10/17 17:47
73	T3.101017.175154	WG633392-02	Serial Dilution		5	L17100508-54	10/10/17 17:51
74	T3.101017.175605	WG633389-28	CCV		1		10/10/17 17:56
75	T3.101017.175956	WG633389-29	CCB		1		10/10/17 17:59

Page: 3 Approved: October 12, 2017

Sam H. Rhodes



Microbac Laboratories Inc.

Data Checklist

Date: 10-OCT-2017
 Analyst: JYH
 Analyst: NA
 Method: 6010B/6010C/200.7
 Instrument: ICP-THERMO3
 Curve Workgroup: 633389
 Runlog ID: 85160
 Analytical Workgroups: 632186,633277,632298,633392

Additional Work Group	
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	1705,1706,060,508
Client Forms	X
Level X	
Level 3	
Level 4	1705,1706,060,508
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	KHR
Comments	

Primary Reviewer:

Secondary Reviewer:
12-OCT-2017



Analytical Method:6010C
Login Number:L17091705

AAB#:WG632186

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-SP650-6474-GRAB	01	09/28/17					10/02/2017	3.7	180		10/10/17	11.9	180	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091705 Work Group: WG632186
 Blank File ID: T3.101017.130304 Blank Sample ID: WG632044-02
 Prep Date: 10/02/17 06:40 Instrument ID: ICP-THERMO3
 Analyzed Date: 10/10/17 13:03 Method: 6010C
 Analyst: JYH

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632044-03	T3.101017.130716	10/10/17 13:07	01
LH18/24-SP650-6474-GRAB	L17091705-01	T3.101017.132308	10/10/17 13:23	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5520525
 Report generated 10/10/2017 15:49



Login Number: L17091705 Prep Date: 10/02/17 06:40 Sample ID: WG632044-02
Instrument ID: ICP-THERMO3 Run Date: 10/10/17 13:03 Prep Method: 3015A
File ID: T3.101017.130304 Analyst: JYH Method: 6010C
Workgroup (AAB#): WG632186 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: ICP-TH-10-OCT-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Selenium, Total	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: 5520526
10-OCT-2017 15:49



Login Number: L17091705 Run Date: 10/10/2017 Sample ID: WG632044-03
Instrument ID: ICP-THERMO3 Run Time: 13:07 Prep Method: 3015A
File ID: T3.101017.130716 Analyst: JYH Method: 6010C
Workgroup (AAB#): WG632186 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD83991 Cal ID: ICP-TH-10-OCT-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Selenium, Total	0.250	0.262	105	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 5520527
Report generated: 10/10/2017 15:49



Loginnum: L17091705 Cal ID: ICP-THERMO3- Worknum: WG632186
 Instrument ID: ICP-THERMO3 Contract #: _____ Method: 6010C
 Parent ID: WG632044-01 File ID: T3.101017.131111 Dil: 1 Matrix: WATER
 Sample ID: WG632044-04 MS File ID: T3.101017.131519 Dil: 1 Units: mg/L
 Sample ID: WG632044-05 MSD File ID: T3.101017.131913 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Selenium	0.0144	0.250	0.318	121	0.250	0.308	117	3.13	80 - 120	20	*

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17091705 **Worknum:** WG632186
Instrument: ICP-THERMO3 **Method:** 6010C
Serial Dil: WG632186-06 **File ID:** T3.101017.133516 **Dil:** 5 **Units:** ug/L
Sample: L17091706-01 **File ID:** T3.101017.132725 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Selenium	3.78		3.70		2.12	

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: 5520522

10/10/2017 15:49



Sample Login ID: L17091705 Worknum: WG632186
 Instrument ID: ICP-THERMO3 Method: 6010C
 Post Spike ID: WG632186-05 File ID: T3.101017.133133 Dil: 1 Units: ug/L
 Sample ID: L17091706-01 File ID: T3.101017.132725 Dil: 1 Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
SELENIUM	209		0	U	200	104.4	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: L17091705 Workgroup (AAB#): WG632186
 Analytical Method: 6010C Instrument ID: ICP-THERMO3
 ICAL Worknum: WG633389 Initial Calibration Date: 10-OCT-2017 12:23

	WG633389-01		WG633389-02		WG633389-03		WG633389-04		WG633389-05		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
SELENIUM	0	-0.000170	NA	NA	.008	-0.000120	.4	0.00424	.8	0.00882	.999661	

INT = Instrument intensity
 R = Coefficient of correlation
 Q = Data Qualifier
 * = Out of Compliance; R < 0.995



Login Number: L17091705 Run Date: 10/10/2017 Sample ID: WG633389-07
Instrument ID: ICP-THERMO3 Run Time: 12:30 Method: 6010C
File ID: T3.101017.123038 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-THERM - 10-OCT-17
Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
SELENIUM	.004	.016	.004	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: L17091705 Run Date: 10/10/2017 Sample ID: WG633389-13
Instrument ID: ICP-THERMO3 Run Time: 12:58 Method: 6010C
File ID: T3.101017.125851 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00400	0.0160	0.00400	U

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



Login Number: L17091705 Run Date: 10/10/2017 Sample ID: WG633389-15
Instrument ID: ICP-THERMO3 Run Time: 13:43 Method: 6010C
File ID: T3.101017.134316 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00400	0.0160	0.00400	U

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



Login Number: L17091705 Run Date: 10/10/2017 Sample ID: WG633389-06
Instrument ID: ICP-THERMO3 Run Time: 12:26 Method: 6010C
File ID: T3.101017.122646 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Selenium	.4	0.413	103	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17091705 Run Date: 10/10/2017 Sample ID: WG633389-12
 Instrument ID: ICP-THERMO3 Run Time: 12:55 Method: 6010C
 File ID: T3.101017.125500 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.399	mg/L	99.7	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091705 Run Date: 10/10/2017 Sample ID: WG633389-14
Instrument ID: ICP-THERMO3 Run Time: 13:39 Method: 6010C
File ID: T3.101017.133925 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.396	mg/L	98.9	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091705 Run Date: 10/10/2017 Sample ID: WG633389-09
 Instrument ID: ICP-THERMO3 Run Time: 12:42 Method: 6010C
 File ID: T3.101017.124246 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0165	mg/L	103	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091705 Run Date: 10/10/2017 Sample ID: WG633389-16
Instrument ID: ICP-THERMO3 Run Time: 13:47 Method: 6010C
File ID: T3.101017.134728 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0181	mg/L	113	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17091705
Instrument ID: ICP-THERMO3
Sol. A: WG633389-10
Sol. AB: WG633389-11

File ID: T3.101017.124655
File ID: T3.101017.125103

Workgroup (AAB#): WG632186
Method: 6010C
Units: mg/L
Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Selenium	NS	0.00252	NS	0.250	0.263	105	

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: L17091705
 Instrument ID: ICP-THERMO3

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	0.0000310	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	0.000250	0	0	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.00	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	196.00	0	-0.0000400	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.00	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	0.00000700	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5520530
 Report generated: 10/10/2017 15:49



Login Number: L17091705

Date: 01/04/2017

Instrument ID: ICP-THERMO3

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	279.00	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	196.00	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.00	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: 5520530
 Report generated: 10/10/2017 15:49



Login Number: L17091705
 Instrument ID: ICP-THERMO3

Date: 01/04/2017
 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	-0.0000210	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	-0.000220	0	0	0
CADMIUM	228.80	0	-0.0000100	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	0.000650	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	279.00	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	0.0000420	0	0	0
PHOSPHORUS	214.90	0.0390	0.000900	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.00	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.00	0	-0.000150	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	-0.000300	0	0	0
VANADIUM	292.40	0	0.0000100	0	0	0
ZINC	206.20	0	0	0	0	0
ZIRCONIUM	339.10	0	-0.0000300	0	0	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5520530
 Report generated: 10/10/2017 15:49



Login Number: L17091705
 Instrument ID: ICP-THERMO3

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	0.00120	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	279.00	-0.00290	-0.0230	0	0	0
MANGANESE	257.60	0	0.0000300	0	0	0
MOLYBDENUM	202.00	0	0	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	196.00	0.000600	0.000580	0	0	0
SILICON	212.40	0	0.0187	0	0	0
SILVER	328.00	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: 5520530
 Report generated: 10/10/2017 15:49



Login Number: L17091705
 Instrument ID: ICP-THERMO3

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	279.00	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	196.00	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.00	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: 5520530
 Report generated: 10/10/2017 15:49



Login Number: L17091705

Date: 01/04/2017

Instrument ID: ICP-THERMO3

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	279.00	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	196.00	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.00	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: 5520530
 Report generated: 10/10/2017 15:49



Login Number: L17091705
 Instrument ID: ICP-THERMO3

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	279.00	0
MANGANESE	257.60	0
MOLYBDENUM	202.00	0
NICKEL	231.60	0
PHOSPHORUS	214.90	0
POTASSIUM	766.40	0
SELENIUM	196.00	0
SILICON	212.40	0
SILVER	328.00	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: 5520530
 Report generated: 10/10/2017 15:49



Login Number: L17091705 Date: 07/10/2017
 Instrument ID: ICP-THERMO3 Method: 6010C

Analyte	Integration Time (Sec.)	Concentration (mg/L)
Aluminum	10.00	900.0
Antimony	20.00	45.0
Arsenic	10.00	45.0
Barium	10.00	45.0
Beryllium	10.00	4.5
Boron	20.00	45.0
Cadmium	20.00	4.5
Calcium	5.00	270.0
Chromium	20.00	36.0
Cobalt	20.00	45.0
Copper	20.00	90.0
Iron	5.00	630.0
Lead	20.00	180.0
Lithium	5.00	36.0
Magnesium	5.00	900.0
Manganese	10.00	36.0
Molybdenum	20.00	27.0
Nickel	20.00	90.0
Phosphorus	20.00	180.0
Potassium	5.00	360.0
Selenium	20.00	90.0
Silicon	20.00	36.0
Silver	10.00	9.0
Sodium	5.00	360.0
Strontium	5.00	9.0
Thallium	20.00	18.0
Tin	20.00	45.0
Titanium	5.00	45.0
Vanadium	20.00	36.0
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 #: L17091705

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 07:12
Matrix: Water	Analytical Method: 6020A	Cal Date: 10/02/2017 12:02
Workgroup #: WG632098	Analyst: JYH	Run Date: 10/02/2017 13:58
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: NI.100217.135837
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Barium, Total	7440-39-3	0.0973		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: WG632048
 Analyst: VC
 Spike Analyst: VC
 Run Date: 10/02/2017 07:12
 Method: 3015A
 Balance: BAL016
 Instrument: MW-3
 Instrument Start: 10/02/2017 07:15

SOP: ME407 Revision 19
 Spike Solution: STD82887
 Spike Witness: ERP
 HNO3 Lot #: COA19940
 40 & 50 ML. DIGESTION TU COA19932
 MS Filters- fisher-Lot# rRGT40686

	SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG632048-02	BLANK	1	20 mL	50 mL	185.29 g	185.292 g		
2	WG632048-03	LCS	1	20 mL	50 mL	185.519 g	185.522 g	.25 mL	
3	L17091647-01	SAMP	1	20 mL	50 mL	183.509 g	183.497 g		10/09/17
4	L17091648-01	SAMP	1	20 mL	50 mL	183.833 g	183.815 g		10/09/17
5	L17091692-01	SAMP	1	20 mL	50 mL	184.386 g	184.377 g		10/05/17
6	L17091692-02	SAMP	1	20 mL	50 mL	184.501 g	184.495 g		10/05/17
7	L17091692-03	SAMP	1	20 mL	50 mL	182.45 g	182.449 g		10/05/17
8	L17091705-01	SAMP	1	20 mL	50 mL	181.582 g	181.566 g		10/10/17
9	L17091706-01	SAMP	1	20 mL	50 mL	183.32 g	183.302 g		10/10/17
10	L17091719-02	SAMP	1	20 mL	50 mL	184.102 g	184.093 g		10/10/17
11	L17091719-04	SAMP	1	20 mL	50 mL	184.295 g	184.289 g		10/10/17
12	L17091719-06	SAMP	1	20 mL	50 mL	181.947 g	181.938 g		10/10/17
13	L17091745-01	SAMP	1	20 mL	50 mL	183.499 g	183.484 g		10/09/17
14	L17091745-02	SAMP	1	20 mL	50 mL	181.599 g	181.577 g		10/09/17
15	L17091745-03	SAMP	1	20 mL	50 mL	182.646 g	182.592 g		10/09/17
16	WG632048-01	REF	1	20 mL	50 mL	182.623 g	182.612 g		
17	L17091745-04	SAMP	1	20 mL	50 mL	182.623 g	182.612 g		10/09/17
18	WG632048-04	MS	1	20 mL	50 mL	182.489 g	182.472 g	.25 mL	
19	WG632048-05	MSD	1	20 mL	50 mL	185.819 g	185.813 g	.25 mL	

Analyst: Vicki Collier

Reviewer: Erin Pottin



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 100217A.REP
 Analyst1: JYH Analyst2: N/A
 Method: 6020/6020A/200.8 SOP: ME700A Rev: 3
 Maintenance Log ID: _____

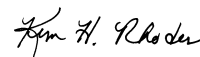
Calibration Std: STD83954 ICV Std: STD83787 Post Spike: STD83027
 ICSA: STD83784 ICSAB: STD83785 Int. Std: RG739344
 CCV: STD83955 LLCCV: STD83789 Tuning Sol : STD83790
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632103,632098

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	NI.100217.115019	Blank	Blank		1		10/02/17 11:50
2	NI.100217.115325	WG632169-01	Calibration Point		1		10/02/17 11:53
3	NI.100217.115630	WG632169-02	Calibration Point		1		10/02/17 11:56
4	NI.100217.115936	WG632169-03	Calibration Point		1		10/02/17 11:59
5	NI.100217.120241	WG632169-04	Calibration Point		1		10/02/17 12:02
6	NI.100217.120549	WG632169-05	Initial Calibration Verification		1		10/02/17 12:05
7	NI.100217.120855	WG632169-06	Initial Calib Blank		1		10/02/17 12:08
8	NI.100217.121202	WG632169-07	Low Level Continuing Calibra		1		10/02/17 12:12
9	NI.100217.121553	WG632169-08	Low Level Initial Calibration V		1		10/02/17 12:15
10	NI.100217.121858	WG632169-09	Interference Check		1		10/02/17 12:18
11	NI.100217.122204	WG632169-10	Interference Check		1		10/02/17 12:22
12	NI.100217.122511	WG632169-11	CCV		1		10/02/17 12:25
13	NI.100217.122816	WG632169-12	CCB		1		10/02/17 12:28
14	NI.100217.123123	WG632081-01	Method/Prep Blank	.25/100	1		10/02/17 12:31
15	NI.100217.123429	WG632081-02	Laboratory Control S	.25/100	1		10/02/17 12:34
16	NI.100217.123734	WG632081-03	Laboratory Control S	.25/100	1		10/02/17 12:37
17	NI.100217.124039	L17091426-01	K7I0761-01		1		10/02/17 12:40
18	NI.100217.124345	WG632103-01	Post Digestion Spike		1	L17091426-01	10/02/17 12:43
19	NI.100217.124650	WG632103-02	Serial Dilution		5	L17091426-01	10/02/17 12:46
20	NI.100217.124956	WG632103-02	Serial Dilution		25	L17091426-01	10/02/17 12:49
21	NI.100217.125304	WG632169-13	CCV		1		10/02/17 12:53
22	NI.100217.125609	WG632169-14	CCB		1		10/02/17 12:56
23	NI.100217.125916	WG632169-15	Low Level Continuing Calibra		1		10/02/17 12:59
24	NI.100217.130336	WG632169-16	CCV		1		10/02/17 13:03
25	NI.100217.130642	WG632169-17	CCB		1		10/02/17 13:06
26	NI.100217.131212	WG632048-02	Method/Prep Blank	20/50	1		10/02/17 13:12
27	NI.100217.131517	WG632048-03	Laboratory Control S	20/50	1		10/02/17 13:15
28	NI.100217.131823	WG632048-01	Reference Sample		1	L17091745-04	10/02/17 13:18
29	NI.100217.132128	WG632048-04	Matrix Spike	20/50	1	L17091745-04	10/02/17 13:21
30	NI.100217.132434	WG632048-05	Matrix Spike Duplica	20/50	1	L17091745-04	10/02/17 13:24
31	NI.100217.132739	L17091647-01	LH18/24-SP140-7472-GRAB	20/50	1		10/02/17 13:27
32	NI.100217.133044	L17091648-01	LH18/24-SP650-6472-GRAB	20/50	1		10/02/17 13:30
33	NI.100217.133350	WG632098-01	Post Digestion Spike		1	L17091648-01	10/02/17 13:33
34	NI.100217.133655	WG632098-02	Serial Dilution		5	L17091648-01	10/02/17 13:36

Page: 1 Approved: October 05, 2017




Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 100217A.REP
 Analyst1: JYH Analyst2: N/A
 Method: 6020/6020A/200.8 SOP: ME700A Rev: 3
 Maintenance Log ID: _____
 Calibration Std: STD83954 ICV Std: STD83787 Post Spike: STD83027
 ICSA: STD83784 ICSAB: STD83785 Int. Std: RGT39344
 CCV: STD83955 LLCV: STD83789 Tuning Sol : STD83790
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632103,632098

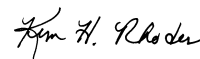
Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	NI.100217.134001	WG632098-02	Serial Dilution		25	L17091648-01	10/02/17 13:40
36	NI.100217.134308	WG632169-18	CCV		1		10/02/17 13:43
37	NI.100217.134613	WG632169-19	CCB		1		10/02/17 13:46
38	NI.100217.134920	L17091692-01	9274-B02-WQ-W0009	20/50	1		10/02/17 13:49
39	NI.100217.135226	L17091692-02	9274-B09-WQ-W0056	20/50	1		10/02/17 13:52
40	NI.100217.135531	L17091692-03	9274-B09-WQ-W0058	20/50	1		10/02/17 13:55
41	NI.100217.135837	L17091705-01	LH18/24-SP650-6474-GRAB	20/50	1		10/02/17 13:58
42	NI.100217.140142	L17091706-01	LH18/24-SP140-7474-GRAB	20/50	1		10/02/17 14:01
43	NI.100217.140447	L17091719-02	A11-MW08-Y3S2	20/50	1		10/02/17 14:04
44	NI.100217.140753	L17091719-04	A11-MW02-Y3S2	20/50	1		10/02/17 14:07
45	NI.100217.141059	L17091719-06	A11/A12-RB01-Y3S2	20/50	1		10/02/17 14:10
46	NI.100217.141405	L17091745-01	MW-103	20/50	1		10/02/17 14:14
47	NI.100217.141710	L17091745-02	MW-103	20/50	1		10/02/17 14:17
48	NI.100217.142017	WG632169-20	CCV		1		10/02/17 14:20
49	NI.100217.142323	WG632169-21	CCB		1		10/02/17 14:23
50	NI.100217.142630	L17091745-03	MW-107	20/50	1		10/02/17 14:26
51	NI.100217.142935	L17091613-12	GB5-S		2		10/02/17 14:29
52	NI.100217.143242	WG632169-22	CCV		1		10/02/17 14:32
53	NI.100217.143547	WG632169-23	CCB		1		10/02/17 14:35
54	NI.100217.143854	WG632169-24	Low Level Continuing Calibra		1		10/02/17 14:38
55	NI.100217.145202	WG632169-25	Low Level Continuing Calibra		1		10/02/17 14:52
56	NI.100217.155613	L17091613-12	GB5-S		2		10/02/17 15:56
57	NI.100217.160020	L17091647-01	LH18/24-SP140-7472-GRAB	20/50	10		10/02/17 16:00
58	NI.100217.160326	40 PPB SE	40 PPB SE		10		10/02/17 16:03
59	NI.100217.160632	WG632169-26	CCV		1		10/02/17 16:06
60	NI.100217.160938	WG632169-27	CCB		1		10/02/17 16:09
61	NI.100217.161245	WG632169-28	Low Level Continuing Calibra		1		10/02/17 16:12

Comments

Seq.	Rerun	Dil.	Reason	Analytes
8			Rerun to verify. JYH	
54			Insufficient volumn, rerun. JYH	

Page: 2 Approved: October 05, 2017




Microbac Laboratories Inc.

Data Checklist

Date: 02-OCT-2017
 Analyst: JYH
 Analyst: NA
 Method: 6020/6020A/200.8
 Instrument: ICP-MS
 Curve Workgroup: 632169
 Runlog ID: 84986
 Analytical Workgroups: 632103,632098

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	1647,1648,1692,1705,1706,1719
Client Forms	X
Level X	
Level 3	
Level 4	1647,1648,1692,1705,1706,1719
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	KHR
Comments	

Primary Reviewer:

Secondary Reviewer:
05-OCT-2017



Analytical Method:6020A
Login Number:L17091705

AAB#:WG632098

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-SP650-6474-GRAB	01	09/28/17					10/02/2017	3.7	180		10/02/17	4	180	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091705
 Blank File ID: NI.100217.131212
 Prep Date: 10/02/17 07:12
 Analyzed Date: 10/02/17 13:12
 Analyst: JYH

Work Group: WG632098
 Blank Sample ID: WG632048-02
 Instrument ID: ICP-MS2
 Method: 6020A

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632048-03	NI.100217.131517	10/02/17 13:15	01
LH18/24-SP650-6474-GRAB	L17091705-01	NI.100217.135837	10/02/17 13:58	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5505825
 Report generated 10/03/2017 12:42



Login Number: L17091705 Prep Date: 10/02/17 07:12 Sample ID: WG632048-02
 Instrument ID: ICP-MS2 Run Date: 10/02/17 13:12 Prep Method: 3015A
 File ID: NI.100217.131212 Analyst: JYH Method: 6020A
 Workgroup (AAB#): WG632098 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: ICP-MS - 02-OCT-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: 5505826
 03-OCT-2017 12:42



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632048-03
 Instrument ID: ICP-MS2 Run Time: 13:15 Prep Method: 3015A
 File ID: NI.100217.131517 Analyst: JYH Method: 6020A
 Workgroup (AAB#): WG632098 Matrix: Water Units: mg/L
 QC Key: DOD4 Lot#: STD82887 Cal ID: ICP-MS - 02-OCT-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Barium, Total	0.125	0.123	98.7	80 - 120	
Lead, Total	0.125	0.125	99.6	80 - 120	
Silver, Total	0.125	0.126	101	80 - 120	

LCS - Modified 03/06/2008
 PDF File ID: 5507617
 Report generated: 10/03/2017 12:42



LCS_LCS2 - Modified 03/06/2008
PDF File ID: 5505827
Report generated: 10/02/2017 16:02



Loginnum: L17091705 Cal ID: ICP-MS2- Worknum: WG632098
 Instrument ID: ICP-MS2 Contract #: _____ Method: 6020A
 Parent ID: WG632048-01 File ID: NI.100217.131823 Dil: 1 Matrix: WATER
 Sample ID: WG632048-04 MS File ID: NI.100217.132128 Dil: 1 Units: mg/L
 Sample ID: WG632048-05 MSD File ID: NI.100217.132434 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Barium	0.0623	0.125	0.182	96.0	0.125	0.185	98.2	1.54	80 - 120	20	
Lead	ND	0.125	0.126	101	0.125	0.126	101	0.173	80 - 120	20	
Silver	ND	0.125	0.123	98.3	0.125	0.124	99.2	0.910	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17091705 **Worknum:** WG632098
Instrument: ICP-MS2 **Method:** 6020A
Serial Dil: WG632098-02 **File ID:** NI.100217.133655 **Dil:** 5 **Units:** ug/L
Sample: L17091648-01 **File ID:** NI.100217.133044 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Barium	38.6	X	39.3	X	1.88	
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: 5505822

10/03/2017 12:42



Sample Login ID: L17091705

Worknum: WG632098

Instrument ID: ICP-MS2

Method: 6020A

Post Spike ID: WG632098-01

File ID: NI.100217.133350

Dil: 1

Units: ug/L

Sample ID: L17091648-01

File ID: NI.100217.133044

Dil: 1

Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
BARIUM	89.6		38.6		50	102.2	75 - 125	
LEAD	52.9		0	U	50	105.9	75 - 125	
SILVER	49.8		0	U	50	99.6	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

00863127

Login: L17091705 Workgroup (AAB#): WG632098
 Analytical Method: 6020A Instrument ID: ICP-MS2
 ICAL Worknum: WG632169 Initial Calibration Date: 02-OCT-2017 12:02

	WG632169-01		WG632169-02		WG632169-03		WG632169-04		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
BARIUM	0	49.7	.4	188	50	149000	100	288000	.999962	
LEAD	0	391	.4	674	50	309000	100	616000	.999949	
SILVER	0	123	.4	563	50	410000	100	795000	.999963	

INT = Instrument intensity
 R = Coefficient of correlation
 Q = Data Qualifier
 * = Out of Compliance; R < 0.995

INT_CAL_ICP - Modified 03/06/2008
 PDF File ID: 5505831
 Report generated: 02-OCT-2017 16:02



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-06
Instrument ID: ICP-MS2 Run Time: 12:08 Method: 6020A
File ID: NI.100217.120855 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG632098 Cal ID: ICP-MS2 - 02-OCT-17
Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
SILVER	.2	.8	.2	U
BARIUM	.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: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-12
 Instrument ID: ICP-MS2 Run Time: 12:28 Method: 6020A
 File ID: NI.100217.122816 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-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: 5505836
 Report generated 10/02/2017 16:02



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-17
 Instrument ID: ICP-MS2 Run Time: 13:06 Method: 6020A
 File ID: NI.100217.130642 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-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: 5505836
 Report generated 10/02/2017 16:02



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-19
 Instrument ID: ICP-MS2 Run Time: 13:46 Method: 6020A
 File ID: NI.100217.134613 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-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: 5505836
 Report generated 10/02/2017 16:02



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-21
 Instrument ID: ICP-MS2 Run Time: 14:23 Method: 6020A
 File ID: NI.100217.142323 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-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: 5505836
 Report generated 10/02/2017 16:02



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-05
 Instrument ID: ICP-MS2 Run Time: 12:05 Method: 6020A
 File ID: NI.100217.120549 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Barium	50	49.1	98.3	90 - 110	
Lead	50	50.0	100	90 - 110	
Silver	50	49.9	99.8	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-11
 Instrument ID: ICP-MS2 Run Time: 12:25 Method: 6020A
 File ID: NI.100217.122511 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.0500	0.0488	mg/L	97.6	90 - 110	
Lead	0.0500	0.0498	mg/L	99.5	90 - 110	
Silver	0.0500	0.0502	mg/L	100	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-16
 Instrument ID: ICP-MS2 Run Time: 13:03 Method: 6020A
 File ID: NI.100217.130336 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.0500	0.0485	mg/L	97.1	90 - 110	
Lead	0.0500	0.0500	mg/L	100	90 - 110	
Silver	0.0500	0.0502	mg/L	100	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-18
 Instrument ID: ICP-MS2 Run Time: 13:43 Method: 6020A
 File ID: NI.100217.134308 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-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	99.6	90 - 110	
Silver	0.0500	0.0508	mg/L	102	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-20
 Instrument ID: ICP-MS2 Run Time: 14:20 Method: 6020A
 File ID: NI.100217.142017 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.0500	0.0484	mg/L	96.8	90 - 110	
Lead	0.0500	0.0503	mg/L	101	90 - 110	
Silver	0.0500	0.0507	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-08
 Instrument ID: ICP-MS2 Run Time: 12:15 Method: 6020A
 File ID: NI.100217.121553 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.750	0.710	ug/L	94.6	70 - 130	
Lead	0.200	0.194	ug/L	97.2	70 - 130	
Silver	0.400	0.387	ug/L	96.7	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-15
 Instrument ID: ICP-MS2 Run Time: 12:59 Method: 6020A
 File ID: NI.100217.125916 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.750	0.693	ug/L	92.4	70 - 130	
Lead	0.200	0.191	ug/L	95.4	70 - 130	
Silver	0.400	0.375	ug/L	93.9	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091705 Run Date: 10/02/2017 Sample ID: WG632169-25
 Instrument ID: ICP-MS2 Run Time: 14:52 Method: 6020A
 File ID: NI.100217.145202 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Barium	0.750	0.692	ug/L	92.3	70 - 130	
Lead	0.200	0.192	ug/L	96.1	70 - 130	
Silver	0.400	0.375	ug/L	93.9	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17091705
Instrument ID: ICP-MS2
Sol. A: WG632169-09
Sol. AB: WG632169-10

File ID: NI.100217.121858
File ID: NI.100217.122204

Workgroup (AAB#): WG632098
Method: 6020A
Units: ug/L
Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Barium	NS	0.0529	NS	100	97.1	97.1	
Lead	NS	0.0494	NS	100	98.8	98.8	
Silver	NS	0.00660	NS	100	85.4	85.4	

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: L17091705 Analytical Method: 6020
 Analytical Workgroup: WG632098 Matrix: 1
 Instrument: ICP-MS2 Analyst: JYH
 ICAL Date: 02-OCT-2017 11:53

Sample	Type	Run Date	BISMUTH	GERMANIUM	INDIUM
			% Rec	% Rec	% Rec
L17091648-01	SAMP	02-OCT-2017 13:30	95.659	100.037	96.441
L17091705-01	SAMP	02-OCT-2017 13:58	96.282	98.907	96.512
WG632048-02	BLANK	02-OCT-2017 13:12	103.343	101.756	100.559
WG632048-03	LCS	02-OCT-2017 13:15	105.257	103.295	101.656
WG632098-01	PSPK	02-OCT-2017 13:33	96.662	101.743	98.032
WG632098-02	SERIAL	02-OCT-2017 13:36	97.185	96.633	92.755
WG632169-05	ICV	02-OCT-2017 12:05	99.424	98.598	97.333
WG632169-06	ICB	02-OCT-2017 12:08	95.816	91.596	90.688
WG632169-08	LLICV	02-OCT-2017 12:15	100.163	98.216	96.423
WG632169-09	ICS	02-OCT-2017 12:18	92.942	91.001	88.259
WG632169-10	ICS	02-OCT-2017 12:22	97.67	95.054	93.687
WG632169-11	CCV	02-OCT-2017 12:25	104.166	103.625	101.681
WG632169-12	CCB	02-OCT-2017 12:28	97.351	94.148	92.677
WG632169-15	LLCCV	02-OCT-2017 12:59	103.532	100.295	99.354
WG632169-16	CCV	02-OCT-2017 13:03	102.941	102.226	101.341
WG632169-17	CCB	02-OCT-2017 13:06	93.341	90.651	87.855
WG632169-18	CCV	02-OCT-2017 13:43	104.562	105.411	101.711
WG632169-19	CCB	02-OCT-2017 13:46	99.321	96.723	94.999
WG632169-20	CCV	02-OCT-2017 14:20	106.885	105.895	103.138
WG632169-21	CCB	02-OCT-2017 14:23	100.562	96.006	93.088
WG632169-25	LLCCV	02-OCT-2017 14:52	102.86	103.838	100.899

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: 5505830
 Report generated: 10/03/2017 12:42



Login Number: L17091705 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 #: L17091705

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091705-01	PrePrep Method: N/A	Instrument: UV-2600
Client ID: LH18/24-SP650-6474-GRAB	Prep Method: 7196A	Prep Date: N/A
Matrix: Water	Analytical Method: 7196A	Cal Date: 09/05/2017 15:26
Workgroup #: WG631899	Analyst: SDC	Run Date: 09/29/2017 11:42
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: 00.1709291142-06
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

$$C_x = (x) (D)$$

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: 29-SEP-2017
 Analyst: SDC
 Analyst: NA
 Method: CR-6
 Instrument: UV-2600
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG631899

Calibration/Linearity	09/06/17
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	SDC
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
02-OCT-2017

Shalyn Cauty

Secondary Reviewer:
03-OCT-2017

Denna Johnson



Analytical Method: 7196A
Login Number: L17091705

AAB#: WG631899

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-SP650-6474-GRAB	01	09/28/17					09/29/2017	.9	1		09/29/17	.9	1	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091705
 Blank File ID: 00.1709291142-03
 Prep Date: 09/29/17 11:42
 Analyzed Date: 09/29/17 11:42
 Analyst: SDC

Work Group: WG631899
 Blank Sample ID: WG631899-01
 Instrument ID: UV-2600
 Method: 7196A

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG631899-02	00.1709291142-04	09/29/17 11:42	
LCS2	WG631899-03	00.1709291142-05	09/29/17 11:42	
LH18/24-SP650-6474-GRAB	L17091705-01	00.1709291142-06	09/29/17 11:42	
DUP	WG631899-05	00.1709291142-08	09/29/17 11:42	

Report Name: BLANK_SUMMARY
 PDF File ID: 5507465
 Report generated 10/03/2017 11:38



Login Number: L17091705 Prep Date: 09/29/17 11:42 Sample ID: WG631899-01
Instrument ID: UV-2600 Run Date: 09/29/17 11:42 Prep Method: 7196A
File ID: 00.1709291142-03 Analyst: SDC Method: 7196A
Workgroup (AAB#): WG631899 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: UV-260-28-SEP-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: 5507466
03-OCT-2017 11:38



Login Number: L17091705 Analyst: SDC Prep Method: 7196A
 Instrument ID: UV-2600 Matrix: Water Method: 7196A
 Workgroup (AAB#): WG631899 Units: mg/L
 QC Key: DOD4 Lot #: STD83698
 Sample ID: WG631899-02 LCS File ID: 00.1709291142-04 Run Date: 09/29/2017 11:42
 Sample ID: WG631899-03 LCS2 File ID: 00.1709291142-05 Run Date: 09/29/2017 11:42

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Chromium, Hexavalent	0.100	0.100	100	0.100	0.102	102	1.46	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5507467
 Report generated: 10/03/2017 11:38



2.4.1.3 Raw Data

WG 628498

Curves

Parameter: CR-6a Low

Spectrophotometer: UV 2600

Calibration (Curve) standard stock: 500

Concentration: 50ng/L 5ng/L

Recipe for preparation of curve standards found in:

SOP: 2186 Revision: 22 Page: 12

Second Source Stock: 83698 (concentration: 2ng/L)

Daily Preparation: 5(2)/100 =

concentration = 0.1

Calibration Standards (mg/L)	Volume (mL)	Cell Size (cm)	Wavelength (nm)	Absorbance
0.2	100	5	540	0.809
0.1	100	5	540	0.418
0.05	100	5	540	0.207
0.02	100	5	540	0.082
0.01	100	5	540	0.042
0.00	100	5	540	0.002
2nd source 0.1	100	5	540 9/5/17	0.409 0.411

Analyst: April Greene

Date/Time: 9/5/17 1526

DCN#128068



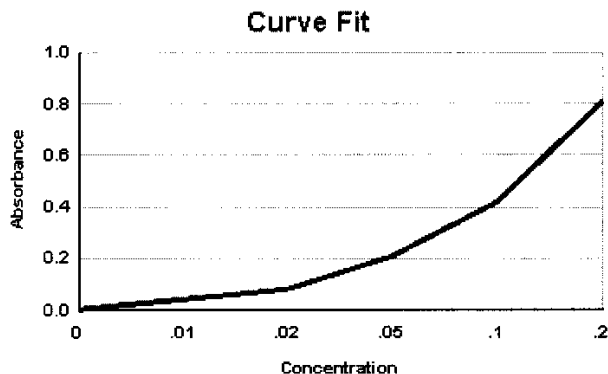
Microbac Laboratories Inc.
INITIAL CALIBRATION

Workgroup: WG628498
Analytical Method: 3500CR
Instrument ID: UV-2600

Analyst: ADG
Initial Calibration Date: 09/05/2017

Analyte: **CHROMIUM, HEXAVALENT**
Number of Points: 6
Slope: 4.05104
Y-Intercept: 0.00343433
Coef. Of Correlation (R^2): 0.999739
Coef. Of Correlation (R): 0.999869

Concentration X	Absorbance Y	X^2	X * Y	Y-Fitted (mX^2+B)
0.00	0.00200	0.00	0.00	0.00343433
0.0100	0.0420	0.000100	0.000420	0.0439447
0.0200	0.0820	0.000400	0.00164	0.0844551
0.0500	0.207	0.00250	0.0104	0.205986
0.100	0.418	0.0100	0.0418	0.408538
0.200	0.809	0.0400	0.162	0.813642



WG_ICAL_CAL_WET - Modified 03/06/2008
Report generated 09/06/2017 08:16



Workgroup #: WG628498

Instrument ID: UV-2600

File ID: 00.1709051526-07

Run Date: 09/05/2017

CCV ID: WG628498-07

Run Time: 15:26

Units: mg/L

Analyst: ADG

Analyte: CHROMIUM, HEXAVALENT

Cal ID: UV-260 - 05-SEP-17 15:26:06

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.1	0.101	4.11	1.0	

* Exceeds %D Limit

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

WET_WG_SSCV - Modified 03/06/2008
Report generated 09/06/2017 08:17



WORKGROUP: WG631899

CHROMIUM (6)^(Cr6)

Standard Methods 3500 Cr-D (18th, 19th), 3500Cr-B(20th)

SPEC: UV-2600

SOP K2186 Rev. # 22

SW846 7196A

Curve ID: 9-6-17

SOP OVAP K3500-Cr Rev. # _____

CCV: 83695

LCS: 83698

Spike: 83697

RGT _____

Matrix: Liquid (mg/L)

Daily dilution: 15/100

Daily dilution: 10/200

Daily dilution: 0.25/100

RGT 691982

Soil (mg/Kg)

Daily dilution: =0.25

Daily dilution: =0.1

Daily dilution: =0.1

Sample	Volume (mL)	pH adj. to 2 ± 0.5	Dilution	Cell size (cm)	Absorbance @ 540 nm
CCV: mg/L(1 cm)	100				
CCV: 0.1 mg/L(5 cm)	100	✓		5cm	0.213
Blank/CCB:	100	✓		5cm	0.000
LCS: 0.1 ppm	100	✓		5cm	0.410
LCS DUP: 0.1 ppm	100	✓		5cm	0.416
09-1705-01	100	✓		5cm	0.001
09-1706-01	100	✓		5cm	0.000
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
	100				
DUP: 09-1705-01	100	✓		5cm	0.000
MS: () 09-1705-01	100	✓		5cm	0.436
MSD: ()	100				
CCV: (1 cm)	100				
CCV: (5 cm)	100	✓		5cm	0.212
CCB:	100	✓		5cm	0.000

Analyst: *Sharon Cooney*

Date / Time: 9-29-17, 1142

SW846 7196 (Dup and/or MS every 10 samples)

SM3500 Cr (Dup and MS/MSD every 20 samples)

DCN#128626



Microbac Laboratories Inc.
SAMPLE REPORT

Workgroup: WG631899Analyst: SDCAnalyte: CHROMIUM, HEXAVALENTDate: 09/29/2017

Sample ID	I Vol	F Vol	Response	Slope	Y Intercept	Anal. Conc.	Rep. Conc.	Dil	Units
WG631899-01	100	100	0	4.051	0.003434	-0.00084777	-0.00084777	1	mg/L
WG631899-02	100	100	0.410	4.051	0.003434	0.10036	0.10036	1	mg/L
WG631899-03	100	100	0.416	4.051	0.003434	0.10184	0.10184	1	mg/L
L17091705-01	100	100	0.00100	4.051	0.003434	-0.00060092	ND	1	mg/L
WG631899-04	100	100	0.00100	4.051	0.003434	-0.00060092	-0.00060092	1	mg/L
L17091706-01	100	100	0	4.051	0.003434	-0.00084777	ND	1	mg/L
WG631899-05	100	100	0	4.051	0.003434	-0.00084777	-0.00084777	1	mg/L
WG631899-06	100	100	0.436	4.051	0.003434	0.10678	0.10678	1	mg/L

UV_SAMPLE_REPORT - Modified 03/06/2008

Report generated 10/02/2017 11:45

Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00863162

Workgroup #: WG632115 Instrument ID: UV-2600
File ID: 00.1709291142-10 Run Date: 09/29/2017
CCV ID: WG632115-03 Run Time: 11:42
Units: mg/L Analyst: SDC
Analyte: CHROMIUM, HEXAVALENT Cal ID: UV-260 - 28-SEP-17

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.05	0.0515	4.24	3.0	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 10/02/2017 11:45



Workgroup #: WG632115
File ID: 00.1709291142-01
CCV ID: WG632115-01
Units: mg/L
Analyte: CHROMIUM, HEXAVALENT

Instrument ID: UV-2600
Run Date: 09/29/2017
Run Time: 11:42
Analyst: SDC
Cal ID: UV-260 - 28-SEP-17

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.05	0.0517	4.26	3.4	

* Exceeds %D Limit
CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008
Report generated 10/02/2017 11:45



3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
October 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	BLR - BRANDON L. RICHARDS
BNB - Brandi N. Bentley	BRG - BRENDA R. GREGORY
CAS - Craig A. Smith	CEB - CHAD E. BARNES
CLC - CHRYS L. CRAWFORD	CLG - CARA L. GREENWOOD
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	RAF - REBEKAH A. FINN
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
ZTB - ZACH T. BARNES	

List of Valid Qualifiers

October 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

October 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. 60266135.GWTP HRUMAR16		Analyses		Remarks (Preservatives, etc.)		Lab I.D.#															
Job: GROUNDWATER TREATMENT PLANT MONTHLY EFFLUENT SAMPLES		MS / MSD		NO. OF CONTAINERS		VOLATILES		SILVER, SELENIUM, LEAD, BARIUM		HEXAVALENT CHROMIUM		1, 4 - DIOXANE		PERCHLORATE									
Prepared By: Scott Beesinger		P.O. Number		Sample Matrix		Date / Time		MS / MSD		NO. OF CONTAINERS		VOLATILES		SILVER, SELENIUM, LEAD, BARIUM		HEXAVALENT CHROMIUM		1, 4 - DIOXANE		PERCHLORATE			
Field Sample I.D.		Sample Matrix		Date / Time		MS / MSD		NO. OF CONTAINERS		VOLATILES		SILVER, SELENIUM, LEAD, BARIUM		HEXAVALENT CHROMIUM		1, 4 - DIOXANE		PERCHLORATE		Remarks (Preservatives, etc.)		Lab I.D.#	
LH18/24-SP650-6474-Grab		Water		09/28/17 / 15:00		3		X		X		X		X		HCL		HCL		HCL		HCL	
LH18/24-SP650-6474-Grab		Water		09/28/17 / 15:00		4		X		X		X		X		NONE		NONE		NONE		NONE	
LH18/24-SP650-6474-Grab		Water		09/28/17 / 15:00		1		X		X		X		X		HNO3		HNO3		HNO3		HNO3	
Trip Blank		Water		09/28/17		2		X		X		X		X		HCL		HCL		HCL		HCL	

STANDARD TURN AROUND TIME

Additional Remarks:

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
<i>Scott Beesinger</i>	09/28/17	15:30									

For Lab Use Only:

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

Microbac OVD
 Received: 09/29/2017 10:11
 By: CARA STRICKLER

Cara Strickler

221000106758

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

COOLER TEMP >6° C LOG

Cooler ID 60758

SAMPLE ID	Bottle 1 °C	Bottle 2 °C	Bottle 3 °C	Bottle 4 °C	Bottle 5 °C	Bottle 6 °C

CHD 9/29/17

pH Exceptions

pH Lot # HC613865

SAMPLE ID	Bottle 1	Bottle 2	Bottle 3	Bottle 4	Bottle 5	Bottle 6

CHD 9/29/17

PRESERVATIVE EXCEPTIONS

NONE AS NOTED

CHD 9/29/17

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17091705

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 10-OCT-2017

Samplenum Container ID Products
L17091705-01 973274

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	29-SEP-2017 10:34	CLS		
2	ANALYZ	V1	ORG4	29-SEP-2017 11:51	HRF	CLS	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	29-SEP-2017 10:34	CLS		
2	ANALYZ	V1	ORG4	29-SEP-2017 11:51	HRF	CLS	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	29-SEP-2017 10:34	CLS		
2	ANALYZ	V1	ORG4	29-SEP-2017 11:51	HRF	CLS	

Samplenum Container ID Products
L17091705-01 973275

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	29-SEP-2017 10:34	CLS		
2	PREP	W1	EXT	02-OCT-2017 16:50	JDH	BRG	
3	DISP	EXT	DISP	03-OCT-2017 07:35	BJO	BJO	
4	ANALYZ*	EXT	SEMI	04-OCT-2017 11:42	SCB	JDH	

**Sample extract/digestate/leachate*

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER		29-SEP-2017 10:34	CLS		

**Sample extract/digestate/leachate*

Samplenum Container ID Products
L17091705-01 973276 6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	29-SEP-2017 10:34	CLS		
2	ANALYZ	W1	SEM	04-OCT-2017 15:10	JWR	CLS	
3	STORE	SEM	A1	05-OCT-2017 14:43	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



Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17091705

Account: 2551

Project: 2551.096

Samples: 2

Due Date: 10-OCT-2017

Samplenum **Container ID** **Products**
L17091705-01 973277 AG-MS BA-MS PB-MS SE-AX

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	29-SEP-2017 10:34	CLS		
2	PREP	W1	DIG	29-SEP-2017 15:01	AC	BRG	
3	ANALYZ*	DIG	METALS	02-OCT-2017 10:48	JYH	AC	
4	STORE	DIG	A1	02-OCT-2017 12:37	BRG	VC	

*Sample extract/digestate/leachate

Samplenum **Container ID** **Products**
L17091705-01 973278 826-SPE 827-DIOXANE CR-6

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	29-SEP-2017 10:34	CLS		
2	ANALYZ	L1	WET	29-SEP-2017 10:43	SDC	BRG	
3	STORE	WET	A1	03-OCT-2017 15:27	BRG	SDC	

Samplenum **Container ID** **Products**
L17091705-02 973279 826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	29-SEP-2017 10:34	CLS		
2	ANALYZ	V1	ORG4	29-SEP-2017 11:51	HRF	CLS	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	29-SEP-2017 10:34	CLS		
2	ANALYZ	V1	ORG4	29-SEP-2017 11:51	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)

Laboratory Report Number: L17091706

Linda Raabe
AECOM Technical Services, Inc.
112 East Pecan
San Antonio, TX 78205

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 October 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



Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com

Lab Report #: L17091706

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?
00113329	I	5.0		J4616879751	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 #:** L17091706**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-SP140-7474-GRAB	L17091706-01	09/28/2017 15:00	09/29/2017 10:11



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091706
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

Laboratory Data Package Cover Page

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

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2017-10-05 18:50:59



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091706
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091706
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
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:	L17091706
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091706
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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

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

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

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



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091706
Project Name:		Method:	6850
Prep Batch Number(s):	WG632566	Reviewer Name:	Eric Lawson
LRC Date:	2017-10-05 00:00:00		

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

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

Exceptions Report

There are no exceptions.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091706
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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
Kerri Buck			2017-10-13 18:01:25



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091706
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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	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:	L17091706
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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:	L17091706
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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?					
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				ER#1
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:	L17091706
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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)					
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:	L17091706
Project Name:		Method:	6010
Prep Batch Number(s):	WG632044	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 00:00:00		

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

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

Exceptions Report

ER#1 - Due to continuing calibration verification failure for selenium on 02-OCT-2017 at 21:15, client sample 01 along with the batch QA/QC samples was reanalyzed on a later calibration which was compliant for selenium.



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091706
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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
Kerri Buck			2017-10-13 17:08:23



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091706
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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	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:	L17091706
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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:	L17091706
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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?					
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:	L17091706
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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)					
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:	L17091706
Project Name:		Method:	6020
Prep Batch Number(s):	WG632048	Reviewer Name:	Kerri Buck
LRC Date:	2017-10-13 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:	L17091706
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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	2017-10-10 14:20:49



Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	Laboratory Log Number:	L17091706
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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:	L17091706
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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:	L17091706
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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:	L17091706
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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:	L17091706
Project Name:		Method:	CR-6
Prep Batch Number(s):	WG631899	Reviewer Name:	Deanna Hesson
LRC Date:	2017-10-10 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 #: L17091706
 Lab Project #: 2551.096
 Project Name: Longhorn Army Ammunition
 Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091706-01	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP140-7474-GRAB	Prep Method: 6850	Prep Date: 10/04/2017 13:00
Matrix: Water	Analytical Method: 6850	Cal Date: 09/08/2017 16:52
Workgroup #: WG632566	Analyst: JWR	Run Date: 10/04/2017 20:20
Collect Date: 09/28/2017 15:00	Dilution: 10000	File ID: 1LM.LM40644
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	5610		4000	2000	1000

Certificate of Analysis

Sample #: L17091706-01	PrePrep Method: N/A	Instrument: ICP-THERMO3
Client ID: LH18/24-SP140-7474-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 06:40
Matrix: Water	Analytical Method: 6010C	Cal Date: 10/10/2017 12:23
Workgroup #: WG632186	Analyst: JYH	Run Date: 10/10/2017 13:27
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: T3.101017.132725
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Selenium, Total	7782-49-2	0.0100	U	0.0200	0.0100	0.00500
U	Analyte was not detected. The concentration is below the reported LOD.					

Lab Report #: L17091706
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091706-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP140-7474-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 07:12
Matrix: Water	Analytical Method: 6020A	Cal Date: 10/02/2017 12:02
Workgroup #: WG632098	Analyst: JYH	Run Date: 10/02/2017 14:01
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: NI.100217.140142
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 #: L17091706
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091706-01	PrePrep Method: N/A	Instrument: UV-2600
Client ID: LH18/24-SP140-7474-GRAB	Prep Method: 7196A	Prep Date: N/A
Matrix: Water	Analytical Method: 7196A	Cal Date: 09/05/2017 15:26
Workgroup #: WG631899	Analyst: SDC	Run Date: 09/29/2017 11:42
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: 00.1709291142-07
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.					

Lab Report #: L17091706

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

2.1 General Chromatography Data

2.1.1 LC/MS Data (6850)

2.1.1.1 Summary Data

Lab Report #: L17091706

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091706-01	PrePrep Method: N/A	Instrument: LCMS1
Client ID: LH18/24-SP140-7474-GRAB	Prep Method: 6850	Prep Date: 10/04/2017 13:00
Matrix: Water	Analytical Method: 6850	Cal Date: 09/08/2017 16:52
Workgroup #: WG632566	Analyst: JWR	Run Date: 10/04/2017 20:20
Collect Date: 09/28/2017 15:00	Dilution: 10000	File ID: 1LM.LM40644
Sample Tag: DL01	Units: ug/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	5610		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: 090817_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 WG628979 (waters)
 Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (09/08/2017)
 CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: NA

Comments: ICAL WG628977 : 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.LM40484	WG628977-01 CCB	1	1		09/08/17 14:40
2	1LM.LM40485	WG628977-02 STD (0.1 ug/L)	1	1	STD80232	09/08/17 14:59
3	1LM.LM40486	WG628977-03 STD (0.2 ug/L)	1	1	STD80232	09/08/17 15:18
4	1LM.LM40487	WG628977-04 STD (0.5 ug/L)	1	1	STD80232	09/08/17 15:37
5	1LM.LM40488	WG628977-05 STD (1.0 ug/L)	1	1	STD80232	09/08/17 15:56
6	1LM.LM40489	WG628977-06 STD (2.0 ug/L)	1	1	STD80232	09/08/17 16:15
7	1LM.LM40490	WG628977-07 STD (5.0 ug/L)	1	1	STD80232	09/08/17 16:34
8	1LM.LM40491	WG628977-08 STD (10 ug/L)	1	1	STD80232	09/08/17 16:52
9	1LM.LM40492	WG628977-09 SSCV (1.0 ug/L)	1	1	STD80234	09/08/17 17:11
10	1LM.LM40493	WG628984-01 CCB	1	1		09/08/17 17:30
11	1LM.LM40494	WG628984-02 CCV (1.0ug/L)	1	1	STD80232	09/08/17 17:49
12	1LM.LM40495	WG628979-05 MRL (0.2ug/L)	1	1	STD80232	09/08/17 18:08
13	1LM.LM40496	WG628979-01 MCT (0.2ug/L)	1	1	STD80234	09/08/17 18:27
14	1LM.LM40497	WG628979-02 BLANK	1	1		09/08/17 18:46
15	1LM.LM40498	WG628979-03 LCS (0.2ug/L)	1	1	STD80234	09/08/17 19:05
16	1LM.LM40499	WG628979-04 LCS2 (0.2ug/L)	1	1	STD80234	09/08/17 19:24
17	1LM.LM40500	L17081653-01	1	1		09/08/17 19:43
18	1LM.LM40501	L17081653-01 (10x) (NR)	1	10		09/08/17 20:02
19	1LM.LM40502	L17081653-01 (100x) (NR)	1	100		09/08/17 20:21
20	1LM.LM40503	L17090079-01	1	1		09/08/17 20:40
21	1LM.LM40504	L17090079-02	1	1		09/08/17 20:59
22	1LM.LM40505	L17090079-03	1	1		09/08/17 21:18
23	1LM.LM40506	WG628984-03 CCV (1.0ug/L)	1	1	STD80232	09/08/17 21:37
24	1LM.LM40507	WG628979-06 MRL (0.2ug/L)	1	1	STD80232	09/08/17 21:56
25	1LM.LM40508	WG628984-04 CCB	1	1		09/08/17 22:15

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Page: 1

Approved: 11-SEP-17




Microbac Laboratories Inc.
Instrument Run Log

Instrument: LCMS1 Dataset: 100417_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 WG632566 (waters)
 Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (09/08/2017)
 CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: NA

Comments:

Samples L17091609-01 and L17091705-01 were analyzed neat and at multiple dilutions based on their range of historical results.
Samples L17091647-01 and L17091706-01 were analyzed at dilutions only based on their historical results.

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	1LM.LM40625	WG632570-01 CCB	1	1		10/04/17 14:21
2	1LM.LM40626	WG632570-02 CCV (1.0ug/L)	1	1	STD80232	10/04/17 14:40
3	1LM.LM40627	WG632566-05 MRL (0.2ug/L)	1	1	STD80232	10/04/17 14:58
4	1LM.LM40628	WG632566-01 MCT (0.2ug/L)	1	1	STD80234	10/04/17 15:17
5	1LM.LM40629	WG632566-02 BLANK	1	1		10/04/17 15:36
6	1LM.LM40630	WG632566-03 LCS (0.2ug/L)	1	1	STD80234	10/04/17 15:55
7	1LM.LM40631	WG632566-04 LCS2 (0.2ug/L)	1	1	STD80234	10/04/17 16:14
8	1LM.LM40632	L17100003-01 LOQ (0.20ug/L)	1	1	STD80234	10/04/17 16:33
9	1LM.LM40633	L17100001-01 LOD (0.10ug/L)	1	1	STD80234	10/04/17 16:52
10	1LM.LM40634	L17091609-01	1	1		10/04/17 17:11
11	1LM.LM40635	L17091609-01 (10x) (NR)	1	10		10/04/17 17:30
12	1LM.LM40636	L17091609-01 (100x) (NR)	1	100		10/04/17 17:49
13	1LM.LM40637	L17091647-01 (10,000x)	1	10000		10/04/17 18:08
14	1LM.LM40638	WG632570-03 CCV (1.0ug/L)	1	1	STD80232	10/04/17 18:27
15	1LM.LM40639	WG632566-06 MRL (0.2ug/L)	1	1	STD80232	10/04/17 18:46
16	1LM.LM40640	WG632570-04 CCB	1	1		10/04/17 19:05
17	1LM.LM40641	L17091705-01	1	1		10/04/17 19:24
18	1LM.LM40642	L17091705-01 (10x) (NR)	1	10		10/04/17 19:42
19	1LM.LM40643	L17091705-01 (100x) (NR)	1	100		10/04/17 20:01
20	1LM.LM40644	L17091706-01 (10,000x)	1	10000		10/04/17 20:20
21	1LM.LM40645	WG632570-05 CCV (1.0ug/L)	1	1	STD80232	10/04/17 20:39
22	1LM.LM40646	WG632566-07 MRL (0.2ug/L)	1	1	STD80232	10/04/17 20:58
23	1LM.LM40647	WG632570-06 CCB	1	1		10/04/17 21:17

Comments

Seq.	Rerun	Dil.	Reason	Analytes
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Page: 1

Approved: 05-OCT-17




Microbac Laboratories Inc.

Data Checklist

Date: 08-SEP-2017
 Analyst: JWR
 Analyst: NA
 Method: 6850
 Instrument: LCMS1
 Curve Workgroup: WG628977
 Runlog ID: 84489
 Analytical Workgroups: L17081653, L17090079

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	NA
Recoveries	NA
%RPD	NA
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	ECL

Primary Reviewer:
11-SEP-2017



Secondary Reviewer:
11-SEP-2017




Microbac Laboratories Inc.

Data Checklist

Date: 04-OCT-2017
 Analyst: JWR
 Analyst: NA
 Method: 6850
 Instrument: LCMS1
 Curve Workgroup: NA
 Runlog ID: 85061
 Analytical Workgroups: L17091609, L17091647, L17091705, 091706 L17100001, 100003

ANALYTICAL	
System Performance Check	X
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	NA
Recoveries	NA
%RPD	NA
Interference check sample (ICS) (LCMS)	MCT
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	X
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	TRRP
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:
05-OCT-2017



Secondary Reviewer:
05-OCT-2017




Analytical Method:6850
Login Number:L17091706

AAB#:WG632566

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-SP140-7474-GRAB	01	09/28/17					10/04/2017	5.9	28		10/04/17	.3	28	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091706 Work Group: WG632566
 Blank File ID: 1LM.LM40629 Blank Sample ID: WG632566-02
 Prep Date: 10/04/17 13:00 Instrument ID: LCMS1
 Analyzed Date: 10/04/17 15:36 Method: 6850
 Analyst: JWR

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
QCMRL	WG632566-05	1LM.LM40627	10/04/17 14:58	01
MCT	WG632566-01	1LM.LM40628	10/04/17 15:17	01
LCS	WG632566-03	1LM.LM40630	10/04/17 15:55	01
LCS2	WG632566-04	1LM.LM40631	10/04/17 16:14	01
QCMRL	WG632566-06	1LM.LM40639	10/04/17 18:46	01
LH18/24-SP140-7474-GRAB	L17091706-01	1LM.LM40644	10/04/17 20:20	DL01
QCMRL	WG632566-07	1LM.LM40646	10/04/17 20:58	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5512546
 Report generated 10/09/2017 08:38



Login Number: L17091706 Prep Date: 10/04/17 13:00 Sample ID: WG632566-02
Instrument ID: LCMS1 Run Date: 10/04/17 15:36 Prep Method: 6850
File ID: 1LM.LM40629 Analyst: JWR Method: 6850
Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
Contract #: _____ Cal ID: LCMS1-08-SEP-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: 5512547
09-OCT-2017 08:38



Login Number: L17091706 Analyst: JWR Prep Method: 6850
 Instrument ID: LCMS1 Matrix: Water Method: 6850
 Workgroup (AAB#): WG632566 Units: ug/L
 QC Key: DOD4 Lot #: STD80234
 Sample ID: WG632566-03 LCS File ID: 1LM.LM40630 Run Date: 10/04/2017 15:55
 Sample ID: WG632566-04 LCS2 File ID: 1LM.LM40631 Run Date: 10/04/2017 16:14

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Perchlorate	0.200	0.193	96.5	0.200	0.197	98.5	2.05	80 - 120	15	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5512548
 Report generated: 10/09/2017 08:38



Login Number: L17091706
Analytical Method: 6850
ICAL Workgroup: WG628977

Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	AVG RF	% RSD	LINEAR (R)	QUAD (R ²)
Perchlorate	1.469	6.88	1.00000	

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

INT_CAL - Modified 03/06/2008
PDF File ID: 5515819
Report generated 10/09/2017 08:38



Login Number: L17091706
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	WG628977-02			WG628977-03			WG628977-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	0.100	52500.0000	1.681	0.200	93400.0000	1.487	0.500	233000.000	1.445

INT_CAL - Modified 03/06/2008
PDF File ID: 5515819
Report generated 10/09/2017 08:38



Login Number: L17091706
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	WG628977-05			WG628977-06			WG628977-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	1.00	460000.000	1.440	2.00	925000.000	1.444	5.00	2230000.00	1.418

INT_CAL - Modified 03/06/2008
PDF File ID: 5515819
Report generated 10/09/2017 08:38



Login Number: L17091706
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	WG628977-08		
	CONC	RESP	RF
Perchlorate	10.0	4190000.00	1.371

INT_CAL - Modified 03/06/2008
PDF File ID: 5515819
Report generated 10/09/2017 08:38



Login Number: L17091706 Run Date: 09/08/2017 Sample ID: WG628977-09
 Instrument ID: LCMS1 Run Time: 17:11 Method: 6850
 File ID: 1LM.LM40492 Analyst: JWR QC Key: DOD4
 ICal Workgroup: WG628977 Cal ID: LCMS1 - 08-SEP-17

Analyte	Expected	Found	Units	RF	%D	UCL	Q
Perchlorate	1.00	1.04	ug/L	1.48	4.00	15	

* Exceeds %D Limit



Login Number: L17091706 Run Date: 10/04/2017 Sample ID: WG632570-01
Instrument ID: LCMS1 Run Time: 14:21 Method: 6850
File ID: LLM.LM40625 Analyst: JWR Units: ug/L
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-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: L17091706 Run Date: 10/04/2017 Sample ID: WG632570-04
Instrument ID: LCMS1 Run Time: 19:05 Method: 6850
File ID: LLM.LM40640 Analyst: JWR Units: ug/L
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-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: L17091706 Run Date: 10/04/2017 Sample ID: WG632570-06
 Instrument ID: LCMS1 Run Time: 21:17 Method: 6850
 File ID: LLM.LM40647 Analyst: JWR Units: ug/L
 Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-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: 5512551
 Report generated 10/09/2017 08:38



Login Number: L17091706 Run Date: 10/04/2017 Sample ID: WG632570-02
 Instrument ID: LCMS1 Run Time: 14:40 Method: 6850
 File ID: 1LM.LM40626 Analyst: JWR QC Key: DOD4
 Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.12	ug/L	1.58	12.0	15	

* Exceeds %D Criteria



Login Number: L17091706 Run Date: 10/04/2017 Sample ID: WG632570-03
Instrument ID: LCMS1 Run Time: 18:27 Method: 6850
File ID: 1LM.LM40638 Analyst: JWR QC Key: DOD4
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-17
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.05	ug/L	1.48	5.00	15	

* Exceeds %D Criteria



Login Number: L17091706 Run Date: 10/04/2017 Sample ID: WG632570-05
Instrument ID: LCMS1 Run Time: 20:39 Method: 6850
File ID: 1LM.LM40645 Analyst: JWR QC Key: DOD4
Workgroup (AAB#): WG632566 Cal ID: LCMS1 - 08-SEP-17
Matrix: WATER

Analyte	Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate	1.00	1.07	ug/L	1.52	7.00	15	

* Exceeds %D Criteria



Login Number: L17091706 Run Date: 10/04/2017 Sample ID: WG632566-05
 Instrument ID: LCMS1 Run Time: 14:58 Prep Method: 6850
 File ID: 1LM.LM40627 Analyst: JWR Method: 6850
 Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: LCMS1-08-SEP-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.200	100	70 - 130	



Login Number: L17091706 Run Date: 10/04/2017 Sample ID: WG632566-06
Instrument ID: LCMS1 Run Time: 18:46 Prep Method: 6850
File ID: 1LM.LM40639 Analyst: JWR Method: 6850
Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
Contract #: _____ Cal ID: LCMS1-08-SEP-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.204	102	70 - 130	



Login Number: L17091706 Run Date: 10/04/2017 Sample ID: WG632566-07
 Instrument ID: LCMS1 Run Time: 20:58 Prep Method: 6850
 File ID: 1LM.LM40646 Analyst: JWR Method: 6850
 Workgroup (AAB#): WG632566 Matrix: Water Units: ug/L
 Contract #: _____ Cal ID: LCMS1-08-SEP-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.197	98.5	70 - 130	



Login Number: L17091706
Instrument ID: LCMS1
Workgroup (AAB#): WG632566

ICAL CCV Number: WG628977-05
CAL ID: LCMS1-08-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG628977	NA	NA	1580000
Upper Limit	NA	NA	2370000
Lower Limit	NA	NA	790000
<u>L17091706-01</u>	<u>10000</u>	<u>DL01</u>	<u>1970000</u>
WG632566-02	1.00	01	1650000
WG632566-03	1.00	01	1670000
WG632566-04	1.00	01	1700000

IS-1 - 018LP

Underline = Response outside limits



Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: 6850	Samplenum: L17091706-01
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40644
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 20:20	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	319000	103000	3.10	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG628977-02
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40485
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 14:59	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	52500	17500	3.00	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG628977-03
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40486
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 15:18	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	93400	29500	3.17	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG628977-04
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40487
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 15:37	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	233000	79100	2.95	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: _____
Prep Date: _____
Anal Method: 6850
Analysis Date: 09/08/2017 15:56

Samplenum: WG628977-05
File ID: 1LM.LM40488
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	460000	150000	3.07	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method:
Prep Date:
Anal Method: 6850
Analysis Date: 09/08/2017 16:15

Samplenum: WG628977-06
File ID: 1LM.LM40489
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	925000	303000	3.05	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG628977-07
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40490
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 16:34	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	2230000	745000	2.99	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG628977-08
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40491
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 16:52	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	4190000	1390000	3.01	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG628977-09
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40492
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 09/08/2017 17:11	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	478000	152000	3.14	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: 6850	Samplenum: WG632566-01
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40628
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 15:17	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	102000	34000	3.00	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: 6850	Samplenum: WG632566-02
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40629
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 15:36	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	2230	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: 6850	Samplenum: WG632566-03
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40630
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 15:55	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	100000	34100	2.93	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: 6850	Samplenum: WG632566-04
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40631
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 16:14	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	103000	32500	3.17	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: 6850	Samplenum: WG632566-05
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40627
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 14:58	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	98100	32300	3.04	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: 6850	Samplenum: WG632566-06
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40639
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 18:46	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	116000	37600	3.09	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: 6850	Samplenum: WG632566-07
Instrument: LCMS1	Prep Date: 10/04/2017 13:00	File ID: 1LM.LM40646
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 20:58	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	116000	40300	2.88	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG632570-01
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40625
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 14:21	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	1420	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG632570-02
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40626
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 14:40	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	490000	156000	3.14	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG632570-03
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40638
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 18:27	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	547000	183000	2.99	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG632570-04
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40640
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 19:05	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	1690	1440	1.17	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706	Prep Method: _____	Samplenum: WG632570-05
Instrument: LCMS1	Prep Date: _____	File ID: 1LM.LM40645
Analyst: JWR	Anal Method: 6850	Matrix: Water
Worknum: WG632566	Analysis Date: 10/04/2017 20:39	Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	579000	190000	3.05	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.



Login #: L17091706
Instrument: LCMS1
Analyst: JWR
Worknum: WG632566

Prep Method: _____
Prep Date: _____
Anal Method: 6850
Analysis Date: 10/04/2017 21:17

Samplenum: WG632570-06
File ID: 1LM.LM40647
Matrix: Water
Units: ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	2310	1310	1.76	2.3	3.8	*

2.2 Metals Data

2.2.1 Metals I C P Data

2.2.1.1 Summary Data

Lab Report #: L17091706

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091706-01	PrePrep Method: N/A	Instrument: ICP-THERMO3
Client ID: LH18/24-SP140-7474-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 06:40
Matrix: Water	Analytical Method: 6010C	Cal Date: 10/10/2017 12:23
Workgroup #: WG632186	Analyst: JYH	Run Date: 10/10/2017 13:27
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: T3.101017.132725
Sample Tag: 01	Units: mg/L	

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Selenium, Total	7782-49-2	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 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: WG632044
 Analyst: ERP
 Spike Analyst: ERP
 Run Date: 10/02/2017 06:40
 Method: 3015A
 Balance: BAL019
 Instrument: MW-1
 Instrument Start: 10/02/2017 07:09

SOP: ME407 Revision 19
 Spike Solution: STD83991
 Spike Witness: VC
 HNO3 Lot #: COA19940
 HCL Lot #: COA20006
 40 & 50 ML. DIGESTION TUCOA19932
 ICP FILTERS LOT#r7ha2443RGT40684

SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG632044-02	BLANK	1	40 mL	50 mL	204.418 g	204.408 g	
2	WG632044-03	LCS	1	40 mL	50 mL	212.505 g	212.498 g	5 mL
3	L17091458-02	SAMP	1	40 mL	50 mL	204.378 g	204.37 g	10/06/17
4	L17091458-04	SAMP	1	40 mL	50 mL	205.84 g	205.821 g	10/06/17
5	L17091532-02	SAMP	1	1 mL	50 mL	202.956 g	202.932 g	10/06/17
6	L17091532-04	SAMP	1	1 mL	50 mL	204.309 g	204.295 g	10/06/17
7	L17091532-06	SAMP	1	1 mL	50 mL	207.01 g	206.98 g	10/06/17
8	L17091645-02	SAMP	1	40 mL	50 mL	205.084 g	205.069 g	10/09/17
9	L17091645-04	SAMP	1	40 mL	50 mL	206.635 g	206.628 g	10/09/17
10	L17091645-06	SAMP	1	40 mL	50 mL	204.463 g	204.449 g	10/09/17
11	L17091691-01	SAMP	1	40 mL	50 mL	205.321 g	205.307 g	10/06/17
12	L17091691-02	SAMP	1	40 mL	50 mL	205.295 g	205.283 g	10/06/17
13	L17091705-01	SAMP	1	40 mL	50 mL	206.56 g	206.546 g	10/10/17
14	L17091706-01	SAMP	1	40 mL	50 mL	203.231 g	203.218 g	10/10/17
15	L17091719-02	SAMP	1	40 mL	50 mL	206.011 g	205.983 g	10/10/17
16	L17091719-04	SAMP	1	40 mL	50 mL	202.673 g	202.641 g	10/10/17
17	L17091719-06	SAMP	1	40 mL	50 mL	205.81 g	205.793 g	10/10/17
18	L17091741-01	SAMP	1	40 mL	50 mL	204.296 g	204.276 g	10/04/17
19	L17091741-02	SAMP	1	40 mL	50 mL	204.663 g	204.647 g	10/04/17
20	WG632044-01	REF	1	40 mL	50 mL	205.91 g	205.869 g	
21	L17091741-03	SAMP	1	40 mL	50 mL	205.91 g	205.869 g	10/04/17
22	L17091768-01	SAMP	1	40 mL	50 mL	208.465 g	208.442 g	10/06/17
23	L17091768-03	SAMP	1	40 mL	50 mL	209.442 g	209.427 g	10/06/17
24	WG632044-04	MS	1	40 mL	50 mL	211.027 g	211.007 g	5 mL
25	WG632044-05	MSD	1	40 mL	50 mL	210.873 g	210.849 g	5 mL

L17091532-04	Filtered digestate
L17091691-02	FILTERED DIGESTATE

Analyst: Evan Potten

Reviewer: Verde Collier



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO3 Dataset: 101017T3.3R.TXT

Analyst1: JYH Analyst2: N/A

Method: 200.7/6010B/6010C SOP: ME600G Rev: 8

Maintenance Log ID: _____

Calibration Std: STD84303 ICV Std: STD84302 Post Spike: STD80131

ICSA: STD84168 IC SAB: STD84169 Int. Std: RGT40895

CCV: STD84304 LLCCV: _____ Tuning Sol: _____

Stannous: _____ Hydroxylamine: _____

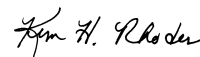
Workgroups: 632186,633277,632298,633392

Comments:

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Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	T3.101017.120638	WG633389-01	Calibration Point		1		10/10/17 12:06
2	T3.101017.121051	WG633389-02	Calibration Point		1		10/10/17 12:10
3	T3.101017.121503	WG633389-03	Calibration Point		1		10/10/17 12:15
4	T3.101017.121915	WG633389-04	Calibration Point		1		10/10/17 12:19
5	T3.101017.122306	WG633389-05	Calibration Point		1		10/10/17 12:23
6	T3.101017.122646	WG633389-06	Initial Calibration Verification		1		10/10/17 12:26
7	T3.101017.123038	WG633389-07	Initial Calib Blank		1		10/10/17 12:30
8	T3.101017.123450	WG633389-08	LLICV		1		10/10/17 12:34
9	T3.101017.124246	WG633389-09	Low Level Initial Calibration V		1		10/10/17 12:42
10	T3.101017.124655	WG633389-10	Interference Check		1		10/10/17 12:46
11	T3.101017.125103	WG633389-11	Interference Check		1		10/10/17 12:51
12	T3.101017.125500	WG633389-12	CCV		1		10/10/17 12:55
13	T3.101017.125851	WG633389-13	CCB		1		10/10/17 12:58
14	T3.101017.130304	WG632044-02	Method/Prep Blank	40/50	1		10/10/17 13:03
15	T3.101017.130716	WG632044-03	Laboratory Control S	40/50	1		10/10/17 13:07
16	T3.101017.131111	WG632044-01	Reference Sample		1	L17091741-03	10/10/17 13:11
17	T3.101017.131519	WG632044-04	Matrix Spike	40/50	1	L17091741-03	10/10/17 13:15
18	T3.101017.131913	WG632044-05	Matrix Spike Duplica	40/50	1	L17091741-03	10/10/17 13:19
19	T3.101017.132308	L17091705-01	LH18/24-SP650-6474-GRAB	40/50	1		10/10/17 13:23
20	T3.101017.132725	L17091706-01	LH18/24-SP140-7474-GRAB	40/50	1		10/10/17 13:27
21	T3.101017.133133	WG632186-05	Post Digestion Spike		1	L17091706-01	10/10/17 13:31
22	T3.101017.133516	WG632186-06	Serial Dilution		5	L17091706-01	10/10/17 13:35
23	T3.101017.133925	WG633389-14	CCV		1		10/10/17 13:39
24	T3.101017.134316	WG633389-15	CCB		1		10/10/17 13:43
25	T3.101017.134728	WG633389-16	Low Level Continuing Calibra		1		10/10/17 13:47
26	T3.101017.135139	PBW 91	PBW 91	40/50	1		10/10/17 13:51
27	T3.101017.135540	LC-SW	LCSW 91	40/50	1		10/10/17 13:55
28	T3.101017.135934	L17100001-01	MDL-1	40/50	1		10/10/17 13:59
29	T3.101017.140346	L17100003-01	LOQ-1		1		10/10/17 14:03
30	T3.101017.140753	WG633389-17	CCV		1		10/10/17 14:07
31	T3.101017.141144	WG633389-18	CCB		1		10/10/17 14:11
32	T3.101017.141557	L17100003-01	LOQ-1	40/50	1		10/10/17 14:15
33	T3.101017.142007	WG632441-02	Method/Prep Blank	40/50	1		10/10/17 14:20
34	T3.101017.142419	WG632441-03	Laboratory Control S	40/50	1		10/10/17 14:24

Page: 1 Approved: October 12, 2017




Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO3 Dataset: 101017T3.3R.TXT
 Analyst1: JYH Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 8
 Maintenance Log ID: _____

Calibration Std: STD84303 ICV Std: STD84302 Post Spike: STD80131
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RGT40895
 CCV: STD84304 LLCCV: _____ Tuning Sol: _____
 Stannous: _____ Hydroxylamine: _____

Workgroups: 632186,633277,632298,633392

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	T3.101017.142813	WG632312-01	Fluid Blank 1		1		10/10/17 14:28
36	T3.101017.143225	WG632312-02	Fluid Blank 2		1		10/10/17 14:32
37	T3.101017.143636	WG632441-01	Reference Sample		1	L17091700-07	10/10/17 14:36
38	T3.101017.144046	WG632441-04	Matrix Spike	40/50	1	L17091700-07	10/10/17 14:40
39	T3.101017.144441	WG632441-05	Matrix Spike Duplica	40/50	1	L17091700-07	10/10/17 14:44
40	T3.101017.144834	L17100060-02	FILTERCAKE-092917	5/50	1		10/10/17 14:48
41	T3.101017.145244	WG632981-03	Post Digestion Spike		1	L17100060-02	10/10/17 14:52
42	T3.101017.145638	WG633389-19	CCV		1		10/10/17 14:56
43	T3.101017.150030	WG633389-20	CCB		1		10/10/17 15:00
44	T3.101017.150443	L17100135-01	K711152-01	5/50	1		10/10/17 15:04
45	T3.101017.150854	WG632981-04	Serial Dilution		5	L17100060-02	10/10/17 15:08
46	T3.101017.151305	WG633389-21	CCV		1		10/10/17 15:13
47	T3.101017.151657	WG633389-22	CCB		1		10/10/17 15:16
48	T3.101017.152058	WG633389-23	Low Level Continuing Calibra		1		10/10/17 15:20
49	T3.101017.161118	L17100012-89	T2		1		10/10/17 16:11
50	T3.101017.161700	L17100012-89	T2		1		10/10/17 16:17
51	T3.101017.162119	WG633389-24	CCV		1		10/10/17 16:21
52	T3.101017.162511	WG633389-25	CCB		1		10/10/17 16:25
53	T3.101017.162924	WG633253-01	Method/Prep Blank	1/50	1		10/10/17 16:29
54	T3.101017.163343	WG633253-02	Laboratory Control S	1/50	1		10/10/17 16:33
55	T3.101017.163757	WG633253-03	Laboratory Control S	1/50	1		10/10/17 16:37
56	T3.101017.164205	L17100508-41	16600-WP01-WP003	1/50	1		10/10/17 16:42
57	T3.101017.164613	L17100508-42	16600-WP01-WP004	1/50	1		10/10/17 16:46
58	T3.101017.165022	L17100508-43	16600-WP01-WP005	1/50	1		10/10/17 16:50
59	T3.101017.165428	L17100508-44	16600-WP01-WP006	1/50	1		10/10/17 16:54
60	T3.101017.165836	L17100508-45	16600-WP01-WP007	1/50	1		10/10/17 16:58
61	T3.101017.170243	L17100508-46	16600-WP01-WP008	1/50	1		10/10/17 17:02
62	T3.101017.170652	L17100508-47	16600-WP01-WP009	1/50	1		10/10/17 17:06
63	T3.101017.171102	WG633389-26	CCV		1		10/10/17 17:11
64	T3.101017.171454	WG633389-27	CCB		1		10/10/17 17:14
65	T3.101017.171910	L17100508-48	16600-WP01-WP010	1/50	1		10/10/17 17:19
66	T3.101017.172318	L17100508-49	16600-WP01-WP011	1/50	1		10/10/17 17:23
67	T3.101017.172728	L17100508-50	16600-WP01-WP012	1/50	1		10/10/17 17:27
68	T3.101017.173136	L17100508-51	16600-WP01-WP013	1/50	1		10/10/17 17:31

Page: 2 Approved: October 12, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-THERMO3 Dataset: 101017T3.3R.TXT
 Analyst1: JYH Analyst2: N/A
 Method: 200.7/6010B/6010C SOP: ME600G Rev: 8
 Maintenance Log ID: _____
 Calibration Std: STD84303 ICV Std: STD84302 Post Spike: STD80131
 ICSA: STD84168 ICSAB: STD84169 Int. Std: RG40895
 CCV: STD84304 LLCCV: _____ Tuning Sol: _____
 Stannous: _____ Hydroxylamine: _____

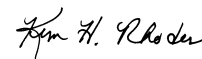
Workgroups: 632186,633277,632298,633392

Comments:

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Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
69	T3.101017.173544	L17100508-52	16600-WP01-WP014	1/50	1		10/10/17 17:35
70	T3.101017.173942	L17100508-53	16600-WP01-WP015	1/50	1		10/10/17 17:39
71	T3.101017.174351	L17100508-54	16600-WP01-WP016	1/50	1		10/10/17 17:43
72	T3.101017.174759	WG633392-01	Post Digestion Spike		1	L17100508-54	10/10/17 17:47
73	T3.101017.175154	WG633392-02	Serial Dilution		5	L17100508-54	10/10/17 17:51
74	T3.101017.175605	WG633389-28	CCV		1		10/10/17 17:56
75	T3.101017.175956	WG633389-29	CCB		1		10/10/17 17:59

Page: 3 Approved: October 12, 2017




Microbac Laboratories Inc.

Data Checklist

Date: 10-OCT-2017
 Analyst: JYH
 Analyst: NA
 Method: 6010B/6010C/200.7
 Instrument: ICP-THERMO3
 Curve Workgroup: 633389
 Runlog ID: 85160
 Analytical Workgroups: 632186,633277,632298,633392

Additional Work Group	
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	1705,1706,060,508
Client Forms	X
Level X	
Level 3	
Level 4	1705,1706,060,508
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	KHR
Comments	

Primary Reviewer:

Secondary Reviewer:
12-OCT-2017



Analytical Method:6010C
Login Number:L17091706

AAB#:WG632186

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-SP140-7474-GRAB	01	09/28/17					10/02/2017	3.7	180		10/10/17	11.9	180	

* = SEE PROJECT QAPP REQUIREMENTS



Analytical Method:6010C
Login Number:L17091706

AAB#:WG632186

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-SP140-7474-GRAB	01	09/28/17					10/02/2017	3.7	180		10/05/17	7.2	180	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091706
 Blank File ID: T3.101017.130304
 Prep Date: 10/02/17 06:40
 Analyzed Date: 10/10/17 13:03
 Analyst: JYH

Work Group: WG632186
 Blank Sample ID: WG632044-02
 Instrument ID: ICP-THERMO3
 Method: 6010C

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632044-03	T3.101017.130716	10/10/17 13:07	01
LH18/24-SP140-7474-GRAB	L17091706-01	T3.101017.132725	10/10/17 13:27	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5520541
 Report generated 10/10/2017 15:49



METHOD BLANK SUMMARY

Login Number: L17091706 Work Group: WG632186
 Blank File ID: T4.100217.203751 Blank Sample ID: WG632044-02
 Prep Date: 10/02/17 06:40 Instrument ID: ICP-THERMO4
 Analyzed Date: 10/02/17 20:37 Method: 6010C
 Analyst: KKB

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632044-03	T4.100217.204139	10/02/17 20:41	01
LCS	WG632044-03	T4.100517.195437	10/05/17 19:54	02
LH18/24-SP140-7474-GRAB	L17091706-01	T4.100517.202442	10/05/17 20:24	02

Report Name: BLANK_SUMMARY
 PDF File ID: 5514357
 Report generated 10/06/2017 11:33



METHOD BLANK SUMMARY

Login Number: L17091706 Work Group: WG632186
 Blank File ID: T4.100517.195049 Blank Sample ID: WG632044-02
 Prep Date: 10/02/17 06:40 Instrument ID: ICP-THERMO4
 Analyzed Date: 10/05/17 19:50 Method: 6010C
 Analyst: KKB

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632044-03	T4.100217.204139	10/02/17 20:41	01
LCS	WG632044-03	T4.100517.195437	10/05/17 19:54	02
LH18/24-SP140-7474-GRAB	L17091706-01	T4.100517.202442	10/05/17 20:24	02

Report Name: BLANK_SUMMARY
 PDF File ID: 5514357
 Report generated 10/06/2017 11:33



Login Number: L17091706 Prep Date: 10/02/17 06:40 Sample ID: WG632044-02
Instrument ID: ICP-THERMO3 Run Date: 10/10/17 13:03 Prep Method: 3015A
File ID: T3.101017.130304 Analyst: JYH Method: 6010C
Workgroup (AAB#): WG632186 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: ICP-TH-10-OCT-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Selenium, Total	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: 5520542
10-OCT-2017 15:49



Login Number: L17091706 Prep Date: 10/02/17 06:40 Sample ID: WG632044-02
Instrument ID: ICP-THERMO4 Run Date: 10/02/17 20:37 Prep Method: 3015A
File ID: T4.100217.203751 Analyst: KKB Method: 6010C
Workgroup (AAB#): WG632186 Matrix: Water Units: mg/L
Contract #: _____ Cal ID: ICP-TH-02-OCT-17

Report Name: BLANK
PDF ID: 5514358
06-OCT-2017 11:38



Login Number: L17091706 Prep Date: 10/02/17 06:40 Sample ID: WG632044-02
 Instrument ID: ICP-THERMO4 Run Date: 10/05/17 19:50 Prep Method: 3015A
 File ID: T4.100517.195049 Analyst: KKB Method: 6010C
 Workgroup (AAB#): WG632186 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: ICP-TH-05-OCT-17

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Selenium, Total	0.0100	0.0200	0.0101	1	*

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: 5514358
 06-OCT-2017 11:38



Login Number: L17091706 Run Date: 10/10/2017 Sample ID: WG632044-03
Instrument ID: ICP-THERMO3 Run Time: 13:07 Prep Method: 3015A
File ID: T3.101017.130716 Analyst: JYH Method: 6010C
Workgroup (AAB#): WG632186 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD83991 Cal ID: ICP-TH-10-OCT-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Selenium, Total	0.250	0.262	105	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 5520543
Report generated: 10/10/2017 15:49



Login Number: <u>L17091706</u>	Run Date: <u>10/02/2017</u>	Sample ID: <u>WG632044-03</u>
Instrument ID: <u>ICP-THERMO4</u>	Run Time: <u>20:41</u>	Prep Method: <u>3015A</u>
File ID: <u>T4.100217.204139</u>	Analyst: <u>KKB</u>	Method: <u>6010C</u>
Workgroup (AAB#): <u>WG632186</u>	Matrix: <u>Water</u>	Units: <u>mg/L</u>
QC Key: <u>DOD4</u>	Lot#: <u>STD83991</u>	Cal ID: <u>ICP-TH-02-OCT-17</u>

LCS - Modified 03/06/2008
PDF File ID: 5514359
Report generated: 10/06/2017 11:33



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632044-03
Instrument ID: ICP-THERMO4 Run Time: 19:54 Prep Method: 3015A
File ID: T4.100517.195437 Analyst: KKB Method: 6010C
Workgroup (AAB#): WG632186 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD83991 Cal ID: ICP-TH-05-OCT-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Selenium, Total	0.250	0.244	97.6	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 5514359
Report generated: 10/06/2017 11:33



Loginnum: L17091706 Cal ID: ICP-THERMO3- Worknum: WG632186
 Instrument ID: ICP-THERMO3 Contract #: _____ Method: 6010C
 Parent ID: WG632044-01 File ID: T3.101017.131111 Dil: 1 Matrix: WATER
 Sample ID: WG632044-04 MS File ID: T3.101017.131519 Dil: 1 Units: mg/L
 Sample ID: WG632044-05 MSD File ID: T3.101017.131913 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Selenium	0.0144	0.250	0.318	121	0.250	0.308	117	3.13	80 - 120	20	*

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Loginnum: L17091706 Cal ID: ICP-THERMO4- Worknum: WG632186
 Instrument ID: ICP-THERMO4 Contract #: _____ Method: 6010C
 Parent ID: WG632044-01 File ID: T4.100517.203936 Dil: 1 Matrix: WATER
 Sample ID: WG632044-04 MS File ID: T4.100517.204322 Dil: 1 Units: mg/L
 Sample ID: WG632044-05 MSD File ID: T4.100517.204657 Dil: 1

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Selenium, Total	0.0402	0.250	0.287	98.7	0.250	0.291	100	1.28	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17091706 **Worknum:** WG632186
Instrument: ICP-THERMO3 **Method:** 6010C
Serial Dil: WG632186-06 **File ID:** T3.101017.133516 **Dil:** 5 **Units:** ug/L
Sample: L17091706-01 **File ID:** T3.101017.132725 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Selenium	3.78		3.70		2.12	

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: 5520538

10/10/2017 15:49



Microbac Laboratories Inc.
Serial Dilution Report

Login: L17091706 **Worknum:** WG632186
Instrument: ICP-THERMO4 **Method:** 6010C
Serial Dil: WG632186-02 **File ID:** T4.100517.200923 **Dil:** 50 **Units:** ug/L
Sample: L17091645-02 **File ID:** T4.100517.200159 **Dil:** 10

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Selenium	17.5		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 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: 5514354

10/06/2017 11:33



Microbac Laboratories Inc.
Serial Dilution Report

Login: L17091706 **Worknum:** WG632186
Instrument: ICP-THERMO4 **Method:** 6010C
Serial Dil: WG632186-02 **File ID:** T4.100217.211120 **Dil:** 5 **Units:** ug/L
Sample: L17091645-02 **File ID:** T4.100217.210400 **Dil:** 1

Analyte	Sample	Qual	Serial Dil	Qual	% Diff	Q
Selenium	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 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: 5514354

10/06/2017 11:33



Sample Login ID: L17091706 Worknum: WG632186
 Instrument ID: ICP-THERMO3 Method: 6010C
 Post Spike ID: WG632186-05 File ID: T3.101017.133133 Dil: 1 Units: ug/L
 Sample ID: L17091706-01 File ID: T3.101017.132725 Dil: 1 Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
SELENIUM	209		0	U	200	104.4	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



Sample Login ID: L17091706 Worknum: WG632186
 Instrument ID: ICP-THERMO4 Method: 6010C
 Post Spike ID: WG632186-01 File ID: T4.100217.210745 Dil: 1 Units: ug/L
 Sample ID: L17091645-02 File ID: T4.100217.210400 Dil: 1 Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
SELENIUM	160		0	U	200	79.9	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



Sample Login ID: L17091706 Worknum: WG632186
 Instrument ID: ICP-THERMO4 Method: 6010C
 Post Spike ID: WG632186-01 File ID: T4.100517.200548 Dil: 10 Units: ug/L
 Sample ID: L17091645-02 File ID: T4.100517.200159 Dil: 10 Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
SELENIUM	181		0	U	200	90.8	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: L17091706 Workgroup (AAB#): WG632186
 Analytical Method: 6010C Instrument ID: ICP-THERMO3
 ICAL Worknum: WG633389 Initial Calibration Date: 10-OCT-2017 12:23

	WG633389-01		WG633389-02		WG633389-03		WG633389-04		WG633389-05		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
SELENIUM	0	-0.000170	NA	NA	.008	-0.000120	.4	0.00424	.8	0.00882	.999661	

INT = Instrument intensity
 R = Coefficient of correlation
 Q = Data Qualifier
 * = Out of Compliance; R < 0.995



Login: L17091706 Workgroup (AAB#): WG632186
 Analytical Method: 6010C Instrument ID: ICP-THERMO4
 ICAL Worknum: WG632178 Initial Calibration Date: 02-OCT-2017 12:37

	WG632178-01		WG632178-02		WG632178-03		WG632178-04		WG632178-05		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
SELENIUM	0	-0.0000100	NA	NA	.008	0.0000900	.4	0.00342	.8	0.00682	.998099	

INT = Instrument intensity
 R = Coefficient of correlation
 Q = Data Qualifier
 * = Out of Compliance; R < 0.995



Login: L17091706 Workgroup (AAB#): WG632186
 Analytical Method: 6010C Instrument ID: ICP-THERMO4
 ICAL Worknum: WG632900 Initial Calibration Date: 05-OCT-2017 16:45

	WG632900-01		WG632900-02		WG632900-03		WG632900-04		WG632900-05		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
SELENIUM	0	-0.0000200	NA	NA	.008	0.0000600	.4	0.00264	.8	0.00521	.998172	

INT = Instrument intensity
 R = Coefficient of correlation
 Q = Data Qualifier
 * = Out of Compliance; R < 0.995



Login Number: L17091706 Run Date: 10/10/2017 Sample ID: WG633389-07
Instrument ID: ICP-THERMO3 Run Time: 12:30 Method: 6010C
File ID: T3.101017.123038 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-THERM - 10-OCT-17
Matrix: WATER

Analytes	MDL	RDL	Concentration	Qualifier
SELENIUM	.004	.016	.004	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: L17091706 Run Date: 10/02/2017 Sample ID: WG632178-07
Instrument ID: ICP-THERMO4 Run Time: 13:11 Method: 6010C
File ID: T4.100217.131115 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-THERI - 02-OCT-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: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-07
Instrument ID: ICP-THERMO4 Run Time: 16:52 Method: 6010C
File ID: T4.100517.165203 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-THERI - 05-OCT-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: L17091706 Run Date: 10/10/2017 Sample ID: WG633389-13
Instrument ID: ICP-THERMO3 Run Time: 12:58 Method: 6010C
File ID: T3.101017.125851 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00400	0.0160	0.00400	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: 5520552
Report generated 10/10/2017 15:49



Login Number: L17091706 Run Date: 10/10/2017 Sample ID: WG633389-15
Instrument ID: ICP-THERMO3 Run Time: 13:43 Method: 6010C
File ID: T3.101017.134316 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00400	0.0160	0.00400	U

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



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-14
 Instrument ID: ICP-THERMO4 Run Time: 17:18 Method: 6010C
 File ID: T4.100517.171838 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 05-OCT-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: 5514368
 Report generated 10/06/2017 11:34



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-20
 Instrument ID: ICP-THERMO4 Run Time: 19:35 Method: 6010C
 File ID: T4.100517.193534 Analyst: KKB Units: mg/L
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00800	0.0160	0.0109	F

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: 5514368
 Report generated 10/06/2017 11:34



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-25
Instrument ID: ICP-THERMO4 Run Time: 20:31 Method: 6010C
File ID: T4.100517.203158 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 05-OCT-17
Matrix: WATER QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Selenium	0.00800	0.0160	-0.00924	F

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: 5514368
Report generated 10/06/2017 11:34



Login Number: L17091706 Run Date: 10/10/2017 Sample ID: WG633389-06
Instrument ID: ICP-THERMO3 Run Time: 12:26 Method: 6010C
File ID: T3.101017.122646 Analyst: JYH Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Selenium	.4	0.413	103	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632178-06
Instrument ID: ICP-THERMO4 Run Time: 13:04 Method: 6010C
File ID: T4.100217.130417 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 02-OCT-17
QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Selenium	.4	0.418	105	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-06
Instrument ID: ICP-THERMO4 Run Time: 16:48 Method: 6010C
File ID: T4.100517.164830 Analyst: KKB Units: mg/L
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 05-OCT-17
QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Selenium	.4	0.397	99.2	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17091706 Run Date: 10/10/2017 Sample ID: WG633389-12
Instrument ID: ICP-THERMO3 Run Time: 12:55 Method: 6010C
File ID: T3.101017.125500 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.399	mg/L	99.7	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/10/2017 Sample ID: WG633389-14
 Instrument ID: ICP-THERMO3 Run Time: 13:39 Method: 6010C
 File ID: T3.101017.133925 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.396	mg/L	98.9	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632178-13
 Instrument ID: ICP-THERMO4 Run Time: 13:33 Method: 6010C
 File ID: T4.100217.133345 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.424	mg/L	106	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632178-39
 Instrument ID: ICP-THERMO4 Run Time: 20:30 Method: 6010C
 File ID: T4.100217.203033 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.360	mg/L	90.1	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632178-41
 Instrument ID: ICP-THERMO4 Run Time: 21:15 Method: 6010C
 File ID: T4.100217.211510 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.349	mg/L	87.4	90 - 110	*

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-13
 Instrument ID: ICP-THERMO4 Run Time: 17:15 Method: 6010C
 File ID: T4.100517.171507 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.402	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
 PDF File ID: 5514367
 Report generated 10/06/2017 11:34



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-19
 Instrument ID: ICP-THERMO4 Run Time: 19:32 Method: 6010C
 File ID: T4.100517.193202 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.378	mg/L	94.5	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
 PDF File ID: 5514367
 Report generated 10/06/2017 11:34



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-24
 Instrument ID: ICP-THERMO4 Run Time: 20:28 Method: 6010C
 File ID: T4.100517.202828 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.400	0.380	mg/L	95.0	90 - 110	

* Exceeds LIMITS Criteria

CCV - Modified 03/05/2008
 PDF File ID: 5514367
 Report generated 10/06/2017 11:34



Login Number: L17091706 Run Date: 10/10/2017 Sample ID: WG633389-09
 Instrument ID: ICP-THERMO3 Run Time: 12:42 Method: 6010C
 File ID: T3.101017.124246 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0165	mg/L	103	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/10/2017 Sample ID: WG633389-16
 Instrument ID: ICP-THERMO3 Run Time: 13:47 Method: 6010C
 File ID: T3.101017.134728 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 10-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0181	mg/L	113	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-10
 Instrument ID: ICP-THERMO4 Run Time: 17:03 Method: 6010C
 File ID: T4.100517.170358 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0172	mg/L	108	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-21
 Instrument ID: ICP-THERMO4 Run Time: 19:39 Method: 6010C
 File ID: T4.100517.193925 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0116	mg/L	72.3	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/05/2017 Sample ID: WG632900-23
 Instrument ID: ICP-THERMO4 Run Time: 19:47 Method: 6010C
 File ID: T4.100517.194701 Analyst: KKB QC Key: DOD4
 Workgroup (AAB#): WG632186 Cal ID: ICP-TH - 05-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Selenium	0.0160	0.0132	mg/L	82.5	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17091706
Instrument ID: ICP-THERMO3
Sol. A: WG633389-10
Sol. AB: WG633389-11

File ID: T3.101017.124655
File ID: T3.101017.125103

Workgroup (AAB#): WG632186
Method: 6010C
Units: mg/L
Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Selenium	NS	0.00252	NS	0.250	0.263	105	

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: L17091706
Instrument ID: ICP-THERMO4
Sol. A : WG632178-11
Sol. AB : WG632178-12

File ID: T4.100217.132626
File ID: T4.100217.133010

Workgroup (AAB#): WG632186
Method: 6010C
Units: mg/L
Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Selenium	NS	0.00389	NS	0.250	0.271	108	

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: L17091706
 Instrument ID: ICP-THERMO4
 Sol. A: WG632900-11
 Sol. AB: WG632900-12

File ID: T4.100517.170745
 File ID: T4.100517.171130

Workgroup (AAB#): WG632186
 Method: 6010C
 Units: mg/L
 Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Selenium	NS	-0.000300	NS	0.250	0.245	98.0	

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: L17091706
 Instrument ID: ICP-THERMO3

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	0.0000310	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	0.000250	0	0	0
LITHIUM	670.70	0	0	0	0	0
MAGNESIUM	279.00	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	196.00	0	-0.0000400	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.00	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	0.00000700	0	0	0
ZIRCONIUM	339.10	0	0	0	0	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5520546
 Report generated: 10/10/2017 15:49



Login Number: L17091706
 Instrument ID: ICP-THERMO3

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	279.00	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	196.00	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.00	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: 5520546
 Report generated: 10/10/2017 15:49



Login Number: L17091706
 Instrument ID: ICP-THERMO3

Date: 01/04/2017
 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	-0.0000210	0	0	0
BARIUM	455.40	0	0	0	0	0
BERYLLIUM	313.10	0	0	0	0	0
BORON	249.60	0	-0.000220	0	0	0
CADMIUM	228.80	0	-0.0000100	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	0.000650	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	279.00	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	0.0000420	0	0	0
PHOSPHORUS	214.90	0.0390	0.000900	0	0	0
POTASSIUM	766.40	0	0	0	0	0
SELENIUM	196.00	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.00	0	-0.000150	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	-0.000300	0	0	0
VANADIUM	292.40	0	0.0000100	0	0	0
ZINC	206.20	0	0	0	0	0
ZIRCONIUM	339.10	0	-0.0000300	0	0	0

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5520546
 Report generated: 10/10/2017 15:49



Login Number: L17091706
 Instrument ID: ICP-THERMO3

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	0.00120	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	279.00	-0.00290	-0.0230	0	0	0
MANGANESE	257.60	0	0.0000300	0	0	0
MOLYBDENUM	202.00	0	0	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	196.00	0.000600	0.000580	0	0	0
SILICON	212.40	0	0.0187	0	0	0
SILVER	328.00	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: 5520546
 Report generated: 10/10/2017 15:49



Login Number: L17091706
 Instrument ID: ICP-THERMO3

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	279.00	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	196.00	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.00	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: 5520546
 Report generated: 10/10/2017 15:49



Login Number: L17091706
 Instrument ID: ICP-THERMO3

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	279.00	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	196.00	0	0	0	0	0
SILICON	212.40	0	0	0	0	0
SILVER	328.00	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: 5520546
 Report generated: 10/10/2017 15:49



Login Number: L17091706
 Instrument ID: ICP-THERMO3

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	279.00	0
MANGANESE	257.60	0
MOLYBDENUM	202.00	0
NICKEL	231.60	0
PHOSPHORUS	214.90	0
POTASSIUM	766.40	0
SELENIUM	196.00	0
SILICON	212.40	0
SILVER	328.00	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: 5520546
 Report generated: 10/10/2017 15:49



Login Number: L17091706
 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: 5514362
 Report generated: 10/06/2017 11:20



Login Number: L17091706
 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: 5514362
 Report generated: 10/06/2017 11:20



Login Number: L17091706
 Instrument ID: ICP-THERMO4

Date: 01/04/2017
 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: 5514362
 Report generated: 10/06/2017 11:20



Login Number: L17091706

Date: 01/04/2017

Instrument ID: ICP-THERMO4

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: 5514362
 Report generated: 10/06/2017 11:20



Login Number: L17091706
 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

CORR_FACTORS - Modified 03/05/2008
 PDF File ID: 5514362
 Report generated: 10/06/2017 11:20



Login Number: L17091706
 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: 5514362
 Report generated: 10/06/2017 11:20



Login Number: L17091706
 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: 5514362
 Report generated: 10/06/2017 11:20



Login Number: L17091706 Date: 07/10/2017
 Instrument ID: ICP-THERMO3 Method: 6010C

Analyte	Integration Time (Sec.)	Concentration (mg/L)
Aluminum	10.00	900.0
Antimony	20.00	45.0
Arsenic	10.00	45.0
Barium	10.00	45.0
Beryllium	10.00	4.5
Boron	20.00	45.0
Cadmium	20.00	4.5
Calcium	5.00	270.0
Chromium	20.00	36.0
Cobalt	20.00	45.0
Copper	20.00	90.0
Iron	5.00	630.0
Lead	20.00	180.0
Lithium	5.00	36.0
Magnesium	5.00	900.0
Manganese	10.00	36.0
Molybdenum	20.00	27.0
Nickel	20.00	90.0
Phosphorus	20.00	180.0
Potassium	5.00	360.0
Selenium	20.00	90.0
Silicon	20.00	36.0
Silver	10.00	9.0
Sodium	5.00	360.0
Strontium	5.00	9.0
Thallium	20.00	18.0
Tin	20.00	45.0
Titanium	5.00	45.0
Vanadium	20.00	36.0
Zinc	20.00	45.0
Zirconium	10.00	45.0

Comments:

All analytes passed acceptance criteria at the specified concentration.



Login Number: L17091706 Date: 07/17/2017
 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	3.6
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.

LINEAR_RANGE - Modified 03/06/2008
 PDF File ID: 5514361
 Report generated: 10/06/2017 11:20



2.2 Metals Data

2.2.2 Metals ICP-MS Data

2.2.2.1 Summary Data

Lab Report #: L17091706

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091706-01	PrePrep Method: N/A	Instrument: ICP-MS2
Client ID: LH18/24-SP140-7474-GRAB	Prep Method: 3015A	Prep Date: 10/02/2017 07:12
Matrix: Water	Analytical Method: 6020A	Cal Date: 10/02/2017 12:02
Workgroup #: WG632098	Analyst: JYH	Run Date: 10/02/2017 14:01
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: NI.100217.140142
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.					

2.2.2.2 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: WG632048
 Analyst: VC
 Spike Analyst: VC
 Run Date: 10/02/2017 07:12
 Method: 3015A
 Balance: BAL016
 Instrument: MW-3
 Instrument Start: 10/02/2017 07:15

SOP: ME407 Revision 19
 Spike Solution: STD82887
 Spike Witness: ERP
 HNO3 Lot #: COA19940
 40 & 50 ML. DIGESTION TU COA19932
 MS Filters- fisher-Lot# rRGT40686

	SAMPLE #	Type	Matrix	Initial Amount	Final Volume	Initial Vessel Wt	Final Vessel Wt	Spike Amount	Due Date
1	WG632048-02	BLANK	1	20 mL	50 mL	185.29 g	185.292 g		
2	WG632048-03	LCS	1	20 mL	50 mL	185.519 g	185.522 g	.25 mL	
3	L17091647-01	SAMP	1	20 mL	50 mL	183.509 g	183.497 g		10/09/17
4	L17091648-01	SAMP	1	20 mL	50 mL	183.833 g	183.815 g		10/09/17
5	L17091692-01	SAMP	1	20 mL	50 mL	184.386 g	184.377 g		10/05/17
6	L17091692-02	SAMP	1	20 mL	50 mL	184.501 g	184.495 g		10/05/17
7	L17091692-03	SAMP	1	20 mL	50 mL	182.45 g	182.449 g		10/05/17
8	L17091705-01	SAMP	1	20 mL	50 mL	181.582 g	181.566 g		10/10/17
9	L17091706-01	SAMP	1	20 mL	50 mL	183.32 g	183.302 g		10/10/17
10	L17091719-02	SAMP	1	20 mL	50 mL	184.102 g	184.093 g		10/10/17
11	L17091719-04	SAMP	1	20 mL	50 mL	184.295 g	184.289 g		10/10/17
12	L17091719-06	SAMP	1	20 mL	50 mL	181.947 g	181.938 g		10/10/17
13	L17091745-01	SAMP	1	20 mL	50 mL	183.499 g	183.484 g		10/09/17
14	L17091745-02	SAMP	1	20 mL	50 mL	181.599 g	181.577 g		10/09/17
15	L17091745-03	SAMP	1	20 mL	50 mL	182.646 g	182.592 g		10/09/17
16	WG632048-01	REF	1	20 mL	50 mL	182.623 g	182.612 g		
17	L17091745-04	SAMP	1	20 mL	50 mL	182.623 g	182.612 g		10/09/17
18	WG632048-04	MS	1	20 mL	50 mL	182.489 g	182.472 g	.25 mL	
19	WG632048-05	MSD	1	20 mL	50 mL	185.819 g	185.813 g	.25 mL	

Analyst: Vicki Collier

Reviewer: Erin Pottin



Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 100217A.REP
 Analyst1: JYH Analyst2: N/A
 Method: 6020/6020A/200.8 SOP: ME700A Rev: 3
 Maintenance Log ID: _____

Calibration Std: STD83954 ICV Std: STD83787 Post Spike: STD83027
 ICSA: STD83784 ICSAB: STD83785 Int. Std: RG739344
 CCV: STD83955 LLCCV: STD83789 Tuning Sol : STD83790
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632103,632098

Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
1	NI.100217.115019	Blank	Blank		1		10/02/17 11:50
2	NI.100217.115325	WG632169-01	Calibration Point		1		10/02/17 11:53
3	NI.100217.115630	WG632169-02	Calibration Point		1		10/02/17 11:56
4	NI.100217.115936	WG632169-03	Calibration Point		1		10/02/17 11:59
5	NI.100217.120241	WG632169-04	Calibration Point		1		10/02/17 12:02
6	NI.100217.120549	WG632169-05	Initial Calibration Verification		1		10/02/17 12:05
7	NI.100217.120855	WG632169-06	Initial Calib Blank		1		10/02/17 12:08
8	NI.100217.121202	WG632169-07	Low Level Continuing Calibra		1		10/02/17 12:12
9	NI.100217.121553	WG632169-08	Low Level Initial Calibration V		1		10/02/17 12:15
10	NI.100217.121858	WG632169-09	Interference Check		1		10/02/17 12:18
11	NI.100217.122204	WG632169-10	Interference Check		1		10/02/17 12:22
12	NI.100217.122511	WG632169-11	CCV		1		10/02/17 12:25
13	NI.100217.122816	WG632169-12	CCB		1		10/02/17 12:28
14	NI.100217.123123	WG632081-01	Method/Prep Blank	.25/100	1		10/02/17 12:31
15	NI.100217.123429	WG632081-02	Laboratory Control S	.25/100	1		10/02/17 12:34
16	NI.100217.123734	WG632081-03	Laboratory Control S	.25/100	1		10/02/17 12:37
17	NI.100217.124039	L17091426-01	K7I0761-01		1		10/02/17 12:40
18	NI.100217.124345	WG632103-01	Post Digestion Spike		1	L17091426-01	10/02/17 12:43
19	NI.100217.124650	WG632103-02	Serial Dilution		5	L17091426-01	10/02/17 12:46
20	NI.100217.124956	WG632103-02	Serial Dilution		25	L17091426-01	10/02/17 12:49
21	NI.100217.125304	WG632169-13	CCV		1		10/02/17 12:53
22	NI.100217.125609	WG632169-14	CCB		1		10/02/17 12:56
23	NI.100217.125916	WG632169-15	Low Level Continuing Calibra		1		10/02/17 12:59
24	NI.100217.130336	WG632169-16	CCV		1		10/02/17 13:03
25	NI.100217.130642	WG632169-17	CCB		1		10/02/17 13:06
26	NI.100217.131212	WG632048-02	Method/Prep Blank	20/50	1		10/02/17 13:12
27	NI.100217.131517	WG632048-03	Laboratory Control S	20/50	1		10/02/17 13:15
28	NI.100217.131823	WG632048-01	Reference Sample		1	L17091745-04	10/02/17 13:18
29	NI.100217.132128	WG632048-04	Matrix Spike	20/50	1	L17091745-04	10/02/17 13:21
30	NI.100217.132434	WG632048-05	Matrix Spike Duplica	20/50	1	L17091745-04	10/02/17 13:24
31	NI.100217.132739	L17091647-01	LH18/24-SP140-7472-GRAB	20/50	1		10/02/17 13:27
32	NI.100217.133044	L17091648-01	LH18/24-SP650-6472-GRAB	20/50	1		10/02/17 13:30
33	NI.100217.133350	WG632098-01	Post Digestion Spike		1	L17091648-01	10/02/17 13:33
34	NI.100217.133655	WG632098-02	Serial Dilution		5	L17091648-01	10/02/17 13:36

Page: 1 Approved: October 05, 2017

Sam H. Rhodes

Microbac Laboratories Inc.

Instrument Run Log

Instrument: ICP-MS2 Dataset: 100217A.REP
 Analyst1: JYH Analyst2: N/A
 Method: 6020/6020A/200.8 SOP: ME700A Rev: 3
 Maintenance Log ID: _____
 Calibration Std: STD83954 ICV Std: STD83787 Post Spike: STD83027
 ICSA: STD83784 ICSAB: STD83785 Int. Std: RGT39344
 CCV: STD83955 LLCV: STD83789 Tuning Sol : STD83790
 Stannous : _____ Hydroxylamine : _____

Workgroups: 632103,632098

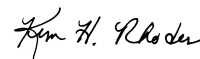
Comments:

Seq.	File ID	Sample	ID	Prep	Dil	Reference	Date/Time
35	NI.100217.134001	WG632098-02	Serial Dilution		25	L17091648-01	10/02/17 13:40
36	NI.100217.134308	WG632169-18	CCV		1		10/02/17 13:43
37	NI.100217.134613	WG632169-19	CCB		1		10/02/17 13:46
38	NI.100217.134920	L17091692-01	9274-B02-WQ-W0009	20/50	1		10/02/17 13:49
39	NI.100217.135226	L17091692-02	9274-B09-WQ-W0056	20/50	1		10/02/17 13:52
40	NI.100217.135531	L17091692-03	9274-B09-WQ-W0058	20/50	1		10/02/17 13:55
41	NI.100217.135837	L17091705-01	LH18/24-SP650-6474-GRAB	20/50	1		10/02/17 13:58
42	NI.100217.140142	L17091706-01	LH18/24-SP140-7474-GRAB	20/50	1		10/02/17 14:01
43	NI.100217.140447	L17091719-02	A11-MW08-Y3S2	20/50	1		10/02/17 14:04
44	NI.100217.140753	L17091719-04	A11-MW02-Y3S2	20/50	1		10/02/17 14:07
45	NI.100217.141059	L17091719-06	A11/A12-RB01-Y3S2	20/50	1		10/02/17 14:10
46	NI.100217.141405	L17091745-01	MW-103	20/50	1		10/02/17 14:14
47	NI.100217.141710	L17091745-02	MW-103	20/50	1		10/02/17 14:17
48	NI.100217.142017	WG632169-20	CCV		1		10/02/17 14:20
49	NI.100217.142323	WG632169-21	CCB		1		10/02/17 14:23
50	NI.100217.142630	L17091745-03	MW-107	20/50	1		10/02/17 14:26
51	NI.100217.142935	L17091613-12	GB5-S		2		10/02/17 14:29
52	NI.100217.143242	WG632169-22	CCV		1		10/02/17 14:32
53	NI.100217.143547	WG632169-23	CCB		1		10/02/17 14:35
54	NI.100217.143854	WG632169-24	Low Level Continuing Calibra		1		10/02/17 14:38
55	NI.100217.145202	WG632169-25	Low Level Continuing Calibra		1		10/02/17 14:52
56	NI.100217.155613	L17091613-12	GB5-S		2		10/02/17 15:56
57	NI.100217.160020	L17091647-01	LH18/24-SP140-7472-GRAB	20/50	10		10/02/17 16:00
58	NI.100217.160326	40 PPB SE	40 PPB SE		10		10/02/17 16:03
59	NI.100217.160632	WG632169-26	CCV		1		10/02/17 16:06
60	NI.100217.160938	WG632169-27	CCB		1		10/02/17 16:09
61	NI.100217.161245	WG632169-28	Low Level Continuing Calibra		1		10/02/17 16:12

Comments

Seq.	Rerun	Dil.	Reason	Analytes
8			Rerun to verify. JYH	
54			Insufficient volumn, rerun. JYH	

Page: 2 Approved: October 05, 2017




Microbac Laboratories Inc.

Data Checklist

Date: 02-OCT-2017
 Analyst: JYH
 Analyst: NA
 Method: 6020/6020A/200.8
 Instrument: ICP-MS
 Curve Workgroup: 632169
 Runlog ID: 84986
 Analytical Workgroups: 632103,632098

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	1647,1648,1692,1705,1706,1719
Client Forms	X
Level X	
Level 3	
Level 4	1647,1648,1692,1705,1706,1719
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	KHR
Comments	

Primary Reviewer:

Secondary Reviewer:
05-OCT-2017



Analytical Method:6020A
Login Number:L17091706

AAB#:WG632098

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-SP140-7474-GRAB	01	09/28/17					10/02/2017	3.7	180		10/02/17	4	180	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091706 Work Group: WG632098
 Blank File ID: NI.100217.131212 Blank Sample ID: WG632048-02
 Prep Date: 10/02/17 07:12 Instrument ID: ICP-MS2
 Analyzed Date: 10/02/17 13:12 Method: 6020A
 Analyst: JYH

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG632048-03	NI.100217.131517	10/02/17 13:15	01
LH18/24-SP140-7474-GRAB	L17091706-01	NI.100217.140142	10/02/17 14:01	01

Report Name: BLANK_SUMMARY
 PDF File ID: 5505841
 Report generated 10/02/2017 16:02



Login Number: L17091706 Prep Date: 10/02/17 07:12 Sample ID: WG632048-02
 Instrument ID: ICP-MS2 Run Date: 10/02/17 13:12 Prep Method: 3015A
 File ID: NI.100217.131212 Analyst: JYH Method: 6020A
 Workgroup (AAB#): WG632098 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: ICP-MS - 02-OCT-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: 5505842
 02-OCT-2017 16:02



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632048-03
Instrument ID: ICP-MS2 Run Time: 13:15 Prep Method: 3015A
File ID: NI.100217.131517 Analyst: JYH Method: 6020A
Workgroup (AAB#): WG632098 Matrix: Water Units: mg/L
QC Key: DOD4 Lot#: STD82887 Cal ID: ICP-MS - 02-OCT-17

Analytes	Expected	Found	% Rec	LCS Limits	Q
Silver, Total	0.125	0.126	101	80 - 120	

LCS - Modified 03/06/2008
PDF File ID: 5507619
Report generated: 10/03/2017 12:43



LCS_LCS2 - Modified 03/06/2008
PDF File ID: 5505843
Report generated: 10/02/2017 16:02



Loginnum: L17091706 Cal ID: ICP-MS2- Worknum: WG632098
 Instrument ID: ICP-MS2 Contract #: _____ Method: 6020A
 Parent ID: WG632048-01 File ID: NI.100217.131823 Dil: 1 Matrix: WATER
 Sample ID: WG632048-04 MS File ID: NI.100217.132128 Dil: 1 Units: mg/L
 Sample ID: WG632048-05 MSD File ID: NI.100217.132434 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	0.124	99.2	0.910	80 - 120	20	

* FAILS %REC LIMIT

FAILS RPD LIMIT

NOTE: This is an internal quality control sample.

Microbac Laboratories Inc.
Serial Dilution Report

Login: L17091706 **Worknum:** WG632098
Instrument: ICP-MS2 **Method:** 6020A
Serial Dil: WG632098-02 **File ID:** NI.100217.133655 **Dil:** 5 **Units:** ug/L
Sample: L17091648-01 **File ID:** NI.100217.133044 **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: 5505838

10/02/2017 16:02



Sample Login ID: L17091706 Worknum: WG632098
 Instrument ID: ICP-MS2 Method: 6020A
 Post Spike ID: WG632098-01 File ID: NI.100217.133350 Dil: 1 Units: ug/L
 Sample ID: L17091648-01 File ID: NI.100217.133044 Dil: 1 Matrix: Water

Analyte	Post Spike Result	C	Sample Result	C	Spike Added(SA)	% R	Control Limit %R	Q
SILVER	49.8		0	U	50	99.6	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

00863355

Login: L17091706 Workgroup (AAB#): WG632098
Analytical Method: 6020A Instrument ID: ICP-MS2
ICAL Worknum: WG632169 Initial Calibration Date: 02-OCT-2017 12:02

	WG632169-01		WG632169-02		WG632169-03		WG632169-04		R	Q
	Conc	INT	Conc	INT	Conc	INT	Conc	INT		
SILVER	0	123	.4	563	50	410000	100	795000	.999963	

INT = Instrument intensity
R = Coefficient of correlation
Q = Data Qualifier
* = Out of Compliance; R < 0.995

INT_CAL_ICP - Modified 03/06/2008
PDF File ID: 5505847
Report generated: 02-OCT-2017 16:02



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-06
Instrument ID: ICP-MS2 Run Time: 12:08 Method: 6020A
File ID: NI.100217.120855 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG632098 Cal ID: ICP-MS2 - 02-OCT-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: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-12
Instrument ID: ICP-MS2 Run Time: 12:28 Method: 6020A
File ID: NI.100217.122816 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-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: 5505852
Report generated 10/02/2017 16:02



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-17
Instrument ID: ICP-MS2 Run Time: 13:06 Method: 6020A
File ID: NI.100217.130642 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-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: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-19
Instrument ID: ICP-MS2 Run Time: 13:46 Method: 6020A
File ID: NI.100217.134613 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-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: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-21
Instrument ID: ICP-MS2 Run Time: 14:23 Method: 6020A
File ID: NI.100217.142323 Analyst: JYH Units: ug/L
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-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: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-05
 Instrument ID: ICP-MS2 Run Time: 12:05 Method: 6020A
 File ID: NI.100217.120549 Analyst: JYH Units: ug/L
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 QC Key: DOD4

Analyte	Expected	Found	%REC	LIMITS	Q
Silver	50	49.9	99.8	90 - 110	

* Exceeds LIMITS Limit



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-11
Instrument ID: ICP-MS2 Run Time: 12:25 Method: 6020A
File ID: NI.100217.122511 Analyst: JYH QC Key: DOD4
Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.0500	0.0502	mg/L	100	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-16
 Instrument ID: ICP-MS2 Run Time: 13:03 Method: 6020A
 File ID: NI.100217.130336 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.0500	0.0502	mg/L	100	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-18
 Instrument ID: ICP-MS2 Run Time: 13:43 Method: 6020A
 File ID: NI.100217.134308 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.0500	0.0508	mg/L	102	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-20
 Instrument ID: ICP-MS2 Run Time: 14:20 Method: 6020A
 File ID: NI.100217.142017 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.0500	0.0507	mg/L	101	90 - 110	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-08
 Instrument ID: ICP-MS2 Run Time: 12:15 Method: 6020A
 File ID: NI.100217.121553 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.400	0.387	ug/L	96.7	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-15
 Instrument ID: ICP-MS2 Run Time: 12:59 Method: 6020A
 File ID: NI.100217.125916 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.400	0.375	ug/L	93.9	70 - 130	

* Exceeds LIMITS Criteria



Login Number: L17091706 Run Date: 10/02/2017 Sample ID: WG632169-25
 Instrument ID: ICP-MS2 Run Time: 14:52 Method: 6020A
 File ID: NI.100217.145202 Analyst: JYH QC Key: DOD4
 Workgroup (AAB#): WG632098 Cal ID: ICP-MS - 02-OCT-17
 Matrix: WATER

Analyte	Expected	Found	UNITS	%REC	LIMITS	Q
Silver	0.400	0.375	ug/L	93.9	70 - 130	

* Exceeds LIMITS Criteria



Login number: L17091706
Instrument ID: ICP-MS2
Sol. A: WG632169-09
Sol. AB: WG632169-10

File ID: NI.100217.121858
File ID: NI.100217.122204

Workgroup (AAB#): WG632098
Method: 6020A
Units: ug/L
Matrix: Water

ANALYTE	Sol. A			Sol. AB			Q
	True	Found	%Recovery	True	Found	%Recovery	
Silver	NS	0.00660	NS	100	85.4	85.4	

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: L17091706 Analytical Method: 6020
 Analytical Workgroup: WG632098 Matrix: 1
 Instrument: ICP-MS2 Analyst: JYH
 ICAL Date: 02-OCT-2017 11:53

Sample	Type	Run Date	BISMUTH	GERMANIUM	INDIUM
			% Rec	% Rec	% Rec
L17091648-01	SAMP	02-OCT-2017 13:30	95.659	100.037	96.441
L17091706-01	SAMP	02-OCT-2017 14:01	99.064	101.937	98.349
WG632048-02	BLANK	02-OCT-2017 13:12	103.343	101.756	100.559
WG632048-03	LCS	02-OCT-2017 13:15	105.257	103.295	101.656
WG632098-01	PSPK	02-OCT-2017 13:33	96.662	101.743	98.032
WG632098-02	SERIAL	02-OCT-2017 13:36	97.185	96.633	92.755
WG632169-05	ICV	02-OCT-2017 12:05	99.424	98.598	97.333
WG632169-06	ICB	02-OCT-2017 12:08	95.816	91.596	90.688
WG632169-08	LLICV	02-OCT-2017 12:15	100.163	98.216	96.423
WG632169-09	ICS	02-OCT-2017 12:18	92.942	91.001	88.259
WG632169-10	ICS	02-OCT-2017 12:22	97.67	95.054	93.687
WG632169-11	CCV	02-OCT-2017 12:25	104.166	103.625	101.681
WG632169-12	CCB	02-OCT-2017 12:28	97.351	94.148	92.677
WG632169-15	LLCCV	02-OCT-2017 12:59	103.532	100.295	99.354
WG632169-16	CCV	02-OCT-2017 13:03	102.941	102.226	101.341
WG632169-17	CCB	02-OCT-2017 13:06	93.341	90.651	87.855
WG632169-18	CCV	02-OCT-2017 13:43	104.562	105.411	101.711
WG632169-19	CCB	02-OCT-2017 13:46	99.321	96.723	94.999
WG632169-20	CCV	02-OCT-2017 14:20	106.885	105.895	103.138
WG632169-21	CCB	02-OCT-2017 14:23	100.562	96.006	93.088
WG632169-25	LLCCV	02-OCT-2017 14:52	102.86	103.838	100.899

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: 5505846
 Report generated: 10/02/2017 16:02



Login Number: L17091706 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.



2.3 General Chemistry Data

2.3.1 Hexavalent Chromium Data

2.3.1.1 Summary Data

Lab Report #: L17091706

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17091706-01	PrePrep Method: N/A	Instrument: UV-2600
Client ID: LH18/24-SP140-7474-GRAB	Prep Method: 7196A	Prep Date: N/A
Matrix: Water	Analytical Method: 7196A	Cal Date: 09/05/2017 15:26
Workgroup #: WG631899	Analyst: SDC	Run Date: 09/29/2017 11:42
Collect Date: 09/28/2017 15:00	Dilution: 1	File ID: 00.1709291142-07
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.					

2.3.1.2 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: 29-SEP-2017
 Analyst: SDC
 Analyst: NA
 Method: CR-6
 Instrument: UV-2600
 Curve Workgroup: NA
 Runlog ID: _____
 Analytical Workgroups: WG631899

Calibration/Linearity	09/06/17
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	SDC
Secondary Reviewer	DIH
Comments	

Primary Reviewer:
02-OCT-2017

Zhalyn Cauty

Secondary Reviewer:
03-OCT-2017

Drenna Johnson



Analytical Method: 7196A
Login Number: L17091706

AAB#: WG631899

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-SP140-7474-GRAB	01	09/28/17					09/29/2017	.9	1		09/29/17	.9	1	

* = SEE PROJECT QAPP REQUIREMENTS



METHOD BLANK SUMMARY

Login Number: L17091706 Work Group: WG631899
 Blank File ID: 00.1709291142-03 Blank Sample ID: WG631899-01
 Prep Date: 09/29/17 11:42 Instrument ID: UV-2600
 Analyzed Date: 09/29/17 11:42 Method: 7196A
 Analyst: SDC

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG631899-02	00.1709291142-04	09/29/17 11:42	
LCS2	WG631899-03	00.1709291142-05	09/29/17 11:42	
LH18/24-SP140-7474-GRAB	L17091706-01	00.1709291142-07	09/29/17 11:42	
DUP	WG631899-05	00.1709291142-08	09/29/17 11:42	

Report Name: BLANK_SUMMARY
 PDF File ID: 5507469
 Report generated 10/03/2017 11:38



Login Number: L17091706 Prep Date: 09/29/17 11:42 Sample ID: WG631899-01
 Instrument ID: UV-2600 Run Date: 09/29/17 11:42 Prep Method: 7196A
 File ID: 00.1709291142-03 Analyst: SDC Method: 7196A
 Workgroup (AAB#): WG631899 Matrix: Water Units: mg/L
 Contract #: _____ Cal ID: UV-260-28-SEP-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: 5507470
 03-OCT-2017 11:39



Login Number: L17091706 Analyst: SDC Prep Method: 7196A
 Instrument ID: UV-2600 Matrix: Water Method: 7196A
 Workgroup (AAB#): WG631899 Units: mg/L
 QC Key: DOD4 Lot #: STD83698
 Sample ID: WG631899-02 LCS File ID: 00.1709291142-04 Run Date: 09/29/2017 11:42
 Sample ID: WG631899-03 LCS2 File ID: 00.1709291142-05 Run Date: 09/29/2017 11:42

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Chromium, Hexavalent	0.100	0.100	100	0.100	0.102	102	1.46	90 - 110	20	

LCS_LCS2 - Modified 03/06/2008
 PDF File ID: 5507471
 Report generated: 10/03/2017 11:39



2.3.1.3 Raw Data

Curves

Parameter: CR-6 Low

Spectrophotometer: UV 2600

Calibration (Curve) standard stock: 500

Concentration: 50ng/L 5ng/L

Recipe for preparation of curve standards found in:
SOP: 2186 Revision: 22 Page: 12

Second Source Stock: 83698 (concentration: 2ng/L)

Daily Preparation: 5(2)/100 =
concentration = 0.1

Calibration Standards (mg/L)	Volume (mL)	Cell Size (cm)	Wavelength (nm)	Absorbance
0.2	100	5	540	0.809
0.1	100	5	540	0.418
0.05	100	5	540	0.207
0.02	100	5	540	0.082
0.01	100	5	540	0.042
0.00	100	5	540	0.002
2nd source 0.1	100	5	540	0.409

Analyst: April Greene

Date/Time: 9/5/17 1526

DCN#128068



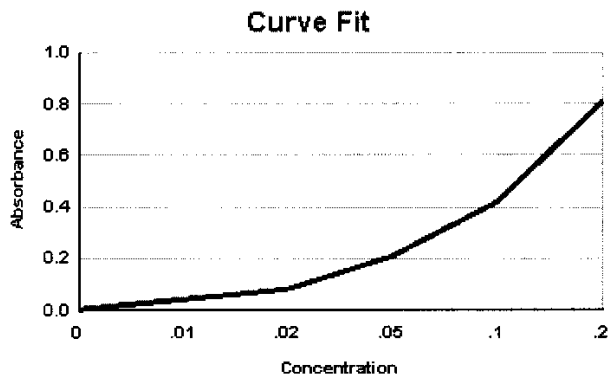
Microbac Laboratories Inc.
INITIAL CALIBRATION

Workgroup: WG628498
Analytical Method: 3500CR
Instrument ID: UV-2600

Analyst: ADG
Initial Calibration Date: 09/05/2017

Analyte: **CHROMIUM, HEXAVALENT**
Number of Points: 6
Slope: 4.05104
Y-Intercept: 0.00343433
Coef. Of Correlation (R^2): 0.999739
Coef. Of Correlation (R): 0.999869

Concentration X	Absorbance Y	X^2	X * Y	Y-Fitted (mX^2+B)
0.00	0.00200	0.00	0.00	0.00343433
0.0100	0.0420	0.000100	0.000420	0.0439447
0.0200	0.0820	0.000400	0.00164	0.0844551
0.0500	0.207	0.00250	0.0104	0.205986
0.100	0.418	0.0100	0.0418	0.408538
0.200	0.809	0.0400	0.162	0.813642



WG_ICAL_CAL_WET - Modified 03/06/2008
Report generated 09/06/2017 08:16



Workgroup #: WG628498

Instrument ID: UV-2600

File ID: 00.1709051526-07

Run Date: 09/05/2017

CCV ID: WG628498-07

Run Time: 15:26

Units: mg/L

Analyst: ADG

Analyte: CHROMIUM, HEXAVALENT

Cal ID: UV-260 - 05-SEP-17 15:26:06

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.1	0.101	4.11	1.0	

* Exceeds %D Limit

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

WET_WG_SSCV - Modified 03/06/2008
Report generated 09/06/2017 08:17



CHROMIUM (6)

Standard Methods 3500 Cr-D (18th, 19th), 3500Cr-B(20th)

SPEC: UV-2600

SOP K2186 Rev. # 22

SW846 7196A

Curve ID: 9-6-17

SOP OVAP K3500-Cr Rev. # _____

CCV: 83695

LCS: 83698

Spike: 83697

RGT _____

Matrix: Liquid (mg/L)

Daily dilution: 1(5)/100

Daily dilution: 1(2)/100

Daily dilution: 0.2(5)/100

RGT 691982

Soil (mg/Kg)

Daily dilution: =0.25

Daily dilution: =0.1

Daily dilution: =0.1

Sample	Volume (mL)	pH adj. to 2 ± 0.5	Dilution	Cell size (cm)	Absorbance @ 540 nm
CCV: mg/L(1 cm)	100				
CCV: 0.1 mg/L(5 cm)	100	✓		5cm	0.213
Blank/CCB:	100	✓		5cm	0.000
LCS: 0.1 ppm	100	✓		5cm	0.410
LCSDUP: 0.1 ppm	100	✓		5cm	0.416
09-1705-01	100	✓		5cm	0.001
09-1706-01	100	✓		5cm	0.000
	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				
	100				
	100				
DUP: 09-1705-01	100	✓		5cm	0.000
MS: () 09-1705-01	100	✓		5cm	0.436
MSD: ()	100				
CCV: (1 cm)	100				
CCV: (5 cm)	100	✓		5cm	0.212
CCB:	100	✓		5cm	0.000

Analyst: Sharon Conley
 SW846 7196 (Dup and/or MS every 10 samples)

Date / Time: 9-29-17, 1142
 SM3500 Cr (Dup and MS/MSD every 20 samples)

DCN#128626



Microbac Laboratories Inc.
SAMPLE REPORT

Workgroup: WG631899Analyst: SDCAnalyte: CHROMIUM, HEXAVALENTDate: 09/29/2017

Sample ID	I Vol	F Vol	Response	Slope	Y Intercept	Anal. Conc.	Rep. Conc.	Dil	Units
WG631899-01	100	100	0	4.051	0.003434	-0.00084777	-0.00084777	1	mg/L
WG631899-02	100	100	0.410	4.051	0.003434	0.10036	0.10036	1	mg/L
WG631899-03	100	100	0.416	4.051	0.003434	0.10184	0.10184	1	mg/L
L17091705-01	100	100	0.00100	4.051	0.003434	-0.00060092	ND	1	mg/L
WG631899-04	100	100	0.00100	4.051	0.003434	-0.00060092	-0.00060092	1	mg/L
L17091706-01	100	100	0	4.051	0.003434	-0.00084777	ND	1	mg/L
WG631899-05	100	100	0	4.051	0.003434	-0.00084777	-0.00084777	1	mg/L
WG631899-06	100	100	0.436	4.051	0.003434	0.10678	0.10678	1	mg/L

UV_SAMPLE_REPORT - Modified 03/06/2008

Report generated 10/02/2017 11:45



Microbac Laboratories Inc.
CONTINUING CALIBRATION REPORT

00863390

Workgroup #: WG632115 Instrument ID: UV-2600
File ID: 00.1709291142-10 Run Date: 09/29/2017
CCV ID: WG632115-03 Run Time: 11:42
Units: mg/L Analyst: SDC
Analyte: CHROMIUM, HEXAVALENT Cal ID: UV-260 - 28-SEP-17

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.05	0.0515	4.24	3.0	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 10/02/2017 11:45



Workgroup #: WG632115

Instrument ID: UV-2600

File ID: 00.1709291142-01

Run Date: 09/29/2017

CCV ID: WG632115-01

Run Time: 11:42

Units: mg/L

Analyst: SDC

Analyte: CHROMIUM, HEXAVALENT

Cal ID: UV-260 - 28-SEP-17

Analyte	Expected	Found	RF	%D	Q
Chromium, Hexavalent	.05	0.0517	4.26	3.4	

* Exceeds %D Limit

CCC Calibration Check Compounds

SPCC System Performance Check Compounds

WET_WG_CCV - Modified 03/06/2008

Report generated 10/02/2017 11:45



3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
October 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	BLR - BRANDON L. RICHARDS
BNB - Brandi N. Bentley	BRG - BRENDA R. GREGORY
CAS - Craig A. Smith	CEB - CHAD E. BARNES
CLC - CHRYS L. CRAWFORD	CLG - CARA L. GREENWOOD
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	RAF - REBEKAH A. FINN
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
ZTB - ZACH T. BARNES	

List of Valid Qualifiers

October 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

October 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 AITT: STEPHANIE MOSSBURG

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

Analyses			MS / MSD	No. OF CONTAINERS	Remarks (Preservatives, etc.)	Lab I.D.#
PERCHLORATE	HEXAVALENT CHROMIUM	SILVER & SELENIUM				
		X	1		HNO3	
	X	X	2		NONE	

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>	09/28/17	15:30									

For Lab Use Only

Received At Lab By: _____ Date: _____ Time: _____

Seal No. _____ Temp of Container _____ Condition _____

Date: _____ Time: _____

Microbac OVD
 Received: 09/29/2017 10:11
 By: CARA STRICKLER

221000106757

Cara Strickler

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17091706

Account: 2551

Project: 2551.096

Samples: 1

Due Date: 10-OCT-2017

Samplenum **Container ID** **Products**
L17091706-01 973280 6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	29-SEP-2017 10:40	CLS		
2	ANALYZ	W1	SEM	04-OCT-2017 15:10	JWR	CLS	
3	STORE	SEM	A1	05-OCT-2017 14:43	BRG	JWR	

Samplenum **Container ID** **Products**
L17091706-01 973281 AG-MS SE-AX

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	29-SEP-2017 10:40	CLS		
2	PREP	W1	DIG	29-SEP-2017 15:01	AC	BRG	
3	ANALYZ*	DIG	METALS	02-OCT-2017 10:48	JYH	AC	
4	STORE	DIG	A1	02-OCT-2017 12:37	BRG	VC	

*Sample extract/digestate/leachate

Samplenum **Container ID** **Products**
L17091706-01 973282 CR-6

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	L1	29-SEP-2017 10:40	CLS		
2	ANALYZ	L1	WET	29-SEP-2017 10:43	SDC	BRG	
3	STORE	WET	A1	03-OCT-2017 15:28	BRG	SDC	

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)

APPENDIX D: Air Monitoring Data – 3rd Quarter 2017

Attachment A

Air Monitoring Calculations

**Longhorn Army Ammunition Plant
Groundwater Treatment Plant
Ambient Air Data - September 26, 2017**

Pollutant		Short Term ESL March 2012	AMCVs (ST Health)	GWTP Ambient Air Concentrations (1)	Status (3)	Downwind Ambient Air Concentrations (2)	Status (3)
	CAS	µg/m ³	µg/m ³	µg/m ³		µg/m ³	
1,1-Dichloroethane	75-34-3	4000	4047	0.74	U PASS	0.63	U PASS
1,1-Dichloroethene	75-35-4	210	714	0.74	U PASS	0.63	U PASS
1,2-Dichloroethane	107-06-2	160	162	0.74	U PASS	0.63	U PASS
Acetone	67-64-1	5900	NA	7.4	U PASS	8.7	PASS
Benzene	71-43-2	170	575	0.74	U PASS	0.63	U PASS
Carbon disulfide	75-15-0	30	NA	7.4	U PASS	6.3	U PASS
Chloroform	67-66-3	100	98	0.74	U PASS	0.63	U PASS
cis-1,2-Dichloroethene	540-59-0	7900	NA	25.0	PASS	0.63	U PASS
Methylene chloride	75-09-2	3600	12158	22.0	PASS	0.63	U PASS
Tetrachloroethene	127-18-4	2000	6782	0.74	U PASS	0.63	U PASS
trans-1,2-Dichloroethene	540-59-0	7900	NA	0.74	U PASS	0.63	U PASS
Trichloroethene	79-01-6	540	537	43.0	PASS	1.1	PASS
Vinyl chloride	75-01-4	20000	66460	1.20	PASS	0.63	U PASS
n-Hexane	110-54-3	5300	6336	1.0	PASS	0.77	PASS
Styrene	100-42-5	110	21725	0.74	U PASS	0.63	U PASS
Toluene	108-88-3	640	15074	2.3	PASS	0.86	PASS
Ethylbenzene	100-41-4	740	86844	0.74	U PASS	0.63	U PASS
m,p-Xylenes	179601-23-1	180	7382	2.1	PASS	1.3	U PASS
o-Xylene	95-47-6	1600	7382	0.84	PASS	0.63	U PASS
1,3-Dichlorobenzene	541-73-1	720	NA	0.74	U PASS	0.63	U PASS
Propene (C3 H6)	115-07-1	Asphyxiant	Asphyxiant	0.74	U NA	0.63	U NA
Dichlorodifluoromethane (CCl2F2)	75-71-8	50000	49452	2.7	PASS	2.7	PASS
Ethanol	64-17-5	18800	NA	7.4	U PASS	6.3	U PASS
Trichlorofluoromethane (CCl3F)	75-69-4	28000	56184	1.4	PASS	1.5	PASS
Trichlorotrifluoroethane (C2Cl3F3)	76-13-1	38000	NA	45	J PASS	5.7	PASS
alpha-Pinene	80-56-8	60	3499	9.50	PASS	5.9	PASS
d-Limonene	5989-27-5	1100	NA	2.50	PASS	1.8	PASS

(1) Sample collected over an 8-hour period on September 26, 2017 between 8 AM and 4 PM

(2) Sample collected over a 24-hour period beginning on June 5, 2017 at 8 AM and ending on June 6, 2017 at 8 AM

(3) Status based on comparison of air sample result to Air Monitoring Comparison Values (AMCVs). When there is no AMCV value for a chemical, the air sample concentration is compared to the short-term ESL.

**Longhorn Army Ammunition Plant
Groundwater Treatment Plant
Emission Stack Air Data - September 26, 2017**

Pollutant	CAS	Measured Air Stripper Stack Concentrations (1)	Air Stripper Emission Rates (2)	Air Stripper Emission Rates(2a)	Allowable Annual Emission (3)	Status (4)	TLV (L)	TLV Reference	Compliance section	Distance Downwind to nearest off-site Receptor (D)	(K) value	Allowable Maximum Hourly Emission Limit at Nearest off-site Receptor ⁽⁶⁾⁽⁷⁾	Status (8)
		$\mu\text{g}/\text{m}^3$	lb/hr	tpy	tpy	lb/hr							
1,1-Dichloroethane	75-34-3	210 U	1.72E-03 U	1.12E-03 U	5	PASS	405	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
1,1-Dichloroethene	75-35-4	310	5.08E-03	3.30E-03	5	PASS	20	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.4	PASS
1,2-Dichloroethane	107-06-2	350	5.74E-03	3.73E-03	5	PASS	40	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	2.9	PASS
Acetone	67-64-1	2100 U	1.72E-02 U	1.12E-02 U	5	PASS	590	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
Benzene	71-43-2	210 U	1.72E-03 U	1.12E-03 U	5	PASS	3	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	0.21	PASS
Carbon disulfide	75-15-0	2100 U	1.72E-02 U	1.12E-02 U	5	PASS	31	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	2.2	PASS
Chloroform	67-66-3	210 U	1.72E-03 U	1.12E-03 U	5	PASS	10	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	0.71	PASS
cis-1,2-Dichloroethene	540-59-0	22,000	3.61E-01	2.34E-01	5	PASS	793	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
Methylene chloride	75-09-2	12,000	1.97E-01	1.28E-01	5	PASS	26	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.9	PASS
Tetrachloroethene	127-18-4	210 U	1.72E-03 U	1.12E-03 U	5	PASS	33.5	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	2.4	PASS
trans-1,2-Dichloroethene	540-59-0	210 U	1.72E-03 U	1.12E-03 U	5	PASS	793	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
Trichloroethene	79-01-6	34,000	5.57E-01	3.62E-01	5	PASS	135	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	6.0	PASS
Vinyl chloride	75-01-4	700	1.15E-02	7.46E-03	5	PASS	2	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	0.14	PASS
n-Hexane	110-54-3	210 U	1.72E-03 U	1.12E-03 U	5	PASS	1800	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
Styrene	100-42-5	210 U	1.72E-03 U	1.12E-03 U	5	PASS	21	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.5	PASS
Toluene	108-88-3	210 U	1.72E-03 U	1.12E-03 U	5	PASS	188	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	6.0	PASS
Ethylbenzene	100-41-4	210 U	1.72E-03 U	1.12E-03 U	5	PASS	434	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
m,p-Xylenes	179601-23-1	420 U	3.44E-03 U	2.24E-03 U	5	PASS	434	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
o-Xylene	95-47-6	210 U	1.72E-03 U	1.12E-03 U	5	PASS	434	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
1,3-Dichlorobenzene	541-73-1	210 U	1.72E-03 U	1.12E-03 U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2000	14	1.0	PASS
Propene (C3 H6)	115-07-1	210 U	1.72E-03 U	1.12E-03 U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2000	14	6.0	PASS
Dichlorodifluoromethane (CCl2F2)	75-71-8	210 U	1.72E-03 U	1.12E-03 U	5	PASS	4950	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
Ethanol	64-17-5	2,100 U	1.72E-02 U	1.12E-02 U	5	PASS	1880	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
Trichlorofluoromethane (CCl3F)	75-69-4	210 U	1.72E-03 U	1.12E-03 U	5	PASS	5620	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
Trichlorotrifluoroethane (C2Cl3F3)	76-13-1	20,000	3.28E-01	2.13E-01	5	PASS	7670	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2000	14	1.0	PASS
alpha-Pinene	80-56-8	210 U	1.72E-03 U	1.12E-03 U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2000	14	1.0	PASS
d-Limonene	5989-27-5	210 U	1.72E-03 U	1.12E-03 U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2000	14	1.0	PASS
TOTAL			1.548										

(1) Sample collected on September 26, 2017 at 2:00 PM

(2) Based on a blower flow rate of 4390 cfm. Note that plant operations is less than or equal to 25 hours per week. 1/2 of detection limit was used for estimating mass rate.

(2a) Based on operation of 25 hours per week, 52 weeks per year.

(3) Per 30TAC 106.533(f)(1)(B)

(4) Based on comparing the calculated air stripper stack sample emission rate in tons per year (tpy) to the allowable annual emission limit per chemical of 5 tpy.

(5) No TLVs for these chemicals

(6) The maximum hourly limit allowed by 30 TAC 106.262, per pollutant, is 6 lbs/hr per "Figure 1: 30 TAC 106.262(a)". The E value was overridden with 6 lb/hr when the calculated E was higher.

(7) The maximum hourly emission rate allowed by 30 TAC 106.261(a)(3) for chemicals with an limit value (L) greater than 200 mg/m³ is 1 lb/hr.

(8) Based on comparing the calculated air stripper stack sample emission rate in pounds per hour (lb/hr) to the allowable maximum emission limit per chemical based on distance downwind to nearest off-site receptor.

Attachment B

**PID Readings and Calibration
Logs**

Photoionization Detector Measurements During GWTP Operation - 3rd Quarter 2017

Date	Time	Location	Air Flow Rate at Blower	Instrument ID	Person Collecting	PID Reading	Weather Conditions
7/7/2017	10:30	Outside GWTP Office	4050 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 85 degrees
7/7/2017	10:30	Downwind	4050 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 85 degrees
7/7/2017	10:30	Stripper	4050 ACFM	MiniRAE 3000	Scott Beesinger	Max. 17.7 ppm Steady State 6.5 ppm	Clear 85 degrees
7/7/2017	14:00	Outside GWTP Office	3870 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 91 degrees
7/7/2017	14:00	Downwind	3870 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 91 degrees
7/7/2017	14:00	Stripper	3870 ACFM	MiniRAE 3000	Kennie moore	Max. 16.0 ppm Steady State 5.3 ppm	Clear 91 degrees
7/10/2017	11:30	Outside GWTP Office	4000 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 84 degrees
7/10/2017	11:30	Downwind	4000 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 84 degrees
7/10/2017	11:30	Stripper	4000 ACFM	MiniRAE 3000	Scott Beesinger	Max. 16.5 ppm Steady State 4.8 ppm	Clear 84 degrees
7/10/2017	14:00	Outside GWTP Office	3815 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 88 degrees
7/10/2017	14:00	Downwind	3815 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 88 degrees
7/10/2017	14:00	Stripper	3815 ACFM	MiniRAE 3000	Kennie moore	Max. 17.9 ppm Steady State 6.1 ppm	Clear 88 degrees
7/13/2017	8:00	Outside GWTP Office	4010 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 80 degrees
7/13/2017	8:00	Downwind	4010 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 80 degrees
7/13/2017	8:00	Stripper	4010 ACFM	MiniRAE 3000	Scott Beesinger	Max. 17.1 ppm Steady State 5.4 ppm	Clear 80 degrees
7/13/2017	14:00	Outside GWTP Office	3775 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 89 degrees
7/13/2017	14:00	Downwind	3775 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 89 degrees
7/13/2017	14:00	Stripper	3775 ACFM	MiniRAE 3000	Kennie moore	Max. 18.3 ppm Steady State 6.9 ppm	Clear 89 degrees
7/17/2017	8:00	Outside GWTP Office	4055 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 81 degrees
7/17/2017	8:00	Downwind	4055 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 81 degrees
7/17/2017	8:00	Stripper	4055 ACFM	MiniRAE 3000	Scott Beesinger	Max. 18.8 ppm Steady State 7.5 ppm	Clear 81 degrees
7/17/2017	14:00	Outside GWTP Office	3785 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 91 degrees
7/17/2017	14:00	Downwind	3785 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 91 degrees
7/17/2017	14:00	Stripper	3785 ACFM	MiniRAE 3000	Kennie moore	Max. 17.1 ppm Steady State 4.9 ppm	Clear 91 degrees
7/20/2017	8:00	Outside GWTP Office	3980 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 81 degrees
7/20/2017	8:00	Downwind	3980 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 81 degrees
7/20/2017	8:00	Stripper	3980 ACFM	MiniRAE 3000	Scott Beesinger	Max. 16.7 ppm Steady State 4.4 ppm	Clear 81 degrees
7/20/2017	13:00	Outside GWTP Office	3720 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 92 degrees
7/20/2017	13:00	Downwind	3720 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 92 degrees
7/20/2017	13:00	Stripper	3720 ACFM	MiniRAE 3000	Kennie moore	Max. 17.9 ppm Steady State 6.0 ppm	Clear 92 degrees
7/24/2017	8:00	Outside GWTP Office	3995 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 76 degrees
7/24/2017	8:00	Downwind	3995 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 76 degrees
7/24/2017	8:00	Stripper	3995 ACFM	MiniRAE 3000	Scott Beesinger	Max. 17.9 ppm Steady State 6.3 ppm	Clear 76 degrees
7/24/2017	13:00	Outside GWTP Office	3735 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 86 degrees
7/24/2017	13:00	Downwind	3735 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 86 degrees
7/24/2017	13:00	Stripper	3735 ACFM	MiniRAE 3000	Kennie moore	Max. 15.8 ppm Steady State 4.5 ppm	Clear 86 degrees
7/31/2017	8:00	Outside GWTP Office	4000 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 75 degrees
7/31/2017	8:00	Downwind	4000 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 75 degrees
7/31/2017	8:00	Stripper	4000 ACFM	MiniRAE 3000	Scott Beesinger	Max. 16.8 ppm Steady State 4.3 ppm	Clear 75 degrees
7/31/2017	14:00	Outside GWTP Office	3765 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 92 degrees
7/31/2017	14:00	Downwind	3765 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 92 degrees
7/31/2017	14:00	Stripper	3765 ACFM	MiniRAE 3000	Kennie moore	Max. 17.8 ppm Steady State 5.9 ppm	Clear 92 degrees
8/7/2017	8:00	Outside GWTP Office	4050 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Overcast/Rain 78 degrees
8/7/2017	8:00	Downwind	4050 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Overcast/Rain 78 degrees
8/7/2017	8:00	Stripper	4050 ACFM	MiniRAE 3000	Scott Beesinger	Max. 15.9 ppm Steady State 3.8 ppm	Overcast/Rain 78 degrees
8/7/2017	14:00	Outside GWTP Office	3715 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Overcast 78 degrees
8/7/2017	14:00	Downwind	3715 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Overcast 78 degrees
8/7/2017	14:00	Stripper	3715 ACFM	MiniRAE 3000	Kennie moore	Max. 16.6 ppm Steady State 4.7 ppm	Overcast 78 degrees
8/10/2017	8:00	Outside GWTP Office	4020 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Overcast 76 degrees
8/10/2017	8:00	Downwind	4020 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Overcast 76 degrees
8/10/2017	8:00	Stripper	4020 ACFM	MiniRAE 3000	Scott Beesinger	Max. 17.9 ppm Steady State 4.4 ppm	Overcast 76 degrees
8/10/2017	12:00	Outside GWTP Office	3855 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Overcast 84 degrees
8/10/2017	12:00	Downwind	3855 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Overcast 84 degrees
8/10/2017	12:00	Stripper	3855 ACFM	MiniRAE 3000	Kennie moore	Max. 16.1 ppm Steady State 4.0 ppm	Overcast 84 degrees

Photoionization Detector Measurements During GWTP Operation - 3rd Quarter 2017

Date	Time	Location	Air Flow Rate at Blower	Instrument ID	Person Collecting	PID Reading	Weather Conditions
9/14/2017	8:00	Outside GWTP Office	4050 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 58 degrees
9/14/2017	8:00	Downwind	4050 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 58 degrees
9/14/2017	8:00	Stripper	4050 ACFM	MiniRAE 3000	Scott Beesinger	Max. 17.1 ppm Steady State 6.9 ppm	Clear 58 degrees
9/14/2017	13:00	Outside GWTP Office	3805 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 84 degrees
9/14/2017	13:00	Downwind	3805 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 84 degrees
9/14/2017	13:00	Stripper	3805 ACFM	MiniRAE 3000	Kennie moore	Max. 16.1 ppm Steady State 4.8 ppm	Clear 84 degrees
9/21/2017	8:00	Outside GWTP Office	4000 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 75 degrees
9/21/2017	8:00	Downwind	4000 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 75 degrees
9/21/2017	8:00	Stripper	4000 ACFM	MiniRAE 3000	Scott Beesinger	Max. 17.9 ppm Steady State 5.5 ppm	Clear 75 degrees
9/21/2017	13:00	Outside GWTP Office	3810 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 90 degrees
9/21/2017	13:00	Downwind	3810 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 90 degrees
9/21/2017	13:00	Stripper	3810 ACFM	MiniRAE 3000	Kennie moore	Max. 18.7 ppm Steady State 7.6 ppm	Clear 90 degrees
9/26/2017	8:00	Outside GWTP Office	3975 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 71 degrees
9/26/2017	8:00	Downwind	3975 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 71 degrees
9/26/2017	8:00	Stripper	3975 ACFM	MiniRAE 3000	Scott Beesinger	Max. 16.5 ppm Steady State 4.3 ppm	Clear 71 degrees
9/26/2017	14:00	Outside GWTP Office	3835 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 90 degrees
9/26/2017	14:00	Downwind	3835 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 90 degrees
9/26/2017	14:00	Stripper	3835 ACFM	MiniRAE 3000	Kennie moore	Max. 17.8 ppm Steady State 6.1 ppm	Clear 90 degrees
9/29/2017	8:00	Outside GWTP Office	4050 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 65 degrees
9/29/2017	8:00	Downwind	4050 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 65 degrees
9/29/2017	8:00	Stripper	4050 ACFM	MiniRAE 3000	Scott Beesinger	Max. 18.3 ppm Steady State 7.2 ppm	Clear 65 degrees
9/29/2017	13:00	Outside GWTP Office	3810 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 76 degrees
9/29/2017	13:00	Downwind	3810 ACFM	MiniRAE 3000	Kennie moore	0.0 ppm	Clear 76 degrees
9/29/2017	13:00	Stripper	3810 ACFM	MiniRAE 3000	Kennie moore	Max. 17.5 ppm Steady State 6.0 ppm	Clear 76 degrees

EQUIPMENT CALIBRATION DAILY LOG

Date: 7/7/17	Project Name: LHAAP GWTP
Project Number: 60256135. GWTPTRUMAR16	Recorded By: Scott Beggins

PID	Model: Mini RAE 3000		Bulb: 11:7		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: 1112989						
	Parameter	Standard	Exp. Date	Lot #	Time: 0705	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100 ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O ₂ (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 7/10/17	Project Name: LHAAP GWTP
Project Number: 60256135. GWTPITRUMAR16	Recorded By: Scott Beegins

PID	Model: Mini RA4 3000		Bulb: 11.7		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: 1112989						
	Parameter	Standard	Exp. Date	Lot #	Time: 0650	Time:	Time:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Initials: SB	Initials:	Initials:
Second Point Calibration	Vapor conc. (ppm)	100 ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: TO ZERO SB	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
First Point Calibration	O ₂ (%)				Initials:	Initials:	Initials:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 7/13/17

Project Number: 60256135. GWTP/TITRUMAR16

Project Name: LHAAP GWTP

Recorded By: Scott Beeching

PID	Model: <u>Mini RAE 3000</u>		Bulb: <u>11.7</u>		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: <u>1112989</u>						
	Parameter	Standard	Exp. Date	Lot #	Time: <u>0645</u>	Time:	Time:
					Initials: <u>SB</u>	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: <u>TO ZERO SB</u>	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	<u>100 ppm</u> (isobutylene)	<u>2/6/19</u>	<u>CAP-248-100-4</u>	Value: <u>SB</u>	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O ₂ (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 7/17/17

Project Number: 60256135. GWTP/TITRUMAR16

Project Name: LHAAP GWTP

Recorded By: Scott BeeginsGA

PID	Model: <u>Mini RA4 3000</u>		Bulb: <u>11.7</u>		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: <u>1112989</u>						
	Parameter	Standard	Exp. Date	Lot #	Time: <u>0715</u>	Time:	Time:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Initials: <u>SB</u>	Initials:	Initials:
Second Point Calibration	Vapor conc. (ppm)	<u>100 ppm</u> (isobutylene)	<u>2/6/19</u>	<u>CAP-248-100-4</u>	Value: <u>TO ZERO SB</u>	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
First Point Calibration	O ₂ (%)				Initials:	Initials:	Initials:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 7/20/17

Project Name: LHAAP GWTP

Project Number: 60256135. GWTPITRUMAR16

Recorded By: Scott Beckinsale

PID	Model: <u>Mini RAE 3000</u>		Bulb: <u>N₂</u>		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: <u>1112989</u>						
	Parameter	Standard	Exp. Date	Lot #	Time: <u>0700</u>	Time:	Time:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Initials: <u>SB</u>	Initials:	Initials:
Second Point Calibration	Vapor conc. (ppm)	<u>100 ppm</u> (isobutylene)	<u>2/6/19</u>	<u>CAP-248-100-4</u>	Value: <u>TO ZERO SB</u>	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
First Point Calibration	O ₂ (%)				Initials:	Initials:	Initials:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 7/24/17 Project Name: LHAAP GWTP
 Project Number: 60256135. GWTPTRUMAR16 Recorded By: Scott Beesinger

PID	Model: <u>Mini RAE 3000</u>		Bulb: <u>H₂</u>		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: <u>1112989</u>						
	Parameter	Standard	Exp. Date	Lot #	Time: <u>7:00</u>	Time:	Time:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Initials: <u>SB</u>	Initials:	Initials:
Second Point Calibration	Vapor conc. (ppm)	<u>100 ppm</u> (isobutylene)	<u>2/6/19</u>	<u>CAP-248-100-4</u>	Value: <u>TO ZERO</u> <u>SB</u>	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
First Point Calibration	O ₂ (%)				Initials:	Initials:	Initials:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 7/31/17	Project Name: LHAAP GWTP
Project Number: 60256135. GWTPTR2UMAR16	Recorded By: Scott Beesinger

PID	Model: Mini RAE 3000		Bulb: 11.7		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: 1112989						
	Parameter	Standard	Exp. Date	Lot #	Time: 0650	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: TO zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100 ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O ₂ (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 8/7/17

Project Name: LHHAP GWTP

Project Number: 60256135, GWTPTRUMAR16

Recorded By: Scott BEESENGER

PID	Model: Mini RAE 3000		Bulb: 11.7 meV		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: 1112989						
	Parameter	Standard	Exp. Date	Lot #	Time: 0645	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: TO ZERO SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O ₂ (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 8/10/17	Project Name: LHAAP GWTP
Project Number: 60256/35, GWTP HRU MAR 16	Recorded By: SCOTT BEESINGER

PID	Model: Mini. RAE 3000		Bulb: 11.7		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: 1112989						
	Parameter	Standard	Exp. Date	Lot #	Time: 0700	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: TO ZERO SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O ₂ (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 9/14/17

Project Name: LHAAP GWTP

Project Number: 60256/35.GWTPTRUMAR16

Recorded By: SCOTT BEESINGER

PID	Model: M: n. RA43000		Bulb: 10.6 meV		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: 1112989						
	Parameter	Standard	Exp. Date	Lot #	Time: 0700	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: TO ZERO SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O ₂ (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 9/21/17	Project Name: LHAAP GWTP
Project Number: 60256135. GWTPTRUMARIB	Recorded By: SCOTT BEESINGER

PID	Model: Mini RA43000		Bulb: 11.7 10.6 meV		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: 1112989						
	Parameter	Standard	Exp. Date	Lot #	Time: 0650	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: TO 2420 SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248 1004	Value: SB	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O ₂ (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 9/26/17	Project Name: LHAAP GWTP
Project Number: 60256135.GWTPTRUMARIB	Recorded By: Scott BEESSINGER

PID	Model: MiniRAE3000		Bulb: 11.7		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: 1112989						
	Parameter	Standard	Exp. Date	Lot #	Time: 0710	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: TO ZERO SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O ₂ (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

EQUIPMENT CALIBRATION DAILY LOG

Date: 9/29/17	Project Name: LHAAP GWTP
Project Number: 60256/35. GWTP+HWMA216	Recorded By: Scott Beesinger

PID	Model: MiniFlare 3000		Bulb: 10.5 meV		Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: 1112989						
	Parameter	Standard	Exp. Date	Lot #	Time: 0700	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100 ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O ₂ METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O ₂ (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

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

Additional Remarks:

Attachment C

**Air Analytical Laboratory
Report**



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LABORATORY REPORT

October 19, 2017

Linda Raabe
AECOM
112 E. Pecan Street Suite 400
San Antonio, TX 78205

RE: LHAAP GWTP / 60256135.GWTPTHRUMAR16

Dear Linda:

Enclosed are the results of the samples submitted to our laboratory on September 29, 2017. For your reference, these analyses have been assigned our service request number P1704815.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

By Kate Kaneko at 3:59 pm, 10/19/17

Kate Kaneko
Project Manager



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Client: AECOM
 Project: LHAAP GWTP / 60256135.GWTPTHRUMAR16

Service Request No: P1704815

CASE NARRATIVE

The samples were received intact under chain of custody on September 29, 2017 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Volatile Organic Compound Analysis

The samples were analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The spike recovery of trichlorofluoromethane in the Laboratory Control Sample (LCS) was outside the Laboratory generated control criteria. The recovery error equates to a potential high bias. However, the recovery in question was within the method criteria, therefore the data quality is not significantly affected. No corrective action was taken.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.



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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
Arizona DHS	http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home	AZ0694
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Louisiana DEQ (NELAP)	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	05071
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2016036
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	1177034
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-004
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
PJLA (DoD ELAP)	http://www.pjlabs.com/search-accredited-labs	65818 (Testing)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-17-8
Utah DOH (NELAP)	http://health.utah.gov/lab/environmental-lab-certification/	CA01627201 7-8
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: AECOM
 Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

Service Request: P1704815

Date Received: 9/29/2017
 Time Received: 09:30

TO-15 - VOC Cans

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pf1 (psig)	
LH18/24-AIR-5471-STRIPPER	P1704815-001	Air	9/26/2017	14:00	AC00674	-0.10	3.67	X
LH18/24-AIR-5471-STRIPPER-DUP	P1704815-002	Air	9/26/2017	14:00	SC02120	0.00	3.61	X
LH18/24-AIR-5471-GWTP	P1704815-003	Air	9/26/2017	14:30	AS01185	-2.32	3.52	X
LH18/24-AIR-5471-DOWNWIND-NORTH	P1704815-004	Air	9/27/2017	06:30	AS00799	-0.02	3.68	X

Air - Chain of Custody Record & Analytical Service Request

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270



Requested Turnaround Time in Business Days (Surcharges) please circle 1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10-Day-Standard		ALS Project No P1704815	
Project Name LITAAP GWTP		ALS Contact	
Project Number 60256135.GWTPTRUMAR16		Analysis Method SI - RL	
P.O. # / Billing Information AECOM 112 E. PECAN, Suite 400 SAN ANTONIO, TX. 78205		Comments e.g. Actual Preservative or specific instructions	
Sampler (Print & Sign) Scott Beesinger			
Client Sample ID	Laboratory ID Number	Date Collected	Time Collected
LH824-Air-5471-Stripper		9/24/17	1400
LH824-Air-5471-Stripper-Dup		9/26/17	1400
LH824-Air-5471-GWTP		9/26/17	1430
LH824-Air-5471-Downwind-NORTH		9/27/17	0630
Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure ^u Hg	Canister End Pressure ^u Hg/psig
ALC00674		-30	0
SC02120		-30	0
AS01185	0A00578	-30	-6
AS00799	FCR00293	-29	-1
Sample Volume			
6L			
6L			
6L			
6L			
Report Tier Levels - please select Tier I - Results (Default in not specified) _____ Tier II (Results + QC Summaries) _____ Tier III (Results + QC & Calibration Summaries) _____ Tier IV (Date Validation Package) 10% Surcharge _____			
Relinquished by: (Signature) Scott Beesinger		Relinquished by: (Signature) Scott Beesinger	
Date: 9/27/17		Date: 9/27/17	
Time: 0700		Time: 0730	
Received by: (Signature) H. G. Perry		Received by: (Signature) H. G. Perry	
Date: _____		Date: 9/29/17	
Time: _____		Time: _____	
Units: _____		Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT	
EDD required YES / No		Project Requirements (MRLs, QAPP)	
Type: _____		Cooler / Blank Temperature _____ °C	

**ALS Environmental
Sample Acceptance Check Form**

Client: AECOM Work order: P1704815
 Project: LHAAP GWTP / 60256135.0004AE GWTP 16-17 NTVL
 Sample(s) received on: 9/29/17 Date opened: 9/29/17 by: E.PEREZ

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

- | | Yes | No | N/A |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1 Were sample containers properly marked with client sample ID? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 Did sample containers arrive in good condition? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 Were chain-of-custody papers used and filled out? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 Did sample container labels and/or tags agree with custody papers? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 Was sample volume received adequate for analysis? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 Are samples within specified holding times? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 Was proper temperature (thermal preservation) of cooler at receipt adhered to? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 8 Were custody seals on outside of cooler/Box/Container? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Location of seal(s)? _____ Sealing Lid? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were signature and date included? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were seals intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 9 Do containers have appropriate preservation , according to method/SOP or Client specified information? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Is there a client indication that the submitted samples are pH preserved? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were VOA vials checked for presence/absence of air bubbles? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 10 Tubes: Are the tubes capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 11 Badges: Are the badges properly capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Are dual bed badges separated and individually capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1704815-001.01	6.0 L Ambient Can					
P1704815-002.01	6.0 L Source Can					
P1704815-003.01	6.0 L Silonite Can					
P1704815-004.01	6.0 L Silonite Can					

Explain any discrepancies: (include lab sample ID numbers): _____

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-STRIPPER

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-001

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.0030 Liter(s)

Test Notes:

Container ID: AC00674

Initial Pressure (psig): -0.10 Final Pressure (psig): 3.67

Container Dilution Factor: 1.26

CAS #	Compound	Result	MRL	Result	MRL	Data Qualifier
		$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	ppbV	ppbV	
115-07-1	Propene	ND	210	ND	120	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	210	ND	42	
74-87-3	Chloromethane	ND	210	ND	100	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	210	ND	30	
75-01-4	Vinyl Chloride	700	210	270	82	
106-99-0	1,3-Butadiene	ND	210	ND	95	
74-83-9	Bromomethane	ND	210	ND	54	
75-00-3	Chloroethane	ND	210	ND	80	
64-17-5	Ethanol	ND	2,100	ND	1,100	
75-05-8	Acetonitrile	ND	210	ND	130	
107-02-8	Acrolein	ND	840	ND	370	
67-64-1	Acetone	ND	2,100	ND	880	
75-69-4	Trichlorofluoromethane (CFC 11)	ND	210	ND	37	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	2,100	ND	850	
107-13-1	Acrylonitrile	ND	210	ND	97	
75-35-4	1,1-Dichloroethene	310	210	79	53	
75-09-2	Methylene Chloride	12,000	210	3,500	60	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	210	ND	67	
76-13-1	Trichlorotrifluoroethane (CFC 113)	20,000	210	2,600	27	
75-15-0	Carbon Disulfide	ND	2,100	ND	670	
156-60-5	trans-1,2-Dichloroethene	ND	210	ND	53	
75-34-3	1,1-Dichloroethane	ND	210	ND	52	
1634-04-4	Methyl tert-Butyl Ether	ND	210	ND	58	
108-05-4	Vinyl Acetate	ND	2,100	ND	600	
78-93-3	2-Butanone (MEK)	ND	2,100	ND	710	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 2 of 3

Client: **AECOM**Client Sample ID: **LH18/24-AIR-5471-STRIPPER**Client Project ID: **LHAAP GWTP / 60256135.GWTPTHRUMAR16**

ALS Project ID: P1704815

ALS Sample ID: P1704815-001

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.0030 Liter(s)

Test Notes:

Container ID: AC00674

Initial Pressure (psig): -0.10 Final Pressure (psig): 3.67

Container Dilution Factor: 1.26

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	22,000	210	5,500	53	
141-78-6	Ethyl Acetate	ND	420	ND	120	
110-54-3	n-Hexane	ND	210	ND	60	
67-66-3	Chloroform	ND	210	ND	43	
109-99-9	Tetrahydrofuran (THF)	ND	210	ND	71	
107-06-2	1,2-Dichloroethane	350	210	87	52	
71-55-6	1,1,1-Trichloroethane	ND	210	ND	39	
71-43-2	Benzene	ND	210	ND	66	
56-23-5	Carbon Tetrachloride	ND	210	ND	33	
110-82-7	Cyclohexane	ND	420	ND	120	
78-87-5	1,2-Dichloropropane	ND	210	ND	45	
75-27-4	Bromodichloromethane	ND	210	ND	31	
79-01-6	Trichloroethene	34,000	210	6,300	39	
123-91-1	1,4-Dioxane	ND	210	ND	58	
80-62-6	Methyl Methacrylate	ND	420	ND	100	
142-82-5	n-Heptane	ND	210	ND	51	
10061-01-5	cis-1,3-Dichloropropene	ND	210	ND	46	
108-10-1	4-Methyl-2-pentanone	ND	210	ND	51	
10061-02-6	trans-1,3-Dichloropropene	ND	210	ND	46	
79-00-5	1,1,2-Trichloroethane	ND	210	ND	39	
108-88-3	Toluene	ND	210	ND	56	
591-78-6	2-Hexanone	ND	210	ND	51	
124-48-1	Dibromochloromethane	ND	210	ND	25	
106-93-4	1,2-Dibromoethane	ND	210	ND	27	
123-86-4	n-Butyl Acetate	ND	210	ND	44	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 3 of 3

Client: AECOM**Client Sample ID:** LH18/24-AIR-5471-STRIPPER**Client Project ID:** LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-001

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.0030 Liter(s)

Test Notes:

Container ID: AC00674

Initial Pressure (psig): -0.10 Final Pressure (psig): 3.67

Container Dilution Factor: 1.26

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	210	ND	45	
127-18-4	Tetrachloroethene	ND	210	ND	31	
108-90-7	Chlorobenzene	ND	210	ND	46	
100-41-4	Ethylbenzene	ND	210	ND	48	
179601-23-1	m,p-Xylenes	ND	420	ND	97	
75-25-2	Bromoform	ND	210	ND	20	
100-42-5	Styrene	ND	210	ND	49	
95-47-6	o-Xylene	ND	210	ND	48	
111-84-2	n-Nonane	ND	210	ND	40	
79-34-5	1,1,2,2-Tetrachloroethane	ND	210	ND	31	
98-82-8	Cumene	ND	210	ND	43	
80-56-8	alpha-Pinene	ND	210	ND	38	
103-65-1	n-Propylbenzene	ND	210	ND	43	
622-96-8	4-Ethyltoluene	ND	210	ND	43	
108-67-8	1,3,5-Trimethylbenzene	ND	210	ND	43	
95-63-6	1,2,4-Trimethylbenzene	ND	210	ND	43	
100-44-7	Benzyl Chloride	ND	210	ND	41	
541-73-1	1,3-Dichlorobenzene	ND	210	ND	35	
106-46-7	1,4-Dichlorobenzene	ND	210	ND	35	
95-50-1	1,2-Dichlorobenzene	ND	210	ND	35	
5989-27-5	d-Limonene	ND	210	ND	38	
96-12-8	1,2-Dibromo-3-chloropropane	ND	210	ND	22	
120-82-1	1,2,4-Trichlorobenzene	ND	210	ND	28	
91-20-3	Naphthalene	ND	210	ND	40	
87-68-3	Hexachlorobutadiene	ND	210	ND	20	

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ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-STRIPPER-DUP

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-002

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.0030 Liter(s)

Test Notes:

Container ID: SC02120

Initial Pressure (psig): 0.0 Final Pressure (psig): 3.61

Container Dilution Factor: 1.25

CAS #	Compound	Result	MRL	Result	MRL	Data Qualifier
		µg/m ³	µg/m ³	ppbV	ppbV	
115-07-1	Propene	ND	210	ND	120	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	210	ND	42	
74-87-3	Chloromethane	ND	210	ND	100	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	210	ND	30	
75-01-4	Vinyl Chloride	690	210	270	82	
106-99-0	1,3-Butadiene	ND	210	ND	94	
74-83-9	Bromomethane	ND	210	ND	54	
75-00-3	Chloroethane	ND	210	ND	79	
64-17-5	Ethanol	ND	2,100	ND	1,100	
75-05-8	Acetonitrile	ND	210	ND	120	
107-02-8	Acrolein	ND	830	ND	360	
67-64-1	Acetone	ND	2,100	ND	880	
75-69-4	Trichlorofluoromethane (CFC 11)	ND	210	ND	37	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	2,100	ND	850	
107-13-1	Acrylonitrile	ND	210	ND	96	
75-35-4	1,1-Dichloroethene	300	210	76	53	
75-09-2	Methylene Chloride	12,000	210	3,400	60	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	210	ND	67	
76-13-1	Trichlorotrifluoroethane (CFC 113)	19,000	210	2,500	27	
75-15-0	Carbon Disulfide	ND	2,100	ND	670	
156-60-5	trans-1,2-Dichloroethene	ND	210	ND	53	
75-34-3	1,1-Dichloroethane	ND	210	ND	51	
1634-04-4	Methyl tert-Butyl Ether	ND	210	ND	58	
108-05-4	Vinyl Acetate	ND	2,100	ND	590	
78-93-3	2-Butanone (MEK)	ND	2,100	ND	710	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 2 of 3

Client: AECOM**Client Sample ID:** LH18/24-AIR-5471-STRIPPER-DUP**Client Project ID:** LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-002

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.0030 Liter(s)

Test Notes:

Container ID: SC02120

Initial Pressure (psig): 0.0 Final Pressure (psig): 3.61

Container Dilution Factor: 1.25

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	22,000	210	5,500	53	
141-78-6	Ethyl Acetate	ND	420	ND	120	
110-54-3	n-Hexane	ND	210	ND	59	
67-66-3	Chloroform	ND	210	ND	43	
109-99-9	Tetrahydrofuran (THF)	ND	210	ND	71	
107-06-2	1,2-Dichloroethane	360	210	88	51	
71-55-6	1,1,1-Trichloroethane	ND	210	ND	38	
71-43-2	Benzene	ND	210	ND	65	
56-23-5	Carbon Tetrachloride	ND	210	ND	33	
110-82-7	Cyclohexane	ND	420	ND	120	
78-87-5	1,2-Dichloropropane	ND	210	ND	45	
75-27-4	Bromodichloromethane	ND	210	ND	31	
79-01-6	Trichloroethene	34,000	210	6,300	39	
123-91-1	1,4-Dioxane	ND	210	ND	58	
80-62-6	Methyl Methacrylate	ND	420	ND	100	
142-82-5	n-Heptane	ND	210	ND	51	
10061-01-5	cis-1,3-Dichloropropene	ND	210	ND	46	
108-10-1	4-Methyl-2-pentanone	ND	210	ND	51	
10061-02-6	trans-1,3-Dichloropropene	ND	210	ND	46	
79-00-5	1,1,2-Trichloroethane	ND	210	ND	38	
108-88-3	Toluene	ND	210	ND	55	
591-78-6	2-Hexanone	ND	210	ND	51	
124-48-1	Dibromochloromethane	ND	210	ND	24	
106-93-4	1,2-Dibromoethane	ND	210	ND	27	
123-86-4	n-Butyl Acetate	ND	210	ND	44	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 3 of 3

Client: AECOM**Client Sample ID:** LH18/24-AIR-5471-STRIPPER-DUP**Client Project ID:** LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-002

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.0030 Liter(s)

Test Notes:

Container ID: SC02120

Initial Pressure (psig): 0.0 Final Pressure (psig): 3.61

Container Dilution Factor: 1.25

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	210	ND	45	
127-18-4	Tetrachloroethene	ND	210	ND	31	
108-90-7	Chlorobenzene	ND	210	ND	45	
100-41-4	Ethylbenzene	ND	210	ND	48	
179601-23-1	m,p-Xylenes	ND	420	ND	96	
75-25-2	Bromoform	ND	210	ND	20	
100-42-5	Styrene	ND	210	ND	49	
95-47-6	o-Xylene	ND	210	ND	48	
111-84-2	n-Nonane	ND	210	ND	40	
79-34-5	1,1,2,2-Tetrachloroethane	ND	210	ND	30	
98-82-8	Cumene	ND	210	ND	42	
80-56-8	alpha-Pinene	ND	210	ND	37	
103-65-1	n-Propylbenzene	ND	210	ND	42	
622-96-8	4-Ethyltoluene	ND	210	ND	42	
108-67-8	1,3,5-Trimethylbenzene	ND	210	ND	42	
95-63-6	1,2,4-Trimethylbenzene	ND	210	ND	42	
100-44-7	Benzyl Chloride	ND	210	ND	40	
541-73-1	1,3-Dichlorobenzene	ND	210	ND	35	
106-46-7	1,4-Dichlorobenzene	ND	210	ND	35	
95-50-1	1,2-Dichlorobenzene	ND	210	ND	35	
5989-27-5	d-Limonene	ND	210	ND	37	
96-12-8	1,2-Dibromo-3-chloropropane	ND	210	ND	22	
120-82-1	1,2,4-Trichlorobenzene	ND	210	ND	28	
91-20-3	Naphthalene	ND	210	ND	40	
87-68-3	Hexachlorobutadiene	ND	210	ND	20	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-GWTP

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-003

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Container ID: AS01185

Initial Pressure (psig): -2.32 Final Pressure (psig): 3.52

Container Dilution Factor: 1.47

CAS #	Compound	Result	MRL	Result	MRL	Data Qualifier
		$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	ppbV	ppbV	
115-07-1	Propene	ND	0.74	ND	0.43	
75-71-8	Dichlorodifluoromethane (CFC 12)	2.7	0.74	0.55	0.15	
74-87-3	Chloromethane	ND	0.74	ND	0.36	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.74	ND	0.11	
75-01-4	Vinyl Chloride	1.2	0.74	0.47	0.29	
106-99-0	1,3-Butadiene	ND	0.74	ND	0.33	
74-83-9	Bromomethane	ND	0.74	ND	0.19	
75-00-3	Chloroethane	ND	0.74	ND	0.28	
64-17-5	Ethanol	ND	7.4	ND	3.9	
75-05-8	Acetonitrile	ND	0.74	ND	0.44	
107-02-8	Acrolein	ND	2.9	ND	1.3	
67-64-1	Acetone	ND	7.4	ND	3.1	
75-69-4	Trichlorofluoromethane (CFC 11)	1.4	0.74	0.25	0.13	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	7.4	ND	3.0	
107-13-1	Acrylonitrile	ND	0.74	ND	0.34	
75-35-4	1,1-Dichloroethene	ND	0.74	ND	0.19	
75-09-2	Methylene Chloride	22	0.74	6.3	0.21	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.74	ND	0.23	
76-13-1	Trichlorotrifluoroethane (CFC 113)	45	0.74	5.9	0.096	
75-15-0	Carbon Disulfide	ND	7.4	ND	2.4	
156-60-5	trans-1,2-Dichloroethene	ND	0.74	ND	0.19	
75-34-3	1,1-Dichloroethane	ND	0.74	ND	0.18	
1634-04-4	Methyl tert-Butyl Ether	ND	0.74	ND	0.20	
108-05-4	Vinyl Acetate	ND	7.4	ND	2.1	
78-93-3	2-Butanone (MEK)	ND	7.4	ND	2.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 2 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-GWTP

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-003

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Container ID: AS01185

Initial Pressure (psig): -2.32 Final Pressure (psig): 3.52

Container Dilution Factor: 1.47

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	25	0.74	6.2	0.19	
141-78-6	Ethyl Acetate	ND	1.5	ND	0.41	
110-54-3	n-Hexane	1.0	0.74	0.30	0.21	
67-66-3	Chloroform	ND	0.74	ND	0.15	
109-99-9	Tetrahydrofuran (THF)	1.4	0.74	0.49	0.25	
107-06-2	1,2-Dichloroethane	ND	0.74	ND	0.18	
71-55-6	1,1,1-Trichloroethane	ND	0.74	ND	0.13	
71-43-2	Benzene	ND	0.74	ND	0.23	
56-23-5	Carbon Tetrachloride	ND	0.74	ND	0.12	
110-82-7	Cyclohexane	ND	1.5	ND	0.43	
78-87-5	1,2-Dichloropropane	ND	0.74	ND	0.16	
75-27-4	Bromodichloromethane	ND	0.74	ND	0.11	
79-01-6	Trichloroethene	43	0.74	8.0	0.14	
123-91-1	1,4-Dioxane	ND	0.74	ND	0.20	
80-62-6	Methyl Methacrylate	ND	1.5	ND	0.36	
142-82-5	n-Heptane	ND	0.74	ND	0.18	
10061-01-5	cis-1,3-Dichloropropene	ND	0.74	ND	0.16	
108-10-1	4-Methyl-2-pentanone	ND	0.74	ND	0.18	
10061-02-6	trans-1,3-Dichloropropene	ND	0.74	ND	0.16	
79-00-5	1,1,2-Trichloroethane	ND	0.74	ND	0.13	
108-88-3	Toluene	2.3	0.74	0.60	0.20	
591-78-6	2-Hexanone	ND	0.74	ND	0.18	
124-48-1	Dibromochloromethane	ND	0.74	ND	0.086	
106-93-4	1,2-Dibromoethane	ND	0.74	ND	0.096	
123-86-4	n-Butyl Acetate	ND	0.74	ND	0.15	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 3 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-GWTP

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-003

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Container ID: AS01185

Initial Pressure (psig): -2.32 Final Pressure (psig): 3.52

Container Dilution Factor: 1.47

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.74	ND	0.16	
127-18-4	Tetrachloroethene	ND	0.74	ND	0.11	
108-90-7	Chlorobenzene	ND	0.74	ND	0.16	
100-41-4	Ethylbenzene	ND	0.74	ND	0.17	
179601-23-1	m,p-Xylenes	2.1	1.5	0.48	0.34	
75-25-2	Bromoform	ND	0.74	ND	0.071	
100-42-5	Styrene	ND	0.74	ND	0.17	
95-47-6	o-Xylene	0.84	0.74	0.19	0.17	
111-84-2	n-Nonane	ND	0.74	ND	0.14	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.74	ND	0.11	
98-82-8	Cumene	ND	0.74	ND	0.15	
80-56-8	alpha-Pinene	9.5	0.74	1.7	0.13	
103-65-1	n-Propylbenzene	ND	0.74	ND	0.15	
622-96-8	4-Ethyltoluene	ND	0.74	ND	0.15	
108-67-8	1,3,5-Trimethylbenzene	ND	0.74	ND	0.15	
95-63-6	1,2,4-Trimethylbenzene	1.2	0.74	0.25	0.15	
100-44-7	Benzyl Chloride	ND	0.74	ND	0.14	
541-73-1	1,3-Dichlorobenzene	ND	0.74	ND	0.12	
106-46-7	1,4-Dichlorobenzene	ND	0.74	ND	0.12	
95-50-1	1,2-Dichlorobenzene	ND	0.74	ND	0.12	
5989-27-5	d-Limonene	2.5	0.74	0.46	0.13	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.74	ND	0.076	
120-82-1	1,2,4-Trichlorobenzene	ND	0.74	ND	0.099	
91-20-3	Naphthalene	ND	0.74	ND	0.14	
87-68-3	Hexachlorobutadiene	ND	0.74	ND	0.069	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-DOWNWIND-NORTH

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-004

Test Code: EPA TO-15

Date Collected: 9/27/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Container ID: AS00799

Initial Pressure (psig): -0.02 Final Pressure (psig): 3.68

Container Dilution Factor: 1.25

CAS #	Compound	Result	MRL	Result	MRL	Data Qualifier
		$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	ppbV	ppbV	
115-07-1	Propene	ND	0.63	ND	0.36	
75-71-8	Dichlorodifluoromethane (CFC 12)	2.7	0.63	0.56	0.13	
74-87-3	Chloromethane	ND	0.63	ND	0.30	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.63	ND	0.089	
75-01-4	Vinyl Chloride	ND	0.63	ND	0.24	
106-99-0	1,3-Butadiene	ND	0.63	ND	0.28	
74-83-9	Bromomethane	ND	0.63	ND	0.16	
75-00-3	Chloroethane	ND	0.63	ND	0.24	
64-17-5	Ethanol	ND	6.3	ND	3.3	
75-05-8	Acetonitrile	ND	0.63	ND	0.37	
107-02-8	Acrolein	ND	2.5	ND	1.1	
67-64-1	Acetone	8.7	6.3	3.6	2.6	
75-69-4	Trichlorofluoromethane (CFC 11)	1.5	0.63	0.26	0.11	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	6.3	ND	2.5	
107-13-1	Acrylonitrile	ND	0.63	ND	0.29	
75-35-4	1,1-Dichloroethene	ND	0.63	ND	0.16	
75-09-2	Methylene Chloride	ND	0.63	ND	0.18	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.63	ND	0.20	
76-13-1	Trichlorotrifluoroethane (CFC 113)	5.7	0.63	0.74	0.082	
75-15-0	Carbon Disulfide	ND	6.3	ND	2.0	
156-60-5	trans-1,2-Dichloroethene	ND	0.63	ND	0.16	
75-34-3	1,1-Dichloroethane	ND	0.63	ND	0.15	
1634-04-4	Methyl tert-Butyl Ether	ND	0.63	ND	0.17	
108-05-4	Vinyl Acetate	ND	6.3	ND	1.8	
78-93-3	2-Butanone (MEK)	ND	6.3	ND	2.1	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 2 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-DOWNWIND-NORTH

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-004

Test Code: EPA TO-15

Date Collected: 9/27/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Container ID: AS00799

Initial Pressure (psig): -0.02 Final Pressure (psig): 3.68

Container Dilution Factor: 1.25

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	0.63	ND	0.16	
141-78-6	Ethyl Acetate	ND	1.3	ND	0.35	
110-54-3	n-Hexane	0.77	0.63	0.22	0.18	
67-66-3	Chloroform	ND	0.63	ND	0.13	
109-99-9	Tetrahydrofuran (THF)	ND	0.63	ND	0.21	
107-06-2	1,2-Dichloroethane	ND	0.63	ND	0.15	
71-55-6	1,1,1-Trichloroethane	ND	0.63	ND	0.11	
71-43-2	Benzene	ND	0.63	ND	0.20	
56-23-5	Carbon Tetrachloride	ND	0.63	ND	0.099	
110-82-7	Cyclohexane	ND	1.3	ND	0.36	
78-87-5	1,2-Dichloropropane	ND	0.63	ND	0.14	
75-27-4	Bromodichloromethane	ND	0.63	ND	0.093	
79-01-6	Trichloroethene	1.1	0.63	0.21	0.12	
123-91-1	1,4-Dioxane	ND	0.63	ND	0.17	
80-62-6	Methyl Methacrylate	ND	1.3	ND	0.31	
142-82-5	n-Heptane	ND	0.63	ND	0.15	
10061-01-5	cis-1,3-Dichloropropene	ND	0.63	ND	0.14	
108-10-1	4-Methyl-2-pentanone	ND	0.63	ND	0.15	
10061-02-6	trans-1,3-Dichloropropene	ND	0.63	ND	0.14	
79-00-5	1,1,2-Trichloroethane	ND	0.63	ND	0.11	
108-88-3	Toluene	0.86	0.63	0.23	0.17	
591-78-6	2-Hexanone	ND	0.63	ND	0.15	
124-48-1	Dibromochloromethane	ND	0.63	ND	0.073	
106-93-4	1,2-Dibromoethane	ND	0.63	ND	0.081	
123-86-4	n-Butyl Acetate	ND	0.63	ND	0.13	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 3 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-DOWNWIND-NORTH

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-004

Test Code: EPA TO-15

Date Collected: 9/27/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Silonite Canister

Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Container ID: AS00799

Initial Pressure (psig): -0.02 Final Pressure (psig): 3.68

Container Dilution Factor: 1.25

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.63	ND	0.13	
127-18-4	Tetrachloroethene	ND	0.63	ND	0.092	
108-90-7	Chlorobenzene	ND	0.63	ND	0.14	
100-41-4	Ethylbenzene	ND	0.63	ND	0.14	
179601-23-1	m,p-Xylenes	ND	1.3	ND	0.29	
75-25-2	Bromoform	ND	0.63	ND	0.060	
100-42-5	Styrene	ND	0.63	ND	0.15	
95-47-6	o-Xylene	ND	0.63	ND	0.14	
111-84-2	n-Nonane	ND	0.63	ND	0.12	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.63	ND	0.091	
98-82-8	Cumene	ND	0.63	ND	0.13	
80-56-8	alpha-Pinene	5.9	0.63	1.1	0.11	
103-65-1	n-Propylbenzene	ND	0.63	ND	0.13	
622-96-8	4-Ethyltoluene	ND	0.63	ND	0.13	
108-67-8	1,3,5-Trimethylbenzene	ND	0.63	ND	0.13	
95-63-6	1,2,4-Trimethylbenzene	ND	0.63	ND	0.13	
100-44-7	Benzyl Chloride	ND	0.63	ND	0.12	
541-73-1	1,3-Dichlorobenzene	ND	0.63	ND	0.10	
106-46-7	1,4-Dichlorobenzene	ND	0.63	ND	0.10	
95-50-1	1,2-Dichlorobenzene	ND	0.63	ND	0.10	
5989-27-5	d-Limonene	1.8	0.63	0.32	0.11	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.63	ND	0.065	
120-82-1	1,2,4-Trichlorobenzene	ND	0.63	ND	0.084	
91-20-3	Naphthalene	ND	0.63	ND	0.12	
87-68-3	Hexachlorobutadiene	ND	0.63	ND	0.059	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 3

Client: AECOM**Client Sample ID:** Method Blank**Client Project ID:** LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P171007-MB

Test Code: EPA TO-15

Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: NA

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Container Dilution Factor: 1.00

CAS #	Compound	Result	MRL	Result	MRL	Data Qualifier
		$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	ppbV	ppbV	
115-07-1	Propene	ND	0.50	ND	0.29	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	0.50	ND	0.10	
74-87-3	Chloromethane	ND	0.50	ND	0.24	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.50	ND	0.072	
75-01-4	Vinyl Chloride	ND	0.50	ND	0.20	
106-99-0	1,3-Butadiene	ND	0.50	ND	0.23	
74-83-9	Bromomethane	ND	0.50	ND	0.13	
75-00-3	Chloroethane	ND	0.50	ND	0.19	
64-17-5	Ethanol	ND	5.0	ND	2.7	
75-05-8	Acetonitrile	ND	0.50	ND	0.30	
107-02-8	Acrolein	ND	2.0	ND	0.87	
67-64-1	Acetone	ND	5.0	ND	2.1	
75-69-4	Trichlorofluoromethane (CFC 11)	ND	0.50	ND	0.089	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	5.0	ND	2.0	
107-13-1	Acrylonitrile	ND	0.50	ND	0.23	
75-35-4	1,1-Dichloroethene	ND	0.50	ND	0.13	
75-09-2	Methylene Chloride	ND	0.50	ND	0.14	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.50	ND	0.16	
76-13-1	Trichlorotrifluoroethane (CFC 113)	ND	0.50	ND	0.065	
75-15-0	Carbon Disulfide	ND	5.0	ND	1.6	
156-60-5	trans-1,2-Dichloroethene	ND	0.50	ND	0.13	
75-34-3	1,1-Dichloroethane	ND	0.50	ND	0.12	
1634-04-4	Methyl tert-Butyl Ether	ND	0.50	ND	0.14	
108-05-4	Vinyl Acetate	ND	5.0	ND	1.4	
78-93-3	2-Butanone (MEK)	ND	5.0	ND	1.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 2 of 3

Client: AECOM**Client Sample ID:** Method Blank**Client Project ID:** LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P171007-MB

Test Code: EPA TO-15

Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: NA

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Container Dilution Factor: 1.00

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	0.50	ND	0.13	
141-78-6	Ethyl Acetate	ND	1.0	ND	0.28	
110-54-3	n-Hexane	ND	0.50	ND	0.14	
67-66-3	Chloroform	ND	0.50	ND	0.10	
109-99-9	Tetrahydrofuran (THF)	ND	0.50	ND	0.17	
107-06-2	1,2-Dichloroethane	ND	0.50	ND	0.12	
71-55-6	1,1,1-Trichloroethane	ND	0.50	ND	0.092	
71-43-2	Benzene	ND	0.50	ND	0.16	
56-23-5	Carbon Tetrachloride	ND	0.50	ND	0.080	
110-82-7	Cyclohexane	ND	1.0	ND	0.29	
78-87-5	1,2-Dichloropropane	ND	0.50	ND	0.11	
75-27-4	Bromodichloromethane	ND	0.50	ND	0.075	
79-01-6	Trichloroethene	ND	0.50	ND	0.093	
123-91-1	1,4-Dioxane	ND	0.50	ND	0.14	
80-62-6	Methyl Methacrylate	ND	1.0	ND	0.24	
142-82-5	n-Heptane	ND	0.50	ND	0.12	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	ND	0.11	
108-10-1	4-Methyl-2-pentanone	ND	0.50	ND	0.12	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	ND	0.11	
79-00-5	1,1,2-Trichloroethane	ND	0.50	ND	0.092	
108-88-3	Toluene	ND	0.50	ND	0.13	
591-78-6	2-Hexanone	ND	0.50	ND	0.12	
124-48-1	Dibromochloromethane	ND	0.50	ND	0.059	
106-93-4	1,2-Dibromoethane	ND	0.50	ND	0.065	
123-86-4	n-Butyl Acetate	ND	0.50	ND	0.11	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 3 of 3

Client: AECOM**Client Sample ID:** Method Blank**Client Project ID:** LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P171007-MB

Test Code: EPA TO-15

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Analyst: Wida Ang

Sample Type: 6.0 L Summa Canister

Test Notes:

Date Collected: NA

Date Received: NA

Date Analyzed: 10/7/17

Volume(s) Analyzed: 1.00 Liter(s)

Container Dilution Factor: 1.00

CAS #	Compound	Result µg/m ³	MRL µg/m ³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.50	ND	0.11	
127-18-4	Tetrachloroethene	ND	0.50	ND	0.074	
108-90-7	Chlorobenzene	ND	0.50	ND	0.11	
100-41-4	Ethylbenzene	ND	0.50	ND	0.12	
179601-23-1	m,p-Xylenes	ND	1.0	ND	0.23	
75-25-2	Bromoform	ND	0.50	ND	0.048	
100-42-5	Styrene	ND	0.50	ND	0.12	
95-47-6	o-Xylene	ND	0.50	ND	0.12	
111-84-2	n-Nonane	ND	0.50	ND	0.095	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	ND	0.073	
98-82-8	Cumene	ND	0.50	ND	0.10	
80-56-8	alpha-Pinene	ND	0.50	ND	0.090	
103-65-1	n-Propylbenzene	ND	0.50	ND	0.10	
622-96-8	4-Ethyltoluene	ND	0.50	ND	0.10	
108-67-8	1,3,5-Trimethylbenzene	ND	0.50	ND	0.10	
95-63-6	1,2,4-Trimethylbenzene	ND	0.50	ND	0.10	
100-44-7	Benzyl Chloride	ND	0.50	ND	0.097	
541-73-1	1,3-Dichlorobenzene	ND	0.50	ND	0.083	
106-46-7	1,4-Dichlorobenzene	ND	0.50	ND	0.083	
95-50-1	1,2-Dichlorobenzene	ND	0.50	ND	0.083	
5989-27-5	d-Limonene	ND	0.50	ND	0.090	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.50	ND	0.052	
120-82-1	1,2,4-Trichlorobenzene	ND	0.50	ND	0.067	
91-20-3	Naphthalene	ND	0.50	ND	0.095	
87-68-3	Hexachlorobutadiene	ND	0.50	ND	0.047	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

SURROGATE SPIKE RECOVERY RESULTS

Page 1 of 1

Client: AECOM
Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13
Analyst: Wida Ang
Sample Type: 6.0 L Summa Canister(s)
Test Notes:

Date(s) Collected: 9/26 - 9/27/17

Date(s) Received: 9/29/17

Date(s) Analyzed: 10/7/17

Client Sample ID	ALS Sample ID	1,2-Dichloroethane-d4	Toluene-d8	Bromofluorobenzene	Acceptance Limits	Data Qualifier
		Percent Recovered	Percent Recovered	Percent Recovered		
Method Blank	P171007-MB	111	96	94	70-130	
Lab Control Sample	P171007-LCS	112	96	95	70-130	
LH18/24-AIR-5471-STRIPPER	P1704815-001	110	98	93	70-130	
LH18/24-AIR-5471-STRIPPER-DUP	P1704815-002	113	97	92	70-130	
LH18/24-AIR-5471-STRIPPER-DUP	P1704815-002DUP	117	95	92	70-130	
LH18/24-AIR-5471-GWTP	P1704815-003	102	104	85	70-130	
LH18/24-AIR-5471-DOWNWIND-NORTH	P1704815-004	101	101	87	70-130	

Surrogate percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 3

Client: AECOM**Client Sample ID:** Lab Control Sample**Client Project ID:** LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P171007-LCS

Test Code: EPA TO-15

Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: NA

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.125 Liter(s)

Test Notes:

CAS #	Compound	Spike Amount µg/m ³	Result µg/m ³	% Recovery	ALS	Data Qualifier
					Acceptance Limits	
115-07-1	Propene	210	217	103	52-127	
75-71-8	Dichlorodifluoromethane (CFC 12)	213	215	101	68-109	
74-87-3	Chloromethane	210	216	103	51-130	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	211	200	95	66-114	
75-01-4	Vinyl Chloride	211	215	102	61-125	
106-99-0	1,3-Butadiene	210	217	103	62-144	
74-83-9	Bromomethane	210	208	99	73-123	
75-00-3	Chloroethane	210	218	104	69-122	
64-17-5	Ethanol	1,040	1090	105	62-124	
75-05-8	Acetonitrile	210	236	112	57-114	
107-02-8	Acrolein	209	213	102	62-116	
67-64-1	Acetone	1,050	1020	97	57-117	
75-69-4	Trichlorofluoromethane (CFC 11)	208	210	101	63-98	L
67-63-0	2-Propanol (Isopropyl Alcohol)	422	463	110	66-121	
107-13-1	Acrylonitrile	212	223	105	68-123	
75-35-4	1,1-Dichloroethene	213	208	98	76-118	
75-09-2	Methylene Chloride	213	179	84	60-118	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	212	248	117	65-126	
76-13-1	Trichlorotrifluoroethane (CFC 113)	214	200	93	73-114	
75-15-0	Carbon Disulfide	214	188	88	57-102	
156-60-5	trans-1,2-Dichloroethene	214	234	109	74-123	
75-34-3	1,1-Dichloroethane	212	213	100	69-111	
1634-04-4	Methyl tert-Butyl Ether	213	218	102	69-113	
108-05-4	Vinyl Acetate	1,060	1100	104	76-128	
78-93-3	2-Butanone (MEK)	212	211	100	63-127	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.

Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

L = Laboratory control sample recovery outside the specified limits, results may be biased high.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 2 of 3

Client: AECOM**Client Sample ID:** Lab Control Sample**Client Project ID:** LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P171007-LCS

Test Code: EPA TO-15

Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: NA

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.125 Liter(s)

Test Notes:

CAS #	Compound	Spike Amount µg/m ³	Result µg/m ³	% Recovery	ALS	Data Qualifier
					Acceptance Limits	
156-59-2	cis-1,2-Dichloroethene	212	225	106	72-117	
141-78-6	Ethyl Acetate	426	453	106	68-127	
110-54-3	n-Hexane	213	202	95	55-116	
67-66-3	Chloroform	212	214	101	70-109	
109-99-9	Tetrahydrofuran (THF)	212	195	92	72-113	
107-06-2	1,2-Dichloroethane	212	229	108	69-113	
71-55-6	1,1,1-Trichloroethane	212	220	104	72-115	
71-43-2	Benzene	213	204	96	65-107	
56-23-5	Carbon Tetrachloride	214	222	104	71-113	
110-82-7	Cyclohexane	425	418	98	71-115	
78-87-5	1,2-Dichloropropane	212	221	104	71-115	
75-27-4	Bromodichloromethane	214	226	106	75-118	
79-01-6	Trichloroethene	212	199	94	68-114	
123-91-1	1,4-Dioxane	213	218	102	81-131	
80-62-6	Methyl Methacrylate	424	397	94	72-130	
142-82-5	n-Heptane	213	207	97	68-116	
10061-01-5	cis-1,3-Dichloropropene	208	221	106	77-126	
108-10-1	4-Methyl-2-pentanone	213	229	108	69-126	
10061-02-6	trans-1,3-Dichloropropene	213	235	110	79-125	
79-00-5	1,1,2-Trichloroethane	212	215	101	75-119	
108-88-3	Toluene	211	190	90	59-118	
591-78-6	2-Hexanone	211	226	107	69-129	
124-48-1	Dibromochloromethane	212	207	98	74-136	
106-93-4	1,2-Dibromoethane	211	205	97	73-131	
123-86-4	n-Butyl Acetate	215	229	107	69-130	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 3 of 3

Client: AECOM**Client Sample ID:** Lab Control Sample**Client Project ID:** LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P171007-LCS

Test Code: EPA TO-15

Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: NA

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.125 Liter(s)

Test Notes:

CAS #	Compound	Spike Amount µg/m ³	Result µg/m ³	% Recovery	ALS	Data Qualifier
					Acceptance Limits	
111-65-9	n-Octane	212	204	96	66-120	
127-18-4	Tetrachloroethene	212	186	88	65-130	
108-90-7	Chlorobenzene	212	191	90	68-120	
100-41-4	Ethylbenzene	212	196	92	68-122	
179601-23-1	m,p-Xylenes	424	391	92	68-123	
75-25-2	Bromoform	212	202	95	69-130	
100-42-5	Styrene	211	200	95	71-133	
95-47-6	o-Xylene	211	200	95	68-122	
111-84-2	n-Nonane	212	218	103	65-120	
79-34-5	1,1,2,2-Tetrachloroethane	212	207	98	69-130	
98-82-8	Cumene	212	198	93	70-123	
80-56-8	alpha-Pinene	213	205	96	70-128	
103-65-1	n-Propylbenzene	214	205	96	69-125	
622-96-8	4-Ethyltoluene	211	209	99	67-130	
108-67-8	1,3,5-Trimethylbenzene	212	199	94	67-124	
95-63-6	1,2,4-Trimethylbenzene	212	206	97	67-129	
100-44-7	Benzyl Chloride	212	219	103	79-138	
541-73-1	1,3-Dichlorobenzene	212	201	95	65-136	
106-46-7	1,4-Dichlorobenzene	214	198	93	66-141	
95-50-1	1,2-Dichlorobenzene	214	203	95	67-136	
5989-27-5	d-Limonene	213	221	104	71-134	
96-12-8	1,2-Dibromo-3-chloropropane	210	217	103	73-136	
120-82-1	1,2,4-Trichlorobenzene	218	235	108	64-134	
91-20-3	Naphthalene	209	217	104	62-136	
87-68-3	Hexachlorobutadiene	212	197	93	60-133	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

LABORATORY DUPLICATE SUMMARY RESULTS

Page 1 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-STRIPPER-DUP

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-002DUP

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.0030 Liter(s)

Test Notes:

Container ID: SC02120

Initial Pressure (psig): 0.0

Final Pressure (psig): 3.61

Container Dilution Factor: 1.25

Compound	Sample Result		Duplicate Sample Result		Average µg/m ³	% RPD	RPD Limit	Data Qualifier
	µg/m ³	ppbV	µg/m ³	ppbV				
Propene	ND	ND	ND	ND	-	-	25	
Dichlorodifluoromethane (CFC 12)	ND	ND	ND	ND	-	-	25	
Chloromethane	ND	ND	ND	ND	-	-	25	
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	ND	ND	ND	-	-	25	
Vinyl Chloride	690	270	705	276	697.5	2	25	
1,3-Butadiene	ND	ND	ND	ND	-	-	25	
Bromomethane	ND	ND	ND	ND	-	-	25	
Chloroethane	ND	ND	ND	ND	-	-	25	
Ethanol	ND	ND	ND	ND	-	-	25	
Acetonitrile	ND	ND	ND	ND	-	-	25	
Acrolein	ND	ND	ND	ND	-	-	25	
Acetone	ND	ND	ND	ND	-	-	25	
Trichlorofluoromethane	ND	ND	ND	ND	-	-	25	
2-Propanol (Isopropyl Alcohol)	ND	ND	ND	ND	-	-	25	
Acrylonitrile	ND	ND	ND	ND	-	-	25	
1,1-Dichloroethene	301	76.0	295	74.3	298	2	25	
Methylene Chloride	11,900	3,410	11,700	3,370	11800	2	25	
3-Chloro-1-propene (Allyl Chloride)	ND	ND	ND	ND	-	-	25	
Trichlorotrifluoroethane	19,500	2,540	19,300	2,520	19400	1	25	
Carbon Disulfide	ND	ND	ND	ND	-	-	25	
trans-1,2-Dichloroethene	ND	ND	ND	ND	-	-	25	
1,1-Dichloroethane	ND	ND	ND	ND	-	-	25	
Methyl tert-Butyl Ether	ND	ND	ND	ND	-	-	25	
Vinyl Acetate	ND	ND	ND	ND	-	-	25	
2-Butanone (MEK)	ND	ND	ND	ND	-	-	25	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

ALS ENVIRONMENTAL

LABORATORY DUPLICATE SUMMARY RESULTS

Page 2 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-STRIPPER-DUP

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-002DUP

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.0030 Liter(s)

Test Notes:

Container ID: SC02120

Initial Pressure (psig): 0.0

Final Pressure (psig): 3.61

Container Dilution Factor: 1.25

Compound	Sample Result		Duplicate Sample Result		Average µg/m ³	% RPD	RPD Limit	Data Qualifier
	µg/m ³	ppbV	µg/m ³	ppbV				
cis-1,2-Dichloroethene	21,900	5,520	21,700	5,470	21800	0.9	25	
Ethyl Acetate	ND	ND	ND	ND	-	-	25	
n-Hexane	ND	ND	ND	ND	-	-	25	
Chloroform	ND	ND	ND	ND	-	-	25	
Tetrahydrofuran (THF)	ND	ND	ND	ND	-	-	25	
1,2-Dichloroethane	355	87.8	352	86.9	353.5	0.8	25	
1,1,1-Trichloroethane	ND	ND	ND	ND	-	-	25	
Benzene	ND	ND	ND	ND	-	-	25	
Carbon Tetrachloride	ND	ND	ND	ND	-	-	25	
Cyclohexane	ND	ND	ND	ND	-	-	25	
1,2-Dichloropropane	ND	ND	ND	ND	-	-	25	
Bromodichloromethane	ND	ND	ND	ND	-	-	25	
Trichloroethene	33,600	6,250	32,400	6,030	33000	4	25	
1,4-Dioxane	ND	ND	ND	ND	-	-	25	
Methyl Methacrylate	ND	ND	ND	ND	-	-	25	
n-Heptane	ND	ND	ND	ND	-	-	25	
cis-1,3-Dichloropropene	ND	ND	ND	ND	-	-	25	
4-Methyl-2-pentanone	ND	ND	ND	ND	-	-	25	
trans-1,3-Dichloropropene	ND	ND	ND	ND	-	-	25	
1,1,2-Trichloroethane	ND	ND	ND	ND	-	-	25	
Toluene	ND	ND	ND	ND	-	-	25	
2-Hexanone	ND	ND	ND	ND	-	-	25	
Dibromochloromethane	ND	ND	ND	ND	-	-	25	
1,2-Dibromoethane	ND	ND	ND	ND	-	-	25	
n-Butyl Acetate	ND	ND	ND	ND	-	-	25	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

ALS ENVIRONMENTAL

LABORATORY DUPLICATE SUMMARY RESULTS

Page 3 of 3

Client: AECOM

Client Sample ID: LH18/24-AIR-5471-STRIPPER-DUP

Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

ALS Sample ID: P1704815-002DUP

Test Code: EPA TO-15

Date Collected: 9/26/17

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Date Received: 9/29/17

Analyst: Wida Ang

Date Analyzed: 10/7/17

Sample Type: 6.0 L Summa Canister

Volume(s) Analyzed: 0.0030 Liter(s)

Test Notes:

Container ID: SC02120

Initial Pressure (psig): 0.0

Final Pressure (psig): 3.61

Container Dilution Factor: 1.25

Compound	Sample Result		Duplicate Sample Result		Average µg/m ³	% RPD	RPD Limit	Data Qualifier
	µg/m ³	ppbV	µg/m ³	ppbV				
n-Octane	ND	ND	ND	ND	-	-	25	
Tetrachloroethene	ND	ND	ND	ND	-	-	25	
Chlorobenzene	ND	ND	ND	ND	-	-	25	
Ethylbenzene	ND	ND	ND	ND	-	-	25	
m,p-Xylenes	ND	ND	ND	ND	-	-	25	
Bromoform	ND	ND	ND	ND	-	-	25	
Styrene	ND	ND	ND	ND	-	-	25	
o-Xylene	ND	ND	ND	ND	-	-	25	
n-Nonane	ND	ND	ND	ND	-	-	25	
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	-	-	25	
Cumene	ND	ND	ND	ND	-	-	25	
alpha-Pinene	ND	ND	ND	ND	-	-	25	
n-Propylbenzene	ND	ND	ND	ND	-	-	25	
4-Ethyltoluene	ND	ND	ND	ND	-	-	25	
1,3,5-Trimethylbenzene	ND	ND	ND	ND	-	-	25	
1,2,4-Trimethylbenzene	ND	ND	ND	ND	-	-	25	
Benzyl Chloride	ND	ND	ND	ND	-	-	25	
1,3-Dichlorobenzene	ND	ND	ND	ND	-	-	25	
1,4-Dichlorobenzene	ND	ND	ND	ND	-	-	25	
1,2-Dichlorobenzene	ND	ND	ND	ND	-	-	25	
d-Limonene	ND	ND	ND	ND	-	-	25	
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	-	-	25	
1,2,4-Trichlorobenzene	ND	ND	ND	ND	-	-	25	
Naphthalene	ND	ND	ND	ND	-	-	25	
Hexachlorobutadiene	ND	ND	ND	ND	-	-	25	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: AECOM
Client Project ID: LHAAP GWTP / 60256135.GWTPTHRUMAR16

ALS Project ID: P1704815

Internal Standard Area and RT Summary

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13
Analyst: Wida Ang
Sample Type: 6.0 L Summa Canister(s)
Test Notes:

Lab File ID: 10071701.D
Date Analyzed: 10/7/17
Time Analyzed: 01:56

	IS1 (BCM)		IS2 (DFB)		IS3 (CBZ)	
	AREA #	RT #	AREA #	RT #	AREA #	RT #
24 Hour Standard	120026	11.15	563368	13.23	230409	17.52
Upper Limit	168036	11.48	788715	13.56	322573	17.85
Lower Limit	72016	10.82	338021	12.90	138245	17.19

Client Sample ID		IS1 (BCM)		IS2 (DFB)		IS3 (CBZ)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
01	Method Blank	110490	11.13	542344	13.22	218949	17.52
02	Lab Control Sample	112436	11.15	532631	13.23	218570	17.52
03	LH18/24-AIR-5471-STRIPPER	115394	11.13	549633	13.22	221054	17.51
04	LH18/24-AIR-5471-STRIPPER-DUP	106476	11.13	507179	13.23	206784	17.52
05	LH18/24-AIR-5471-STRIPPER-DUP (Lab Dupli	101515	11.13	488782	13.23	200990	17.52
06	LH18/24-AIR-5471-GWTP	96818	11.13	479120	13.22	173024	17.52
07	LH18/24-AIR-5471-DOWNWIND-NORTH	97588	11.13	475828	13.23	180146	17.52
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

IS1 (BCM) = Bromochloromethane

IS2 (DFB) = 1,4-Difluorobenzene

IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = 140% of internal standard area

AREA LOWER LIMIT = 60% of internal standard area

RT UPPER LIMIT = 0.33 minutes of internal standard RT

RT LOWER LIMIT = 0.33 minutes of internal standard RT

Column used to flag values outside QC limits with an I.

I = Internal standard not within the specified limits.

Data File : I:\MS13\DATA\2017 10\07\10071709.D
 Acq On : 7 Oct 2017 7:58
 Sample : P1704815-001 (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:43:32 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.13	130	115394	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.22	114	549633	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.51	82	221054	12.500	ng	-0.01

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	159565	13.742	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	109.92%	
57) Toluene-d8 (SS2)	15.65	98	563800	12.206	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	97.68%	
73) Bromofluorobenzene (SS3)	18.91	174	206852	11.607	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	92.88%	

Target Compounds

						Qvalue
2) Propene	4.39	42	179	N.D.		
3) Dichlorodifluoromethan...	4.41	85	913	N.D.		
4) Chloromethane	0.00	50	0	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.		
6) Vinyl Chloride	5.18	62	23820	1.673	ng	100
7) 1,3-Butadiene	0.00	54	0	N.D.		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	6.58	45	54	N.D.		
11) Acetonitrile	0.00	41	0	N.D.		
12) Acrolein	0.00	56	0	N.D.		
13) Acetone	7.18	58	2669	N.D.		
14) Trichlorofluoromethane	7.15	101	1145	N.D.		
15) 2-Propanol (Isopropanol)	7.67	45	193	N.D.		
16) Acrylonitrile	0.00	53	0	N.D.		
17) 1,1-Dichloroethene	8.29	96	7812	0.743	ng	95
18) 2-Methyl-2-Propanol (t...	8.30	59	169	N.D.		
19) Methylene Chloride	8.48	84	355021	28.574	ng	95
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.	d	
21) Trichlorotrifluoroethane	8.91	151	505863	46.908	ng	96
22) Carbon Disulfide	8.76	76	7966	N.D.		
23) trans-1,2-Dichloroethene	9.73	61	2108	N.D.		
24) 1,1-Dichloroethane	9.97	63	2467	N.D.		
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D.		
27) 2-Butanone (MEK)	0.00	72	0	N.D.		
28) cis-1,2-Dichloroethene	10.96	61	708495	52.320	ng	96
29) Diisopropyl Ether	11.29	87	112	N.D.		
30) Ethyl Acetate	11.24	61	345	N.D.		
31) n-Hexane	0.00	57	0	N.D.		
32) Chloroform	11.30	83	2958	N.D.		
34) Tetrahydrofuran (THF)	11.76	72	121	N.D.		
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.		
36) 1,2-Dichloroethane	12.08	62	10280	0.834	ng	94
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.		
39) Isopropyl Acetate	0.00	61	0	N.D.		
40) 1-Butanol	0.00	56	0	N.D.		
41) Benzene	12.83	78	1935	N.D.		
42) Carbon Tetrachloride	0.00	117	0	N.D.		
43) Cyclohexane	13.13	84	573	N.D.		
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	0.00	63	0	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D.	d	
47) Trichloroethene	13.91	130	1039181	80.662	ng	99
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.		
50) Methyl Methacrylate	13.92	100	2119	N.D.		

Data File : I:\MS13\DATA\2017 10\07\10071709.D
 Acq On : 7 Oct 2017 7:58
 Sample : P1704815-001 (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:43:32 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

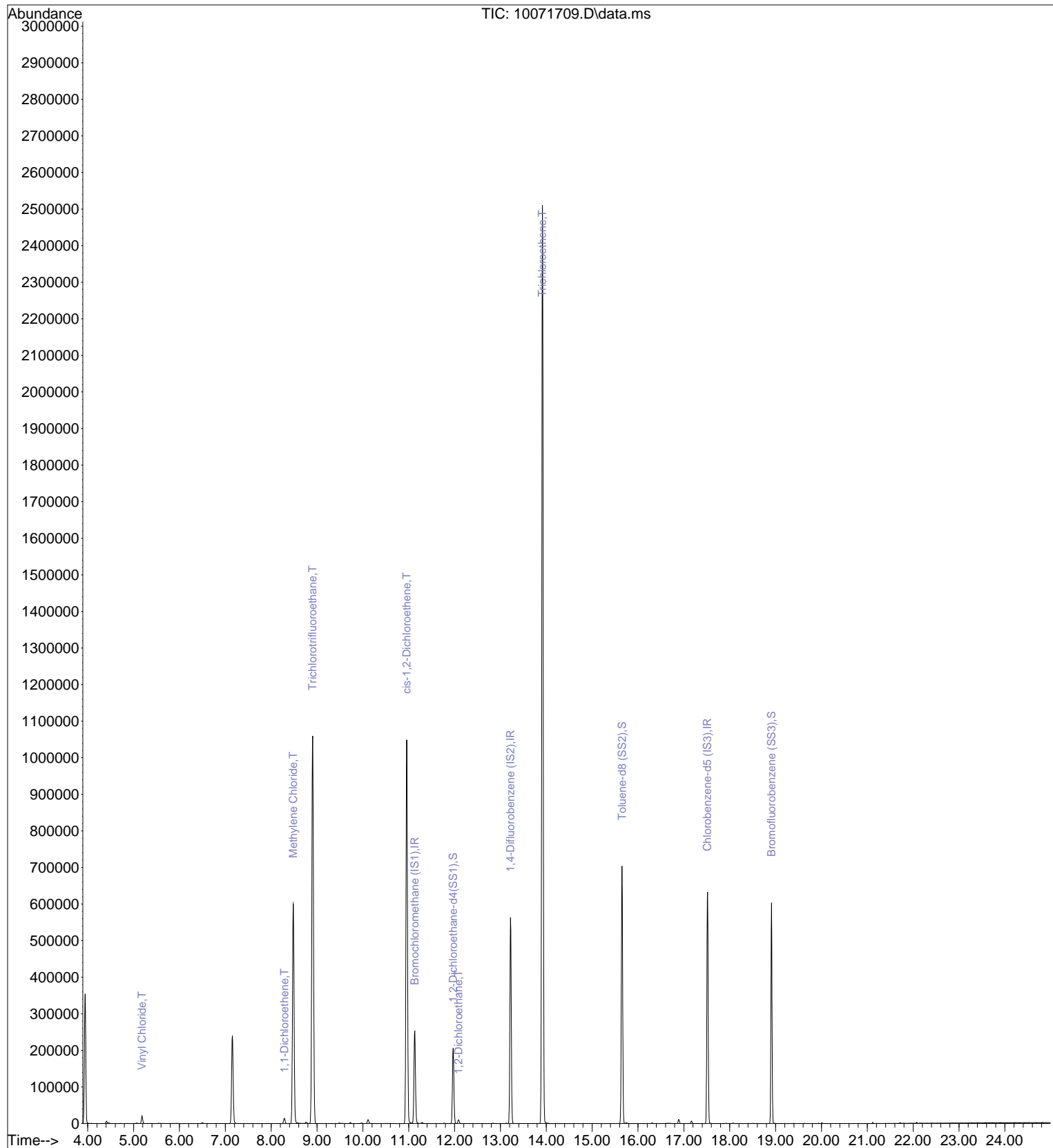
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	0.00	71	0	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.		
58) Toluene	15.75	91	2473	N.D.		
59) 2-Hexanone	0.00	43	0	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	0.00	43	0	N.D.		
63) n-Octane	0.00	57	0	N.D.		
64) Tetrachloroethene	16.89	166	4630	N.D.		
65) Chlorobenzene	0.00	112	0	N.D.		
66) Ethylbenzene	17.92	91	1197	N.D.		
67) m- & p-Xylenes	18.07	91	1719	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	18.41	104	517	N.D.		
70) o-Xylene	18.51	91	702	N.D.		
71) n-Nonane	0.00	43	0	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	0.00	105	0	N.D.		
75) alpha-Pinene	19.39	93	455	N.D.		
76) n-Propylbenzene	19.39	91	110	N.D.		
77) 3-Ethyltoluene	19.58	105	133	N.D.		
78) 4-Ethyltoluene	19.58	105	133	N.D.		
79) 1,3,5-Trimethylbenzene	19.58	105	133	N.D.		
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	20.05	105	323	N.D.		
82) 1,2,4-Trimethylbenzene	20.05	105	323	N.D.		
83) n-Decane	20.13	57	124	N.D.		
84) Benzyl Chloride	0.00	91	0	N.D.		
85) 1,3-Dichlorobenzene	0.00	146	0	N.D.		
86) 1,4-Dichlorobenzene	0.00	146	0	N.D.		
87) sec-Butylbenzene	0.00	105	0	N.D.		
88) 4-Isopropyltoluene (p-...	0.00	119	0	N.D.		
89) 1,2,3-Trimethylbenzene	0.00	105	0	N.D.		
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.		
91) d-Limonene	0.00	68	0	N.D.		
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.		
93) n-Undecane	21.12	57	734	N.D.		
94) 1,2,4-Trichlorobenzene	0.00	180	0	N.D.		
95) Naphthalene	22.16	128	575	N.D.		
96) n-Dodecane	22.08	57	373	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	0.00	55	0	N.D.		
99) tert-Butylbenzene	0.00	119	0	N.D.		
100) n-Butylbenzene	0.00	91	0	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071709.D
 Acq On : 7 Oct 2017 7:58
 Sample : P1704815-001 (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:43:32 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M



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~~107~~ 10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.13	130	115394	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.22	114	549633	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.51	82	221054	12.500	ng	-0.01

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	159565	13.742	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	109.92%	
57) Toluene-d8 (SS2)	15.65	98	563800	12.206	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	97.68%	
73) Bromofluorobenzene (SS3)	18.91	174	206852	11.607	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	92.88%	

Target Compounds

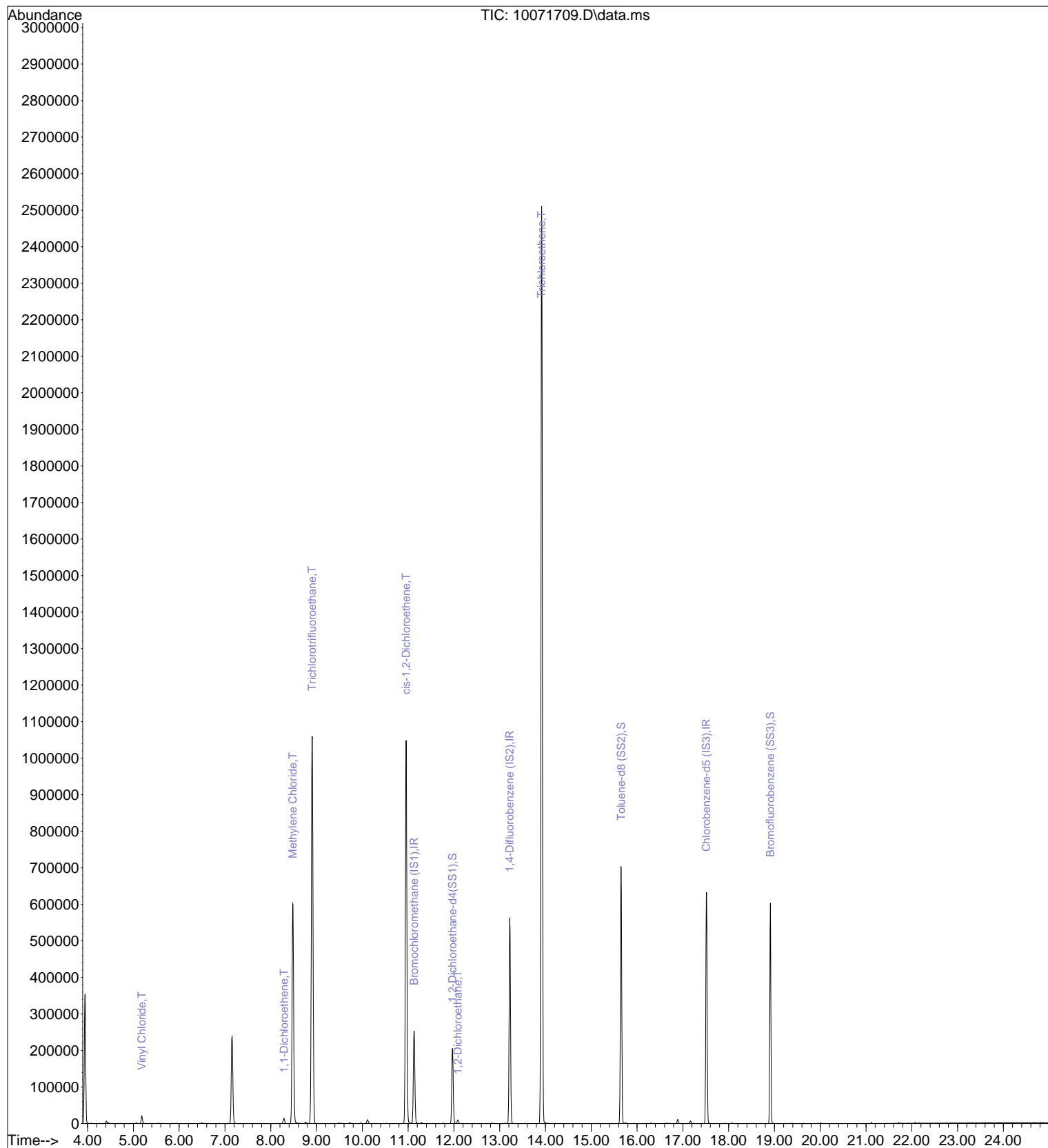
						Qvalue
6) Vinyl Chloride	5.18	62	23820	1.673	ng	100
17) 1,1-Dichloroethene	8.29	96	7812	0.743	ng	95
19) Methylene Chloride	8.48	84	355021	28.574	ng	95
21) Trichlorotrifluoroethane	8.91	151	505863	46.908	ng	96
28) cis-1,2-Dichloroethene	10.96	61	708495	52.320	ng	96
36) 1,2-Dichloroethane	12.08	62	10280	0.834	ng	94
47) Trichloroethene	13.91	130	1039181	80.662	ng	99

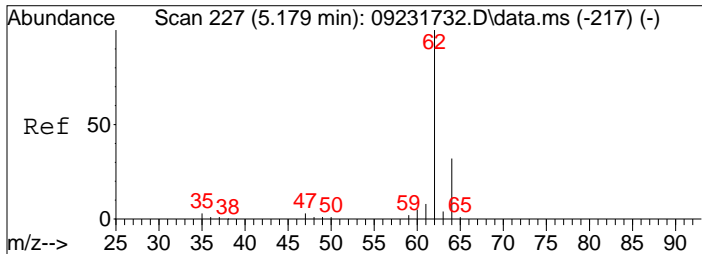
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071709.D
Acq On : 7 Oct 2017 7:58
Sample : P1704815-001 (3.0mL)
Misc : S31-09111702

Vial: 4
Operator: WA
Inst : MS13

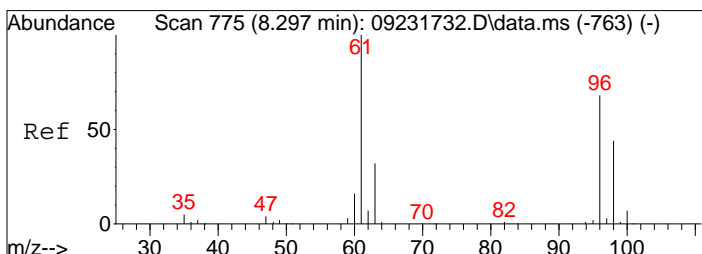
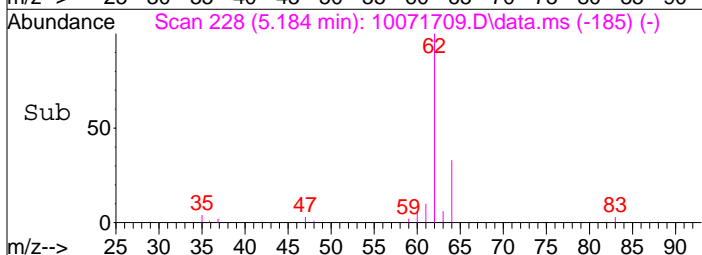
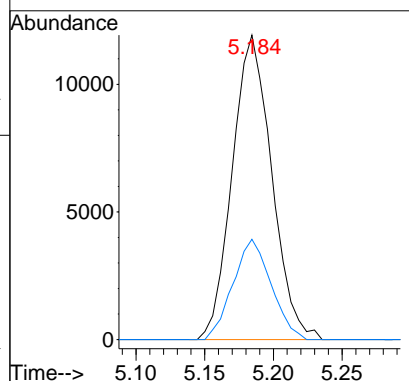
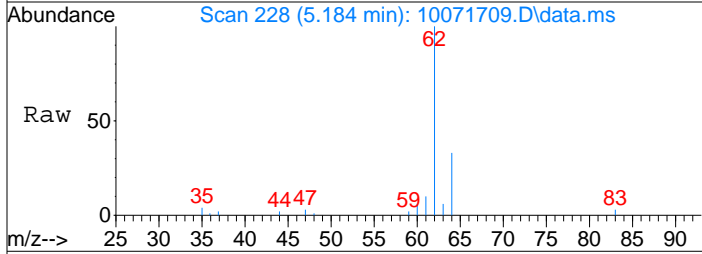
Quant Time: Oct 09 16:43:32 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:36:07 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M





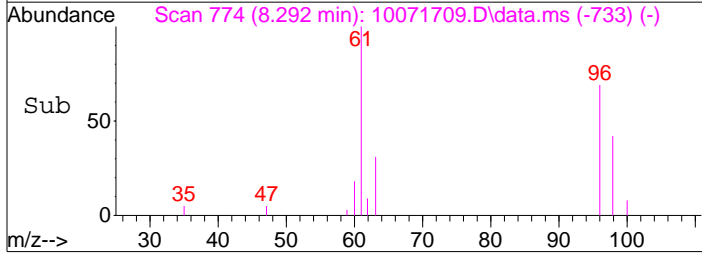
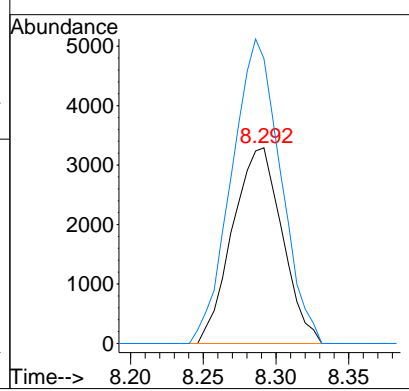
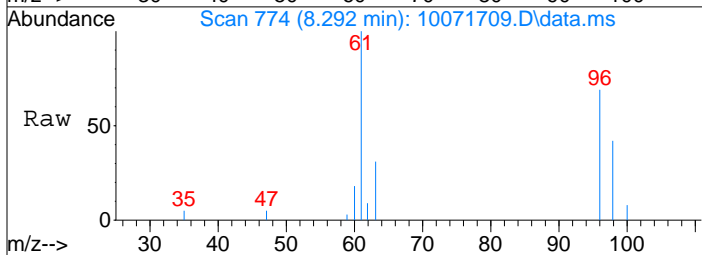
#6
 Vinyl Chloride
 Concen: 1.67 ng
 RT: 5.18 min Scan# 228
 Delta R.T. -0.006 min
 Lab File: 10071709.D
 Acq: 7 Oct 2017 7:58

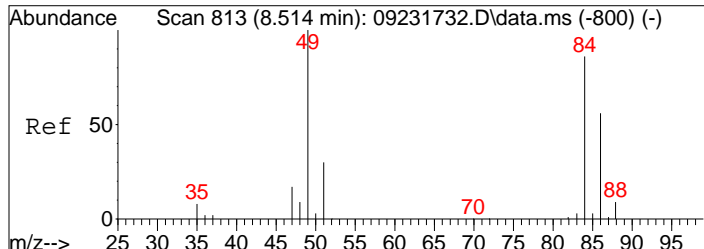
Tgt Ion	Resp	Lower	Upper
62	100		
64	31.8	11.8	51.8



#17
 1,1-Dichloroethene
 Concen: 0.74 ng
 RT: 8.29 min Scan# 774
 Delta R.T. -0.017 min
 Lab File: 10071709.D
 Acq: 7 Oct 2017 7:58

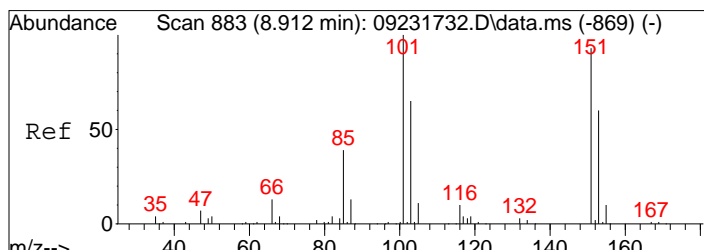
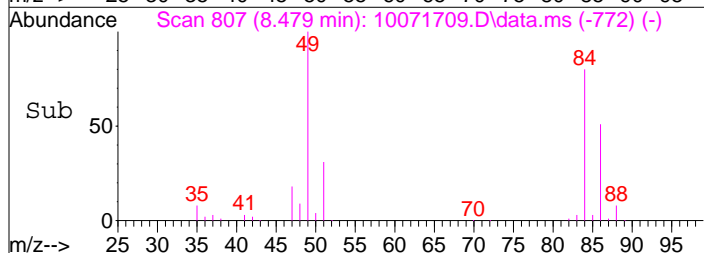
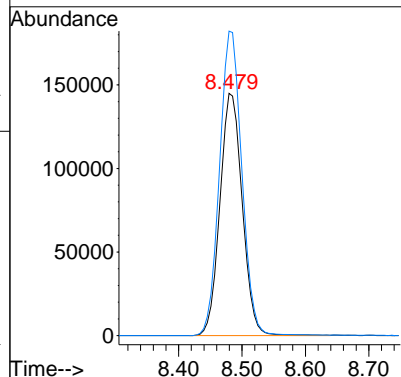
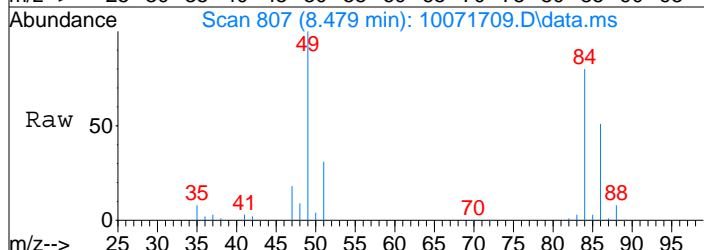
Tgt Ion	Resp	Lower	Upper
96	100		
61	153.7	127.1	167.1





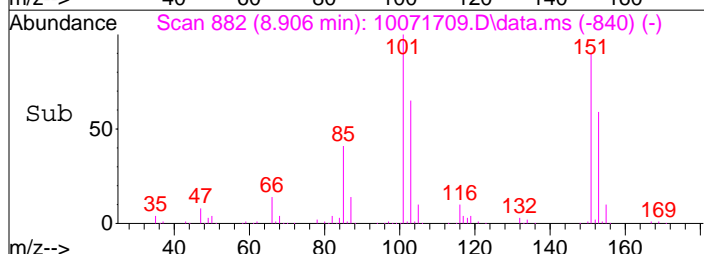
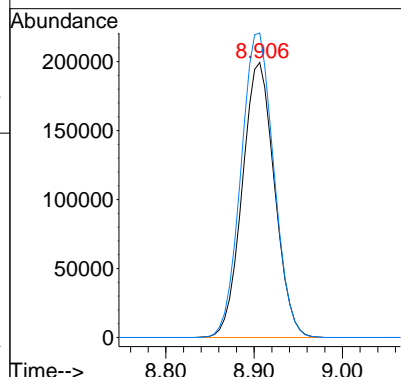
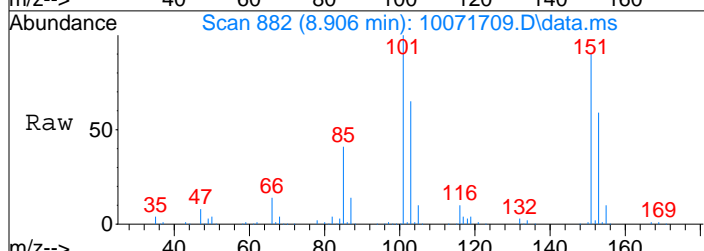
#19
 Methylene Chloride
 Concen: 28.57 ng
 RT: 8.48 min Scan# 807
 Delta R.T. -0.051 min
 Lab File: 10071709.D
 Acq: 7 Oct 2017 7:58

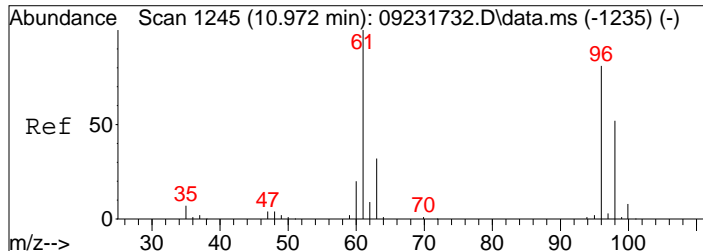
Tgt Ion:	84	Resp:	355021
Ion Ratio	Lower	Upper	
84	100		
49	125.8	94.9	144.9



#21
 Trichlorotrifluoroethane
 Concen: 46.91 ng
 RT: 8.91 min Scan# 882
 Delta R.T. -0.011 min
 Lab File: 10071709.D
 Acq: 7 Oct 2017 7:58

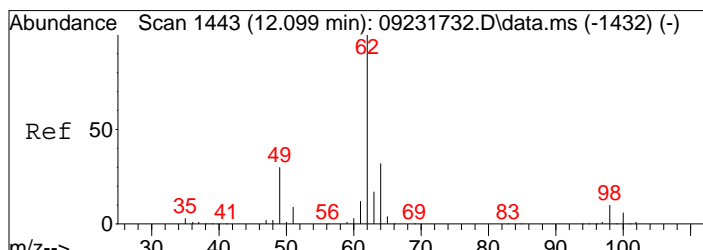
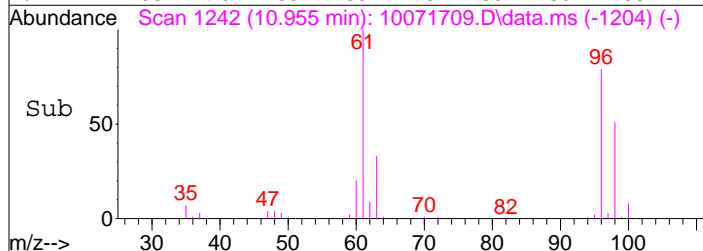
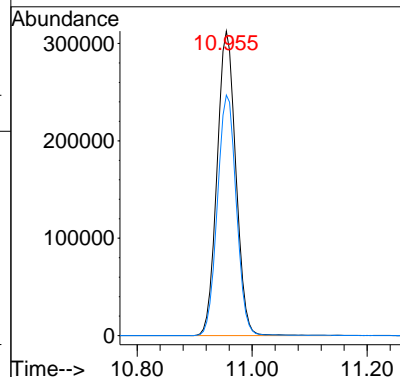
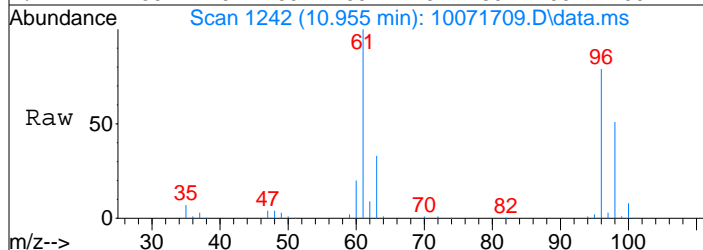
Tgt Ion:	151	Resp:	505863
Ion Ratio	Lower	Upper	
151	100		
101	112.8	88.3	128.3





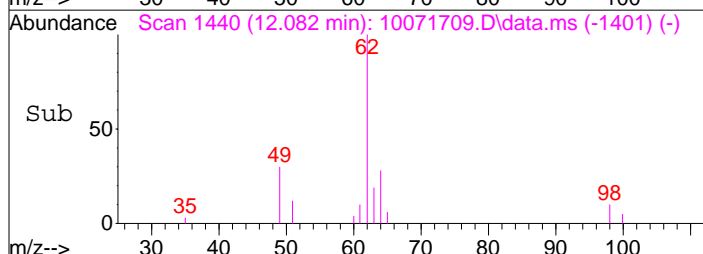
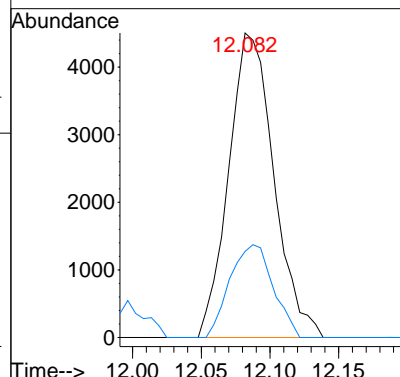
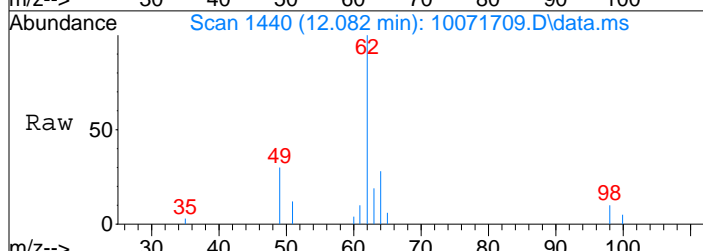
#28
 cis-1,2-Dichloroethene
 Concen: 52.32 ng
 RT: 10.96 min Scan# 1242
 Delta R.T. -0.034 min
 Lab File: 10071709.D
 Acq: 7 Oct 2017 7:58

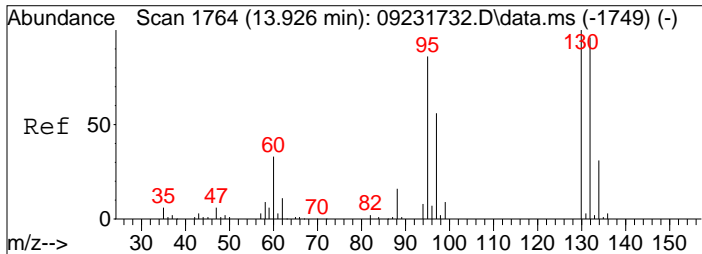
Tgt Ion	Resp	Lower	Upper
61	100		
96	79.6	63.2	103.2



#36
 1,2-Dichloroethane
 Concen: 0.83 ng
 RT: 12.08 min Scan# 1440
 Delta R.T. -0.028 min
 Lab File: 10071709.D
 Acq: 7 Oct 2017 7:58

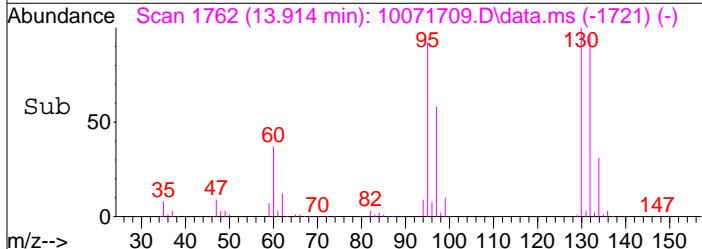
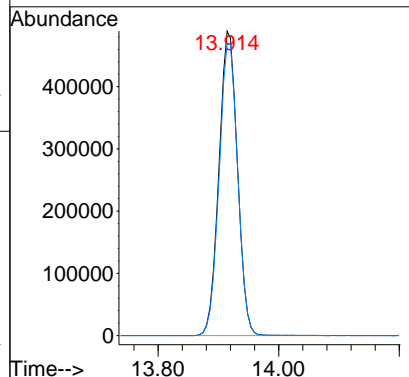
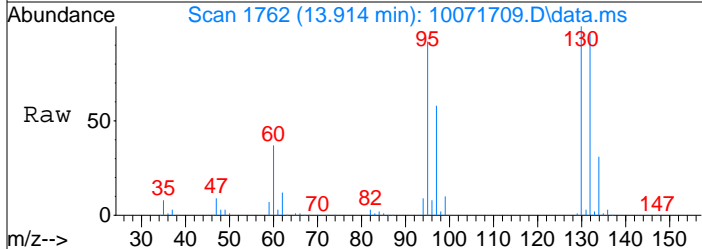
Tgt Ion	Resp	Lower	Upper
62	100		
64	29.2	12.5	52.5





#47
Trichloroethene
Concen: 80.66 ng
RT: 13.91 min Scan# 1762
Delta R.T. -0.017 min
Lab File: 10071709.D
Acq: 7 Oct 2017 7:58

Tgt Ion	Resp	1039181
130	100	
132	96.8	76.1 116.1



Data File : I:\MS13\DATA\2017 10\07\10071710.D
 Acq On : 7 Oct 2017 8:34
 Sample : P1704815-002 (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:44:20 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

 10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.13	130	106476	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.23	114	507179	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.52	82	206784	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	151685	14.158	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	113.28%	
57) Toluene-d8 (SS2)	15.65	98	522112	12.084	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	96.64%	
73) Bromofluorobenzene (SS3)	18.91	174	191329	11.476	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	91.84%	

Target Compounds

						Qvalue
2) Propene	4.39	42	132	N.D.		
3) Dichlorodifluoromethan...	4.53	85	121	N.D.		
4) Chloromethane	0.00	50	0	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.		
6) Vinyl Chloride	5.19	62	21777	1.657	ng	100
7) 1,3-Butadiene	0.00	54	0	N.D.		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	6.63	45	298	N.D.		
11) Acetonitrile	0.00	41	0	N.D.		
12) Acrolein	0.00	56	0	N.D.		
13) Acetone	7.18	58	2014	N.D.		
14) Trichlorofluoromethane	7.16	101	987	N.D.		
15) 2-Propanol (Isopropanol)	7.69	45	61	N.D.		
16) Acrylonitrile	0.00	53	0	N.D.		
17) 1,1-Dichloroethene	8.29	96	7021	0.723	ng	90
18) 2-Methyl-2-Propanol (t...	8.29	59	111	N.D.		
19) Methylene Chloride	8.49	84	326082	28.443	ng	94
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.	d	
21) Trichlorotrifluoroethane	8.91	151	465121	46.742	ng	95
22) Carbon Disulfide	8.76	76	4955	N.D.		
23) trans-1,2-Dichloroethene	9.74	61	1846	N.D.		
24) 1,1-Dichloroethane	9.97	63	2277	N.D.		
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D.		
27) 2-Butanone (MEK)	0.00	72	0	N.D.		
28) cis-1,2-Dichloroethene	10.96	61	656170	52.515	ng	95
29) Diisopropyl Ether	0.00	87	0	N.D.		
30) Ethyl Acetate	11.21	61	113	N.D.		
31) n-Hexane	0.00	57	0	N.D.		
32) Chloroform	11.29	83	2774	N.D.		
34) Tetrahydrofuran (THF)	11.77	72	291	N.D.		
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.		
36) 1,2-Dichloroethane	12.09	62	9700	0.853	ng	100
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.		
39) Isopropyl Acetate	0.00	61	0	N.D.		
40) 1-Butanol	0.00	56	0	N.D.		
41) Benzene	12.84	78	1870	N.D.		
42) Carbon Tetrachloride	0.00	117	0	N.D.		
43) Cyclohexane	13.13	84	515	N.D.		
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	0.00	63	0	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D.	d	
47) Trichloroethene	13.92	130	958030	80.587	ng	99
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.		
50) Methyl Methacrylate	13.91	100	1906	N.D.		

Data File : I:\MS13\DATA\2017 10\07\10071710.D
 Acq On : 7 Oct 2017 8:34
 Sample : P1704815-002 (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:44:20 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

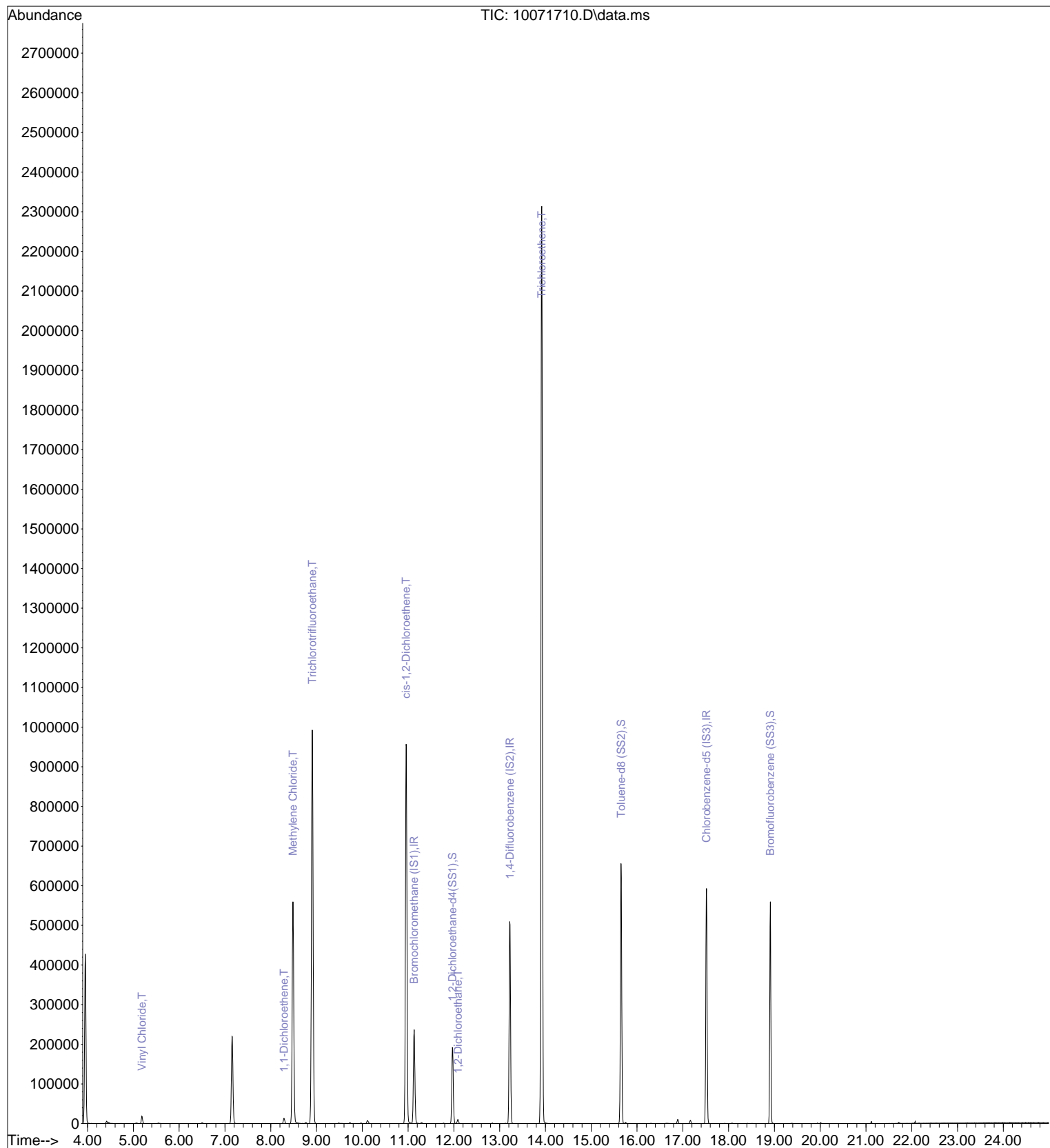
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	0.00	71	0	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.		
58) Toluene	15.75	91	2507	N.D.		
59) 2-Hexanone	0.00	43	0	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	0.00	43	0	N.D.		
63) n-Octane	0.00	57	0	N.D.		
64) Tetrachloroethene	16.89	166	4474	N.D.		
65) Chlorobenzene	0.00	112	0	N.D.		
66) Ethylbenzene	17.92	91	1166	N.D.		
67) m- & p-Xylenes	18.07	91	1693	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	18.42	104	492	N.D.		
70) o-Xylene	18.51	91	692	N.D.		
71) n-Nonane	0.00	43	0	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	0.00	105	0	N.D.		
75) alpha-Pinene	19.38	93	554	N.D.		
76) n-Propylbenzene	19.39	91	172	N.D.		
77) 3-Ethyltoluene	19.36	105	252	N.D.		
78) 4-Ethyltoluene	0.00	105	0	N.D.		
79) 1,3,5-Trimethylbenzene	0.00	105	0	N.D.		
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	20.05	105	395	N.D.		
82) 1,2,4-Trimethylbenzene	20.05	105	395	N.D.		
83) n-Decane	20.14	57	246	N.D.		
84) Benzyl Chloride	0.00	91	0	N.D.		
85) 1,3-Dichlorobenzene	0.00	146	0	N.D.		
86) 1,4-Dichlorobenzene	0.00	146	0	N.D.		
87) sec-Butylbenzene	0.00	105	0	N.D.		
88) 4-Isopropyltoluene (p-...	0.00	119	0	N.D.		
89) 1,2,3-Trimethylbenzene	0.00	105	0	N.D.		
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.		
91) d-Limonene	0.00	68	0	N.D.		
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.		
93) n-Undecane	21.11	57	957	N.D.		
94) 1,2,4-Trichlorobenzene	0.00	180	0	N.D.		
95) Naphthalene	22.16	128	630	N.D.		
96) n-Dodecane	22.08	57	747	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	0.00	55	0	N.D.		
99) tert-Butylbenzene	0.00	119	0	N.D.		
100) n-Butylbenzene	0.00	91	0	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071710.D
Acq On : 7 Oct 2017 8:34
Sample : P1704815-002 (3.0mL)
Misc : S31-09111702

Vial: 4
Operator: WA
Inst : MS13

Quant Time: Oct 09 16:44:20 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:36:07 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 10\07\10071710.D
 Acq On : 7 Oct 2017 8:34
 Sample : P1704815-002 (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:44:20 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
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 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

 10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.13	130	106476	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.23	114	507179	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.52	82	206784	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	151685	14.158	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	113.28%	
57) Toluene-d8 (SS2)	15.65	98	522112	12.084	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	96.64%	
73) Bromofluorobenzene (SS3)	18.91	174	191329	11.476	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	91.84%	

Target Compounds

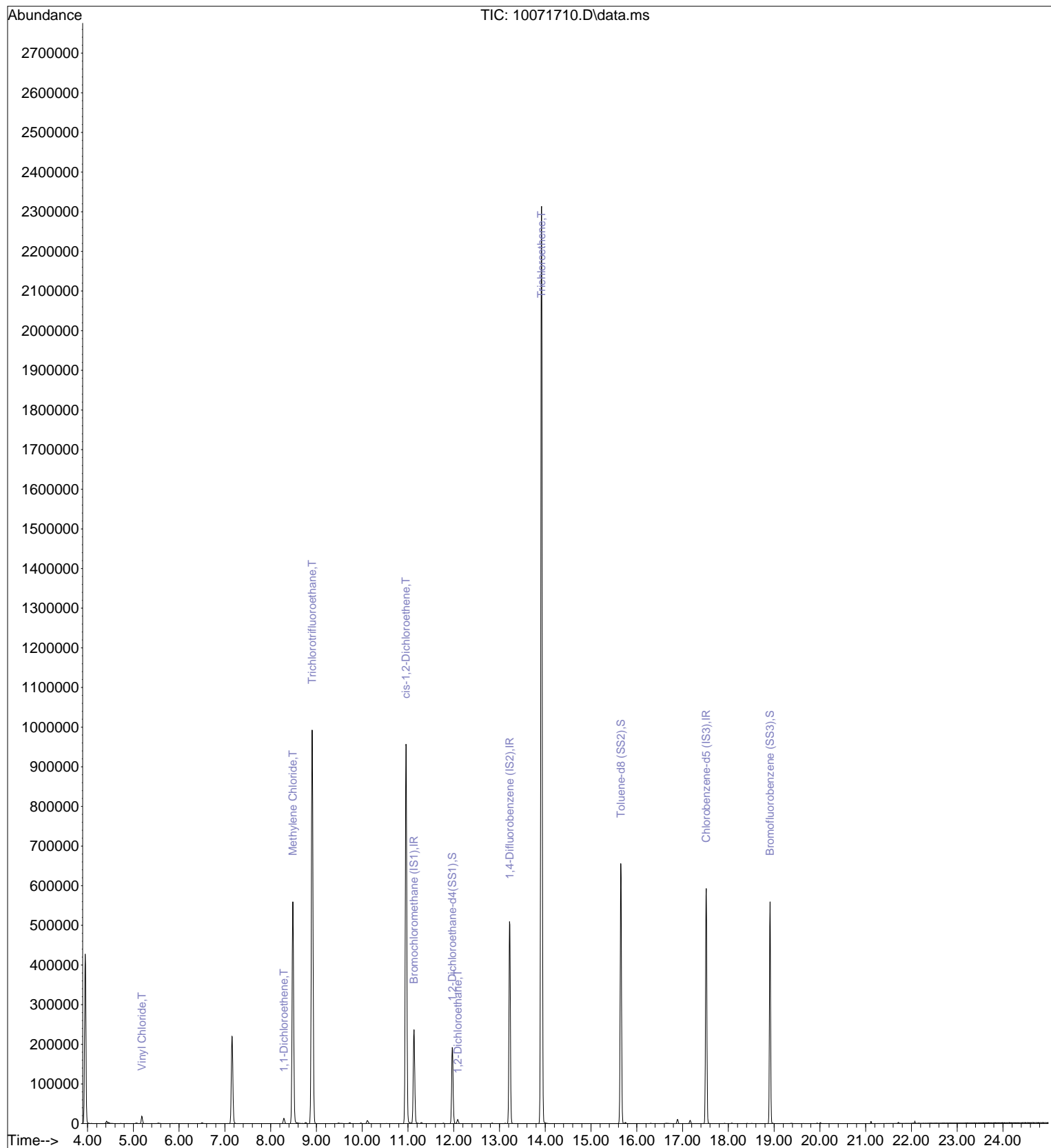
						Qvalue
6) Vinyl Chloride	5.19	62	21777	1.657	ng	100
17) 1,1-Dichloroethene	8.29	96	7021	0.723	ng	90
19) Methylene Chloride	8.49	84	326082	28.443	ng	94
21) Trichlorotrifluoroethane	8.91	151	465121	46.742	ng	95
28) cis-1,2-Dichloroethene	10.96	61	656170	52.515	ng	95
36) 1,2-Dichloroethane	12.09	62	9700	0.853	ng	100
47) Trichloroethene	13.92	130	958030	80.587	ng	99

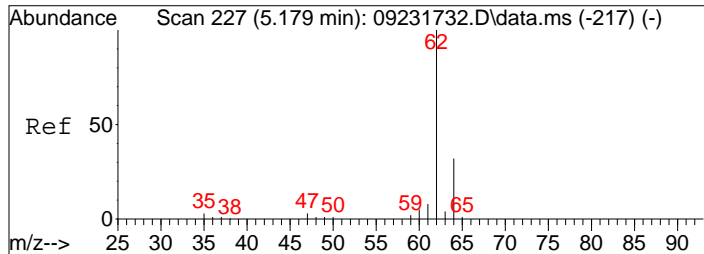
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071710.D
 Acq On : 7 Oct 2017 8:34
 Sample : P1704815-002 (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

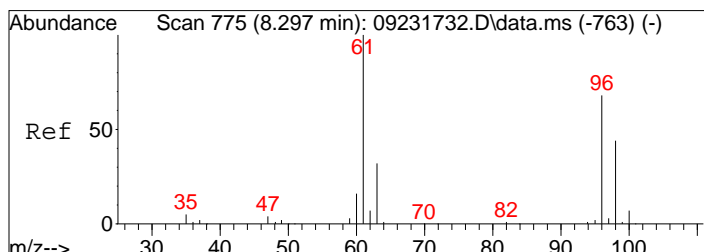
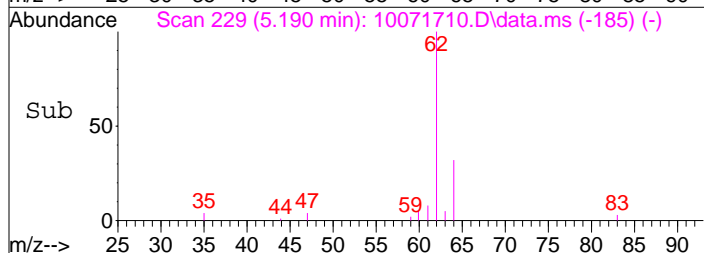
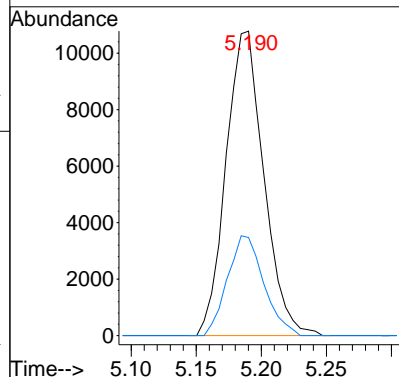
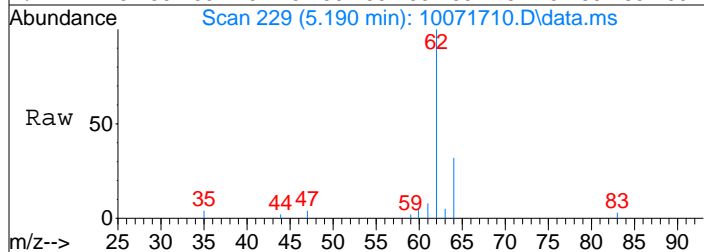
Quant Time: Oct 09 16:44:20 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M





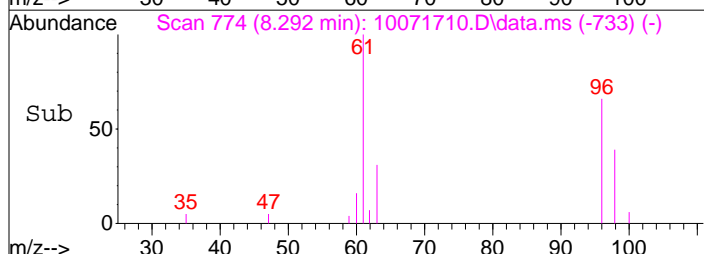
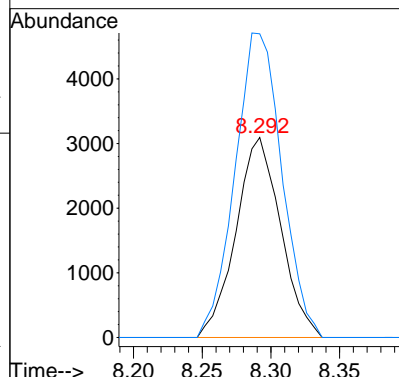
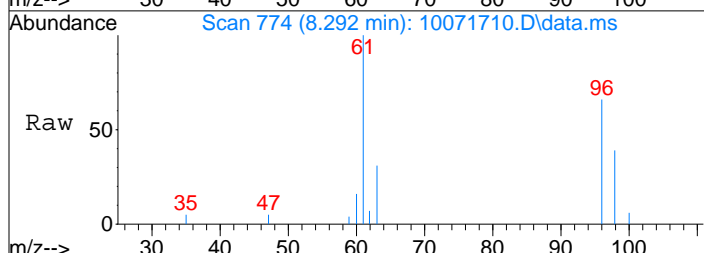
#6
 Vinyl Chloride
 Concen: 1.66 ng
 RT: 5.19 min Scan# 229
 Delta R.T. 0.000 min
 Lab File: 10071710.D
 Acq: 7 Oct 2017 8:34

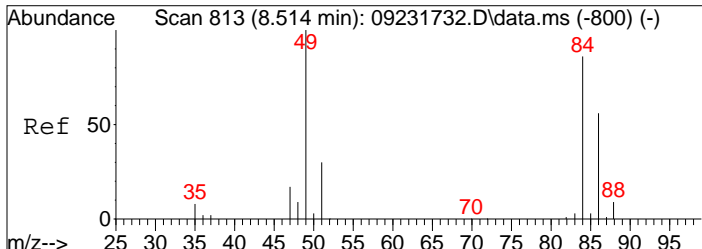
Tgt Ion	Resp	Lower	Upper
62	21777		
64	100	31.5	51.8



#17
 1,1-Dichloroethene
 Concen: 0.72 ng
 RT: 8.29 min Scan# 774
 Delta R.T. -0.017 min
 Lab File: 10071710.D
 Acq: 7 Oct 2017 8:34

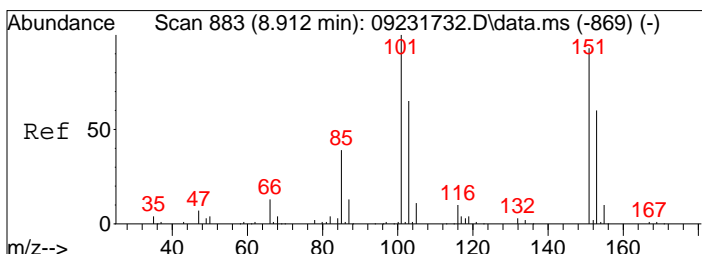
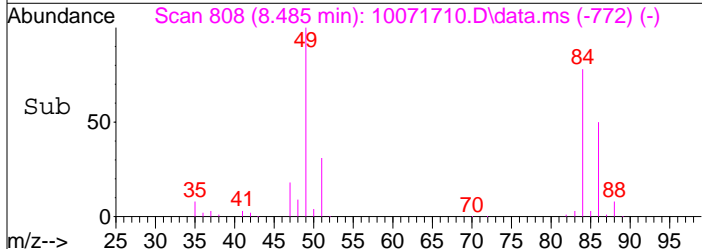
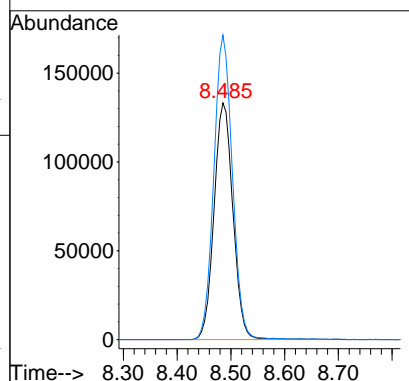
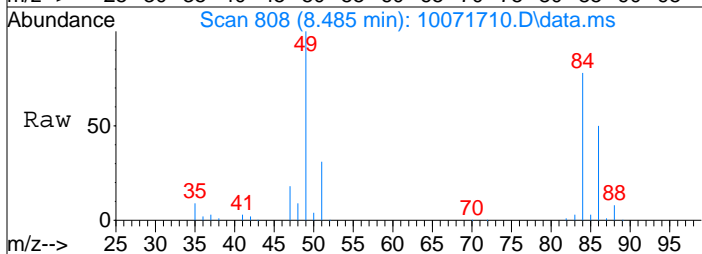
Tgt Ion	Resp	Lower	Upper
96	7021		
61	159.1	127.1	167.1





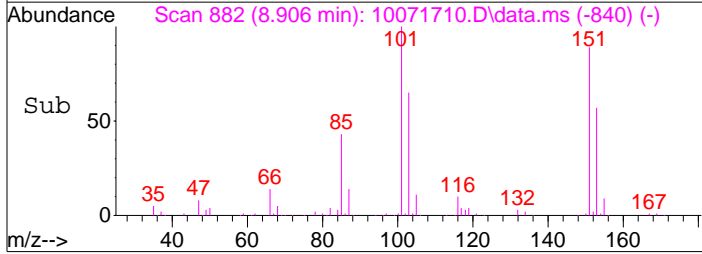
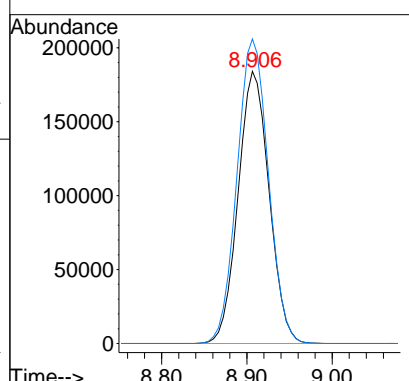
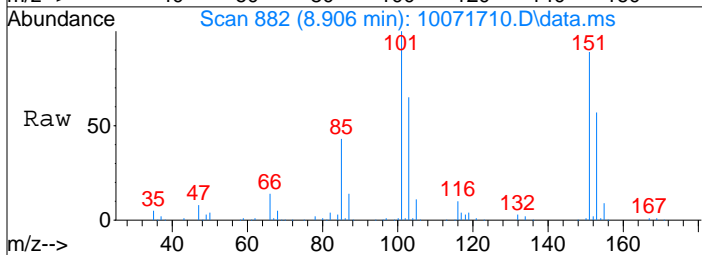
#19
 Methylene Chloride
 Concen: 28.44 ng
 RT: 8.49 min Scan# 808
 Delta R.T. -0.045 min
 Lab File: 10071710.D
 Acq: 7 Oct 2017 8:34

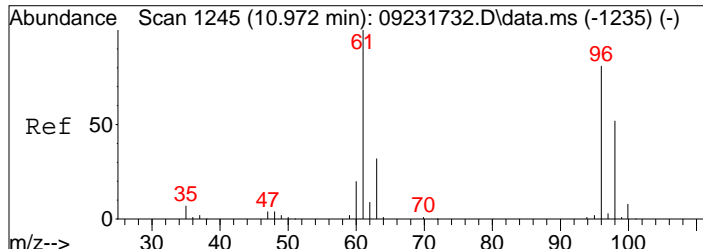
Tgt Ion	Resp	Lower	Upper
84	100		
49	126.8	94.9	144.9



#21
 Trichlorotrifluoroethane
 Concen: 46.74 ng
 RT: 8.91 min Scan# 882
 Delta R.T. -0.011 min
 Lab File: 10071710.D
 Acq: 7 Oct 2017 8:34

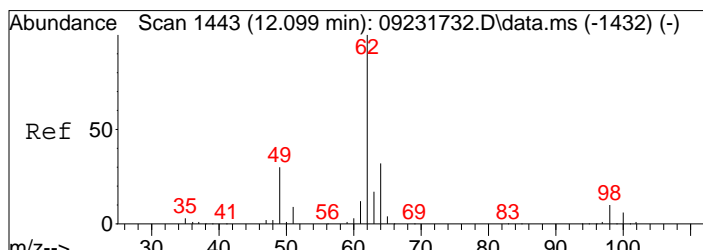
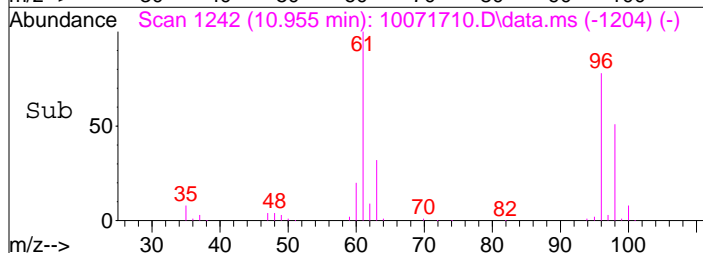
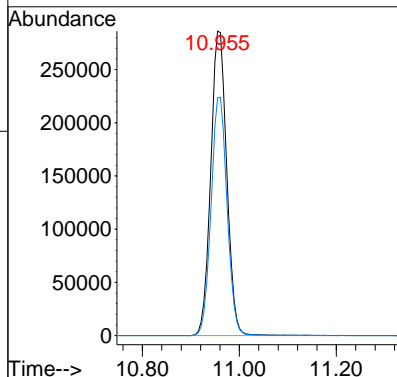
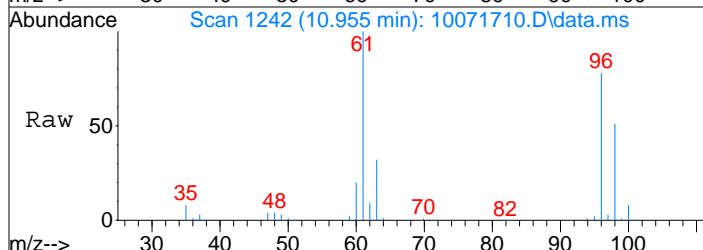
Tgt Ion	Resp	Lower	Upper
151	100		
101	113.4	88.3	128.3





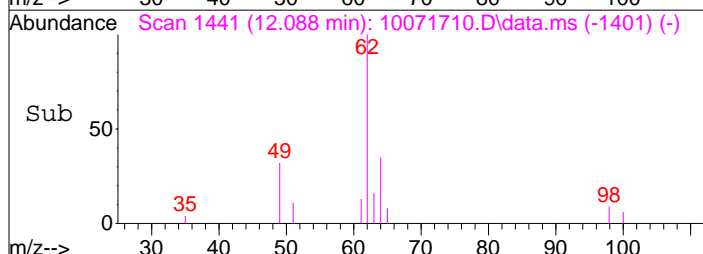
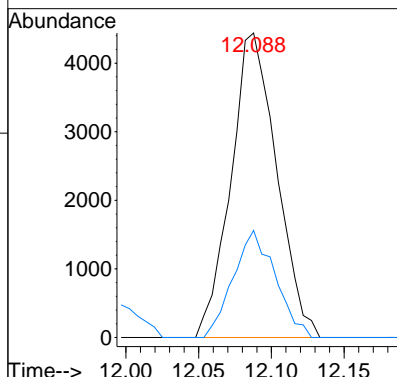
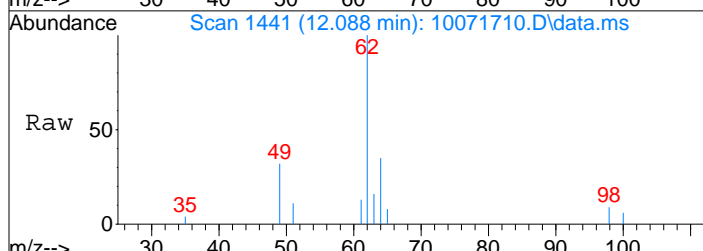
#28
 cis-1,2-Dichloroethene
 Concen: 52.51 ng
 RT: 10.96 min Scan# 1242
 Delta R.T. -0.034 min
 Lab File: 10071710.D
 Acq: 7 Oct 2017 8:34

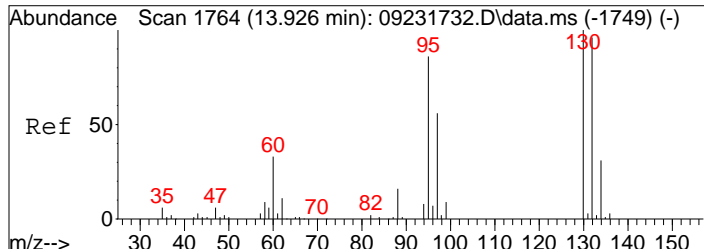
Tgt Ion: 61 Resp: 656170
 Ion Ratio Lower Upper
 61 100
 96 78.4 63.2 103.2



#36
 1,2-Dichloroethane
 Concen: 0.85 ng
 RT: 12.09 min Scan# 1441
 Delta R.T. -0.023 min
 Lab File: 10071710.D
 Acq: 7 Oct 2017 8:34

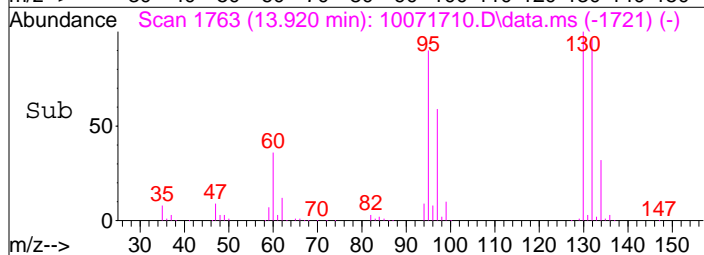
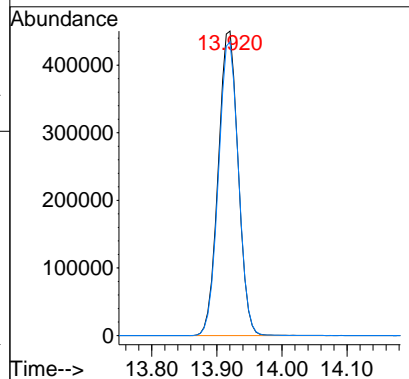
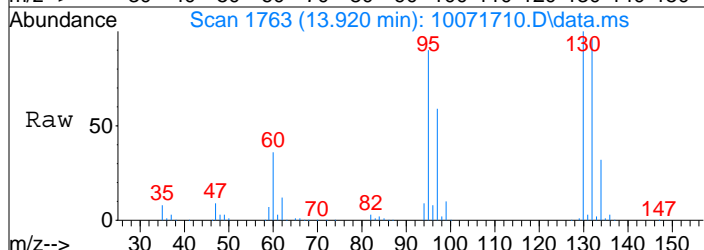
Tgt Ion: 62 Resp: 9700
 Ion Ratio Lower Upper
 62 100
 64 32.4 12.5 52.5





#47
 Trichloroethene
 Concen: 80.59 ng
 RT: 13.92 min Scan# 1763
 Delta R.T. -0.011 min
 Lab File: 10071710.D
 Acq: 7 Oct 2017 8:34

Tgt Ion:130 Resp: 958030
 Ion Ratio Lower Upper
 130 100
 132 96.7 76.1 116.1



Data File : I:\MS13\DATA\2017 10\07\10071728.D
 Acq On : 7 Oct 2017 19:29
 Sample : P1704815-003 (1000mL)
 Misc : S31-09111702

Vial: 1
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:46:27 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

WA 10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.13	130	96818	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.22	114	479120	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.52	82	173024	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	123767	12.704	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	101.60%	
57) Toluene-d8 (SS2)	15.65	98	472198	13.061	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	104.48%	
73) Bromofluorobenzene (SS3)	18.91	174	148863	10.671	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	85.36%	

Target Compounds

						Qvalue
2) Propene	4.38	42	2728	N.D.		
3) Dichlorodifluoromethan...	4.52	85	31054	1.839 ng		99
4) Chloromethane	4.77	50	5011	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	5.04	135	785	N.D.		
6) Vinyl Chloride	5.18	62	9857	0.825 ng		99
7) 1,3-Butadiene	0.00	54	0	N.D.		
8) Bromomethane	5.84	94	187	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	6.49	45	22557	3.608 ng		90
11) Acetonitrile	6.74	41	7341	0.472 ng		97
12) Acrolein	6.95	56	1362	N.D.		
13) Acetone	7.15	58	26081	3.909 ng	#	56
14) Trichlorofluoromethane	7.37	101	14053	0.973 ng		100
15) 2-Propanol (Isopropanol)	7.65	45	3971	N.D.		
16) Acrylonitrile	7.85	53	531	N.D.		
17) 1,1-Dichloroethene	8.29	96	3235	N.D.		
18) 2-Methyl-2-Propanol (t...	8.53	59	1024	N.D.		
19) Methylene Chloride	8.49	84	154298	14.801 ng		99
20) 3-Chloro-1-propene (Al...	8.68	41	178	N.D.		
21) Trichlorotrifluoroethane	8.91	151	279705	30.913 ng		98
22) Carbon Disulfide	8.76	76	21027	0.572 ng		92
23) trans-1,2-Dichloroethene	9.73	61	1095	N.D.		
24) 1,1-Dichloroethane	9.98	63	1136	N.D.		
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D. d		
27) 2-Butanone (MEK)	10.48	72	5078	0.822 ng	#	90
28) cis-1,2-Dichloroethene	10.96	61	189888	16.713 ng		100
29) Diisopropyl Ether	11.29	87	112	N.D.		
30) Ethyl Acetate	11.27	61	309	N.D.		
31) n-Hexane	11.25	57	9952	0.713 ng		98
32) Chloroform	11.30	83	2416	N.D.		
34) Tetrahydrofuran (THF)	11.74	72	6376	0.975 ng	#	84
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.		
36) 1,2-Dichloroethane	12.09	62	3024	N.D.		
38) 1,1,1-Trichloroethane	12.36	97	237	N.D.		
39) Isopropyl Acetate	12.76	61	283	N.D.		
40) 1-Butanol	0.00	56	0	N.D. d		
41) Benzene	12.83	78	17372	0.468 ng		98
42) Carbon Tetrachloride	12.99	117	4219	N.D.		
43) Cyclohexane	13.13	84	3619	N.D.		
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	13.54	63	1509	N.D.		
46) Bromodichloromethane	13.91	83	4486	N.D.		
47) Trichloroethene	13.91	130	327056	29.122 ng		100
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D. d		
50) Methyl Methacrylate	14.25	100	1016	N.D.		

Data File : I:\MS13\DATA\2017 10\07\10071728.D
 Acq On : 7 Oct 2017 19:29
 Sample : P1704815-003 (1000mL)
 Misc : S31-09111702

Vial: 1
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:46:27 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

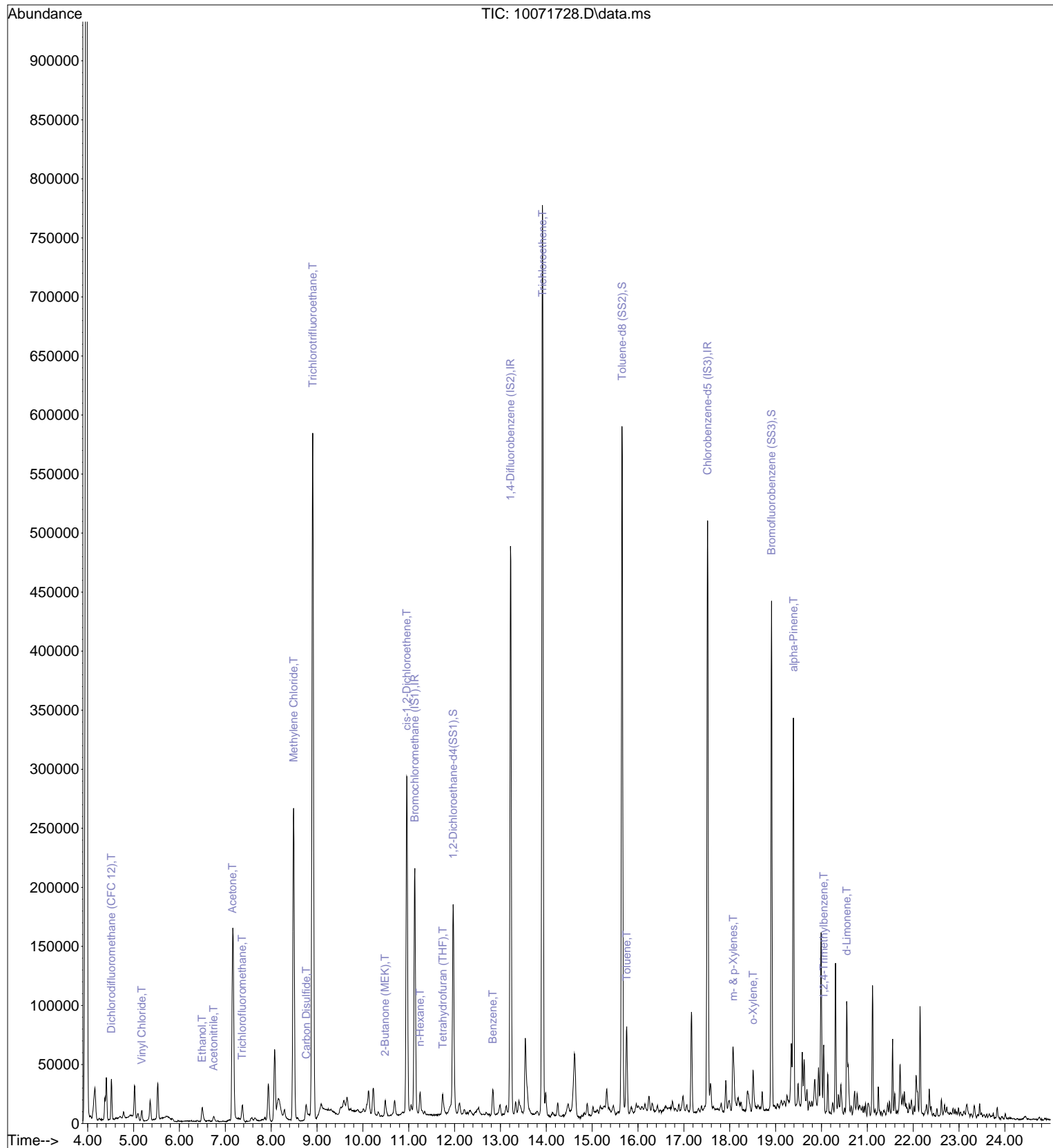
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	14.25	71	3775	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	14.83	58	943	N.D.		
54) trans-1,3-Dichloropropene	15.32	75	759	N.D.		
55) 1,1,2-Trichloroethane	15.46	97	370	N.D.		
58) Toluene	15.75	91	56517	1.543	ng	99
59) 2-Hexanone	16.00	43	1866	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	16.41	107	403	N.D.		
62) n-Butyl Acetate	16.63	43	1038	N.D.		
63) n-Octane	16.59	57	643	N.D.		
64) Tetrachloroethene	16.89	166	2231	N.D.		
65) Chlorobenzene	17.57	112	2124	N.D.		
66) Ethylbenzene	17.92	91	18159	N.D.		
67) m- & p-Xylenes	18.07	91	44951	1.405	ng	100
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	18.41	104	6675	N.D.		
70) o-Xylene	18.51	91	18258	0.570	ng	99
71) n-Nonane	18.71	43	5797	N.D.		
72) 1,1,2,2-Tetrachloroethane	18.50	83	540	N.D.		
74) Cumene	19.04	105	1912	N.D.		
75) alpha-Pinene	19.39	93	138443	6.478	ng	100
76) n-Propylbenzene	19.49	91	10081	N.D.		
77) 3-Ethyltoluene	0.00	105	0	N.D.	d	
78) 4-Ethyltoluene	19.62	105	10485	N.D.		
79) 1,3,5-Trimethylbenzene	19.68	105	7261	N.D.		
80) alpha-Methylstyrene	19.82	118	978	N.D.		
81) 2-Ethyltoluene	19.86	105	8265	N.D.		
82) 1,2,4-Trimethylbenzene	20.05	105	28798	0.832	ng	88
83) n-Decane	0.00	57	0	N.D.	d	
84) Benzyl Chloride	20.16	91	306	N.D.		
85) 1,3-Dichlorobenzene	20.18	146	755	N.D.		
86) 1,4-Dichlorobenzene	20.24	146	2745	N.D.		
87) sec-Butylbenzene	20.29	105	1695	N.D.		
88) 4-Isopropyltoluene (p-...	20.43	119	6004	N.D.		
89) 1,2,3-Trimethylbenzene	20.43	105	8303	N.D.		
90) 1,2-Dichlorobenzene	20.54	146	629	N.D.		
91) d-Limonene	20.55	68	22466	1.725	ng	# 37
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.		
93) n-Undecane	21.24	57	7825	N.D.		
94) 1,2,4-Trichlorobenzene	22.05	180	653	N.D.		
95) Naphthalene	22.16	128	15376	N.D.		
96) n-Dodecane	0.00	57	0	N.D.	d	
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	18.24	55	1721	N.D.		
99) tert-Butylbenzene	20.04	119	4067	N.D.		
100) n-Butylbenzene	20.80	91	4724	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071728.D
 Acq On : 7 Oct 2017 19:29
 Sample : P1704815-003 (1000mL)
 Misc : S31-09111702

Vial: 1
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:46:27 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
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 DataAcq Meth:TO15.M

WA 10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.13	130	96818	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.22	114	479120	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.52	82	173024	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	123767	12.704	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	101.60%	
57) Toluene-d8 (SS2)	15.65	98	472198	13.061	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	104.48%	
73) Bromofluorobenzene (SS3)	18.91	174	148863	10.671	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	85.36%	

Target Compounds

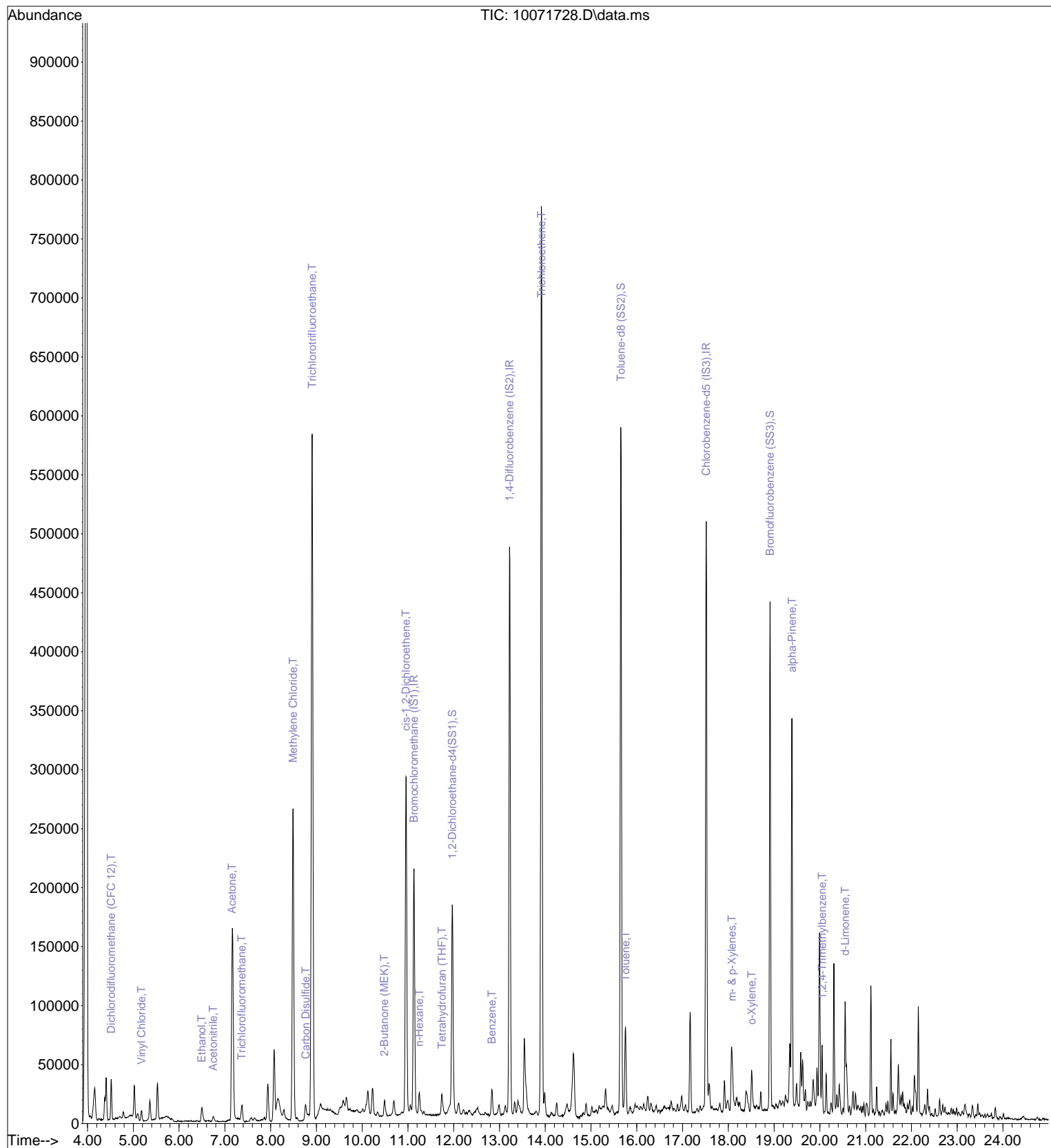
	R.T.	QIon	Response	Conc	Units	Qvalue
3) Dichlorodifluoromethan...	4.52	85	31054	1.839	ng	99
6) Vinyl Chloride	5.18	62	9857	0.825	ng	99
10) Ethanol	6.49	45	22557	3.608	ng	90
11) Acetonitrile	6.74	41	7341	0.472	ng	97
13) Acetone	7.15	58	26081	3.909	ng	# 56
14) Trichlorofluoromethane	7.37	101	14053	0.973	ng	100
19) Methylene Chloride	8.49	84	154298	14.801	ng	99
21) Trichlorotrifluoroethane	8.91	151	279705	30.913	ng	98
22) Carbon Disulfide	8.76	76	21027	0.572	ng	92
27) 2-Butanone (MEK)	10.48	72	5078	0.822	ng	# 90
28) cis-1,2-Dichloroethene	10.96	61	189888	16.713	ng	100
31) n-Hexane	11.25	57	9952	0.713	ng	98
34) Tetrahydrofuran (THF)	11.74	72	6376	0.975	ng	# 84
41) Benzene	12.83	78	17372	0.468	ng	98
47) Trichloroethene	13.91	130	327056	29.122	ng	100
58) Toluene	15.75	91	56517	1.543	ng	99
67) m- & p-Xylenes	18.07	91	44951	1.405	ng	100
70) o-Xylene	18.51	91	18258	0.570	ng	99
75) alpha-Pinene	19.39	93	138443	6.478	ng	100
82) 1,2,4-Trimethylbenzene	20.05	105	28798	0.832	ng	88
91) d-Limonene	20.55	68	22466	1.725	ng	# 37

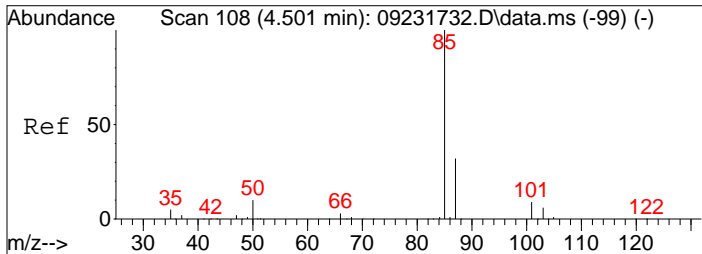
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071728.D
 Acq On : 7 Oct 2017 19:29
 Sample : P1704815-003 (1000mL)
 Misc : S31-09111702

Vial: 1
 Operator: WA
 Inst : MS13

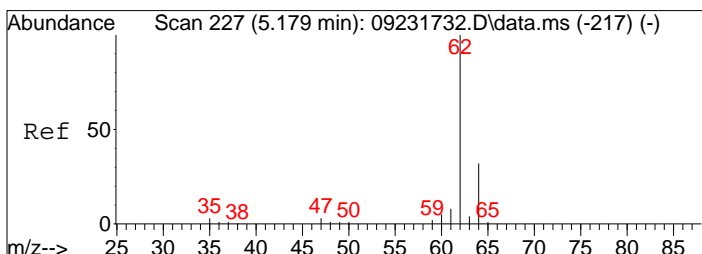
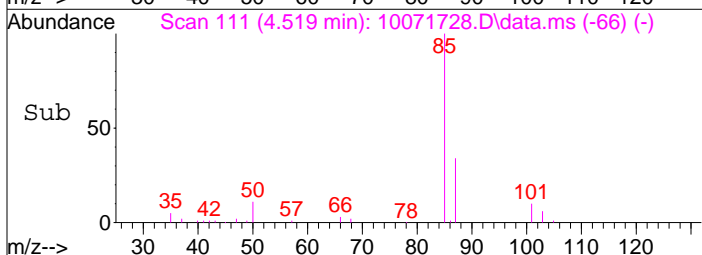
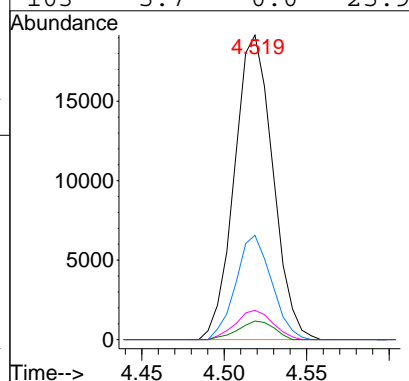
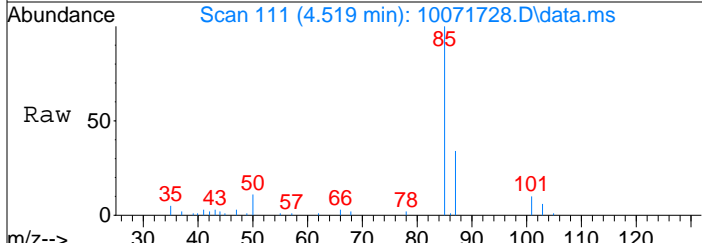
Quant Time: Oct 09 16:46:27 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
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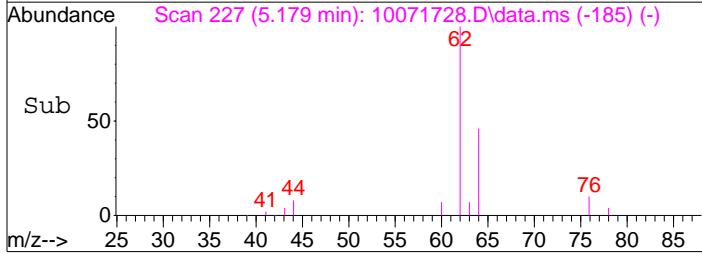
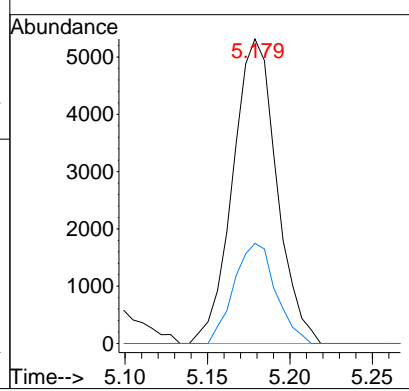
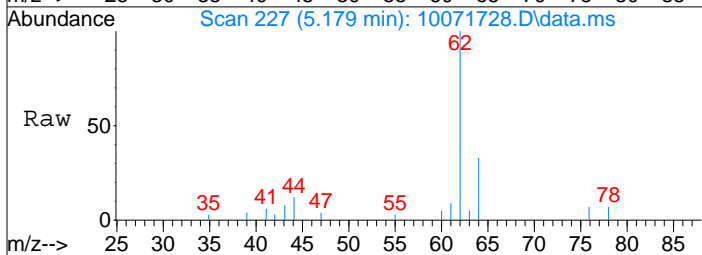
#3
 Dichlorodifluoromethane (CFC 12)
 Concen: 1.84 ng
 RT: 4.52 min Scan# 111
 Delta R.T. 0.006 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

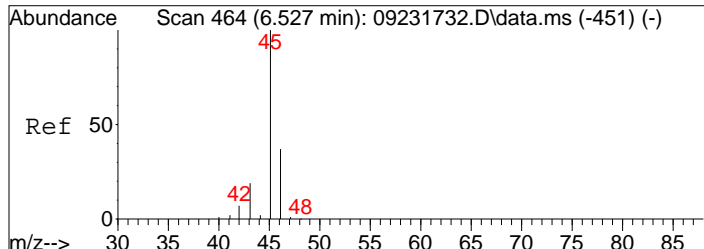
Tgt Ion	Resp	Lower	Upper
85	31054		
87	31.9	12.6	52.6
101	9.4	0.0	29.2
103	5.7	0.0	25.9



#6
 Vinyl Chloride
 Concen: 0.83 ng
 RT: 5.18 min Scan# 227
 Delta R.T. -0.011 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

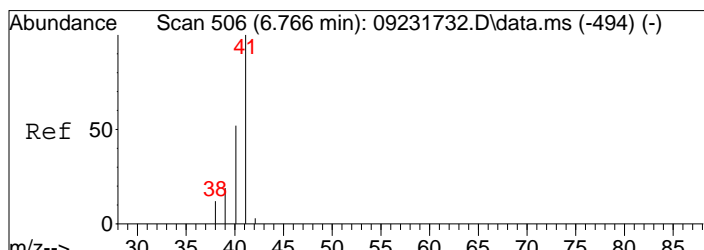
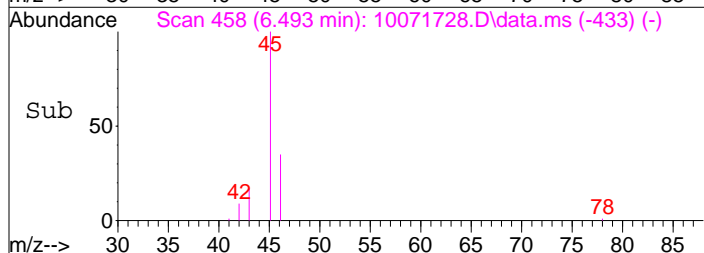
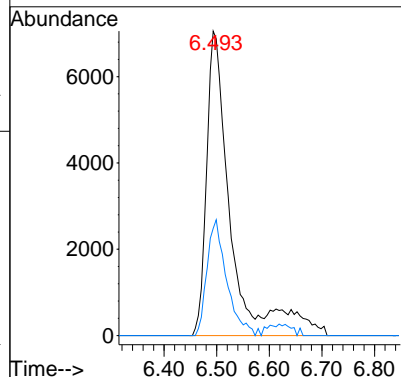
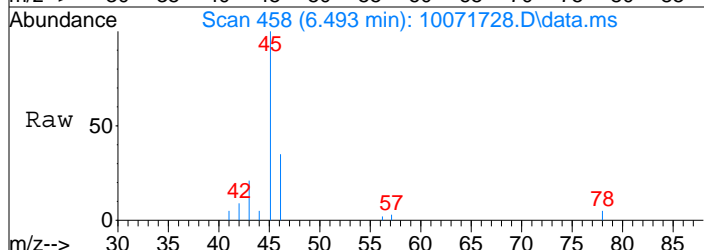
Tgt Ion	Resp	Lower	Upper
62	9857		
64	31.3	11.8	51.8





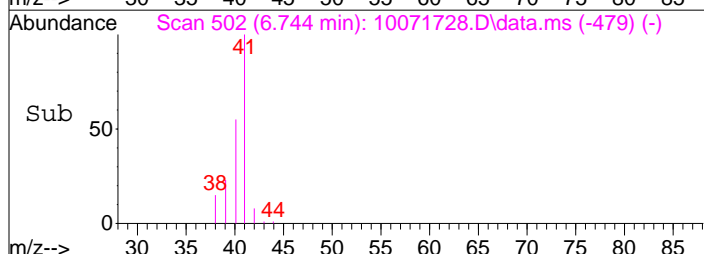
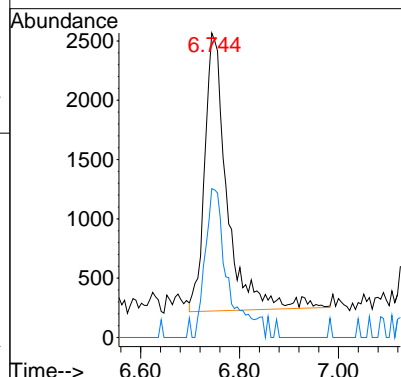
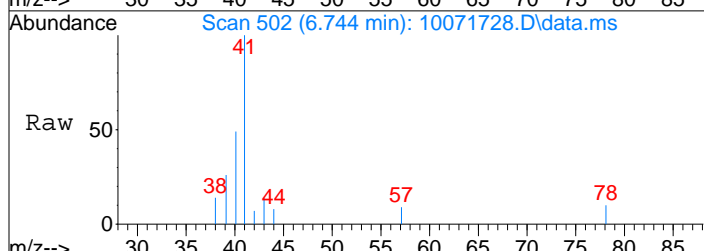
#10
 Ethanol
 Concen: 3.61 ng
 RT: 6.49 min Scan# 458
 Delta R.T. -0.108 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

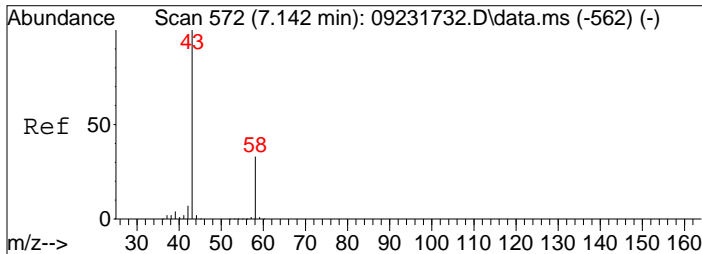
Tgt Ion: 45 Resp: 22557
 Ion Ratio Lower Upper
 45 100
 46 30.9 16.8 56.8



#11
 Acetonitrile
 Concen: 0.47 ng
 RT: 6.74 min Scan# 502
 Delta R.T. -0.068 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

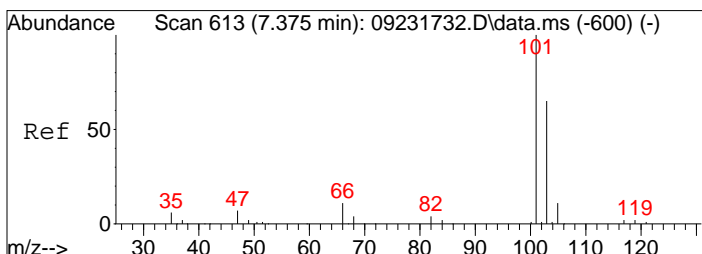
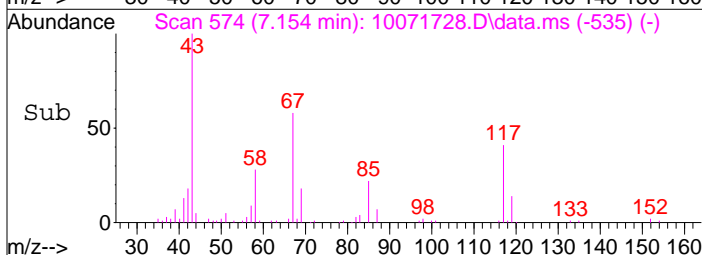
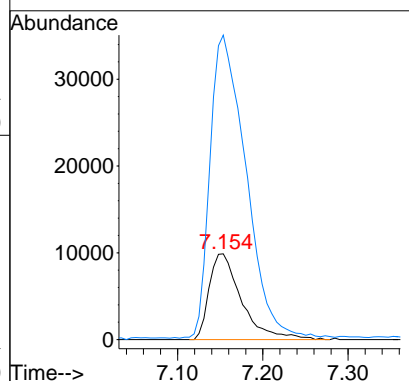
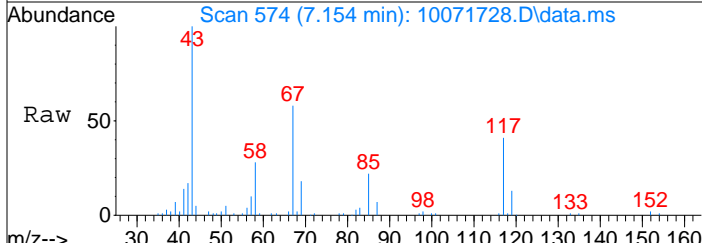
Tgt Ion: 41 Resp: 7341
 Ion Ratio Lower Upper
 41 100
 40 55.0 32.6 72.6





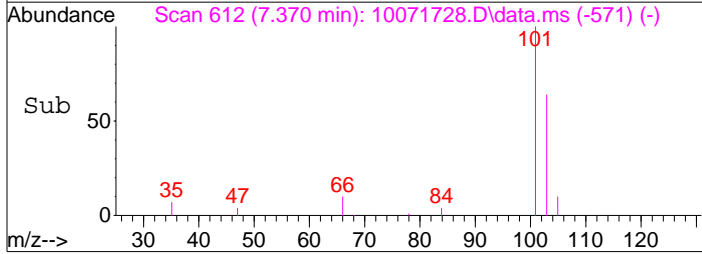
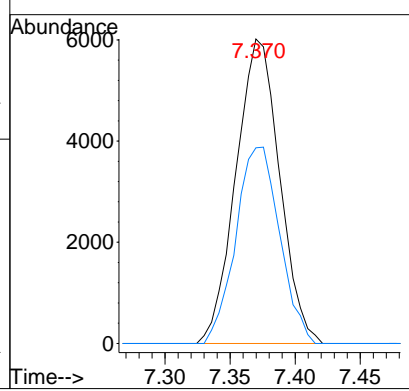
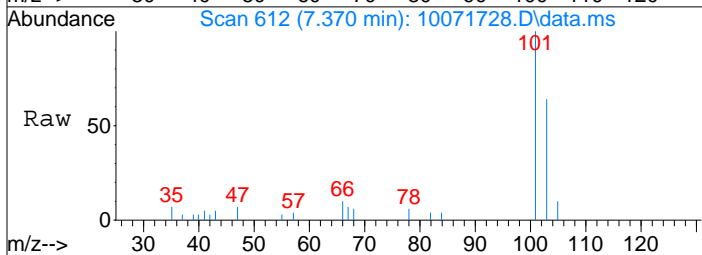
#13
 Acetone
 Concen: 3.91 ng
 RT: 7.15 min Scan# 574
 Delta R.T. -0.028 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

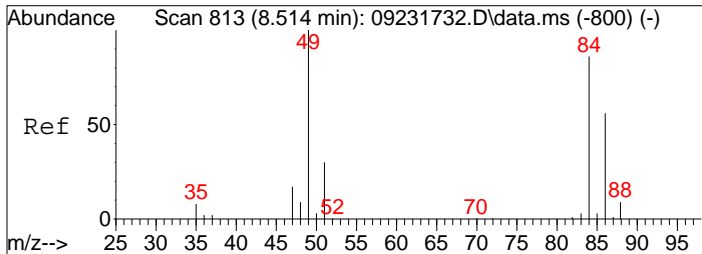
Tgt Ion: 58 Resp: 26081
 Ion Ratio Lower Upper
 58 100
 43 392.6 275.7 335.7#



#14
 Trichlorofluoromethane
 Concen: 0.97 ng
 RT: 7.37 min Scan# 612
 Delta R.T. -0.017 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

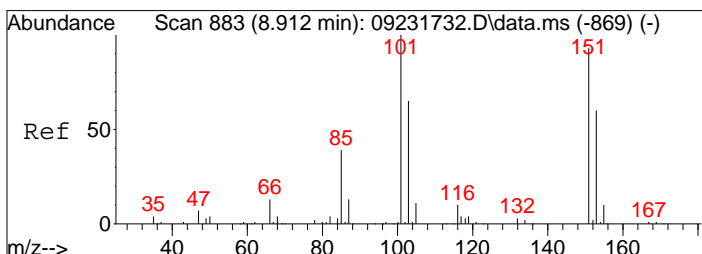
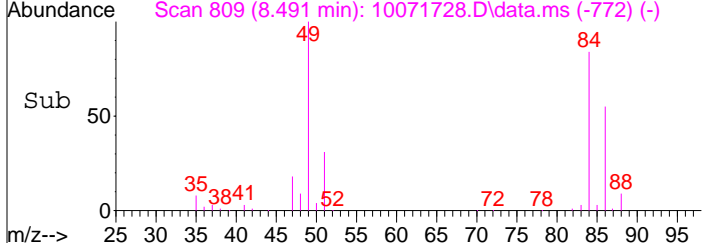
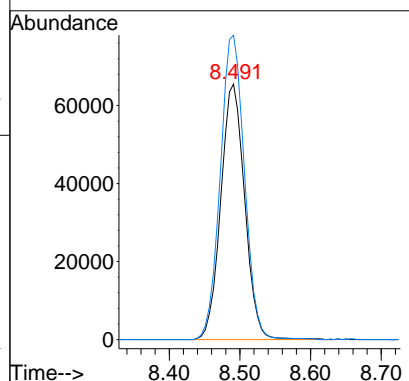
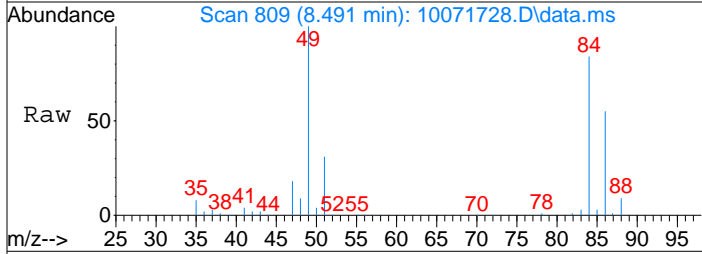
Tgt Ion: 101 Resp: 14053
 Ion Ratio Lower Upper
 101 100
 103 64.7 44.9 84.9





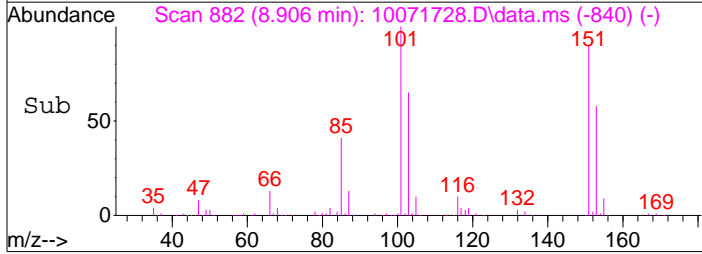
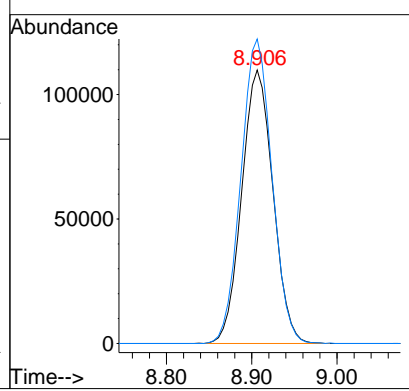
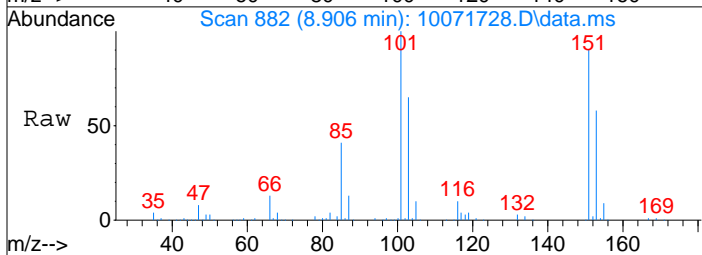
#19
 Methylene Chloride
 Concen: 14.80 ng
 RT: 8.49 min Scan# 809
 Delta R.T. -0.040 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

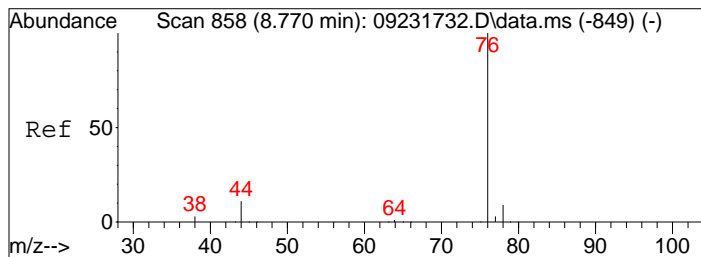
Tgt Ion:	84	Resp:	154298
Ion Ratio	Lower	Upper	
84	100		
49	120.6	94.9	144.9



#21
 Trichlorotrifluoroethane
 Concen: 30.91 ng
 RT: 8.91 min Scan# 882
 Delta R.T. -0.011 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

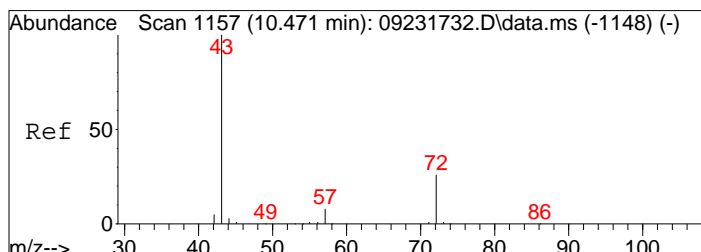
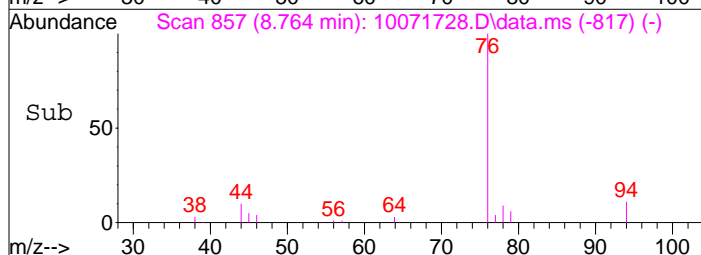
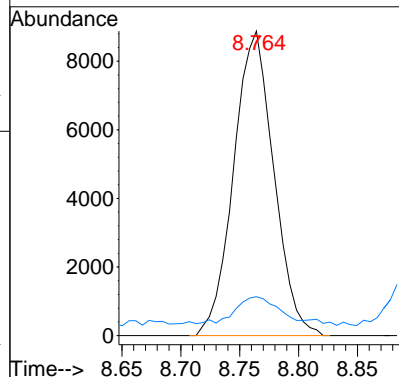
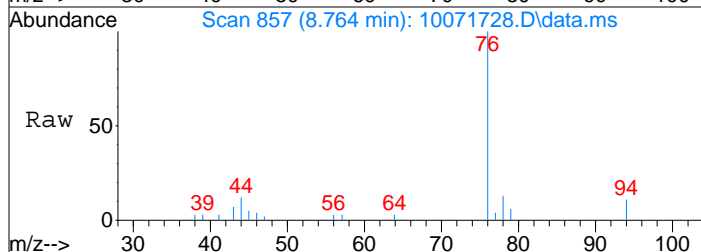
Tgt Ion:	151	Resp:	279705
Ion Ratio	Lower	Upper	
151	100		
101	110.7	88.3	128.3





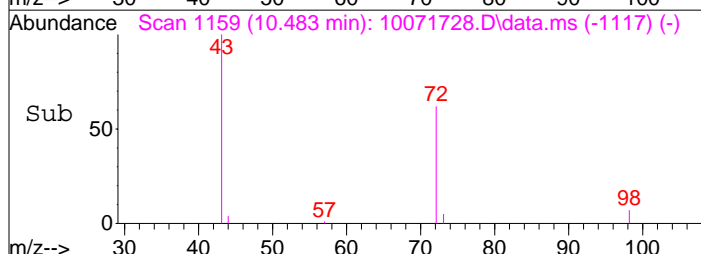
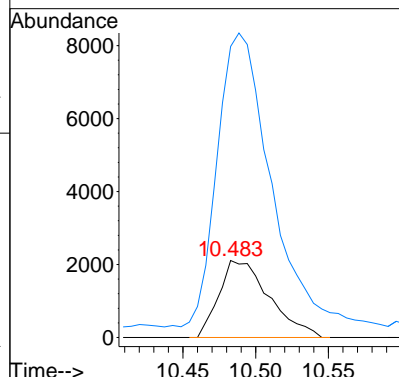
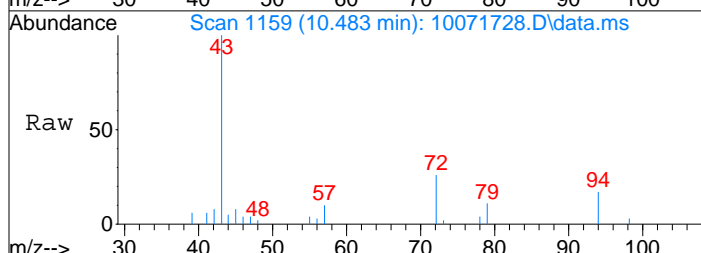
#22
 Carbon Disulfide
 Concen: 0.57 ng
 RT: 8.76 min Scan# 857
 Delta R.T. -0.023 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

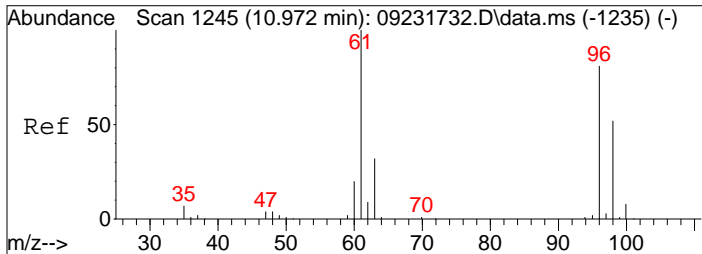
Tgt Ion	Resp	Lower	Upper
76	100		
78	11.9	0.0	29.1



#27
 2-Butanone (MEK)
 Concen: 0.82 ng
 RT: 10.48 min Scan# 1159
 Delta R.T. -0.011 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

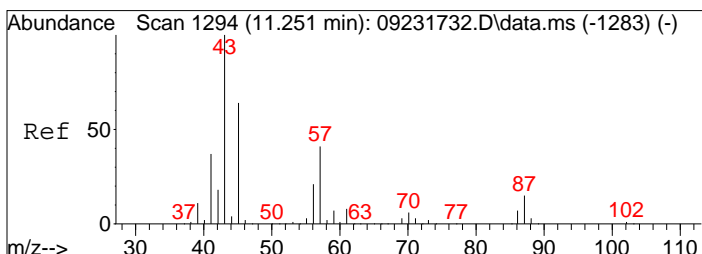
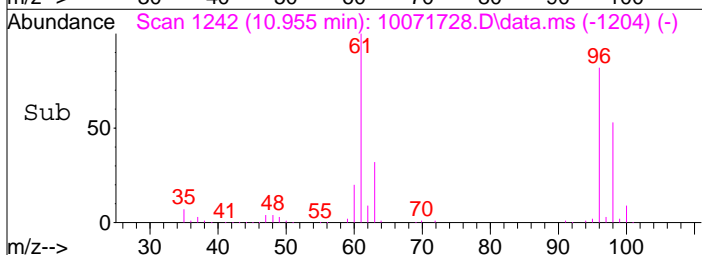
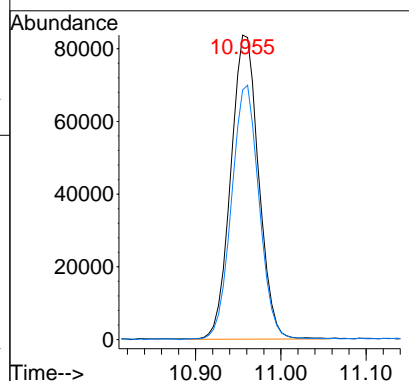
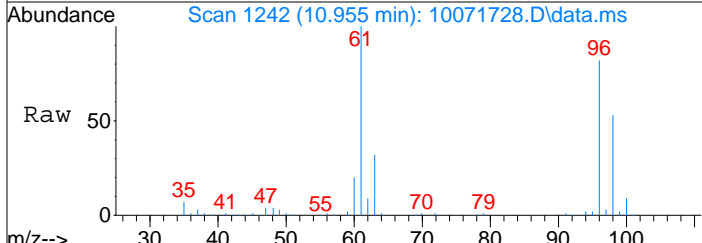
Tgt Ion	Resp	Lower	Upper
72	100		
43	407.9	364.5	404.5#





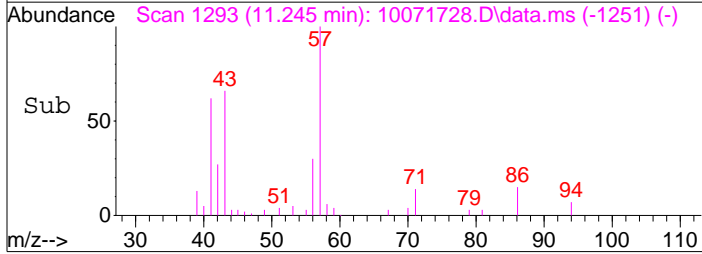
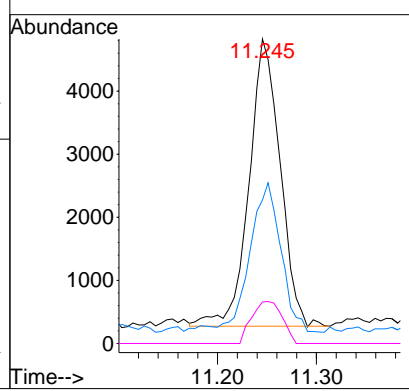
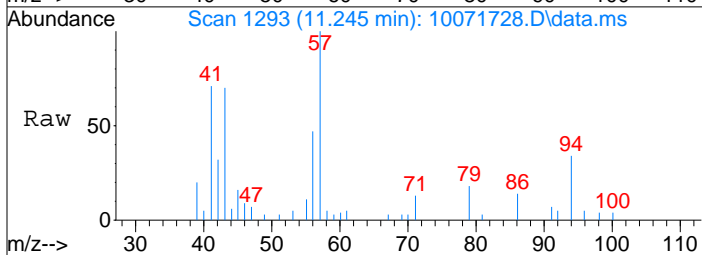
#28
 cis-1,2-Dichloroethene
 Concen: 16.71 ng
 RT: 10.96 min Scan# 1242
 Delta R.T. -0.034 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

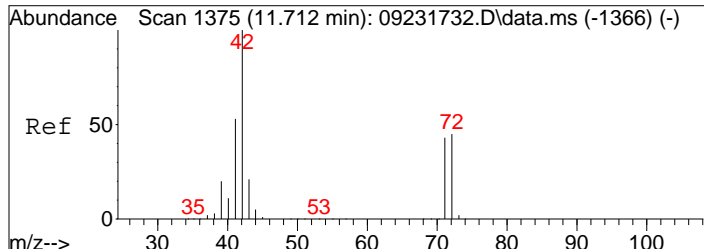
Tgt Ion	Resp	Lower	Upper
61	100		
96	83.4	63.2	103.2



#31
 n-Hexane
 Concen: 0.71 ng
 RT: 11.25 min Scan# 1293
 Delta R.T. -0.011 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

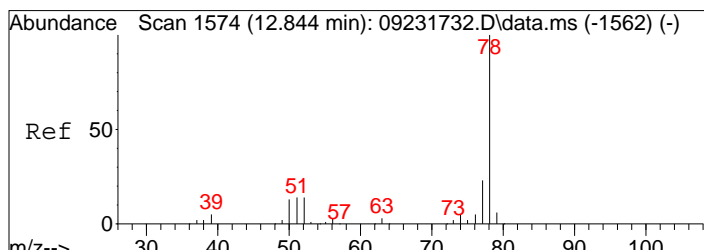
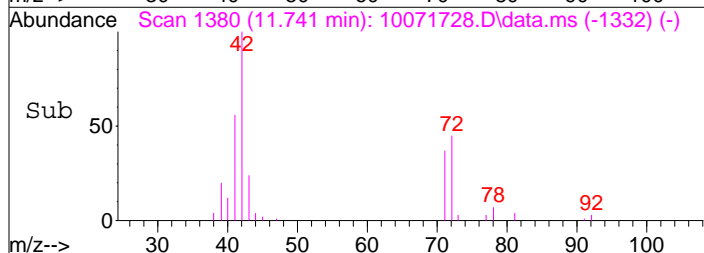
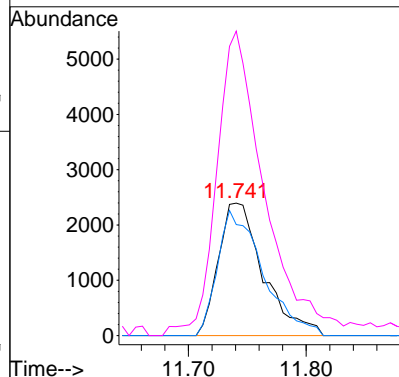
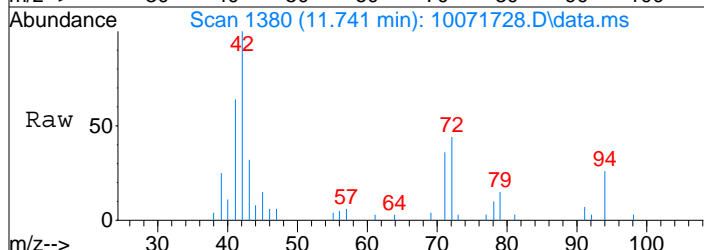
Tgt Ion	Resp	Lower	Upper
57	100		
56	51.2	41.4	62.0
86	14.3	13.1	19.7





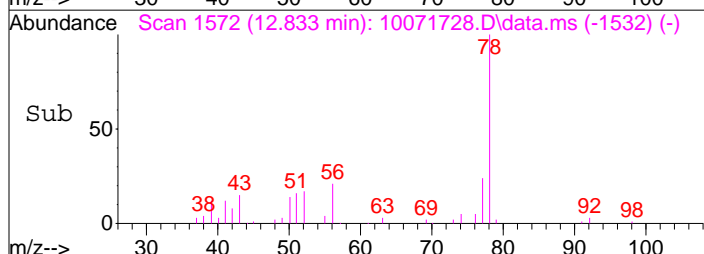
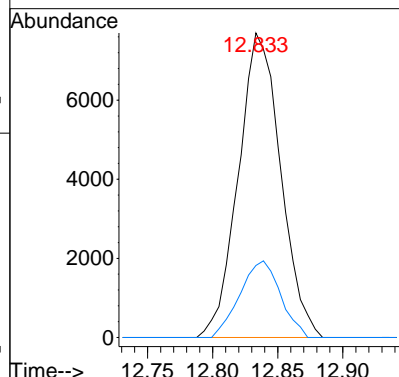
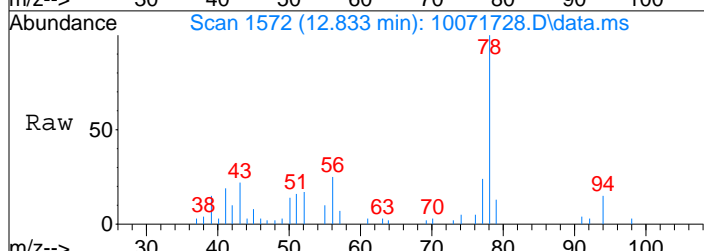
#34
 Tetrahydrofuran (THF)
 Concen: 0.98 ng
 RT: 11.74 min Scan# 1380
 Delta R.T. 0.023 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

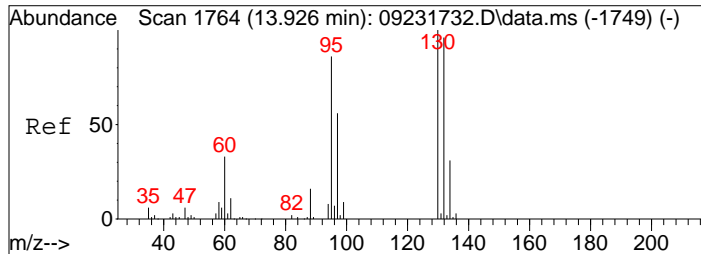
Tgt Ion	Resp	Lower	Upper
72	6376		
71	95.2	75.7	115.7
42	255.7	199.8	239.8#



#41
 Benzene
 Concen: 0.47 ng
 RT: 12.83 min Scan# 1572
 Delta R.T. -0.023 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

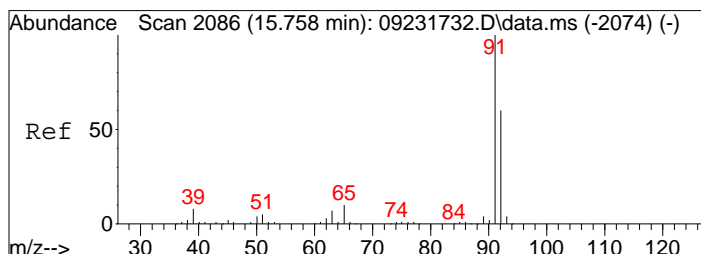
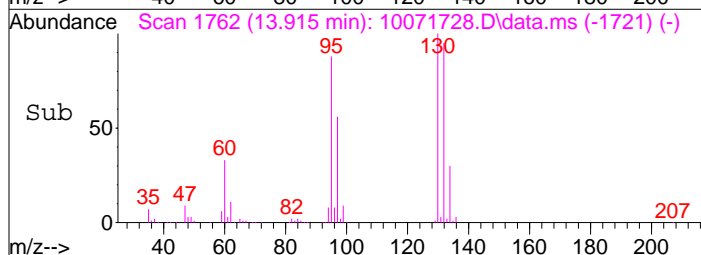
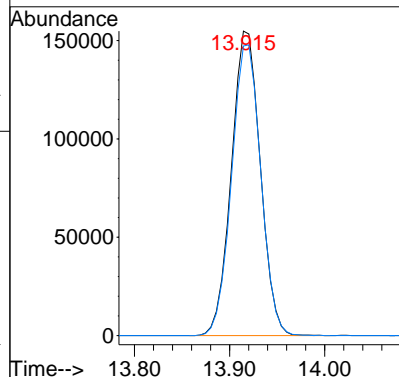
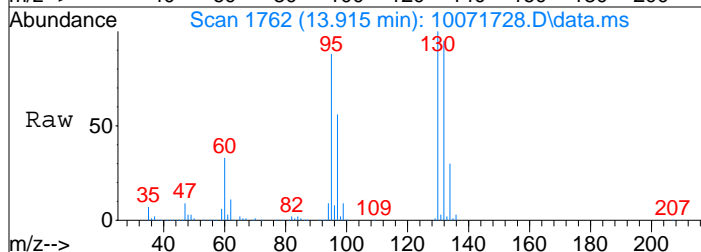
Tgt Ion	Resp	Lower	Upper
78	17372		
77	24.1	3.0	43.0





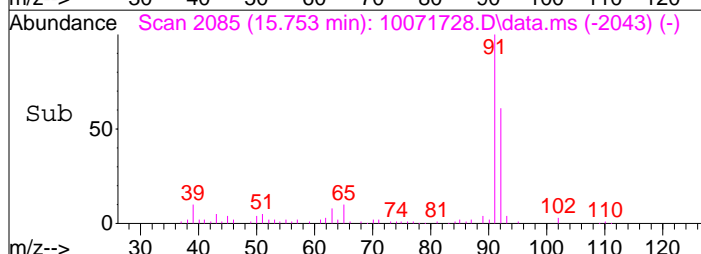
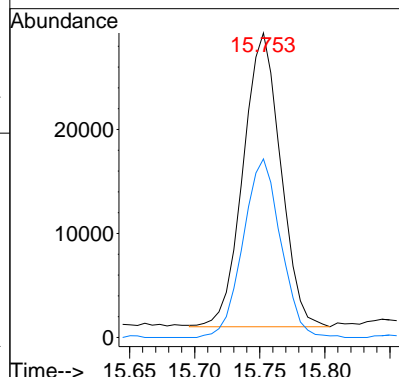
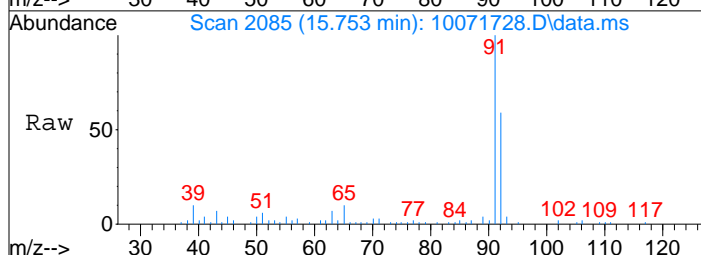
#47
 Trichloroethene
 Concen: 29.12 ng
 RT: 13.91 min Scan# 1762
 Delta R.T. -0.017 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

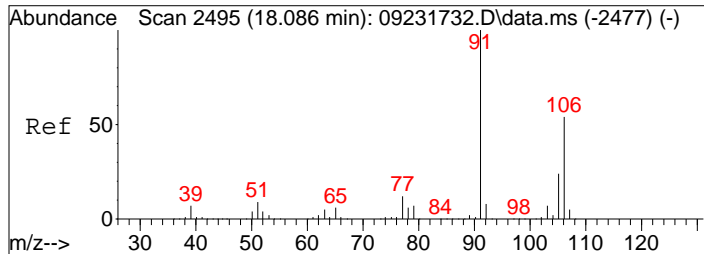
Tgt Ion: 130 Resp: 327056
 Ion Ratio Lower Upper
 130 100
 132 96.5 76.1 116.1



#58
 Toluene
 Concen: 1.54 ng
 RT: 15.75 min Scan# 2085
 Delta R.T. -0.011 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

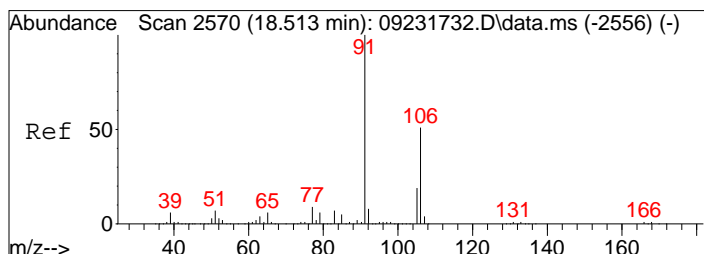
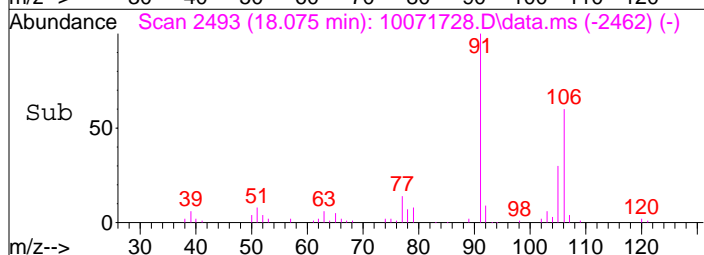
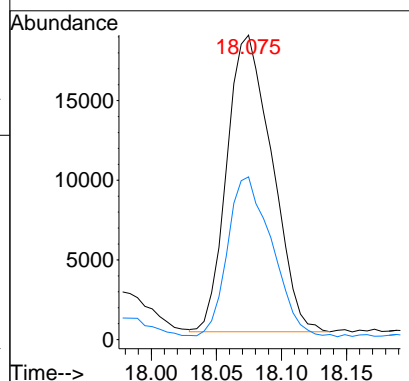
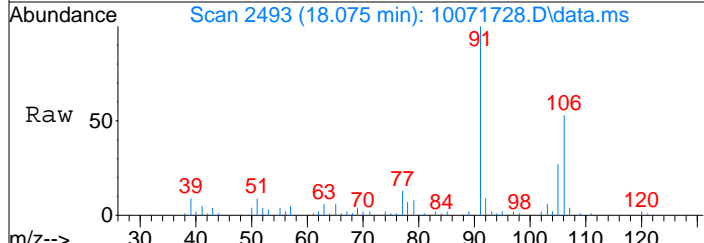
Tgt Ion: 91 Resp: 56517
 Ion Ratio Lower Upper
 91 100
 92 61.1 40.7 80.7





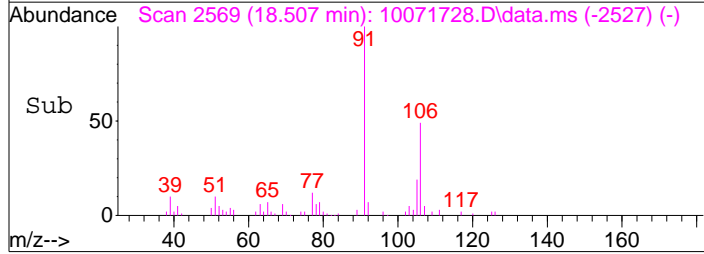
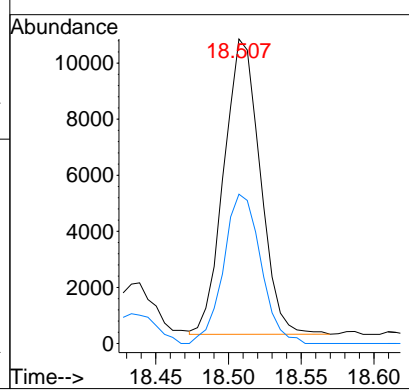
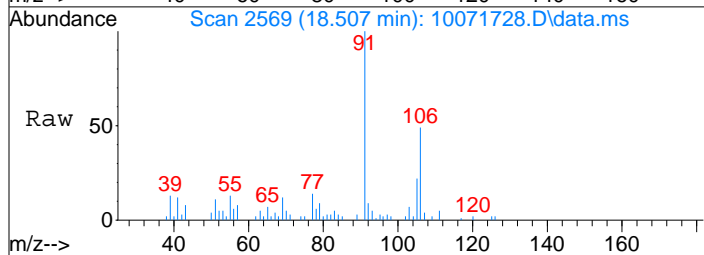
#67
 m- & p-Xylenes
 Concen: 1.41 ng
 RT: 18.07 min Scan# 2493
 Delta R.T. -0.023 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

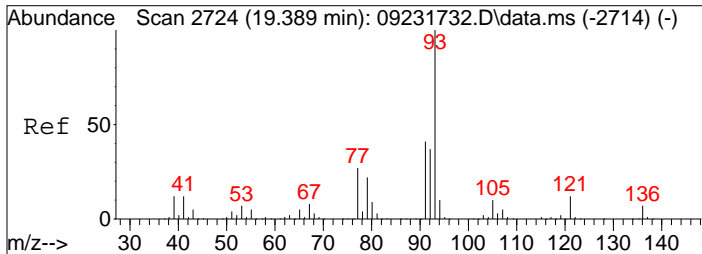
Tgt Ion:	91	Resp:	44951
Ion Ratio	Lower	Upper	
91	100		
106	52.9	32.7	72.7



#70
 o-Xylene
 Concen: 0.57 ng
 RT: 18.51 min Scan# 2569
 Delta R.T. -0.011 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

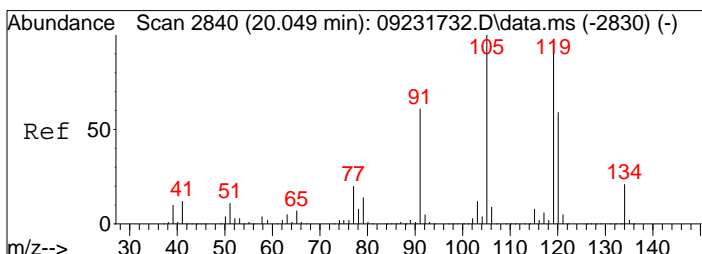
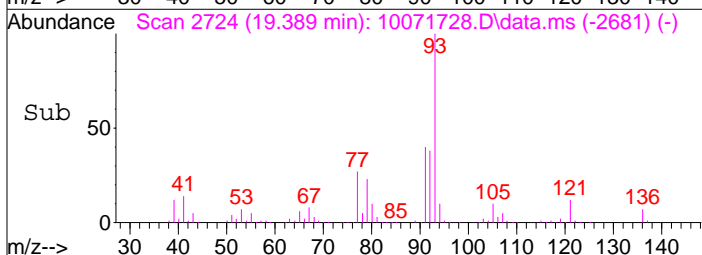
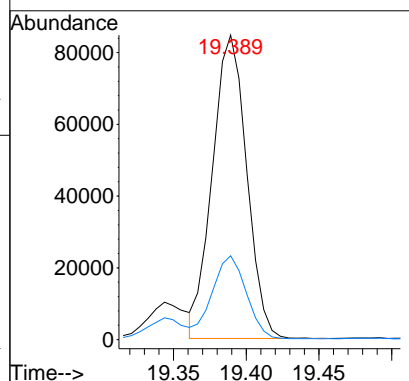
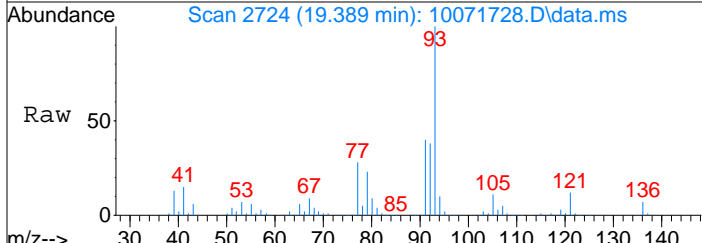
Tgt Ion:	91	Resp:	18258
Ion Ratio	Lower	Upper	
91	100		
106	52.0	31.0	71.0





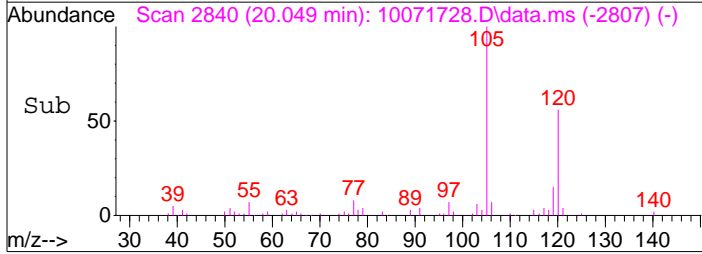
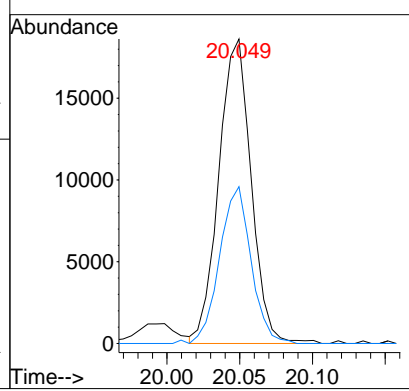
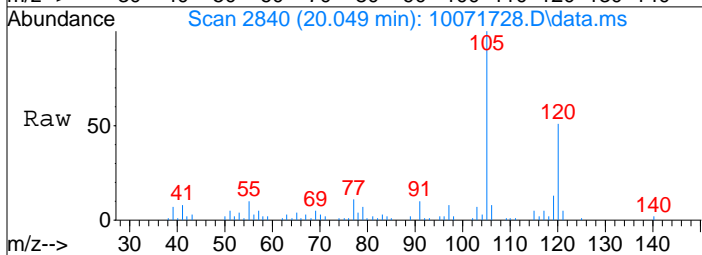
#75
 alpha-Pinene
 Concen: 6.48 ng
 RT: 19.39 min Scan# 2724
 Delta R.T. -0.006 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

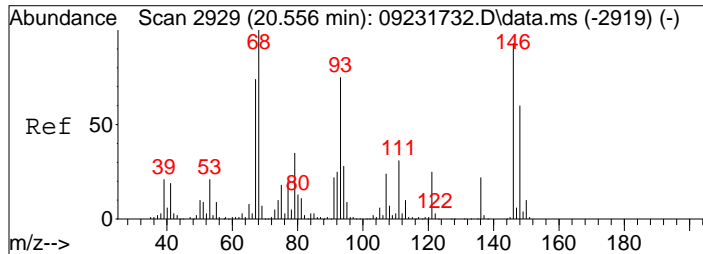
Tgt Ion	Resp	Lower	Upper
93	138443	100	
77	27.4	7.4	47.4



#82
 1,2,4-Trimethylbenzene
 Concen: 0.83 ng
 RT: 20.05 min Scan# 2840
 Delta R.T. -0.011 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

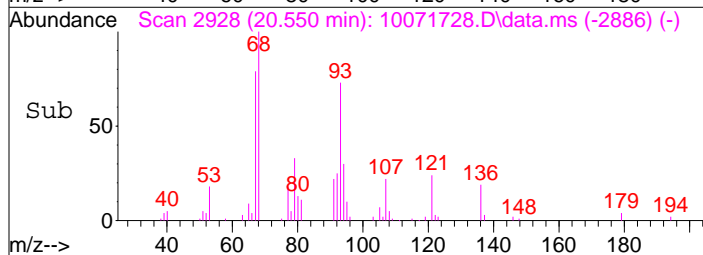
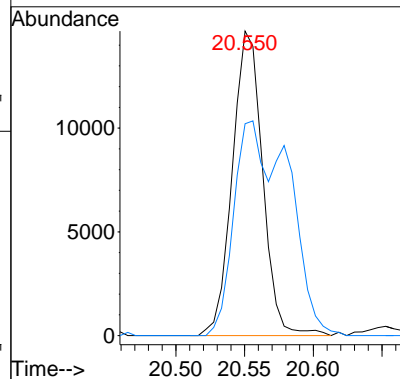
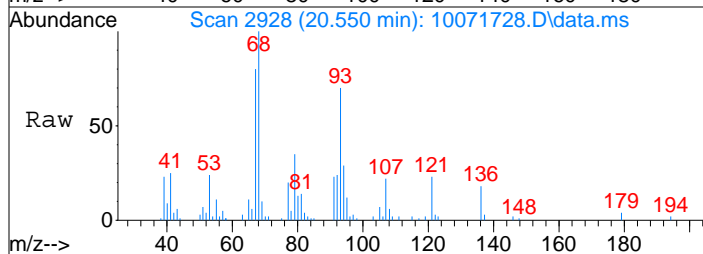
Tgt Ion	Resp	Lower	Upper
105	28798	100	
120	50.2	38.9	78.9





#91
 d-Limonene
 Concen: 1.72 ng
 RT: 20.55 min Scan# 2928
 Delta R.T. -0.011 min
 Lab File: 10071728.D
 Acq: 7 Oct 2017 19:29

Tgt Ion	Resp	Lower	Upper
68	100		
93	127.4	54.1	94.1#



Data File : I:\MS13\DATA\2017 10\07\10071729.D
 Acq On : 7 Oct 2017 20:04
 Sample : P1704815-004 (1000mL)
 Misc : S31-09111702

Vial: 2
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:47:37 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.13	130	97588	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.23	114	475828	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.52	82	180146	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	123743	12.602	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	100.80%	
57) Toluene-d8 (SS2)	15.65	98	475840	12.641	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	101.12%	
73) Bromofluorobenzene (SS3)	18.91	174	157584	10.850	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	86.80%	

Target Compounds

						Qvalue
2) Propene	4.38	42	2453	N.D.		
3) Dichlorodifluoromethan...	4.52	85	37353	2.195 ng		99
4) Chloromethane	4.78	50	4785	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	5.05	135	809	N.D.		
6) Vinyl Chloride	5.01	62	254	N.D.		
7) 1,3-Butadiene	0.00	54	0	N.D.		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	6.49	45	23371	3.709 ng		87
11) Acetonitrile	6.74	41	5838	N.D.		
12) Acrolein	6.95	56	976	N.D.		
13) Acetone	7.14	58	46597	6.928 ng	#	65
14) Trichlorofluoromethane	7.37	101	17125	1.177 ng		98
15) 2-Propanol (Isopropanol)	7.64	45	14777	0.675 ng		94
16) Acrylonitrile	7.94	53	256	N.D.		
17) 1,1-Dichloroethene	0.00	96	0	N.D.		
18) 2-Methyl-2-Propanol (t...	8.53	59	1364	N.D.		
19) Methylene Chloride	8.49	84	3765	N.D.		
20) 3-Chloro-1-propene (Al...	8.59	41	777	N.D.		
21) Trichlorotrifluoroethane	8.91	151	41310	4.530 ng		97
22) Carbon Disulfide	8.76	76	20546	0.554 ng		100
23) trans-1,2-Dichloroethene	0.00	61	0	N.D.		
24) 1,1-Dichloroethane	0.00	63	0	N.D.		
25) Methyl tert-Butyl Ether	10.11	73	710	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D.	d	
27) 2-Butanone (MEK)	10.49	72	5327	0.856 ng	#	82
28) cis-1,2-Dichloroethene	10.96	61	3326	N.D.		
29) Diisopropyl Ether	0.00	87	0	N.D.		
30) Ethyl Acetate	11.30	61	256	N.D.		
31) n-Hexane	11.25	57	8619	0.612 ng	#	97
32) Chloroform	11.30	83	1513	N.D.		
34) Tetrahydrofuran (THF)	11.75	72	2351	N.D.		
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.		
36) 1,2-Dichloroethane	12.09	62	133	N.D.		
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.		
39) Isopropyl Acetate	0.00	61	0	N.D.		
40) 1-Butanol	12.83	56	4063	N.D.		
41) Benzene	12.84	78	11608	N.D.		
42) Carbon Tetrachloride	12.99	117	4964	N.D.		
43) Cyclohexane	13.12	84	1751	N.D.		
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	0.00	63	0	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D.		
47) Trichloroethene	13.92	130	10075	0.903 ng		98
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	13.99	57	11447	N.D.		
50) Methyl Methacrylate	14.25	100	463	N.D.		

Data File : I:\MS13\DATA\2017 10\07\10071729.D
 Acq On : 7 Oct 2017 20:04
 Sample : P1704815-004 (1000mL)
 Misc : S31-09111702

Vial: 2
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:47:37 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

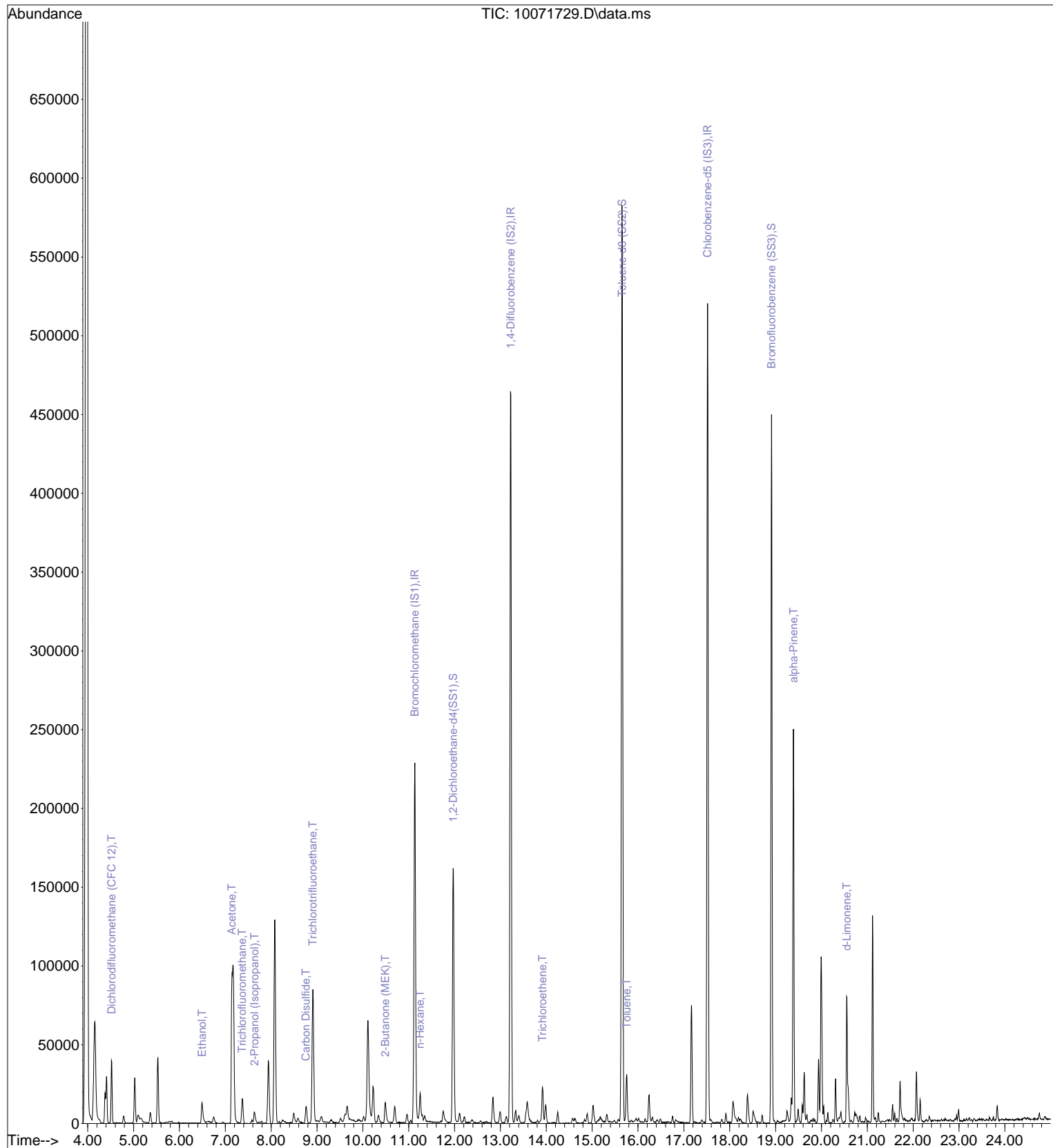
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	14.25	71	1820	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	14.83	58	556	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.		
58) Toluene	15.75	91	26184	0.687	ng	95
59) 2-Hexanone	16.01	43	2010	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	16.63	43	1039	N.D.		
63) n-Octane	16.75	57	731	N.D.		
64) Tetrachloroethene	16.89	166	206	N.D.		
65) Chlorobenzene	17.56	112	123	N.D.		
66) Ethylbenzene	17.92	91	5495	N.D.		
67) m- & p-Xylenes	18.07	91	12013	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	18.40	104	4028	N.D.		
70) o-Xylene	18.51	91	4429	N.D.		
71) n-Nonane	18.71	43	2527	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	19.04	105	770	N.D.		
75) alpha-Pinene	19.39	93	104213	4.684	ng	100
76) n-Propylbenzene	19.49	91	1539	N.D.		
77) 3-Ethyltoluene	19.58	105	3778	N.D.		
78) 4-Ethyltoluene	19.62	105	2441	N.D.		
79) 1,3,5-Trimethylbenzene	19.69	105	1600	N.D.		
80) alpha-Methylstyrene	19.82	118	903	N.D.		
81) 2-Ethyltoluene	19.86	105	1395	N.D.		
82) 1,2,4-Trimethylbenzene	20.05	105	5625	N.D.		
83) n-Decane	20.14	57	2415	N.D.		
84) Benzyl Chloride	20.11	91	298	N.D.		
85) 1,3-Dichlorobenzene	20.25	146	588	N.D.		
86) 1,4-Dichlorobenzene	20.25	146	588	N.D.		
87) sec-Butylbenzene	20.42	105	1606	N.D.		
88) 4-Isopropyltoluene (p-...	20.42	119	3020	N.D.		
89) 1,2,3-Trimethylbenzene	20.42	105	1606	N.D.		
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.		
91) d-Limonene	20.55	68	19234	1.418	ng	# 48
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.		
93) n-Undecane	21.24	57	2535	N.D.		
94) 1,2,4-Trichlorobenzene	0.00	180	0	N.D.		
95) Naphthalene	22.16	128	6044	N.D.		
96) n-Dodecane	22.15	57	2731	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	18.23	55	1305	N.D.		
99) tert-Butylbenzene	20.04	119	846	N.D.		
100) n-Butylbenzene	20.78	91	1113	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071729.D
 Acq On : 7 Oct 2017 20:04
 Sample : P1704815-004 (1000mL)
 Misc : S31-09111702

Vial: 2
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:47:37 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 10\07\10071729.D
 Acq On : 7 Oct 2017 20:04
 Sample : P1704815-004 (1000mL)
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Vial: 2
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 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

WA 10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.13	130	97588	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.23	114	475828	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.52	82	180146	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	123743	12.602	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	100.80%	
57) Toluene-d8 (SS2)	15.65	98	475840	12.641	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	101.12%	
73) Bromofluorobenzene (SS3)	18.91	174	157584	10.850	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	86.80%	

Target Compounds

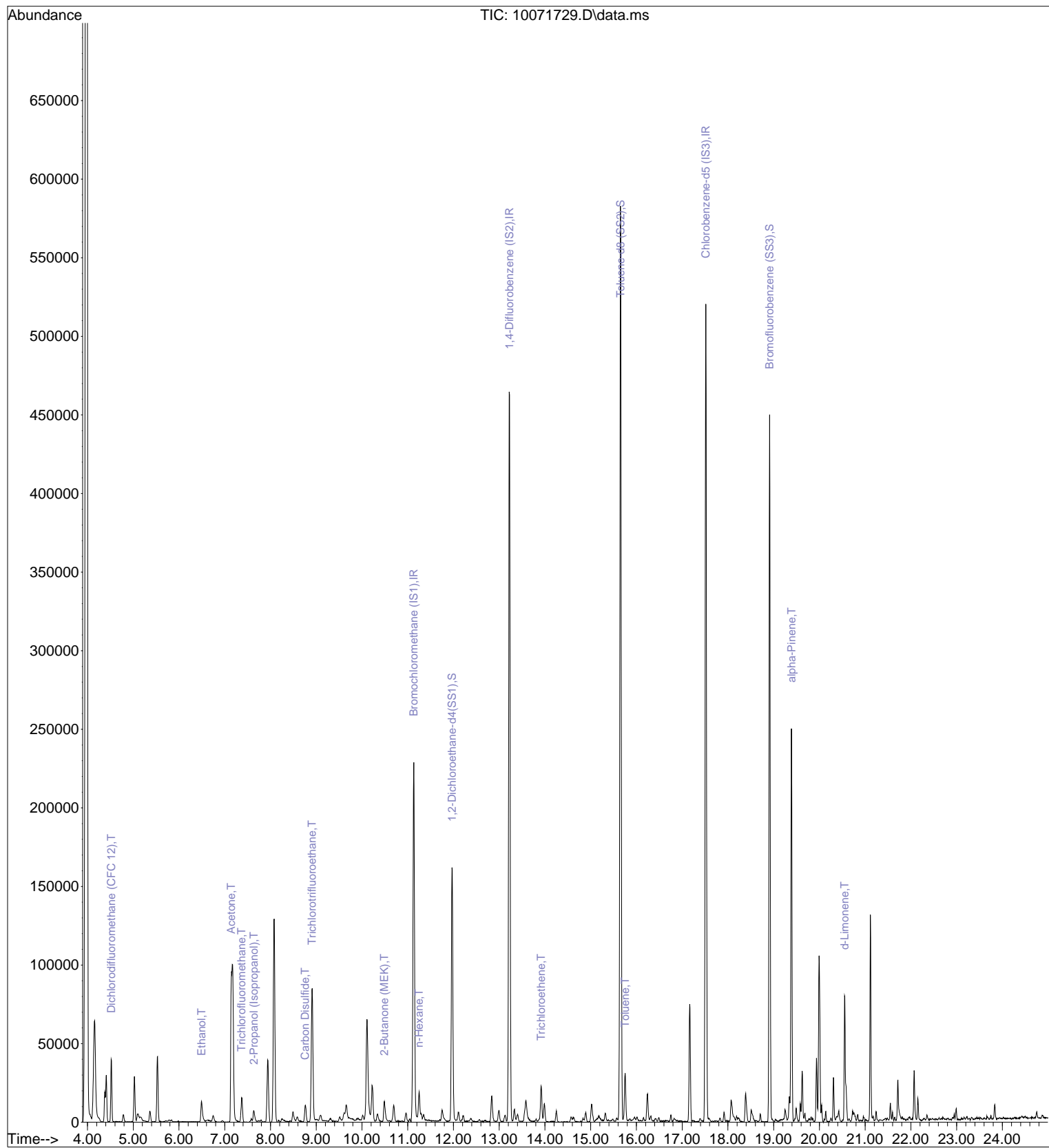
	R.T.	QIon	Response	Conc	Units	Qvalue
3) Dichlorodifluoromethan...	4.52	85	37353	2.195	ng	99
10) Ethanol	6.49	45	23371	3.709	ng	87
13) Acetone	7.14	58	46597	6.928	ng	# 65
14) Trichlorofluoromethane	7.37	101	17125	1.177	ng	98
15) 2-Propanol (Isopropanol)	7.64	45	14777	0.675	ng	94
21) Trichlorotrifluoroethane	8.91	151	41310	4.530	ng	97
22) Carbon Disulfide	8.76	76	20546	0.554	ng	100
27) 2-Butanone (MEK)	10.49	72	5327	0.856	ng	# 82
31) n-Hexane	11.25	57	8619	0.612	ng	# 97
47) Trichloroethene	13.92	130	10075	0.903	ng	98
58) Toluene	15.75	91	26184	0.687	ng	95
75) alpha-Pinene	19.39	93	104213	4.684	ng	100
91) d-Limonene	20.55	68	19234	1.418	ng	# 48

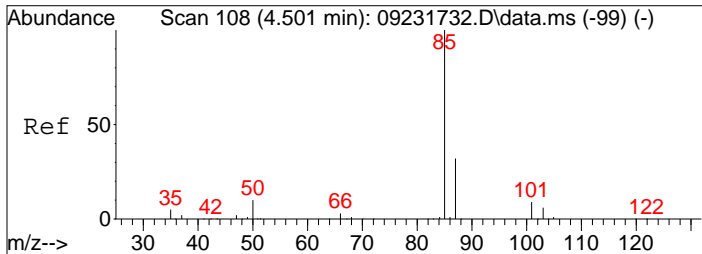
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071729.D
Acq On : 7 Oct 2017 20:04
Sample : P1704815-004 (1000mL)
Misc : S31-09111702

Vial: 2
Operator: WA
Inst : MS13

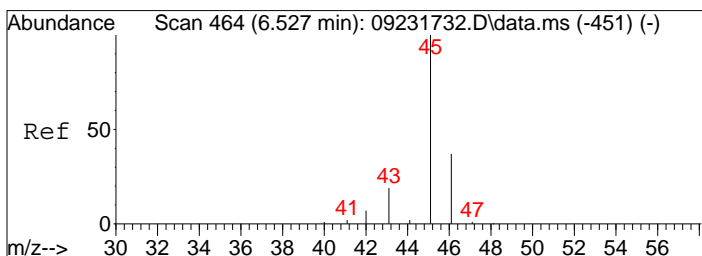
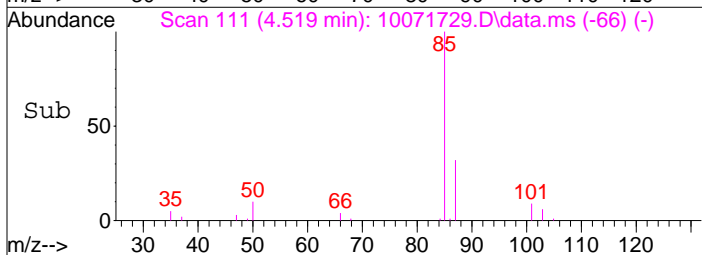
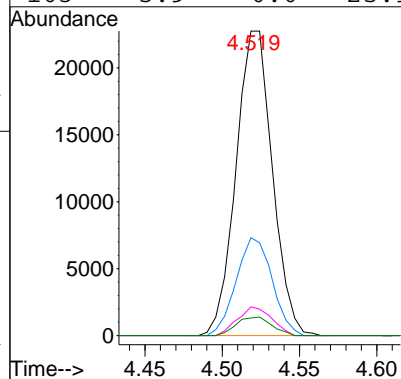
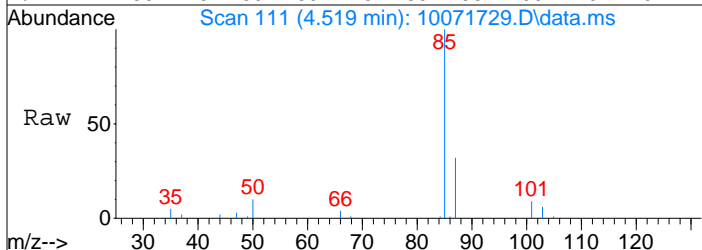
Quant Time: Oct 09 16:47:37 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:36:07 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M





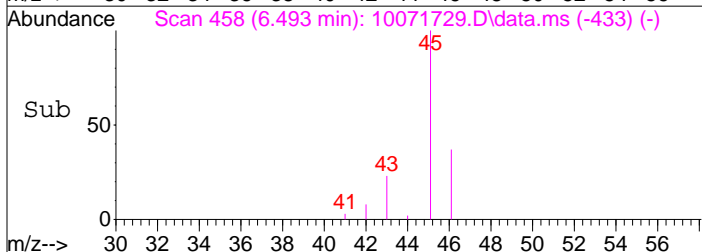
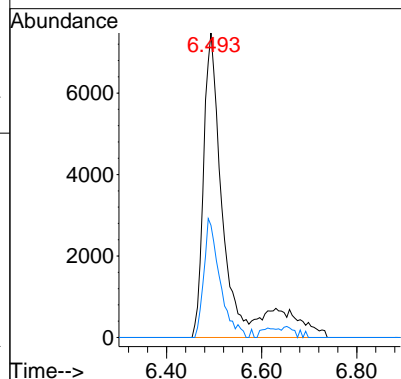
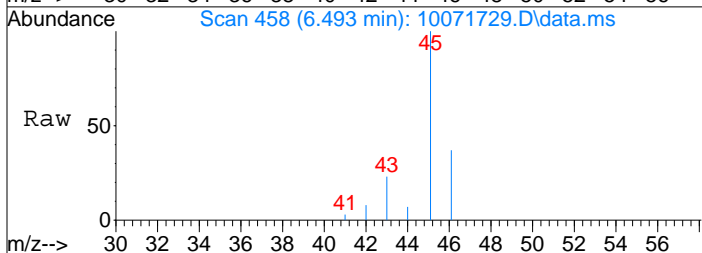
#3
 Dichlorodifluoromethane (CFC 12)
 Concen: 2.20 ng
 RT: 4.52 min Scan# 111
 Delta R.T. 0.006 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

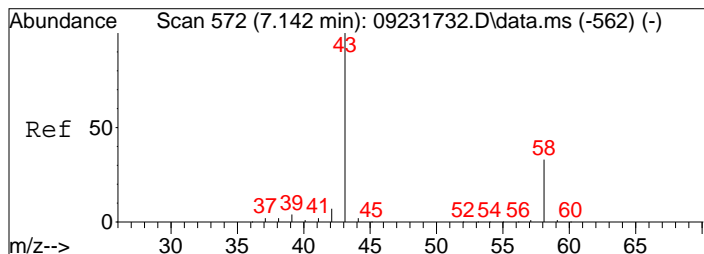
Tgt Ion	Resp	Lower	Upper
85	100		
87	31.7	12.6	52.6
101	8.9	0.0	29.2
103	5.9	0.0	25.9



#10
 Ethanol
 Concen: 3.71 ng
 RT: 6.49 min Scan# 458
 Delta R.T. -0.108 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

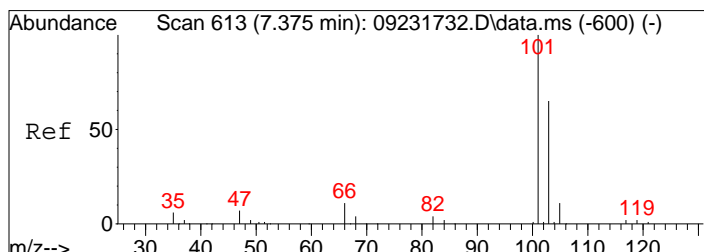
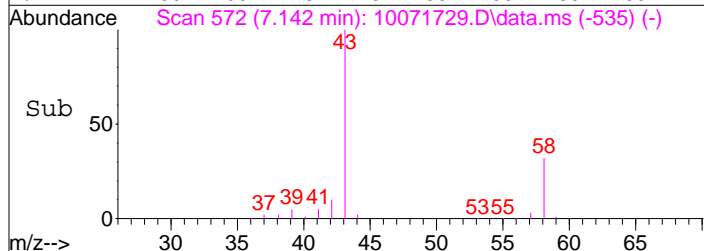
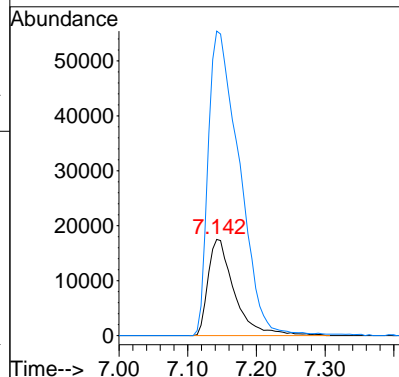
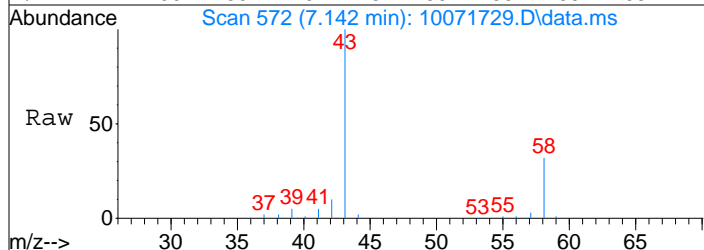
Tgt Ion	Resp	Lower	Upper
45	100		
46	29.2	16.8	56.8





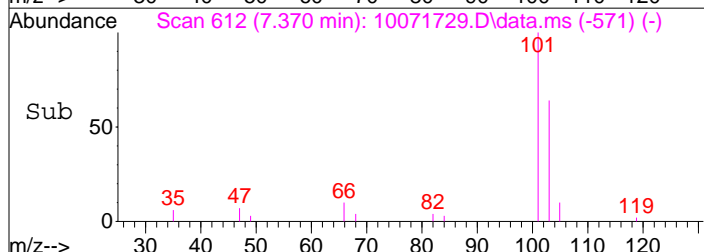
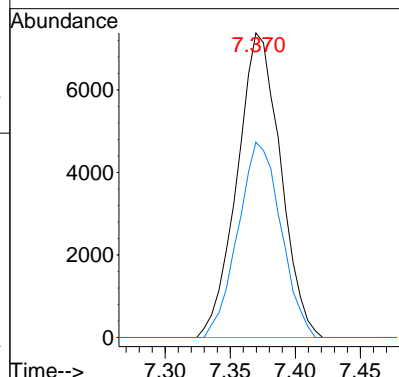
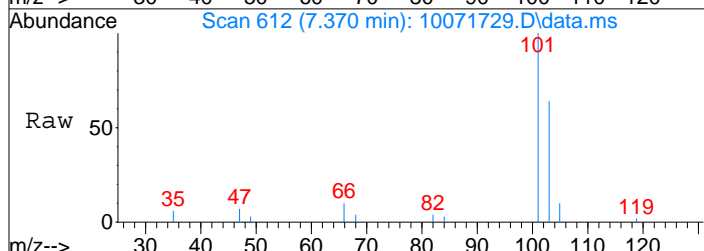
#13
 Acetone
 Concen: 6.93 ng
 RT: 7.14 min Scan# 572
 Delta R.T. -0.040 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

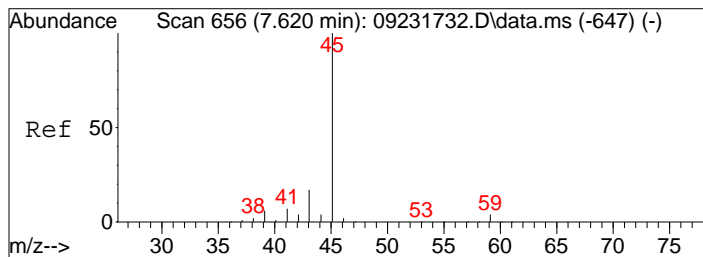
Tgt Ion: 58 Resp: 46597
 Ion Ratio Lower Upper
 58 100
 43 375.2 275.7 335.7#



#14
 Trichlorofluoromethane
 Concen: 1.18 ng
 RT: 7.37 min Scan# 612
 Delta R.T. -0.017 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

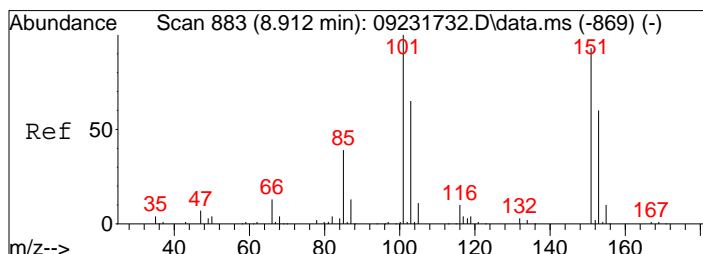
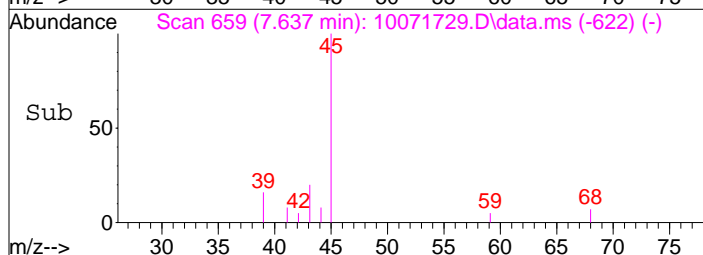
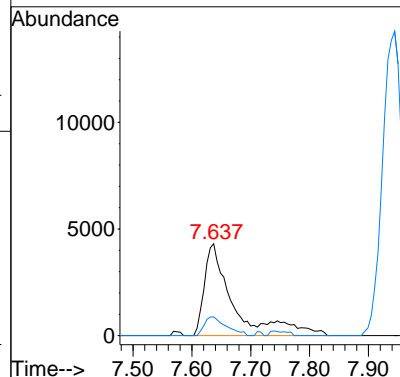
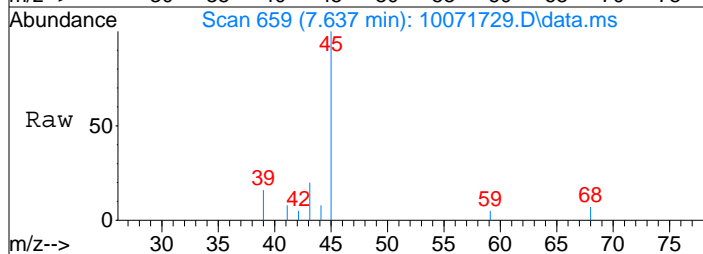
Tgt Ion:101 Resp: 17125
 Ion Ratio Lower Upper
 101 100
 103 63.3 44.9 84.9





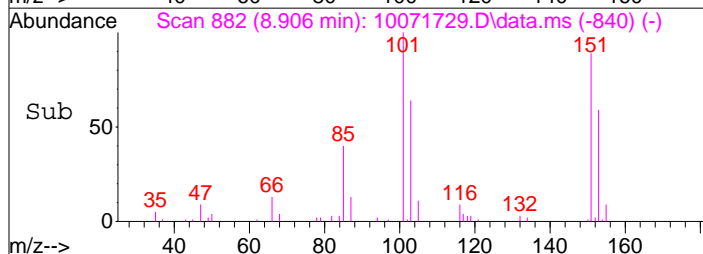
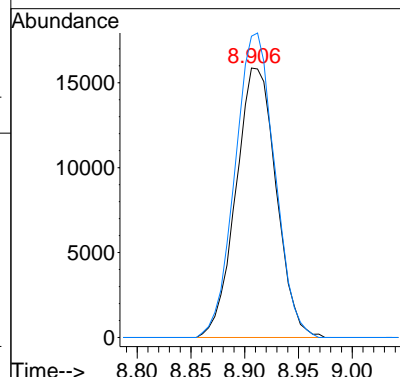
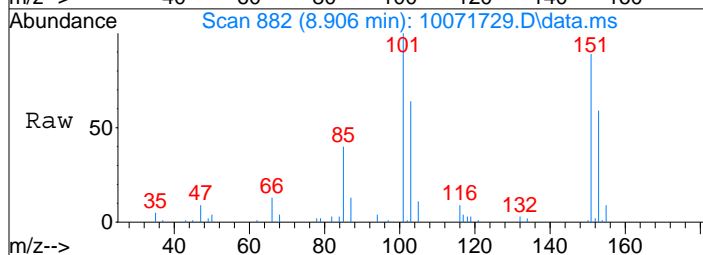
#15
 2-Propanol (Isopropanol)
 Concen: 0.68 ng
 RT: 7.64 min Scan# 659
 Delta R.T. -0.040 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

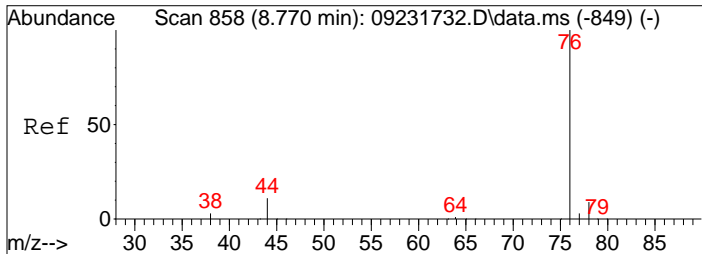
Tgt Ion	Resp	Lower	Upper
45	14777		
43	15.3	0.0	37.7



#21
 Trichlorotrifluoroethane
 Concen: 4.53 ng
 RT: 8.91 min Scan# 882
 Delta R.T. -0.011 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

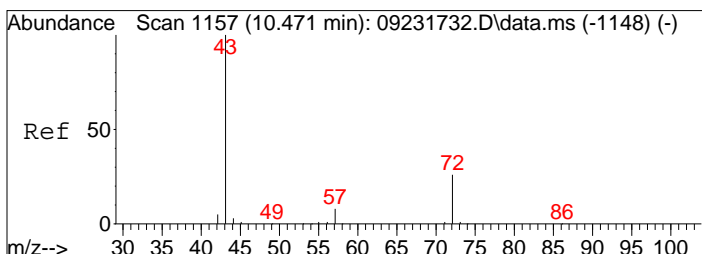
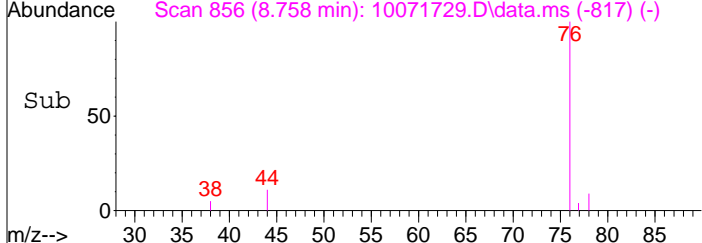
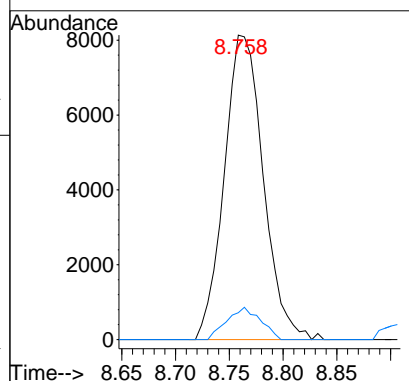
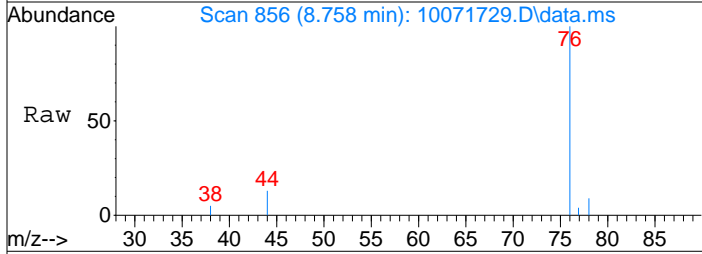
Tgt Ion	Resp	Lower	Upper
151	41310		
101	111.4	88.3	128.3





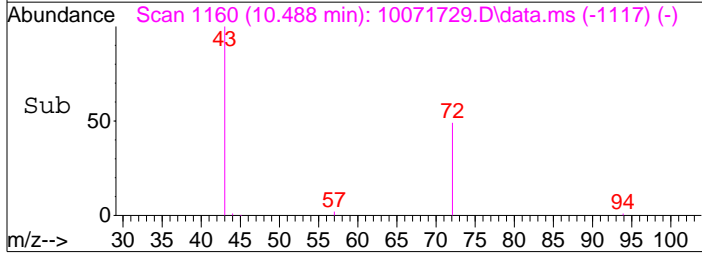
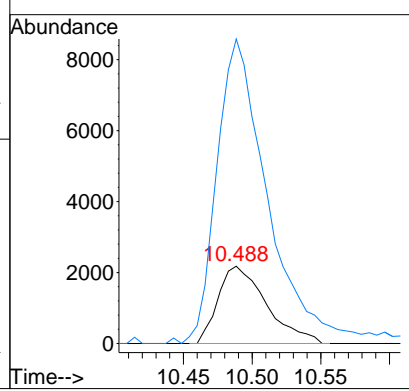
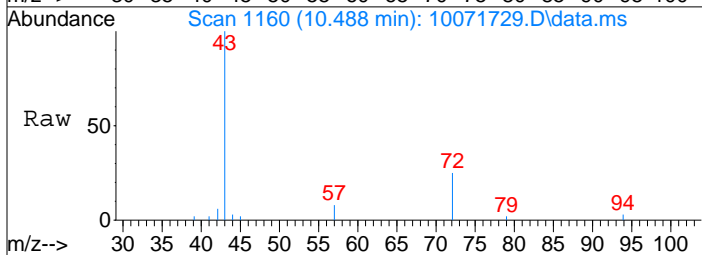
#22
 Carbon Disulfide
 Concen: 0.55 ng
 RT: 8.76 min Scan# 856
 Delta R.T. -0.029 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

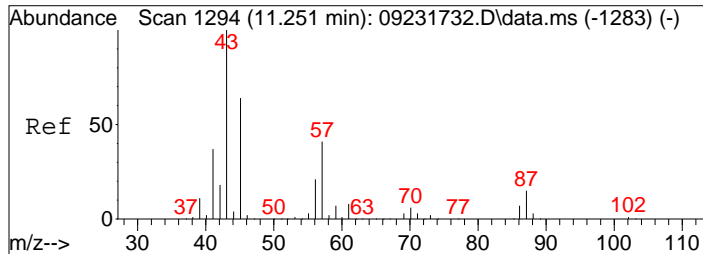
Tgt Ion	Resp	Lower	Upper
76	100		
78	9.1	0.0	29.1



#27
 2-Butanone (MEK)
 Concen: 0.86 ng
 RT: 10.49 min Scan# 1160
 Delta R.T. -0.006 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

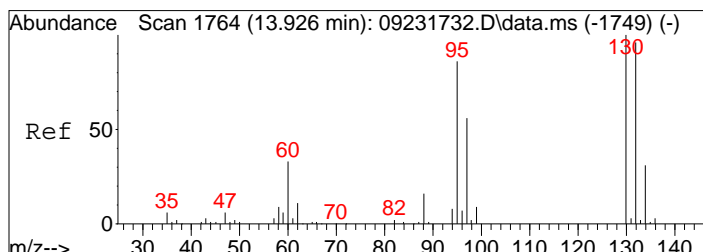
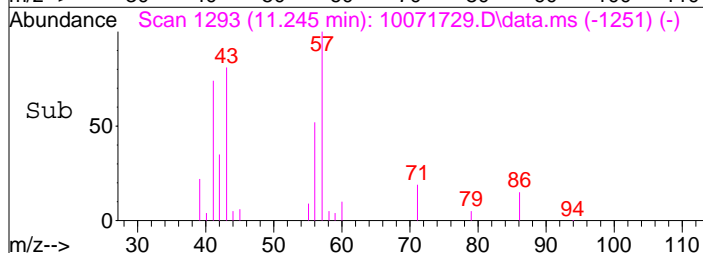
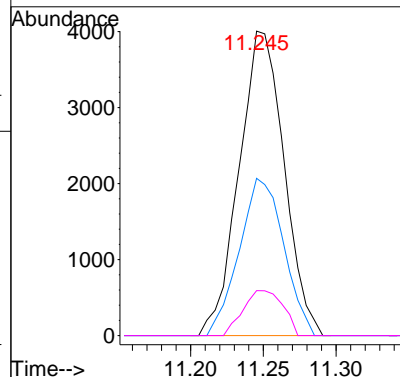
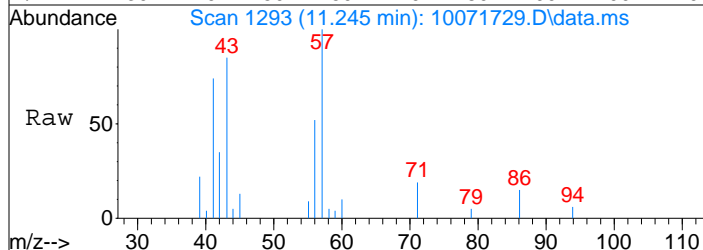
Tgt Ion	Resp	Lower	Upper
72	100		
43	425.2	364.5	404.5#





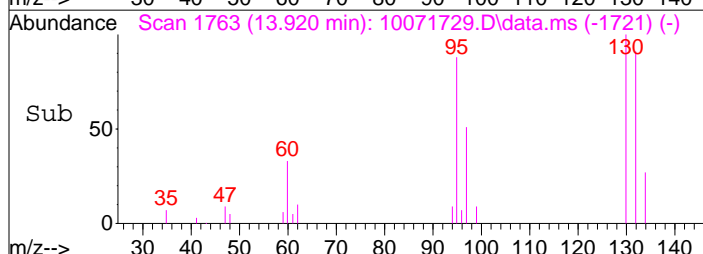
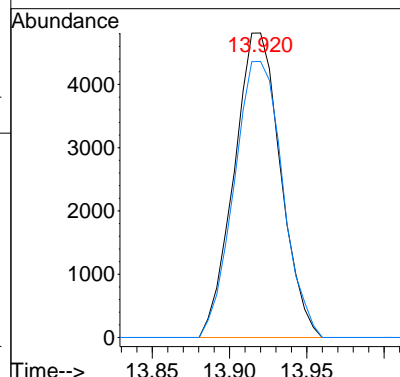
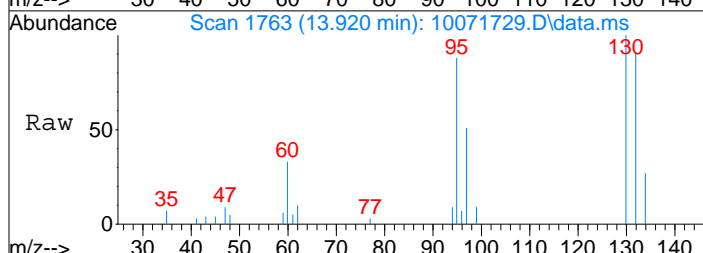
#31
 n-Hexane
 Concen: 0.61 ng
 RT: 11.25 min Scan# 1293
 Delta R.T. -0.011 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

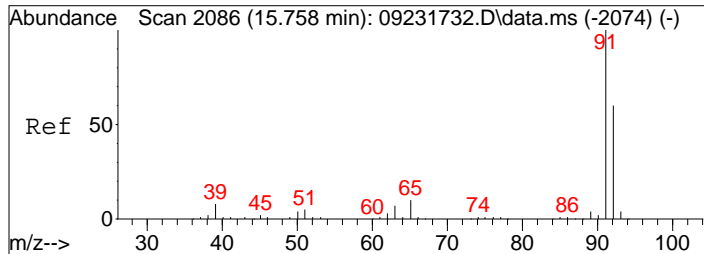
Tgt Ion:	Resp:	Lower	Upper
57	8619		
56	51.1	41.4	62.0
86	13.1	13.1	19.7#



#47
 Trichloroethene
 Concen: 0.90 ng
 RT: 13.92 min Scan# 1763
 Delta R.T. -0.011 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

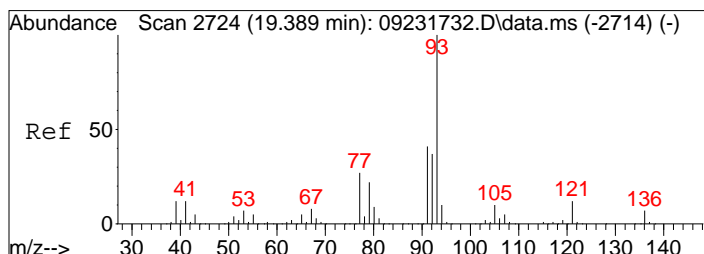
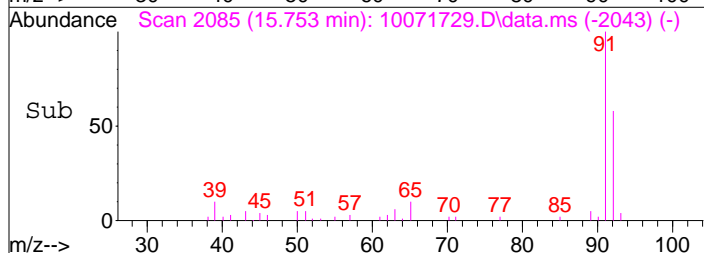
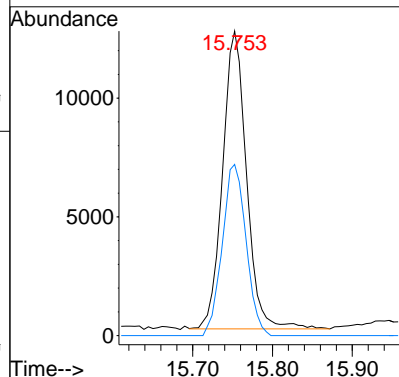
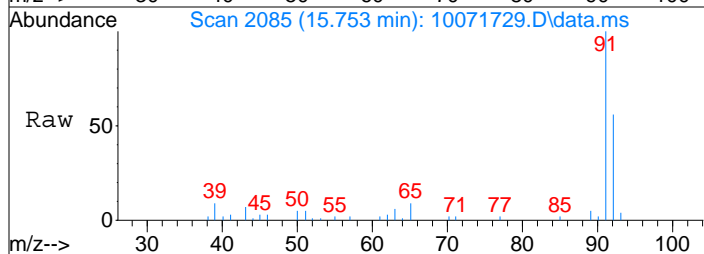
Tgt Ion:	Resp:	Lower	Upper
130	10075		
132	94.5	76.1	116.1





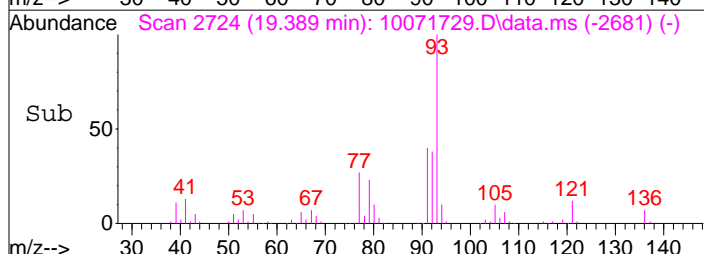
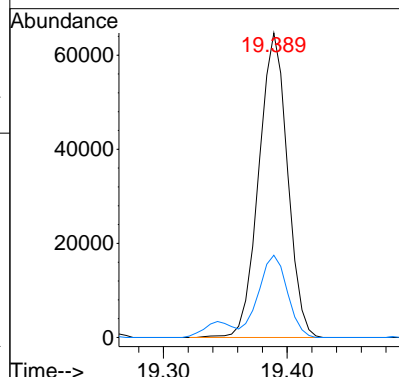
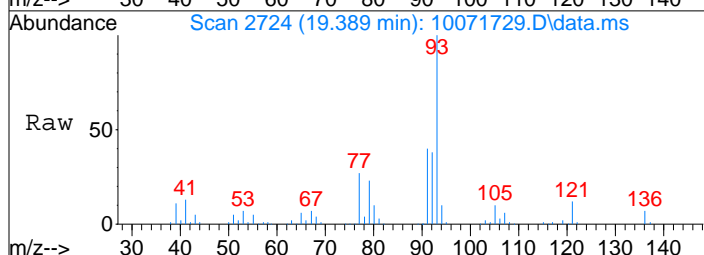
#58
 Toluene
 Concen: 0.69 ng
 RT: 15.75 min Scan# 2085
 Delta R.T. -0.011 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

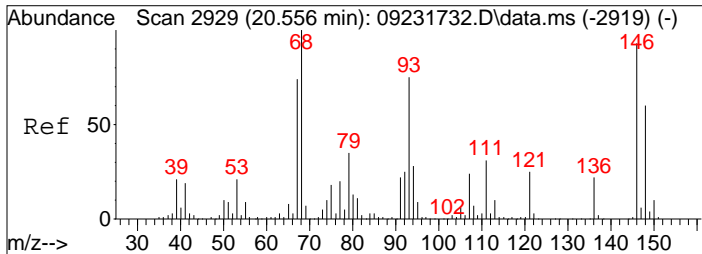
Tgt Ion	Resp	Lower	Upper
91	100		
92	56.9	40.7	80.7



#75
 alpha-Pinene
 Concen: 4.68 ng
 RT: 19.39 min Scan# 2724
 Delta R.T. -0.006 min
 Lab File: 10071729.D
 Acq: 7 Oct 2017 20:04

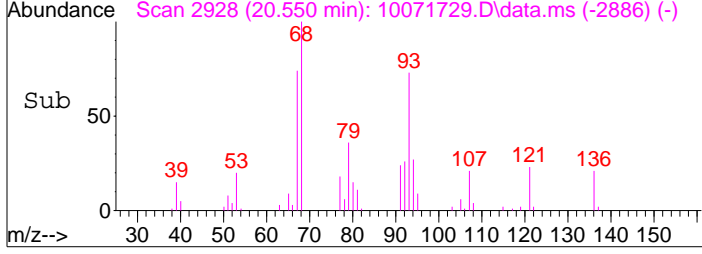
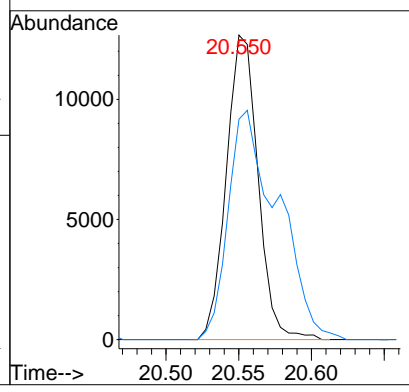
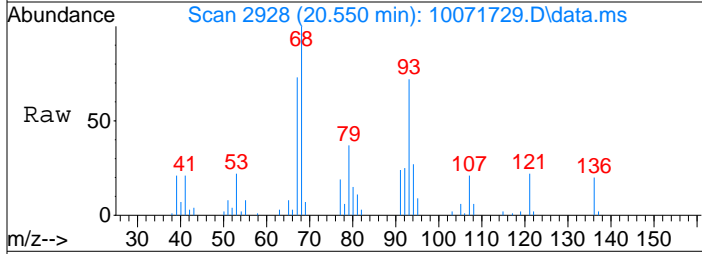
Tgt Ion	Resp	Lower	Upper
93	100		
77	27.2	7.4	47.4





#91
d-Limonene
Concen: 1.42 ng
RT: 20.55 min Scan# 2928
Delta R.T. -0.011 min
Lab File: 10071729.D
Acq: 7 Oct 2017 20:04

Tgt Ion	Resp	Lower	Upper
68	19234		
68	100		
93	117.9	54.1	94.1#



Data File : I:\MS13\DATA\2017 10\07\10071704.D
 Acq On : 7 Oct 2017 3:41
 Sample : MB R13100717 1000mL
 Misc : S31-09111702_AC00880

Vial: 3
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 08:02:15 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.13	130	110490	12.500	ng	-0.04
37) 1,4-Difluorobenzene (IS2)	13.22	114	542344	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.52	82	218949	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	153773	13.831	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	110.64%	
57) Toluene-d8 (SS2)	15.65	98	551851	12.062	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	96.48%	
73) Bromofluorobenzene (SS3)	18.91	174	206430	11.694	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	93.52%	

Target Compounds

						Qvalue
2) Propene	4.39	42	209	N.D.		
3) Dichlorodifluoromethan...	0.00	85	0	N.D.		
4) Chloromethane	0.00	50	0	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.		
6) Vinyl Chloride	0.00	62	0	N.D.		
7) 1,3-Butadiene	0.00	54	0	N.D.		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	0.00	45	0	N.D. d		
11) Acetonitrile	6.76	41	199	N.D.		
12) Acrolein	6.95	56	528	0.082	ng	# 72
13) Acetone	7.16	58	5007	0.658	ng	# 61
14) Trichlorofluoromethane	0.00	101	0	N.D.		
15) 2-Propanol (Isopropanol)	7.67	45	116	N.D.		
16) Acrylonitrile	0.00	53	0	N.D.		
17) 1,1-Dichloroethene	0.00	96	0	N.D.		
18) 2-Methyl-2-Propanol (t...	0.00	59	0	N.D.		
19) Methylene Chloride	8.49	84	677	0.057	ng	# 66
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.		
21) Trichlorotrifluoroethane	0.00	151	0	N.D.		
22) Carbon Disulfide	0.00	76	0	N.D. d		
23) trans-1,2-Dichloroethene	0.00	61	0	N.D.		
24) 1,1-Dichloroethane	0.00	63	0	N.D.		
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D.		
27) 2-Butanone (MEK)	10.52	72	324	N.D.		
28) cis-1,2-Dichloroethene	0.00	61	0	N.D.		
29) Diisopropyl Ether	0.00	87	0	N.D.		
30) Ethyl Acetate	0.00	61	0	N.D.		
31) n-Hexane	0.00	57	0	N.D.		
32) Chloroform	0.00	83	0	N.D.		
34) Tetrahydrofuran (THF)	0.00	72	0	N.D.		
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.		
36) 1,2-Dichloroethane	0.00	62	0	N.D.		
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.		
39) Isopropyl Acetate	0.00	61	0	N.D.		
40) 1-Butanol	12.84	56	892	0.085	ng	# 70
41) Benzene	12.83	78	475	N.D.		
42) Carbon Tetrachloride	0.00	117	0	N.D.		
43) Cyclohexane	0.00	84	0	N.D.		
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	0.00	63	0	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D.		
47) Trichloroethene	0.00	130	0	N.D.		
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.		
50) Methyl Methacrylate	0.00	100	0	N.D.		

Data File : I:\MS13\DATA\2017 10\07\10071704.D
 Acq On : 7 Oct 2017 3:41
 Sample : MB R13100717 1000mL
 Misc : S31-09111702_AC00880

Vial: 3
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 08:02:15 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

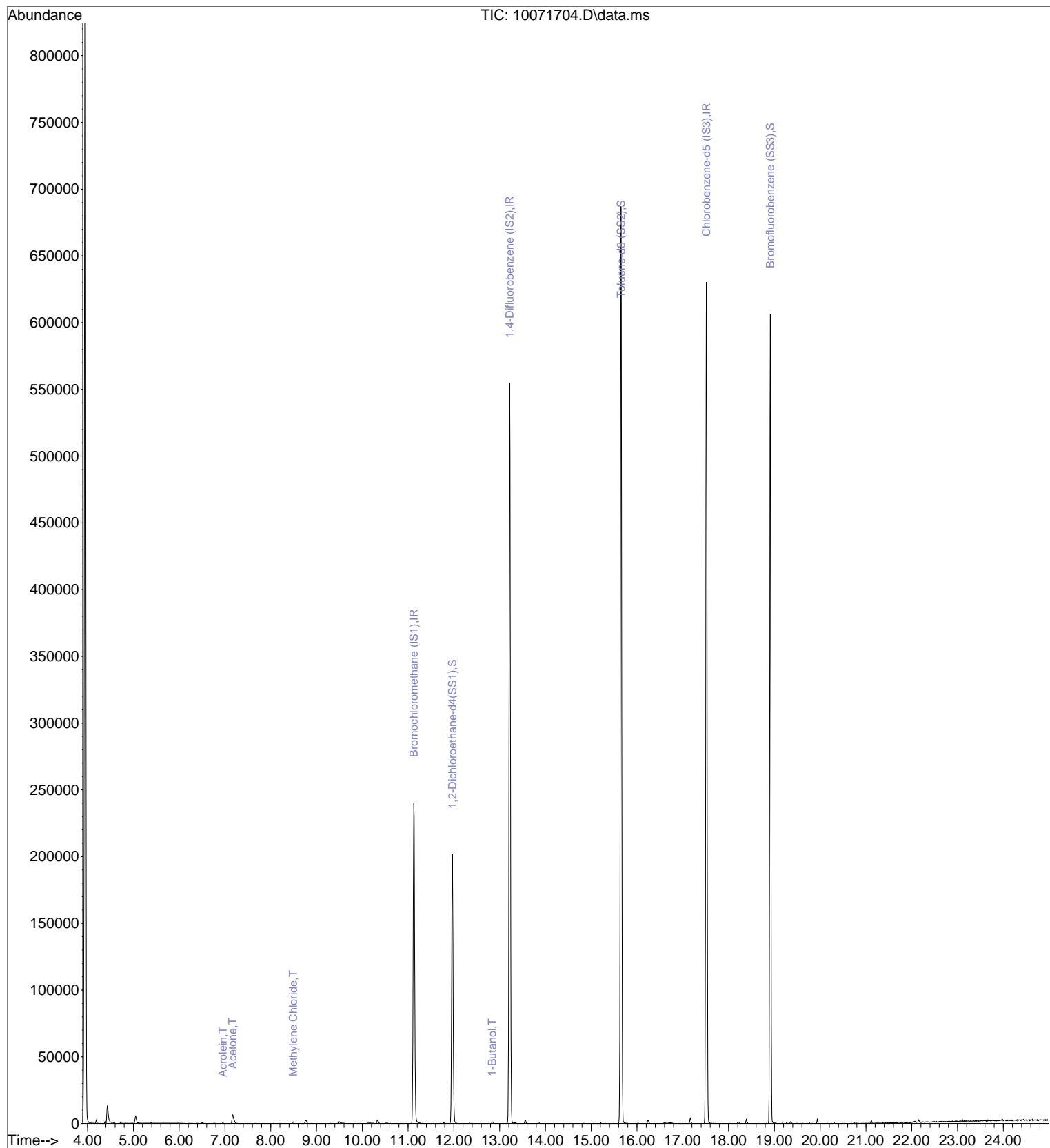
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	0.00	71	0	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.		
58) Toluene	0.00	91	0	N.D.		
59) 2-Hexanone	16.02	43	486	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	0.00	43	0	N.D.		
63) n-Octane	0.00	57	0	N.D.		
64) Tetrachloroethene	0.00	166	0	N.D.		
65) Chlorobenzene	0.00	112	0	N.D.		
66) Ethylbenzene	0.00	91	0	N.D.		
67) m- & p-Xylenes	0.00	91	0	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	0.00	104	0	N.D.		
70) o-Xylene	0.00	91	0	N.D.		
71) n-Nonane	0.00	43	0	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	18.91	105	213	N.D.		
75) alpha-Pinene	0.00	93	0	N.D.		
76) n-Propylbenzene	0.00	91	0	N.D.		
77) 3-Ethyltoluene	19.35	105	724	N.D.		
78) 4-Ethyltoluene	0.00	105	0	N.D.		
79) 1,3,5-Trimethylbenzene	0.00	105	0	N.D.		
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	0.00	105	0	N.D.		
82) 1,2,4-Trimethylbenzene	0.00	105	0	N.D.		
83) n-Decane	20.31	57	297	N.D.		
84) Benzyl Chloride	20.16	91	120	N.D.		
85) 1,3-Dichlorobenzene	20.24	146	171	N.D.		
86) 1,4-Dichlorobenzene	20.24	146	171	N.D.		
87) sec-Butylbenzene	0.00	105	0	N.D.		
88) 4-Isopropyltoluene (p-...	0.00	119	0	N.D.		
89) 1,2,3-Trimethylbenzene	0.00	105	0	N.D.		
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.		
91) d-Limonene	0.00	68	0	N.D.		
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.		
93) n-Undecane	21.12	57	641	N.D.		
94) 1,2,4-Trichlorobenzene	22.05	180	279	N.D.		
95) Naphthalene	22.15	128	1917	N.D.		
96) n-Dodecane	22.15	57	189	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	18.23	55	292	N.D.		
99) tert-Butylbenzene	0.00	119	0	N.D.		
100) n-Butylbenzene	0.00	91	0	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071704.D
Acq On : 7 Oct 2017 3:41
Sample : MB R13100717 1000mL
Misc : S31-09111702_AC00880

Vial: 3
Operator: WA
Inst : MS13

Quant Time: Oct 09 08:02:15 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:36:07 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 10\07\10071705.D
 Acq On : 7 Oct 2017 4:16
 Sample : LCS R13100717 25ng
 Misc : S31-09111702/S31-09201702 (10/18)

Vial: 3
 Operator: WA
 Inst : MS13

Quant Time: Oct 07 07:26:50 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.15	130	112436	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	13.23	114	532631	12.500	ng	-0.01
56) Chlorobenzene-d5 (IS3)	17.52	82	218570	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.98	65	157706	13.940	ng	-0.02
Spiked Amount	12.500	Range 70 - 130	Recovery =	111.52%		
57) Toluene-d8 (SS2)	15.66	98	545759	11.950	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery =	95.60%		
73) Bromofluorobenzene (SS3)	18.91	174	208908	11.855	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery =	94.88%		

Target Compounds

						Qvalue
2) Propene	4.35	42	323982	27.088	ng	100
3) Dichlorodifluoromethan...	4.50	85	526437	26.852	ng	100
4) Chloromethane	4.77	50	394733	26.944	ng	99
5) 1,2-Dichloro-1,1,2,2-t...	5.02	135	273043	25.040	ng	100
6) Vinyl Chloride	5.17	62	372203	26.827	ng	100
7) 1,3-Butadiene	5.43	54	286742	27.155	ng	97
8) Bromomethane	5.85	94	243288	26.050	ng	100
9) Chloroethane	6.16	64	196670	27.248	ng	100
10) Ethanol	6.53	45	989051	136.234	ng	99
11) Acetonitrile	6.76	41	533378	29.523	ng	100
12) Acrolein	6.94	56	174206	26.576	ng	100
13) Acetone	7.14	58	990987	127.890	ng	94
14) Trichlorofluoromethane	7.38	101	440936	26.294	ng	100
15) 2-Propanol (Isopropanol)	7.61	45	1459391	57.878	ng	99
16) Acrylonitrile	7.86	53	375827	27.869	ng	100
17) 1,1-Dichloroethene	8.30	96	266176	25.970	ng	92
18) 2-Methyl-2-Propanol (t...	8.46	59	1438787	57.048	ng	99
19) Methylene Chloride	8.51	84	270399	22.335	ng	93
20) 3-Chloro-1-propene (Al...	8.66	41	455522	31.054	ng	95
21) Trichlorotrifluoroethane	8.91	151	263100	25.038	ng	95
22) Carbon Disulfide	8.77	76	1005764	23.544	ng	100
23) trans-1,2-Dichloroethene	9.74	61	392429	29.231	ng	95
24) 1,1-Dichloroethane	9.98	63	476199	26.650	ng	100
25) Methyl tert-Butyl Ether	10.08	73	841029	27.248	ng	99
26) Vinyl Acetate	10.23	86	320049	137.457	ng	# 79
27) 2-Butanone (MEK)	10.47	72	189389	26.399	ng	# 89
28) cis-1,2-Dichloroethene	10.97	61	370361	28.070	ng	95
29) Diisopropyl Ether	11.26	87	266677	27.133	ng	# 82
30) Ethyl Acetate	11.27	61	193617	56.669	ng	97
31) n-Hexane	11.25	57	409564	25.259	ng	99
32) Chloroform	11.31	83	459398	26.780	ng	100
34) Tetrahydrofuran (THF)	11.71	72	184815	24.336	ng	93
35) Ethyl tert-Butyl Ether	11.84	87	335788	26.518	ng	95
36) 1,2-Dichloroethane	12.09	62	343335	28.586	ng	99
38) 1,1,1-Trichloroethane	12.37	97	416173	27.456	ng	99
39) Isopropyl Acetate	12.79	61	335652	54.031	ng	# 92
40) 1-Butanol	12.81	56	575038	55.881	ng	96
41) Benzene	12.84	78	1050590	25.474	ng	100
42) Carbon Tetrachloride	13.00	117	379524	27.731	ng	100
43) Cyclohexane	13.13	84	824084	52.204	ng	96
44) tert-Amyl Methyl Ether	13.47	73	796236	26.959	ng	98
45) 1,2-Dichloropropane	13.68	63	265103	27.677	ng	100
46) Bromodichloromethane	13.87	83	368482	28.241	ng	100
47) Trichloroethene	13.92	130	310864	24.900	ng	100
48) 1,4-Dioxane	13.90	88	231610	27.203	ng	96
49) 2,2,4-Trimethylpentane...	13.99	57	1142045	27.337	ng	99
50) Methyl Methacrylate	14.12	100	229873	49.653	ng	90

Data File : I:\MS13\DATA\2017 10\07\10071705.D
 Acq On : 7 Oct 2017 4:16
 Sample : LCS R13100717 25ng
 Misc : S31-09111702/S31-09201702 (10/18)

Vial: 3
 Operator: WA
 Inst : MS13

Quant Time: Oct 07 07:26:50 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

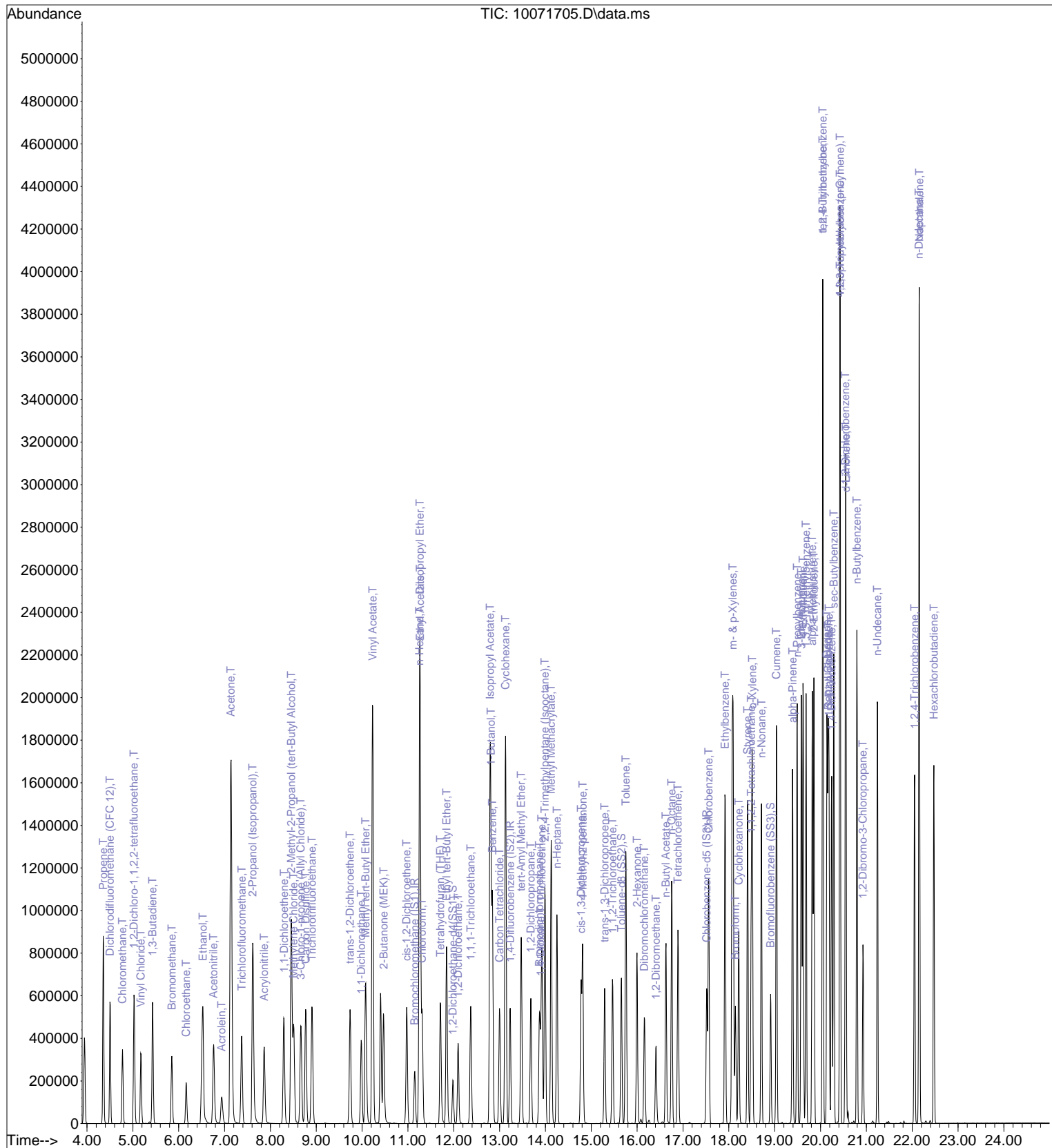
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	14.25	71	261765	25.902	ng	97
52) cis-1,3-Dichloropropene	14.78	75	450086	27.645	ng	99
53) 4-Methyl-2-pentanone	14.81	58	260140	28.593	ng	94
54) trans-1,3-Dichloropropene	15.29	75	418993	29.351	ng	100
55) 1,1,2-Trichloroethane	15.46	97	268351	26.829	ng	99
58) Toluene	15.75	91	1100766	23.793	ng	100
59) 2-Hexanone	16.00	43	635193	28.262	ng	96
60) Dibromochloromethane	16.16	129	340835	25.824	ng	99
61) 1,2-Dibromoethane	16.41	107	307426	25.662	ng	100
62) n-Butyl Acetate	16.63	43	717519	28.677	ng	97
63) n-Octane	16.75	57	229517	25.501	ng	96
64) Tetrachloroethene	16.89	166	344775	23.305	ng	99
65) Chlorobenzene	17.56	112	770862	23.921	ng	100
66) Ethylbenzene	17.92	91	1268895	24.493	ng	99
67) m- & p-Xylenes	18.09	91	1976193	48.906	ng	100
68) Bromoform	18.14	173	307913	25.249	ng	100
69) Styrene	18.41	104	843929	25.061	ng	99
70) o-Xylene	18.51	91	1010845	24.965	ng	98
71) n-Nonane	18.71	43	561090	27.198	ng	96
72) 1,1,2,2-Tetrachloroethane	18.49	83	479965	25.908	ng	100
74) Cumene	19.04	105	1330156	24.762	ng	99
75) alpha-Pinene	19.39	93	693211	25.679	ng	98
76) n-Propylbenzene	19.49	91	1573425	25.608	ng	99
77) 3-Ethyltoluene	19.58	105	1314009	24.115	ng	99
78) 4-Ethyltoluene	19.62	105	1313257	26.169	ng	99
79) 1,3,5-Trimethylbenzene	19.69	105	1100839	24.932	ng	98
80) alpha-Methylstyrene	19.82	118	650007	24.801	ng	99
81) 2-Ethyltoluene	19.86	105	1320511	25.359	ng	99
82) 1,2,4-Trimethylbenzene	20.05	105	1125852	25.742	ng	99
83) n-Decane	20.14	57	590205	28.260	ng	98
84) Benzyl Chloride	20.16	91	1031159	27.375	ng	98
85) 1,3-Dichlorobenzene	20.19	146	715646	25.079	ng	100
86) 1,4-Dichlorobenzene	20.24	146	722449	24.715	ng	100
87) sec-Butylbenzene	20.29	105	1511059	25.245	ng	99
88) 4-Isopropyltoluene (p-...	20.42	119	1453570	24.950	ng	98
89) 1,2,3-Trimethylbenzene	20.42	105	1168390	26.550	ng	98
90) 1,2-Dichlorobenzene	20.54	146	682814	25.313	ng	99
91) d-Limonene	20.56	68	454430	27.619	ng	97
92) 1,2-Dibromo-3-Chloropr...	20.93	157	264418	27.123	ng	92
93) n-Undecane	21.24	57	633720	26.754	ng	98
94) 1,2,4-Trichlorobenzene	22.05	180	569738	29.393	ng	100
95) Naphthalene	22.16	128	1664317	27.112	ng	100
96) n-Dodecane	22.15	57	637573	29.344	ng	98
97) Hexachlorobutadiene	22.47	225	362520	24.601	ng	99
98) Cyclohexanone	18.22	55	404354	27.392	ng	96
99) tert-Butylbenzene	20.05	119	1117631	24.836	ng	100
100) n-Butylbenzene	20.79	91	1218066	26.707	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071705.D
Acq On : 7 Oct 2017 4:16
Sample : LCS R13100717 25ng
Misc : S31-09111702/S31-09201702 (10/18)

Vial: 3
Operator: WA
Inst : MS13

Quant Time: Oct 07 07:26:50 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:36:07 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 10\07\10071711.D
 Acq On : 7 Oct 2017 9:08
 Sample : P1704815-002dup (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:45:04 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.13	130	101515	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.23	114	488782	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.52	82	200990	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	149762	14.662	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	117.28%	
57) Toluene-d8 (SS2)	15.65	98	500737	11.923	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	95.36%	
73) Bromofluorobenzene (SS3)	18.91	174	186137	11.487	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	91.92%	

Target Compounds

						Qvalue
2) Propene	4.39	42	180	N.D.		
3) Dichlorodifluoromethan...	4.42	85	840	N.D.		
4) Chloromethane	0.00	50	0	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.		
6) Vinyl Chloride	5.19	62	21182	1.691	ng	100
7) 1,3-Butadiene	0.00	54	0	N.D.		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	6.58	45	112	N.D.		
11) Acetonitrile	0.00	41	0	N.D.		
12) Acrolein	0.00	56	0	N.D.		
13) Acetone	7.19	58	2288	N.D.		
14) Trichlorofluoromethane	7.16	101	970	N.D.		
15) 2-Propanol (Isopropanol)	7.69	45	52	N.D.		
16) Acrylonitrile	0.00	53	0	N.D.		
17) 1,1-Dichloroethene	8.30	96	6542	0.707	ng	86
18) 2-Methyl-2-Propanol (t...	0.00	59	0	N.D.		
19) Methylene Chloride	8.49	84	307004	28.087	ng	92
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.	d	
21) Trichlorotrifluoroethane	8.91	151	438857	46.258	ng	94
22) Carbon Disulfide	8.76	76	3963	N.D.		
23) trans-1,2-Dichloroethene	9.73	61	1896	N.D.		
24) 1,1-Dichloroethane	9.98	63	2139	N.D.		
25) Methyl tert-Butyl Ether	0.00	73	0	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D.		
27) 2-Butanone (MEK)	0.00	72	0	N.D.		
28) cis-1,2-Dichloroethene	10.96	61	619713	52.021	ng	94
29) Diisopropyl Ether	0.00	87	0	N.D.		
30) Ethyl Acetate	11.22	61	115	N.D.		
31) n-Hexane	0.00	57	0	N.D.		
32) Chloroform	11.30	83	2632	N.D.		
34) Tetrahydrofuran (THF)	11.78	72	297	N.D.		
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.		
36) 1,2-Dichloroethane	12.09	62	9156	0.844	ng	99
38) 1,1,1-Trichloroethane	0.00	97	0	N.D.		
39) Isopropyl Acetate	0.00	61	0	N.D.		
40) 1-Butanol	0.00	56	0	N.D.		
41) Benzene	12.84	78	1840	N.D.		
42) Carbon Tetrachloride	0.00	117	0	N.D.		
43) Cyclohexane	13.12	84	545	N.D.		
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	0.00	63	0	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D.	d	
47) Trichloroethene	13.91	130	891006	77.770	ng	99
48) 1,4-Dioxane	0.00	88	0	N.D.		
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.		
50) Methyl Methacrylate	13.91	100	1836	N.D.		

Data File : I:\MS13\DATA\2017 10\07\10071711.D
 Acq On : 7 Oct 2017 9:08
 Sample : P1704815-002dup (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:45:04 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

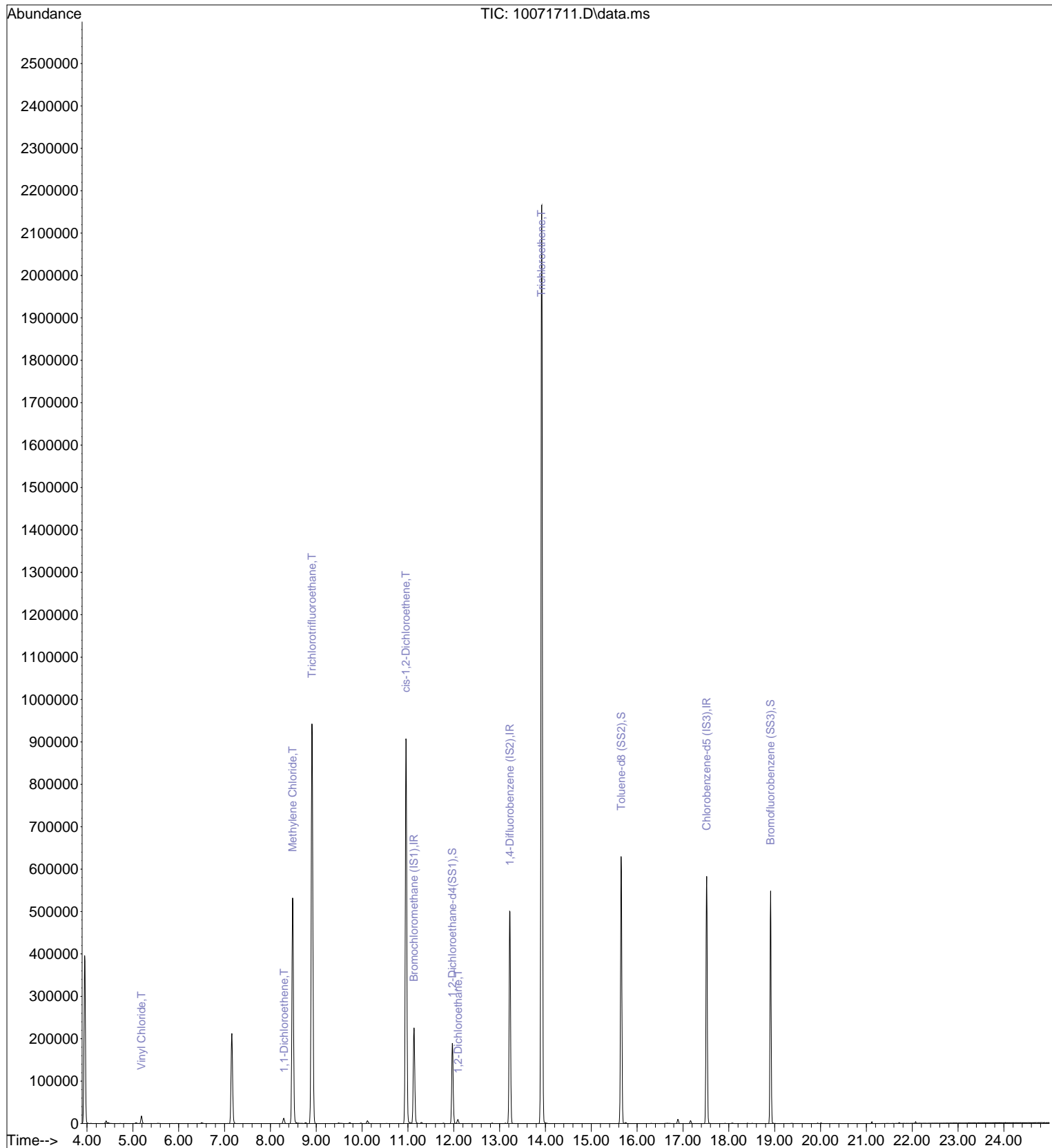
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	0.00	71	0	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	N.D.		
58) Toluene	15.75	91	2500	N.D.		
59) 2-Hexanone	0.00	43	0	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	0.00	43	0	N.D.		
63) n-Octane	0.00	57	0	N.D.		
64) Tetrachloroethene	16.89	166	3918	N.D.		
65) Chlorobenzene	0.00	112	0	N.D.		
66) Ethylbenzene	17.92	91	1181	N.D.		
67) m- & p-Xylenes	18.07	91	1746	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	18.41	104	473	N.D.		
70) o-Xylene	18.51	91	775	N.D.		
71) n-Nonane	0.00	43	0	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	0.00	105	0	N.D.		
75) alpha-Pinene	19.38	93	511	N.D.		
76) n-Propylbenzene	19.51	91	167	N.D.		
77) 3-Ethyltoluene	19.58	105	218	N.D.		
78) 4-Ethyltoluene	19.58	105	218	N.D.		
79) 1,3,5-Trimethylbenzene	19.58	105	218	N.D.		
80) alpha-Methylstyrene	0.00	118	0	N.D.		
81) 2-Ethyltoluene	19.85	105	135	N.D.		
82) 1,2,4-Trimethylbenzene	20.05	105	299	N.D.		
83) n-Decane	20.15	57	171	N.D.		
84) Benzyl Chloride	0.00	91	0	N.D.		
85) 1,3-Dichlorobenzene	20.24	146	134	N.D.		
86) 1,4-Dichlorobenzene	20.24	146	134	N.D.		
87) sec-Butylbenzene	0.00	105	0	N.D.		
88) 4-Isopropyltoluene (p-...	20.42	119	224	N.D.		
89) 1,2,3-Trimethylbenzene	0.00	105	0	N.D.		
90) 1,2-Dichlorobenzene	0.00	146	0	N.D.		
91) d-Limonene	0.00	68	0	N.D.		
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.		
93) n-Undecane	21.12	57	809	N.D.		
94) 1,2,4-Trichlorobenzene	0.00	180	0	N.D.		
95) Naphthalene	22.16	128	709	N.D.		
96) n-Dodecane	22.07	57	613	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	0.00	55	0	N.D.		
99) tert-Butylbenzene	0.00	119	0	N.D.		
100) n-Butylbenzene	0.00	91	0	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071711.D
 Acq On : 7 Oct 2017 9:08
 Sample : P1704815-002dup (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

Quant Time: Oct 09 16:45:04 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 10\07\10071711.D
 Acq On : 7 Oct 2017 9:08
 Sample : P1704815-002dup (3.0mL)
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 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

WA 10/9/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.13	130	101515	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.23	114	488782	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.52	82	200990	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	149762	14.662	ng	-0.03
Spiked Amount	12.500	Range 70 - 130	Recovery	=	117.28%	
57) Toluene-d8 (SS2)	15.65	98	500737	11.923	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	95.36%	
73) Bromofluorobenzene (SS3)	18.91	174	186137	11.487	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	91.92%	

Target Compounds

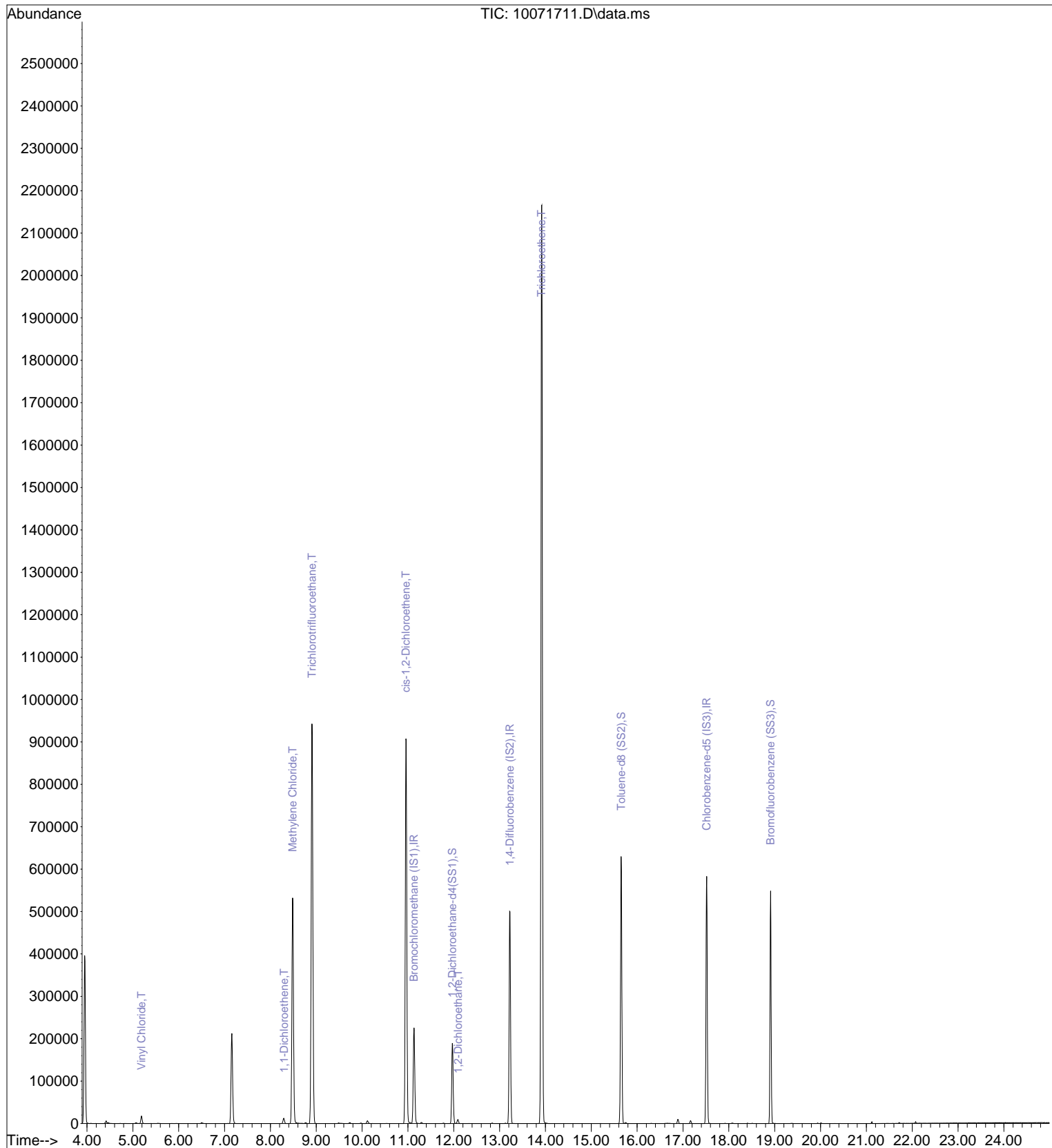
						Qvalue
6) Vinyl Chloride	5.19	62	21182	1.691	ng	100
17) 1,1-Dichloroethene	8.30	96	6542	0.707	ng	86
19) Methylene Chloride	8.49	84	307004	28.087	ng	92
21) Trichlorotrifluoroethane	8.91	151	438857	46.258	ng	94
28) cis-1,2-Dichloroethene	10.96	61	619713	52.021	ng	94
36) 1,2-Dichloroethane	12.09	62	9156	0.844	ng	99
47) Trichloroethene	13.91	130	891006	77.770	ng	99

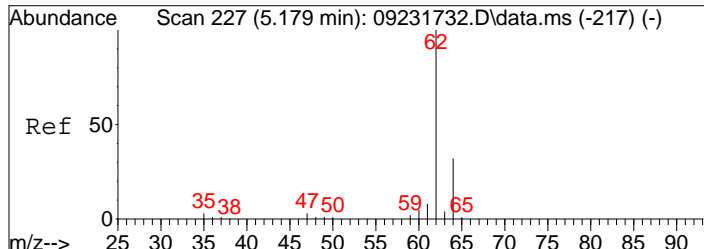
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071711.D
 Acq On : 7 Oct 2017 9:08
 Sample : P1704815-002dup (3.0mL)
 Misc : S31-09111702

Vial: 4
 Operator: WA
 Inst : MS13

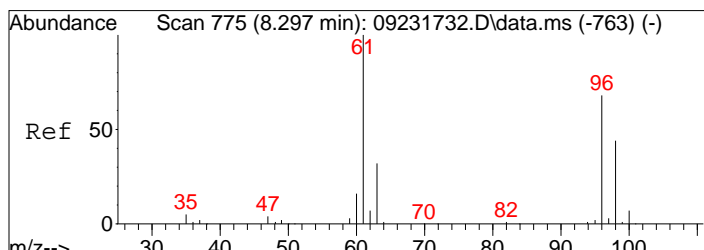
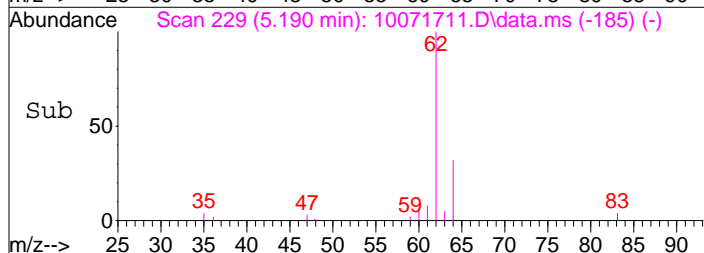
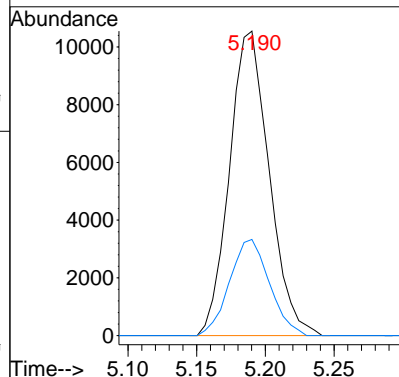
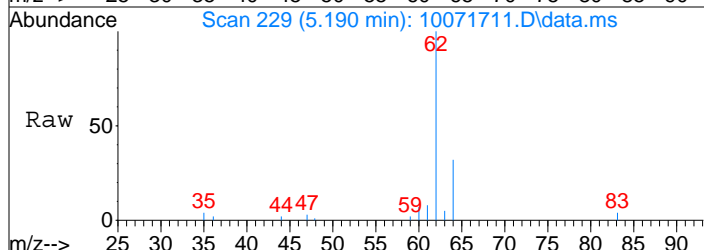
Quant Time: Oct 09 16:45:04 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M





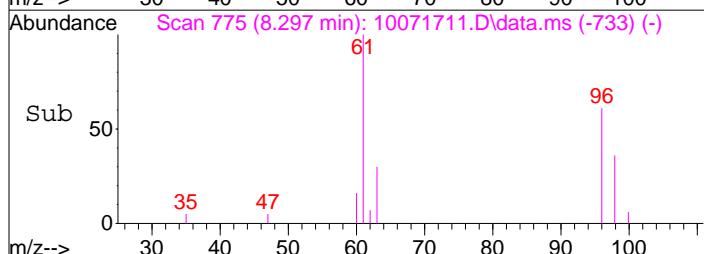
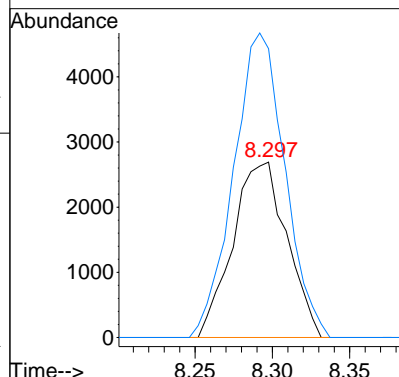
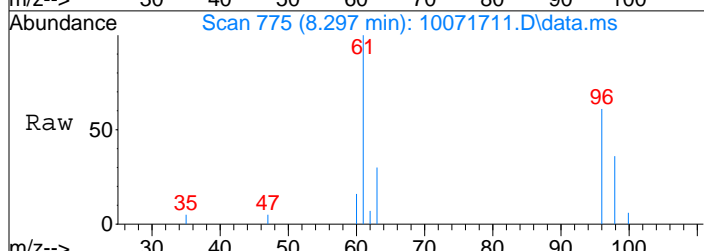
#6
 Vinyl Chloride
 Concen: 1.69 ng
 RT: 5.19 min Scan# 229
 Delta R.T. 0.000 min
 Lab File: 10071711.D
 Acq: 7 Oct 2017 9:08

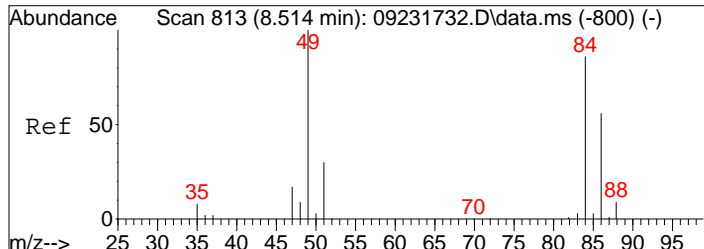
Tgt Ion	Resp	Lower	Upper
62	100		
64	31.8	11.8	51.8



#17
 1,1-Dichloroethene
 Concen: 0.71 ng
 RT: 8.30 min Scan# 775
 Delta R.T. -0.011 min
 Lab File: 10071711.D
 Acq: 7 Oct 2017 9:08

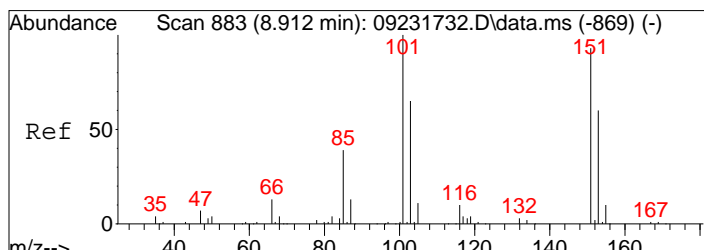
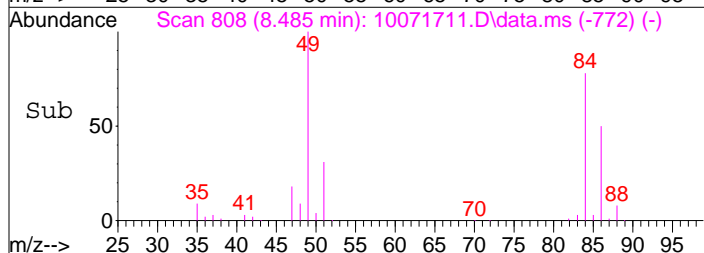
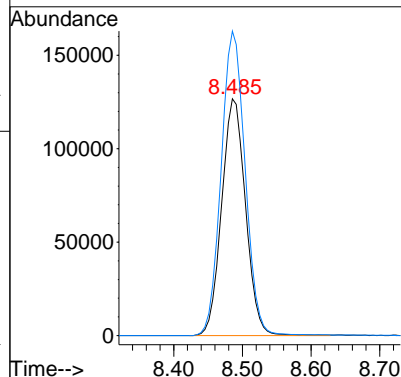
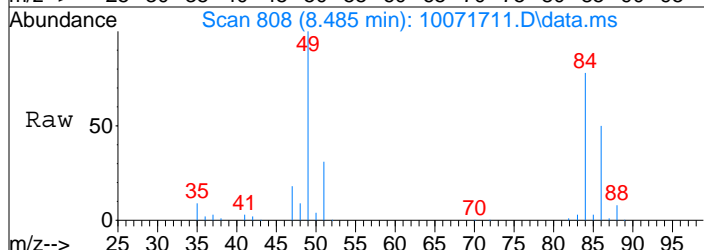
Tgt Ion	Resp	Lower	Upper
96	100		
61	164.9	127.1	167.1





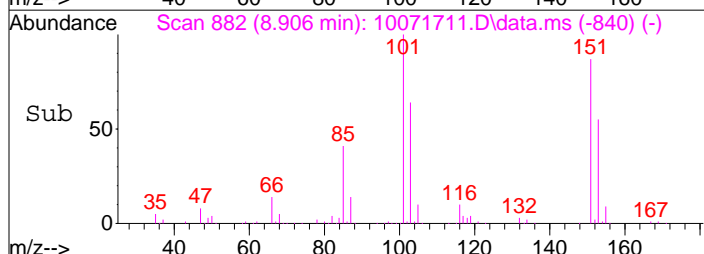
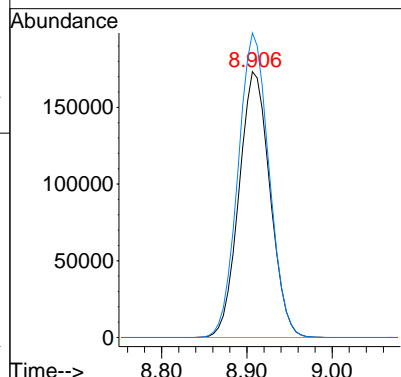
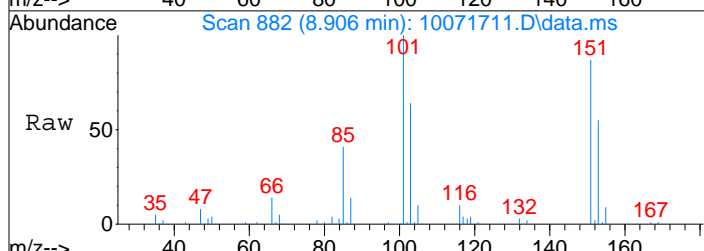
#19
 Methylene Chloride
 Concen: 28.09 ng
 RT: 8.49 min Scan# 808
 Delta R.T. -0.045 min
 Lab File: 10071711.D
 Acq: 7 Oct 2017 9:08

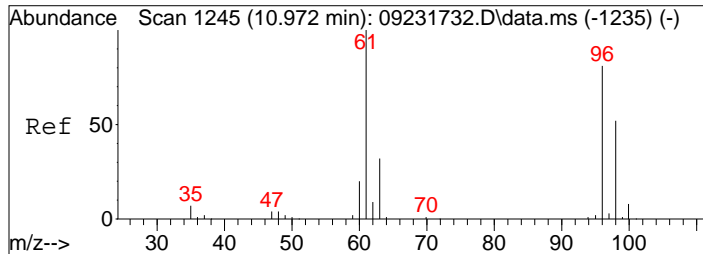
Tgt Ion	Resp	Lower	Upper
84	307004		
84	100		
49	129.1	94.9	144.9



#21
 Trichlorotrifluoroethane
 Concen: 46.26 ng
 RT: 8.91 min Scan# 882
 Delta R.T. -0.011 min
 Lab File: 10071711.D
 Acq: 7 Oct 2017 9:08

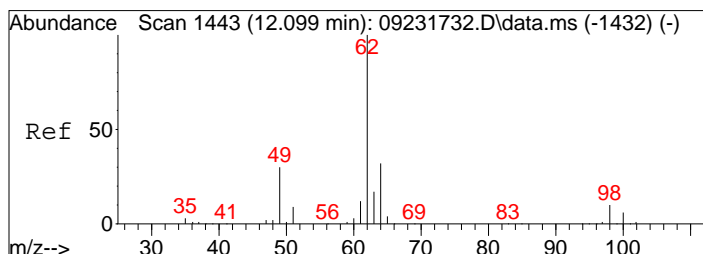
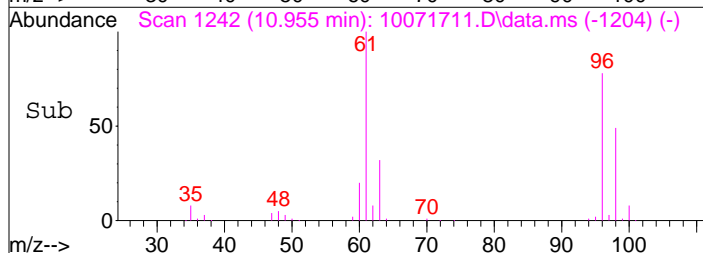
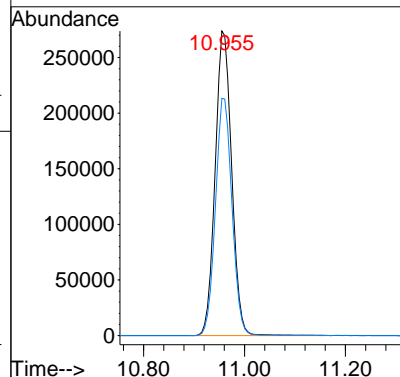
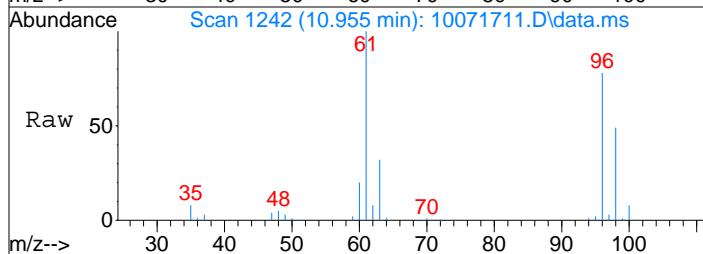
Tgt Ion	Resp	Lower	Upper
151	438857		
151	100		
101	114.4	88.3	128.3





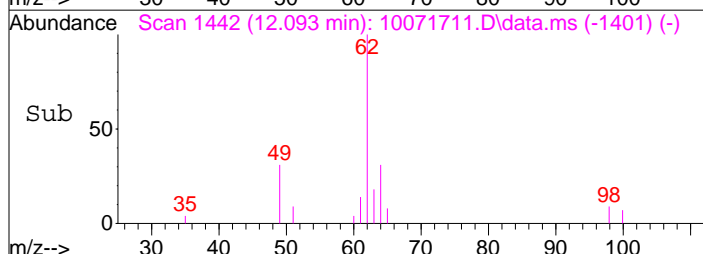
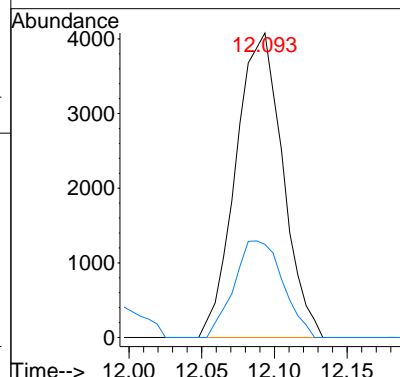
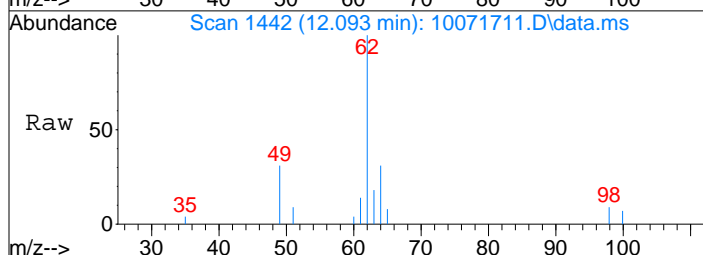
#28
 cis-1,2-Dichloroethene
 Concen: 52.02 ng
 RT: 10.96 min Scan# 1242
 Delta R.T. -0.034 min
 Lab File: 10071711.D
 Acq: 7 Oct 2017 9:08

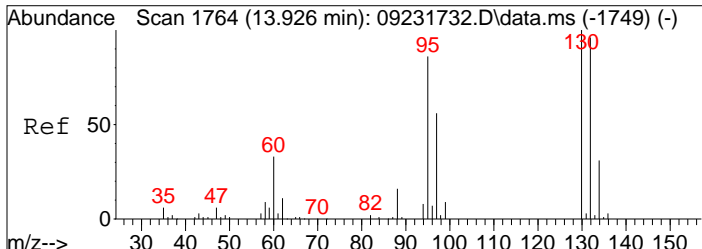
Tgt Ion: 61 Resp: 619713
 Ion Ratio Lower Upper
 61 100
 96 78.2 63.2 103.2



#36
 1,2-Dichloroethane
 Concen: 0.84 ng
 RT: 12.09 min Scan# 1442
 Delta R.T. -0.017 min
 Lab File: 10071711.D
 Acq: 7 Oct 2017 9:08

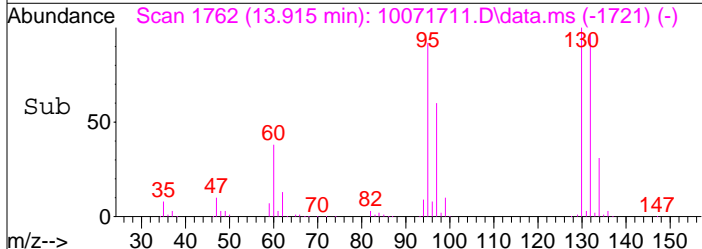
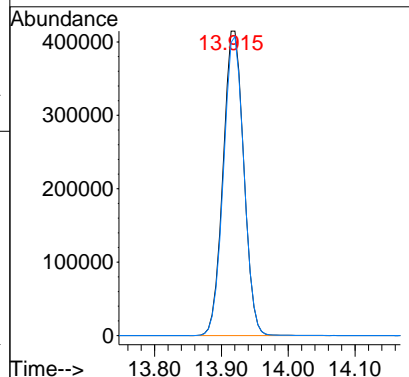
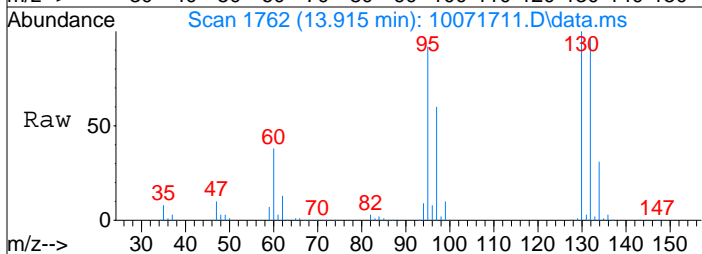
Tgt Ion: 62 Resp: 9156
 Ion Ratio Lower Upper
 62 100
 64 32.9 12.5 52.5





#47
Trichloroethene
Concen: 77.77 ng
RT: 13.91 min Scan# 1762
Delta R.T. -0.017 min
Lab File: 10071711.D
Acq: 7 Oct 2017 9:08

Tgt Ion	Resp	Lower	Upper
130	100		
132	97.1	76.1	116.1



Method Path : I:\MS13\METHODS\
 Method File : R13092317.M
 Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 Last Update : Mon Sep 25 06:36:07 2017
 Response Via : Initial Calibration

Calibration Files

0.08=09121706.D 0.10=09231727.D 0.20=09231728.D 0.40=09231729.D 1.0 =09231730.D 5.0 =09231731.D 25 =09231732.D
 50 =09231733.D 100 =09231734.D

Compound	0.08	0.10	0.20	0.40	1.0	5.0	25	50	100	Avg	%RSD
-----ISTD-----											
1) IR Bromochloromethane...											
2) T Propene	1.299	1.373	1.333	1.341	1.295	1.405	1.405	1.260	1.333	1.330	3.45
3) T Dichlorodifluo...	2.187	2.067	2.143	2.268	2.171	2.395	2.171	2.395	2.160	2.045	5.11
4) T Chloromethane	1.630	1.525	1.585	1.725	1.594	1.783	1.690	1.690	1.499	1.629	6.04
5) T 1,2-Dichloro-1...	1.089	1.069	1.242	1.234	1.191	1.321	1.278	1.278	1.274	1.212	7.49
6) T Vinyl Chloride	1.451	1.386	1.470	1.581	1.515	1.708	1.621	1.621	1.607	1.542	6.84
7) T 1,3-Butadiene	1.110	1.007	1.090	1.156	1.138	1.337	1.295	1.295	1.259	1.174	9.60
8) T Bromomethane	1.043	1.012	1.026	1.090	0.943	1.155	0.994	1.043	1.038	1.038	6.12
9) T Chloroethane	0.612	0.739	0.805	0.867	0.817	0.916	0.846	0.818	0.802	0.802	11.52
10) T Ethanol	0.696	0.807	0.809	0.865	0.812	0.894	0.807	0.807	0.767	0.807	7.37
11) T Acetonitrile	1.648	1.663	1.855	2.100	2.133	2.360	2.178	2.132	2.009	2.009	12.83
12) T Acrolein				0.688	0.688	0.713	0.816	0.742	0.725	0.729	6.54
13) T Acetone	0.905	0.877	0.932	0.876	0.837	0.909	0.808	0.747	0.861	0.861	7.09
14) T Trichlorofluor...	1.769	1.762	1.845	1.962	1.866	2.024	1.859	1.827	1.864	1.864	4.82
15) T 2-Propanol (Is...	2.596	2.609	2.757	2.927	2.855	3.253	2.927	2.927	2.502	2.803	8.62
16) T Acrylonitrile			1.236	1.440	1.500	1.704	1.704	1.573	1.542	1.499	10.42
17) T 1,1-Dichloroet...	0.891	1.130	1.151	1.170	1.131	1.281	1.193	1.168	1.139	1.139	9.76
18) T 2-Methyl-2-Pro...	2.527	2.655	2.828	2.944	2.888	3.298	2.952	2.340	2.804	2.804	10.51
19) T Methylene Chlo...	1.941	1.499	1.338	1.258	1.141	1.279	1.181	1.130	1.346	1.346	19.98
20) T 3-Chloro-1-pro...	1.409	1.395	1.580	1.584	1.676	1.927	1.767	1.709	1.631	1.631	10.98
21) T Trichlorotrifl...	1.090	1.029	1.154	1.188	1.162	1.309	1.217	1.197	1.168	1.168	7.19
22) T Carbon Disulfide		5.904	5.265	4.658	4.256	4.657	4.320	4.184	4.749	4.749	13.22
23) T trans-1,2-Dich...	1.157	1.291	1.424	1.547	1.560	1.758	1.626	1.578	1.493	1.493	12.94
24) T 1,1-Dichloroet...	1.919	1.898	1.910	2.047	1.965	2.182	2.011	1.961	1.987	1.987	4.74
25) T Methyl tert-Bu...	3.013	3.195	3.405	3.528	3.462	3.854	3.556	3.439	3.432	3.432	7.28
26) T Vinyl Acetate			0.216	0.245	0.252	0.295	0.276	0.268	0.259	0.259	10.64
27) T 2-Butanone (MEK)			0.725	0.762	0.798	0.879	0.819	0.803	0.798	0.798	6.55
28) T cis-1,2-Dichlo...	1.333	1.268	1.404	1.501	1.486	1.689	1.553	1.502	1.467	1.467	8.96
29) T Diisopropyl Ether	0.931	1.063	1.166	1.231	1.167	1.272	0.988	0.923	1.093	1.093	12.44
30) T Ethyl Acetate	0.286	0.342	0.370	0.413	0.415	0.440	0.398	0.376	0.380	0.380	12.84
31) T n-Hexane	1.892	1.773	1.940	1.965	1.853	1.813	1.617	1.567	1.803	1.803	8.03
32) T Chloroform	1.745	1.718	1.866	2.013	1.886	2.140	1.968	1.920	1.907	1.907	7.25
33) S 1,2-Dichloroet...	1.231	1.251	1.262	1.260	1.283	1.279	1.254	1.242	1.258	1.258	1.40
34) T Tetrahydrofura...	1.009	0.820	0.852	0.844	0.785	0.862	0.801	0.782	0.844	0.844	8.66
35) T Ethyl tert-But...	1.196	1.302	1.395	1.471	1.426	1.586	1.465	1.421	1.408	1.408	8.29
36) T 1,2-Dichloroet...	1.094	1.194	1.312	1.391	1.380	1.539	1.410	1.362	1.335	1.335	10.28
-----ISTD-----											
37) IR 1,4-Difluorobenzen...											
38) T 1,1,1-Trichlor...	0.327	0.311	0.352	0.367	0.355	0.402	0.373	0.359	0.356	0.356	7.83
39) T Isopropyl Acetate	0.140	0.134	0.143	0.153	0.147	0.162	0.149	0.138	0.146	0.146	6.22
40) T 1-Butanol		0.181	0.209	0.228	0.240	0.277	0.257	0.237	0.233	0.233	13.46
41) T Benzene	1.047	0.951	0.968	0.990	0.933	1.029	0.950	0.875	0.968	0.968	5.66
42) T Carbon Tetrach...	0.286	0.288	0.300	0.323	0.319	0.372	0.347	0.334	0.321	0.321	9.25

IDA 9/25/17

Method Path : I:\MS13\METHODS\
 Method File : R13092317.M

Title	EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)									
43) T Cyclohexane	0.356	0.347	0.372	0.386	0.365	0.409	0.376	0.352	0.370	5.42
44) T tert-Amyl Meth...	0.652	0.639	0.677	0.705	0.679	0.782	0.726	0.685	0.693	6.49
45) T 1,2-Dichloropr...	0.197	0.204	0.220	0.237	0.227	0.251	0.236	0.226	0.225	7.93
46) T Bromodichlorom...	0.275	0.280	0.288	0.307	0.305	0.350	0.328	0.316	0.306	8.24
47) T Trichloroethene	0.279	0.280	0.284	0.304	0.284	0.320	0.301	0.292	0.293	4.90
48) T 1,4-Dioxane	0.150	0.171	0.200	0.215	0.203	0.232	0.218	0.209	0.200	13.32
49) T 2,2,4-Trimethy...	0.954	0.909	0.976	1.022	0.962	1.085	1.002	0.932	0.980	5.66
50) T Methyl Methacr...	0.082	0.101	0.101	0.110	0.106	0.118	0.111	0.107	0.105	10.85
51) T n-Heptane	0.243	0.240	0.231	0.247	0.235	0.250	0.231	0.221	0.237	4.05
52) T cis-1,3-Dichlo...	0.302	0.310	0.360	0.382	0.382	0.437	0.410	0.394	0.372	12.51
53) T 4-Methyl-2-pen...	0.172	0.185	0.211	0.226	0.218	0.248	0.230	0.218	0.214	11.50
54) T trans-1,3-Dich...	0.234	0.251	0.292	0.328	0.340	0.396	0.376	0.363	0.322	18.21
55) T 1,1,2-Trichlor...	0.206	0.212	0.227	0.241	0.232	0.267	0.250	0.242	0.235	8.45
----- ISTD -----										
56) IR Chlorobenzene-d5 (...)	2.645	2.640	2.637	2.628	2.595	2.591	2.585	2.574	2.612	1.09
57) S Toluene-d8 (SS2)	2.630	2.499	2.661	2.756	2.566	2.878	2.646	2.530	2.646	4.69
58) T Toluene	1.074	1.151	1.206	1.346	1.336	1.502	1.370	1.297	1.285	10.58
59) T 2-Hexanone	0.601	0.625	0.734	0.779	0.767	0.893	0.829	0.812	0.755	13.20
60) T Dibromochlorom...	0.541	0.585	0.664	0.725	0.696	0.796	0.745	0.729	0.685	12.42
61) T 1,2-Dibromoethane	1.233	1.232	1.359	1.503	1.467	1.675	1.537	1.442	1.431	10.61
62) T n-Butyl Acetate	0.486	0.501	0.513	0.535	0.516	0.565	0.515	0.486	0.515	5.07
63) T n-Octane	0.784	0.770	0.821	0.886	0.833	0.936	0.874	0.863	0.846	6.50
64) T Tetrachloroethene	1.760	1.705	1.878	1.895	1.802	2.029	1.876	1.798	1.843	5.40
65) T Chlorobenzene	2.791	2.803	2.966	3.060	2.924	3.314	3.018	2.827	2.963	5.86
66) T Ethylbenzene	2.192	2.158	2.270	2.435	2.239	2.607	2.379	2.207	2.311	6.60
67) T m- & p-Xylenes	0.563	0.578	0.635	0.706	0.697	0.840	0.788	0.772	0.697	14.40
68) T Bromoform	1.675	1.730	1.801	1.978	1.942	2.250	2.067	1.964	1.926	9.74
69) T Styrene	2.190	2.119	2.275	2.433	2.279	2.605	2.387	2.237	2.316	6.66
70) T o-Xylene	1.031	1.146	1.188	1.267	1.204	1.333	1.191	1.079	1.180	8.19
71) T n-Nonane	0.965	0.938	0.998	1.085	1.052	1.230	1.136	1.073	1.059	8.97
72) T 1,1,2,2-Tetrac...	0.999	1.011	0.999	1.011	1.004	1.008	1.022	1.007	1.008	0.75
73) S Bromofluoroben...	2.861	2.882	3.001	3.221	3.054	3.479	3.161	2.919	3.072	6.80
74) T Cumene	1.344	1.340	1.480	1.639	1.565	1.785	1.646	1.551	1.544	9.90
75) T alpha-Pinene	3.324	3.246	3.431	3.687	3.535	4.016	3.610	3.262	3.514	7.38
76) T n-Propylbenzene	2.985	2.832	3.020	3.275	3.104	3.481	3.333	2.900	3.116	7.28
77) T 3-Ethyltoluene	2.685	2.653	2.727	2.987	2.868	3.347	2.890	2.801	2.870	7.78
78) T 4-Ethyltoluene	2.381	2.280	2.357	2.642	2.531	2.894	2.649	2.467	2.525	7.88
79) T 1,3,5-Trimethy...	1.227	1.491	1.477	1.477	1.719	1.587	1.493	1.499	1.499	10.79
80) T alpha-Methylst...	2.784	2.680	2.926	3.119	2.980	3.391	3.098	2.846	2.978	7.52
81) T 1-Ethyltoluene	2.230	2.238	2.359	2.657	2.548	2.919	2.654	2.406	2.501	9.51
82) T 1,2,4-Trimethy...	0.974	1.010	1.125	1.345	1.267	1.418	1.271	1.146	1.194	13.18
83) T n-Decane	1.751	1.936	2.076	2.556	2.388	2.219	2.154	2.154	2.154	13.72
84) T Benzyl Chloride	1.499	1.487	1.540	1.695	1.606	1.871	1.723	1.633	1.632	7.92
85) T 1,3-Dichlorobe...	1.558	1.523	1.570	1.710	1.632	1.914	1.781	1.685	1.672	7.82
86) T 1,4-Dichlorobe...	3.217	3.216	3.358	3.572	3.408	3.900	3.526	3.189	3.423	7.02
87) T sec-Butylbenzene	3.145	3.073	3.282	3.545	3.354	3.833	3.422	3.001	3.332	8.17
88) T 4-Isopropyltol...	2.245	2.201	2.377	2.673	2.558	2.958	2.684	2.438	2.517	10.05
89) T 1,2,3-Trimethy...	1.434	1.368	1.484	1.626	1.519	1.769	1.628	1.513	1.543	8.22
90) T 1,2-Dichlorobe...	0.813	0.762	0.843	1.017	1.003	1.144	1.029	0.917	0.941	13.77
91) T d-Limonene	0.443	0.420	0.506	0.568	0.577	0.686	0.642	0.619	0.558	16.96
92) T 1,2-Dibromo-3-...	1.383	1.343	1.501	1.501	1.341	1.501	1.341	1.206	1.355	7.81
93) T n-Undecane	0.845	0.772	0.792	1.226	1.203	1.423	1.335	1.273	1.109	23.70
94) T 1,2,4-Trichlor...										

Method Path : I:\MS13\METHODS\
 Method File : R13092317.M
 Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)

95) T	Naphthalene	1.930	3.695	3.696	4.308	3.938	3.497	3.511	23.44
96) T	n-Dodecane	1.235	1.230	1.421	1.252	1.075	1.243	9.88	
97) T	Hexachlorobuta...	0.754	0.808	0.873	0.826	0.899	0.876	0.843	8.40
98) T	Cyclohexanone	0.721	0.693	0.785	0.886	1.000	0.933	0.880	12.41
99) T	tert-Butylbenzene	2.402	2.377	2.535	2.723	2.587	2.921	2.642	7.30
100) T	n-Butylbenzene	2.376	2.278	2.426	2.777	2.681	3.059	2.755	9.86

(#) = Out of Range

9/25/17

Primary Source Standards Concentrations (Working & Initial Calibration)

1ng/L Std. ID: S31-09121704
4ng/L Std. ID: S31-09231704
20ng/L Std. ID: S31-09231704
200ng/L Std. ID: S31-09231702

Table with columns for Source Std. (mg/L), Primary Working Standards (200ng/L, 4ng/L, 1ng/L), Dilution Factors (5, 50, 250, 1000), and Working STD Conc. (ng/L) at various volumes (0.020, 0.025, 0.050, 0.100, 0.20, 0.25, 0.125, 0.25, 200, 50ng, 5ng, 200, 0.25, 200, 0.125, 200, 0.25, 200).

Primary Source Standards Concentrations (Working & Initial Calibration)

1ng/L Std. ID: S31-09121704
4ng/L Std. ID: S31-09231704
20ng/L Std. ID: S31-09231704
200ng/L Std. ID: S31-09231702

Table with columns for Compounds, Source Std. mg/m³, and various concentration standards (200ng/L, 20ng/L, 2ng/L, 0.2ng/L, 0.02ng/L, 0.002ng/L, 0.0002ng/L) across different dilution factors (5, 50, 250, 1000). Includes Working STD Conc. (ng/L) and ICAL Points.

Method : I:\MS13\METHODS\R13092317.M (RTE Integrator)
 Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 Last Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration

#	ID	Conc	ISTD Conc	Path\File
1	0.08	0	13	
2	0.10	0	13	I:\MS13\DATA\2017_09\23\09231727.D
3	0.20	0	13	I:\MS13\DATA\2017_09\23\09231728.D
4	0.40	0	13	I:\MS13\DATA\2017_09\23\09231729.D
5	1.0	1	13	I:\MS13\DATA\2017_09\23\09231730.D
6	5.0	5	13	I:\MS13\DATA\2017_09\23\09231731.D
7	25	26	13	I:\MS13\DATA\2017_09\23\09231732.D
8	50	52	13	I:\MS13\DATA\2017_09\23\09231733.D
9	100	104	13	I:\MS13\DATA\2017_09\23\09231734.D

#	ID	Update Time	Quant Time	Acquisition Time
1	0.08			
2	0.10	Sep 25 06:34 2017	Sep 25 06:24 2017	23 Sep 2017 16:34
3	0.20	Sep 25 06:35 2017	Sep 25 06:24 2017	23 Sep 2017 17:09
4	0.40	Sep 25 06:35 2017	Sep 25 06:25 2017	23 Sep 2017 17:44
5	1.0	Sep 25 06:35 2017	Sep 25 06:25 2017	23 Sep 2017 18:19
6	5.0	Sep 25 06:35 2017	Sep 25 06:25 2017	23 Sep 2017 18:53
7	25	Sep 25 06:35 2017	Sep 25 06:25 2017	23 Sep 2017 19:28
8	50	Sep 25 06:35 2017	Sep 25 06:25 2017	23 Sep 2017 20:03
9	100	Sep 25 06:36 2017	Sep 25 06:25 2017	23 Sep 2017 20:38

ADA 9/25/17

R13092317.M

Mon Sep 25 15:37:29 2017

Data File : I:\MS13\DATA\2017 09\23\09231727.D
 Acq On : 23 Sep 2017 16:34
 Sample : 0.10ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09121704 (10/11)

Vial: 14
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:24:57 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

WA 9/25/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.13	130	115264	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	13.22	114	565570	12.500	ng	-0.01
56) Chlorobenzene-d5 (IS3)	17.52	82	214612	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	141838	11.727	ng	-0.02
Spiked Amount	12.500	Range 70 - 130	Recovery	=	93.84%	
57) Toluene-d8 (SS2)	15.65	98	567554	12.201	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	97.60%	
73) Bromofluorobenzene (SS3)	18.91	174	214421	15.315	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	122.56%	

Target Compounds

						Qvalue
2) Propene	4.39	42	1242	0.083	ng	# 87
3) Dichlorodifluoromethan...	4.54	85	2113	0.096	ng	# 87
4) Chloromethane	4.80	50	1512	0.083	ng	89
5) 1,2-Dichloro-1,1,2,2-t...	5.05	135	1025	0.083	ng	74
6) Vinyl Chloride	5.20	62	1381	0.079	ng	74
7) 1,3-Butadiene	5.45	54	1084	0.092	ng	93
8) Bromomethane	5.86	94	955	0.092	ng	94
9) Chloroethane	6.18	64	571	0.066	ng	# 43
10) Ethanol	6.49	45	3385	0.374	ng	88
11) Acetonitrile	6.77	41	1609	0.060	ng	92
12) Acrolein	6.97	56	334	0.039	ng	# 35
13) Acetone	7.17	58	4440	0.470	ng	99
14) Trichlorofluoromethane	7.38	101	1714	0.090	ng	94
15) 2-Propanol (Isopropanol)	7.65	45	5043	0.158	ng	84
16) Acrylonitrile	7.86	53	674	0.042	ng	91
17) 1,1-Dichloroethene	8.30	96	872	0.072	ng	# 79
18) 2-Methyl-2-Propanol (t...	8.51	59	4939	0.166	ng	83
19) Methylene Chloride	8.49	84	1894	0.146	ng	94
20) 3-Chloro-1-propene (Al...	8.66	41	1369	0.070	ng	85
21) Trichlorotrifluoroethane	8.92	151	1058	0.091	ng	96
22) Carbon Disulfide	8.78	76	7934	0.168	ng	95
23) trans-1,2-Dichloroethene	9.73	61	1153	0.068	ng	90
24) 1,1-Dichloroethane	9.96	63	1808	0.084	ng	84
25) Methyl tert-Butyl Ether	10.13	73	2973	0.081	ng	83
26) Vinyl Acetate	10.23	86	676	0.279	ng	# 1
27) 2-Butanone (MEK)	10.51	72	365	0.042	ng	# 1
28) cis-1,2-Dichloroethene	10.95	61	1312	0.081	ng	93
29) Diisopropyl Ether	11.29	87	914	0.077	ng	# 58
30) Ethyl Acetate	11.29	61	563	0.127	ng	86
31) n-Hexane	11.25	57	1860	0.085	ng	# 87
32) Chloroform	11.29	83	1707	0.085	ng	94
34) Tetrahydrofuran (THF)	11.76	72	990	0.102	ng	93
35) Ethyl tert-Butyl Ether	11.87	87	1168	0.079	ng	94
36) 1,2-Dichloroethane	12.08	62	1064	0.074	ng	74
38) 1,1,1-Trichloroethane	12.37	97	1595	0.090	ng	86
39) Isopropyl Acetate	12.81	61	1335	0.167	ng	# 90
40) 1-Butanol	12.84	56	1432	0.108	ng	# 65
41) Benzene	12.84	78	5006	0.098	ng	92
42) Carbon Tetrachloride	13.00	117	1373	0.088	ng	99
43) Cyclohexane	13.13	84	3442	0.181	ng	99
44) tert-Amyl Methyl Ether	13.50	73	3117	0.088	ng	91
45) 1,2-Dichloropropane	13.68	63	949	0.078	ng	100
46) Bromodichloromethane	13.86	83	1330	0.085	ng	88
47) Trichloroethene	13.92	130	1340	0.090	ng	95
48) 1,4-Dioxane	13.93	88	723	0.068	ng	98
49) 2,2,4-Trimethylpentane...	13.99	57	4575	0.087	ng	95
50) Methyl Methacrylate	14.14	100	708	0.139	ng	# 73

Data File : I:\MS13\DATA\2017 09\23\09231727.D
 Acq On : 23 Sep 2017 16:34
 Sample : 0.10ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09121704 (10/11)

Vial: 14
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:24:57 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

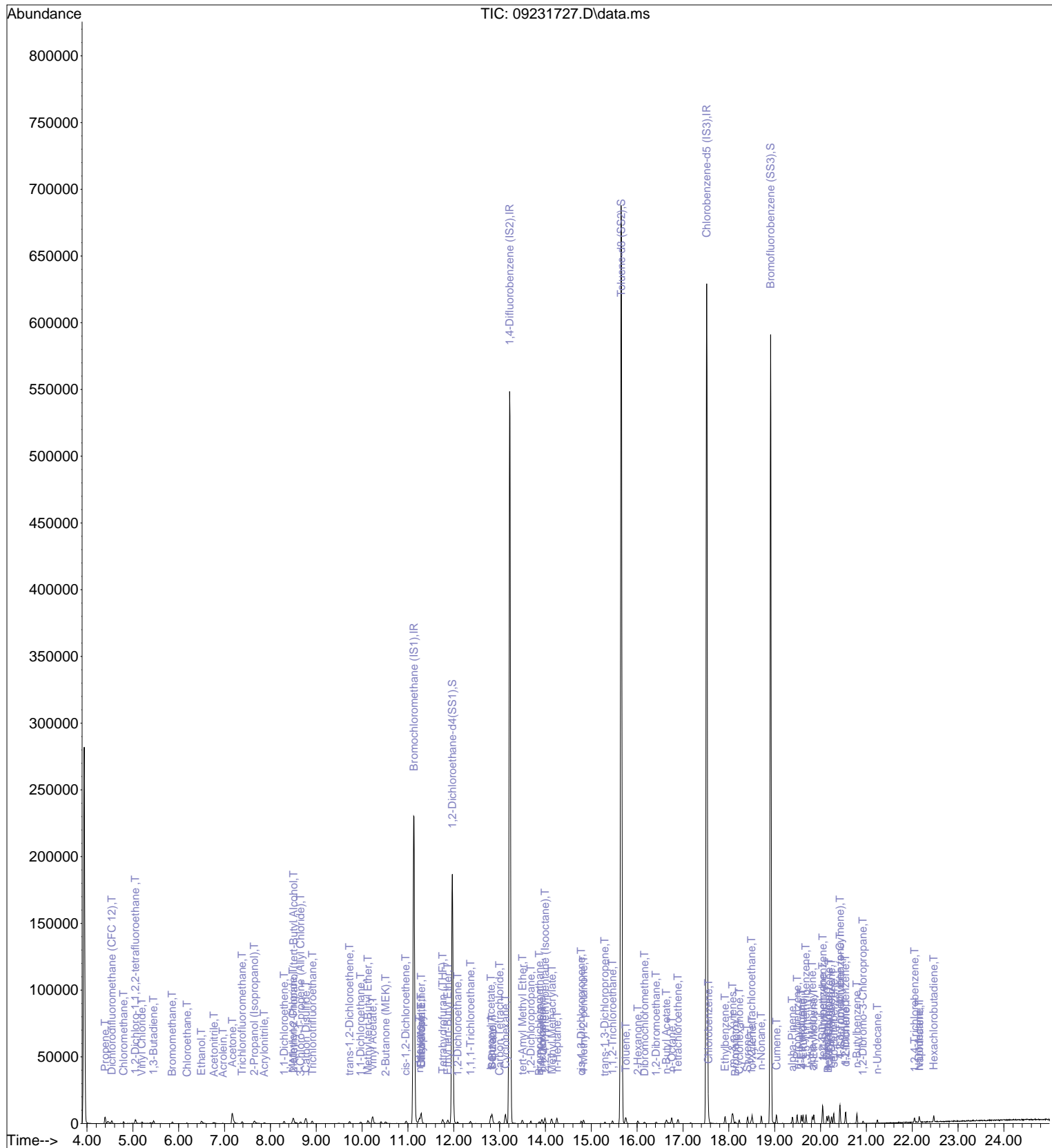
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
51) n-Heptane	14.25	71	1169	0.094	ng #	87
52) cis-1,3-Dichloropropene	14.78	75	1531	0.079	ng	90
53) 4-Methyl-2-pentanone	14.83	58	823	0.068	ng #	75
54) trans-1,3-Dichloropropene	15.29	75	1128	0.068	ng	80
55) 1,1,2-Trichloroethane	15.46	97	993	0.083	ng	94
58) Toluene	15.75	91	4760	0.089	ng	100
59) 2-Hexanone	16.01	43	1955	0.068	ng	86
60) Dibromochloromethane	16.16	129	1095	0.076	ng	95
61) 1,2-Dibromoethane	16.41	107	988	0.074	ng	100
62) n-Butyl Acetate	16.63	43	2261	0.072	ng	96
63) n-Octane	16.75	57	885	0.077	ng #	91
64) Tetrachloroethene	16.89	166	1431	0.093	ng	92
65) Chlorobenzene	17.56	112	3221	0.091	ng	100
66) Ethylbenzene	17.92	91	5041	0.087	ng	99
67) m- & p-Xylenes	18.08	91	7990	0.178	ng	98
68) Bromoform	18.14	173	1027	0.080	ng	78
69) Styrene	18.40	104	3042	0.082	ng	96
70) o-Xylene	18.51	91	3967	0.087	ng	95
71) n-Nonane	18.71	43	1865	0.070	ng	90
72) 1,1,2,2-Tetrachloroethane	18.49	83	1751	0.088	ng	96
74) Cumene	19.04	105	5167	0.088	ng	98
75) alpha-Pinene	19.38	93	2413	0.078	ng	81
76) n-Propylbenzene	19.49	91	6073	0.089	ng	95
77) 3-Ethyltoluene	19.58	105	5381	0.090	ng	100
78) 4-Ethyltoluene	19.62	105	4835	0.088	ng	96
79) 1,3,5-Trimethylbenzene	19.68	105	4288	0.088	ng	95
80) alpha-Methylstyrene	19.82	118	1985	0.072	ng	91
81) 2-Ethyltoluene	19.85	105	5066	0.088	ng	99
82) 1,2,4-Trimethylbenzene	20.05	105	4024	0.083	ng	100
83) n-Decane	20.14	57	1771	0.065	ng	96
84) Benzyl Chloride	20.16	91	2856	0.073	ng	92
85) 1,3-Dichlorobenzene	20.18	146	2757	0.091	ng	98
86) 1,4-Dichlorobenzene	20.24	146	2846	0.094	ng	99
87) sec-Butylbenzene	20.29	105	5827	0.089	ng	99
88) 4-Isopropyltoluene (p-...	20.43	119	5540	0.089	ng	99
89) 1,2,3-Trimethylbenzene	20.43	105	3954	0.081	ng	98
90) 1,2-Dichlorobenzene	20.54	146	2666	0.094	ng	99
91) d-Limonene	20.55	68	1403	0.069	ng	92
92) 1,2-Dibromo-3-Chloropr...	20.93	157	799	0.077	ng	92
93) n-Undecane	21.24	57	915	0.031	ng	88
94) 1,2,4-Trichlorobenzene	22.05	180	1591	0.073	ng	93
95) Naphthalene	22.16	128	3651	0.055	ng	94
96) n-Dodecane	22.15	57	370	0.013	ng #	59
97) Hexachlorobutadiene	22.47	225	1368	0.094	ng	91
98) Cyclohexanone	18.23	55	1287	0.070	ng	96
99) tert-Butylbenzene	20.04	119	4331	0.089	ng	99
100) n-Butylbenzene	20.80	91	4299	0.083	ng	96

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 09\23\09231727.D
Acq On : 23 Sep 2017 16:34
Sample : 0.10ng TO-15 ICAL Std
Misc : S31-09111702/S31-09121704 (10/11)

Vial: 14
Operator: WA
Inst : MS13

Quant Time: Sep 25 06:24:57 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:24:19 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 09\23\09231728.D
 Acq On : 23 Sep 2017 17:09
 Sample : 0.20ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09121704 (10/11)

Vial: 14
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:24:59 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

WA 9/25/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.13	130	114459	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	13.23	114	565013	12.500	ng	0.00
56) Chlorobenzene-d5 (IS3)	17.52	82	214110	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	143200	11.923	ng	-0.02
Spiked Amount	12.500	Range 70 - 130	Recovery	=	95.36%	
57) Toluene-d8 (SS2)	15.65	98	565299	12.181	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	97.44%	
73) Bromofluorobenzene (SS3)	18.91	174	216550	15.504	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	124.00%	

Target Compounds

						Qvalue
2) Propene	4.39	42	2607	0.176	ng	94
3) Dichlorodifluoromethan...	4.54	85	3968	0.182	ng	# 91
4) Chloromethane	4.80	50	2809	0.156	ng	97
5) 1,2-Dichloro-1,1,2,2-t...	5.05	135	1998	0.162	ng	82
6) Vinyl Chloride	5.20	62	2620	0.152	ng	95
7) 1,3-Butadiene	5.45	54	1953	0.167	ng	94
8) Bromomethane	5.86	94	1840	0.179	ng	95
9) Chloroethane	6.17	64	1369	0.159	ng	73
10) Ethanol	6.49	45	7793	0.867	ng	88
11) Acetonitrile	6.75	41	3225	0.122	ng	85
12) Acrolein	6.95	56	1099	0.130	ng	97
13) Acetone	7.16	58	8551	0.912	ng	98
14) Trichlorofluoromethane	7.38	101	3392	0.179	ng	100
15) 2-Propanol (Isopropanol)	7.63	45	10067	0.318	ng	94
16) Acrylonitrile	7.86	53	1851	0.115	ng	100
17) 1,1-Dichloroethene	8.30	96	2196	0.184	ng	93
18) 2-Methyl-2-Propanol (t...	8.49	59	10309	0.348	ng	94
19) Methylene Chloride	8.50	84	2904	0.226	ng	99
20) 3-Chloro-1-propene (Al...	8.66	41	2692	0.139	ng	92
21) Trichlorotrifluoroethane	8.91	151	1984	0.172	ng	97
22) Carbon Disulfide	8.77	76	11494	0.246	ng	95
23) trans-1,2-Dichloroethene	9.73	61	2555	0.152	ng	97
24) 1,1-Dichloroethane	9.97	63	3552	0.167	ng	95
25) Methyl tert-Butyl Ether	10.12	73	6260	0.172	ng	96
26) Vinyl Acetate	10.23	86	1738	0.721	ng	# 64
27) 2-Butanone (MEK)	10.50	72	1162	0.133	ng	# 61
28) cis-1,2-Dichloroethene	10.97	61	2477	0.153	ng	93
29) Diisopropyl Ether	11.29	87	2074	0.177	ng	# 91
30) Ethyl Acetate	11.29	61	1338	0.304	ng	94
31) n-Hexane	11.25	57	3462	0.159	ng	# 95
32) Chloroform	11.30	83	3339	0.168	ng	100
34) Tetrahydrofuran (THF)	11.75	72	1597	0.165	ng	# 88
35) Ethyl tert-Butyl Ether	11.87	87	2526	0.173	ng	98
36) 1,2-Dichloroethane	12.09	62	2307	0.162	ng	92
38) 1,1,1-Trichloroethane	12.37	97	3026	0.170	ng	97
39) Isopropyl Acetate	12.80	61	2552	0.319	ng	99
40) 1-Butanol	12.83	56	3462	0.261	ng	91
41) Benzene	12.84	78	9091	0.178	ng	98
42) Carbon Tetrachloride	12.99	117	2762	0.178	ng	98
43) Cyclohexane	13.12	84	6704	0.352	ng	98
44) tert-Amyl Methyl Ether	13.49	73	6109	0.172	ng	98
45) 1,2-Dichloropropane	13.68	63	1965	0.162	ng	96
46) Bromodichloromethane	13.87	83	2705	0.172	ng	94
47) Trichloroethene	13.92	130	2685	0.180	ng	97
48) 1,4-Dioxane	13.92	88	1645	0.154	ng	91
49) 2,2,4-Trimethylpentane...	13.99	57	8715	0.165	ng	97
50) Methyl Methacrylate	14.13	100	1566	0.308	ng	# 84

Data File : I:\MS13\DATA\2017 09\23\09231728.D
 Acq On : 23 Sep 2017 17:09
 Sample : 0.20ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09121704 (10/11)

Vial: 14
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:24:59 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

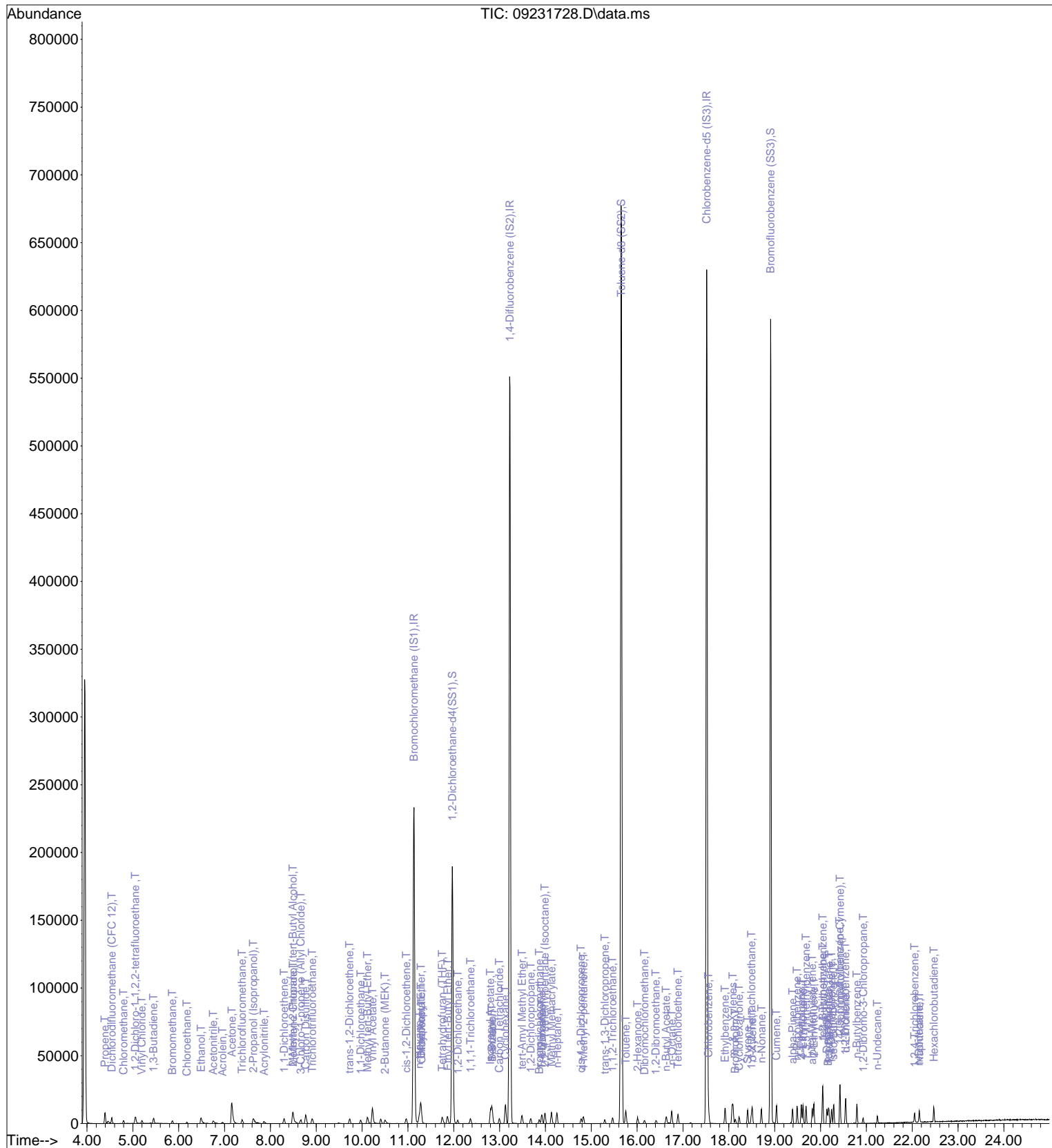
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
51) n-Heptane	14.26	71	2307	0.185	ng	92
52) cis-1,3-Dichloropropene	14.77	75	3141	0.163	ng	95
53) 4-Methyl-2-pentanone	14.83	58	1774	0.146	ng #	94
54) trans-1,3-Dichloropropene	15.30	75	2421	0.146	ng	86
55) 1,1,2-Trichloroethane	15.46	97	2036	0.171	ng	99
58) Toluene	15.75	91	9024	0.168	ng	98
59) 2-Hexanone	16.01	43	4179	0.145	ng	88
60) Dibromochloromethane	16.16	129	2270	0.158	ng	98
61) 1,2-Dibromoethane	16.41	107	2134	0.161	ng	100
62) n-Butyl Acetate	16.63	43	4507	0.143	ng	95
63) n-Octane	16.75	57	1821	0.159	ng	95
64) Tetrachloroethene	16.89	166	2805	0.182	ng	95
65) Chlorobenzene	17.56	112	6227	0.176	ng	98
66) Ethylbenzene	17.92	91	10100	0.174	ng	100
67) m- & p-Xylenes	18.09	91	15696	0.350	ng	100
68) Bromoform	18.14	173	2105	0.164	ng	97
69) Styrene	18.41	104	6269	0.169	ng	94
70) o-Xylene	18.51	91	7657	0.168	ng	99
71) n-Nonane	18.71	43	4138	0.156	ng	99
72) 1,1,2,2-Tetrachloroethane	18.49	83	3397	0.172	ng	98
74) Cumene	19.04	105	10385	0.178	ng	100
75) alpha-Pinene	19.39	93	4803	0.156	ng	81
76) n-Propylbenzene	19.49	91	11831	0.174	ng	99
77) 3-Ethyltoluene	19.58	105	10186	0.171	ng	98
78) 4-Ethyltoluene	19.62	105	9534	0.174	ng	99
79) 1,3,5-Trimethylbenzene	19.69	105	8194	0.169	ng	97
80) alpha-Methylstyrene	19.82	118	3872	0.141	ng	94
81) 2-Ethyltoluene	19.86	105	9733	0.170	ng	98
82) 1,2,4-Trimethylbenzene	20.05	105	8057	0.166	ng	99
83) n-Decane	20.14	57	3663	0.135	ng	93
84) Benzyl Chloride	20.16	91	5567	0.143	ng	93
85) 1,3-Dichlorobenzene	20.19	146	5457	0.180	ng	99
86) 1,4-Dichlorobenzene	20.24	146	5551	0.183	ng	98
87) sec-Butylbenzene	20.28	105	11624	0.179	ng	97
88) 4-Isopropyltoluene (p-...	20.42	119	10801	0.174	ng	96
89) 1,2,3-Trimethylbenzene	20.42	105	7736	0.158	ng	98
90) 1,2-Dichlorobenzene	20.54	146	5077	0.179	ng	96
91) d-Limonene	20.55	68	2622	0.129	ng	96
92) 1,2-Dibromo-3-Chloropr...	20.93	157	1512	0.146	ng	89
93) n-Undecane	21.24	57	1765	0.060	ng	99
94) 1,2,4-Trichlorobenzene	22.05	180	2900	0.133	ng	98
95) Naphthalene	22.15	128	7031	0.106	ng	97
96) n-Dodecane	22.15	57	657	0.023	ng #	65
97) Hexachlorobutadiene	22.47	225	2723	0.188	ng	96
98) Cyclohexanone	18.22	55	2466	0.135	ng	97
99) tert-Butylbenzene	20.05	119	8549	0.176	ng	97
100) n-Butylbenzene	20.79	91	8226	0.159	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 09\23\09231728.D
 Acq On : 23 Sep 2017 17:09
 Sample : 0.20ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09121704 (10/11)

Vial: 14
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:24:59 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 09\23\09231729.D
 Acq On : 23 Sep 2017 17:44
 Sample : 0.40ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09121704 (10/11)

Vial: 14
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:01 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

USA 9/25/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.13	130	105858	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	13.23	114	519000	12.500	ng	0.00
56) Chlorobenzene-d5 (IS3)	17.52	82	196852	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	133640	12.031	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	96.24%	
57) Toluene-d8 (SS2)	15.65	98	519134	12.167	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	97.36%	
73) Bromofluorobenzene (SS3)	18.91	174	196647	15.313	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	122.48%	

Target Compounds

						Qvalue
2) Propene	4.38	42	4681	0.341	ng	98
3) Dichlorodifluoromethan...	4.53	85	7608	0.378	ng	98
4) Chloromethane	4.79	50	5400	0.324	ng	100
5) 1,2-Dichloro-1,1,2,2-t...	5.05	135	4297	0.377	ng	94
6) Vinyl Chloride	5.19	62	5138	0.322	ng	97
7) 1,3-Butadiene	5.45	54	3911	0.362	ng	99
8) Bromomethane	5.86	94	3451	0.363	ng	94
9) Chloroethane	6.17	64	2760	0.346	ng	99
10) Ethanol	6.48	45	14451	1.738	ng	89
11) Acetonitrile	6.74	41	6653	0.272	ng	93
12) Acrolein	6.94	56	2458	0.315	ng	95
13) Acetone	7.15	58	16801	1.937	ng	95
14) Trichlorofluoromethane	7.38	101	6570	0.374	ng	100
15) 2-Propanol (Isopropanol)	7.61	45	19680	0.671	ng	99
16) Acrylonitrile	7.85	53	4422	0.298	ng	95
17) 1,1-Dichloroethene	8.29	96	4138	0.374	ng	97
18) 2-Methyl-2-Propanol (t...	8.47	59	20310	0.742	ng	98
19) Methylene Chloride	8.49	84	4795	0.404	ng	100
20) 3-Chloro-1-propene (Al...	8.66	41	5640	0.315	ng	95
21) Trichlorotrifluoroethane	8.91	151	4115	0.385	ng	100
22) Carbon Disulfide	8.77	76	18960	0.438	ng	99
23) trans-1,2-Dichloroethene	9.73	61	5216	0.337	ng	98
24) 1,1-Dichloroethane	9.96	63	6611	0.336	ng	97
25) Methyl tert-Butyl Ether	10.10	73	12340	0.366	ng	96
26) Vinyl Acetate	10.22	86	3863	1.733	ng	# 83
27) 2-Butanone (MEK)	10.50	72	2584	0.320	ng	# 80
28) cis-1,2-Dichloroethene	10.96	61	5074	0.340	ng	94
29) Diisopropyl Ether	11.27	87	4207	0.388	ng	# 95
30) Ethyl Acetate	11.28	61	2674	0.656	ng	99
31) n-Hexane	11.26	57	7007	0.349	ng	98
32) Chloroform	11.29	83	6707	0.364	ng	98
34) Tetrahydrofuran (THF)	11.73	72	3071	0.344	ng	94
35) Ethyl tert-Butyl Ether	11.86	87	5004	0.370	ng	99
36) 1,2-Dichloroethane	12.08	62	4690	0.356	ng	96
38) 1,1,1-Trichloroethane	12.37	97	6298	0.386	ng	97
39) Isopropyl Acetate	12.80	61	5018	0.684	ng	98
40) 1-Butanol	12.82	56	7337	0.602	ng	91
41) Benzene	12.84	78	16997	0.362	ng	99
42) Carbon Tetrachloride	13.00	117	5274	0.370	ng	94
43) Cyclohexane	13.13	84	13201	0.755	ng	98
44) tert-Amyl Methyl Ether	13.48	73	11890	0.364	ng	98
45) 1,2-Dichloropropane	13.68	63	3898	0.349	ng	95
46) Bromodichloromethane	13.86	83	5101	0.353	ng	95
47) Trichloroethene	13.92	130	5000	0.365	ng	99
48) 1,4-Dioxane	13.92	88	3534	0.361	ng	99
49) 2,2,4-Trimethylpentane...	13.99	57	17189	0.355	ng	99
50) Methyl Methacrylate	14.13	100	3544	0.758	ng	98

Data File : I:\MS13\DATA\2017 09\23\09231729.D
 Acq On : 23 Sep 2017 17:44
 Sample : 0.40ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09121704 (10/11)

Vial: 14
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:01 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

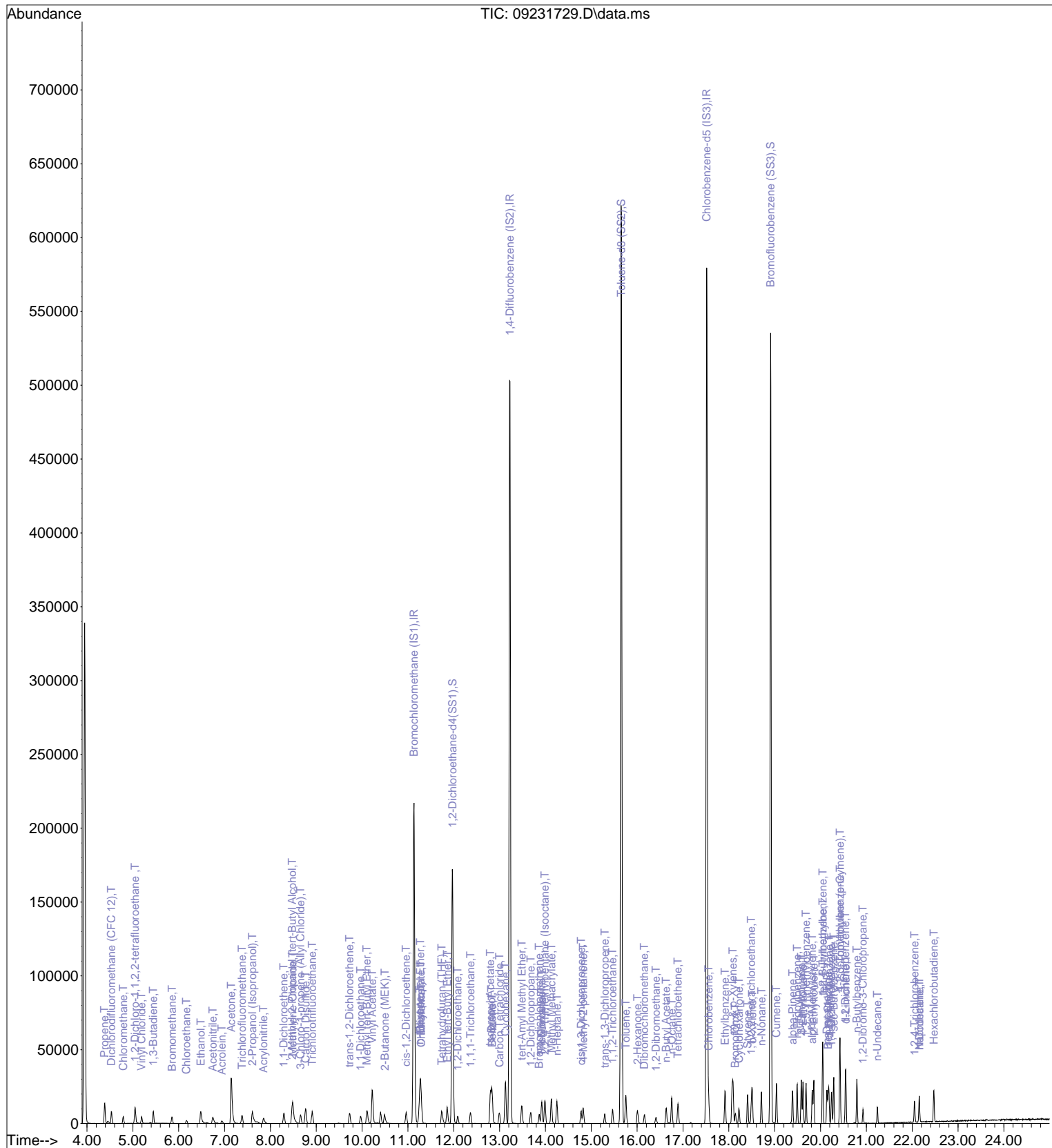
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
51) n-Heptane	14.25	71	4081	0.356	ng	94
52) cis-1,3-Dichloropropene	14.78	75	6688	0.377	ng	98
53) 4-Methyl-2-pentanone	14.82	58	3715	0.332	ng	98
54) trans-1,3-Dichloropropene	15.30	75	5167	0.338	ng	97
55) 1,1,2-Trichloroethane	15.46	97	4020	0.368	ng	94
58) Toluene	15.75	91	17666	0.358	ng	99
59) 2-Hexanone	16.01	43	8056	0.304	ng	96
60) Dibromochloromethane	16.16	129	4907	0.372	ng	99
61) 1,2-Dibromoethane	16.41	107	4449	0.365	ng	100
62) n-Butyl Acetate	16.63	43	9143	0.316	ng	98
63) n-Octane	16.76	57	3425	0.326	ng	99
64) Tetrachloroethene	16.89	166	5500	0.389	ng	93
65) Chlorobenzene	17.56	112	12611	0.388	ng	97
66) Ethylbenzene	17.92	91	19656	0.369	ng	95
67) m- & p-Xylenes	18.09	91	30359	0.736	ng	98
68) Bromoform	18.14	173	4251	0.361	ng	98
69) Styrene	18.41	104	12006	0.352	ng	97
70) o-Xylene	18.51	91	15118	0.362	ng	99
71) n-Nonane	18.71	43	7888	0.323	ng	96
72) 1,1,2,2-Tetrachloroethane	18.49	83	6642	0.365	ng	98
74) Cumene	19.04	105	19884	0.371	ng	100
75) alpha-Pinene	19.39	93	9755	0.345	ng	92
76) n-Propylbenzene	19.49	91	22994	0.367	ng	100
77) 3-Ethyltoluene	19.58	105	19972	0.365	ng	100
78) 4-Ethyltoluene	19.62	105	18022	0.358	ng	98
79) 1,3,5-Trimethylbenzene	19.69	105	15578	0.350	ng	99
80) alpha-Methylstyrene	19.82	118	8106	0.320	ng	91
81) 2-Ethyltoluene	19.86	105	19535	0.371	ng	99
82) 1,2,4-Trimethylbenzene	20.05	105	15616	0.350	ng	98
83) n-Decane	20.14	57	7505	0.300	ng	99
84) Benzyl Chloride	20.16	91	11844	0.331	ng	99
85) 1,3-Dichlorobenzene	20.19	146	10390	0.373	ng	100
86) 1,4-Dichlorobenzene	20.24	146	10520	0.377	ng	98
87) sec-Butylbenzene	20.29	105	22319	0.373	ng	99
88) 4-Isopropyltoluene (p-...	20.42	119	21211	0.371	ng	98
89) 1,2,3-Trimethylbenzene	20.42	105	15364	0.342	ng	99
90) 1,2-Dichlorobenzene	20.54	146	10125	0.389	ng	98
91) d-Limonene	20.55	68	5334	0.286	ng	99
92) 1,2-Dibromo-3-Chloropr...	20.93	157	3351	0.351	ng	97
93) n-Undecane	21.24	57	3663	0.136	ng	95
94) 1,2,4-Trichlorobenzene	22.05	180	5474	0.273	ng	93
95) Naphthalene	22.15	128	12837	0.210	ng	98
96) n-Dodecane	22.15	57	1284	0.049	ng	92
97) Hexachlorobutadiene	22.47	225	5381	0.405	ng	97
98) Cyclohexanone	18.22	55	5136	0.305	ng	96
99) tert-Butylbenzene	20.05	119	16766	0.376	ng	99
100) n-Butylbenzene	20.79	91	16107	0.338	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 09\23\09231729.D
Acq On : 23 Sep 2017 17:44
Sample : 0.40ng TO-15 ICAL Std
Misc : S31-09111702/S31-09121704 (10/11)

Vial: 14
Operator: WA
Inst : MS13

Quant Time: Sep 25 06:25:01 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:24:19 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 09\23\09231730.D
 Acq On : 23 Sep 2017 18:19
 Sample : 1.0ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231704 (10/22)

Vial: 15
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:03 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

 9/25/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.13	130	112231	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	13.23	114	542501	12.500	ng	0.00
56) Chlorobenzene-d5 (IS3)	17.52	82	206075	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	141467	12.012	ng	-0.02
Spiked Amount	12.500	Range 70 - 130	Recovery	=	96.08%	
57) Toluene-d8 (SS2)	15.66	98	541518	12.124	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	96.96%	
73) Bromofluorobenzene (SS3)	18.91	174	208410	15.503	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	124.00%	

Target Compounds

						Qvalue
2) Propene	4.37	42	12488	0.859	ng	97
3) Dichlorodifluoromethan...	4.52	85	21344	1.001	ng	99
4) Chloromethane	4.78	50	15580	0.882	ng	98
5) 1,2-Dichloro-1,1,2,2-t...	5.04	135	11312	0.937	ng	99
6) Vinyl Chloride	5.18	62	14646	0.865	ng	99
7) 1,3-Butadiene	5.43	54	10987	0.960	ng	99
8) Bromomethane	5.84	94	9722	0.964	ng	100
9) Chloroethane	6.16	64	7874	0.932	ng	98
10) Ethanol	6.48	45	40942	4.644	ng	99
11) Acetonitrile	6.74	41	19964	0.770	ng	99
12) Acrolein	6.93	56	6508	0.787	ng	98
13) Acetone	7.13	58	41844	4.551	ng	98
14) Trichlorofluoromethane	7.38	101	18516	0.995	ng	100
15) 2-Propanol (Isopropanol)	7.59	45	55380	1.782	ng	100
16) Acrylonitrile	7.85	53	13651	0.868	ng	99
17) 1,1-Dichloroethene	8.30	96	11146	0.951	ng	99
18) 2-Methyl-2-Propanol (t...	8.45	59	56036	1.930	ng	99
19) Methylene Chloride	8.49	84	11946	0.949	ng	99
20) 3-Chloro-1-propene (Al...	8.66	41	14993	0.790	ng	100
21) Trichlorotrifluoroethane	8.91	151	11233	0.992	ng	94
22) Carbon Disulfide	8.76	76	44453	0.969	ng	100
23) trans-1,2-Dichloroethene	9.72	61	15011	0.914	ng	100
24) 1,1-Dichloroethane	9.97	63	18786	0.902	ng	99
25) Methyl tert-Butyl Ether	10.10	73	33893	0.947	ng	100
26) Vinyl Acetate	10.22	86	11622	4.919	ng	# 91
27) 2-Butanone (MEK)	10.48	72	7195	0.841	ng	# 88
28) cis-1,2-Dichloroethene	10.96	61	14377	0.908	ng	100
29) Diisopropyl Ether	11.27	87	11770	1.024	ng	# 94
30) Ethyl Acetate	11.27	61	7926	1.834	ng	98
31) n-Hexane	11.25	57	18804	0.883	ng	99
32) Chloroform	11.30	83	19179	0.982	ng	97
34) Tetrahydrofuran (THF)	11.73	72	8061	0.851	ng	99
35) Ethyl tert-Butyl Ether	11.85	87	13987	0.975	ng	100
36) 1,2-Dichloroethane	12.09	62	13180	0.943	ng	98
38) 1,1,1-Trichloroethane	12.37	97	17164	1.006	ng	99
39) Isopropyl Acetate	12.79	61	14076	1.835	ng	99
40) 1-Butanol	12.81	56	20929	1.643	ng	95
41) Benzene	12.84	78	45426	0.925	ng	100
42) Carbon Tetrachloride	12.99	117	14850	0.997	ng	98
43) Cyclohexane	13.13	84	35722	1.954	ng	100
44) tert-Amyl Methyl Ether	13.48	73	32347	0.947	ng	99
45) 1,2-Dichloropropane	13.68	63	10980	0.941	ng	99
46) Bromodichloromethane	13.86	83	14212	0.942	ng	98
47) Trichloroethene	13.92	130	13995	0.977	ng	100
48) 1,4-Dioxane	13.91	88	9901	0.967	ng	97
49) 2,2,4-Trimethylpentane...	13.99	57	47025	0.929	ng	99
50) Methyl Methacrylate	14.12	100	10038	2.054	ng	100

Data File : I:\MS13\DATA\2017 09\23\09231730.D
 Acq On : 23 Sep 2017 18:19
 Sample : 1.0ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231704 (10/22)

Vial: 15
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:03 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

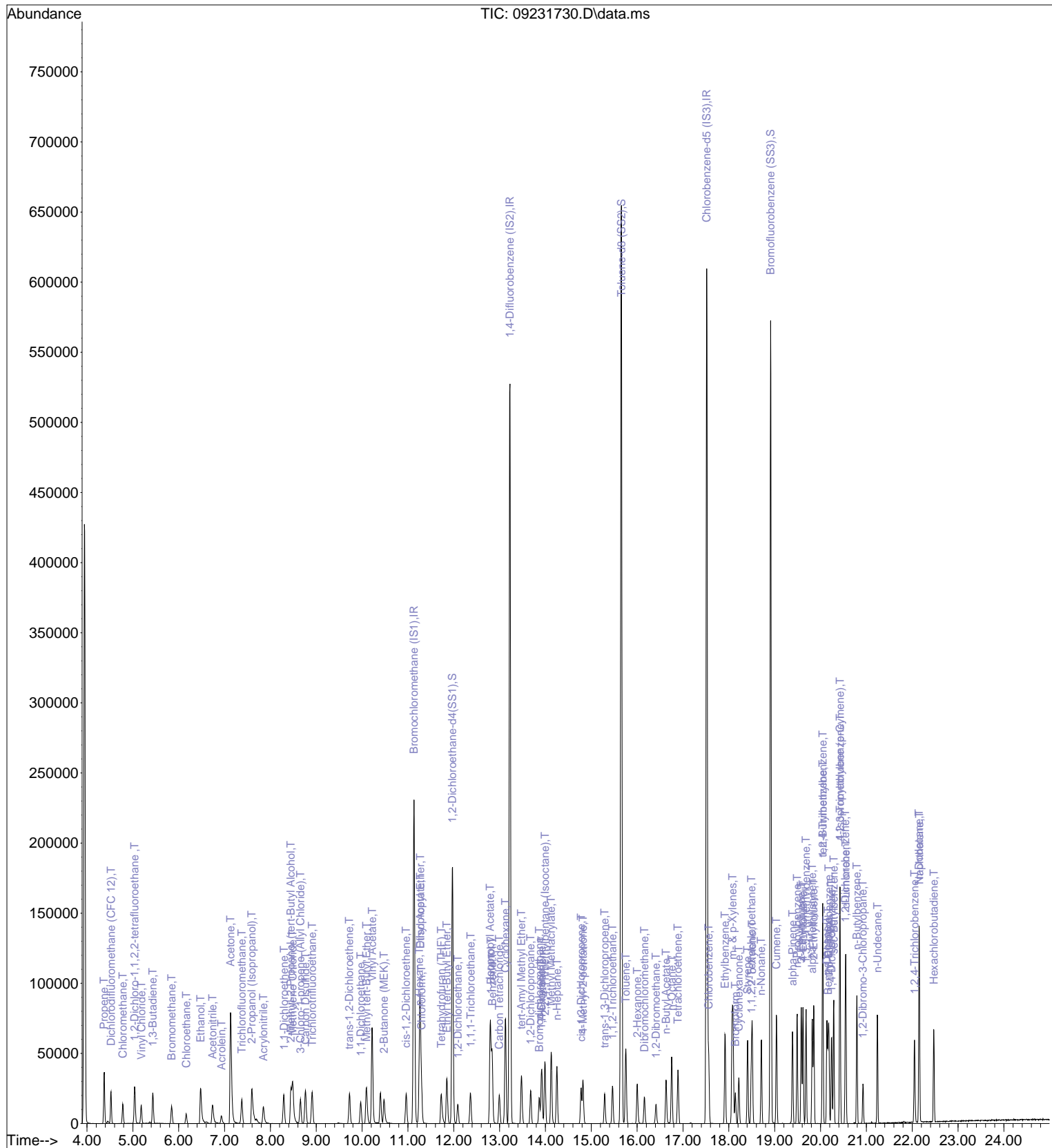
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	14.25	71	11439	0.954	ng	99
52) cis-1,3-Dichloropropene	14.78	75	18572	1.003	ng	98
53) 4-Methyl-2-pentanone	14.82	58	10387	0.888	ng	99
54) trans-1,3-Dichloropropene	15.29	75	15187	0.951	ng	100
55) 1,1,2-Trichloroethane	15.46	97	11142	0.976	ng	100
58) Toluene	15.75	91	47896	0.928	ng	99
59) 2-Hexanone	16.00	43	23515	0.848	ng	97
60) Dibromochloromethane	16.16	129	13623	0.986	ng	100
61) 1,2-Dibromoethane	16.41	107	12710	0.995	ng	97
62) n-Butyl Acetate	16.63	43	26457	0.872	ng	100
63) n-Octane	16.75	57	9348	0.849	ng	99
64) Tetrachloroethene	16.89	166	15526	1.049	ng	99
65) Chlorobenzene	17.56	112	33308	0.979	ng	99
66) Ethylbenzene	17.92	91	53079	0.951	ng	100
67) m- & p-Xylenes	18.08	91	85227	1.973	ng	99
68) Bromoform	18.14	173	12377	1.004	ng	99
69) Styrene	18.41	104	34504	0.967	ng	99
70) o-Xylene	18.51	91	42324	0.967	ng	99
71) n-Nonane	18.71	43	22008	0.862	ng	99
72) 1,1,2,2-Tetrachloroethane	18.49	83	18904	0.993	ng	99
74) Cumene	19.04	105	55863	0.995	ng	100
75) alpha-Pinene	19.39	93	28261	0.955	ng	97
76) n-Propylbenzene	19.49	91	64679	0.987	ng	99
77) 3-Ethyltoluene	19.58	105	56689	0.991	ng	99
78) 4-Ethyltoluene	19.62	105	51661	0.980	ng	100
79) 1,3,5-Trimethylbenzene	19.69	105	45683	0.981	ng	100
80) alpha-Methylstyrene	19.82	118	25788	0.973	ng	92
81) 2-Ethyltoluene	19.85	105	54511	0.989	ng	100
82) 1,2,4-Trimethylbenzene	20.05	105	46031	0.984	ng	99
83) n-Decane	20.14	57	23478	0.898	ng	98
84) Benzyl Chloride	20.16	91	34281	0.914	ng	100
85) 1,3-Dichlorobenzene	20.18	146	29936	1.026	ng	99
86) 1,4-Dichlorobenzene	20.24	146	29996	1.026	ng	99
87) sec-Butylbenzene	20.29	105	62119	0.992	ng	99
88) 4-Isopropyltoluene (p-...	20.42	119	59969	1.003	ng	100
89) 1,2,3-Trimethylbenzene	20.42	105	45217	0.962	ng	100
90) 1,2-Dichlorobenzene	20.54	146	29029	1.065	ng	100
91) d-Limonene	20.55	68	16857	0.864	ng	99
92) 1,2-Dibromo-3-Chloropr...	20.93	157	9835	0.984	ng	97
93) n-Undecane	21.24	57	24001	0.854	ng	100
94) 1,2,4-Trichlorobenzene	22.05	180	22169	1.057	ng	99
95) Naphthalene	22.16	128	64321	1.007	ng	99
96) n-Dodecane	22.15	57	21504	0.781	ng	98
97) Hexachlorobutadiene	22.47	225	15208	1.093	ng	99
98) Cyclohexanone	18.22	55	15184	0.862	ng	99
99) tert-Butylbenzene	20.05	119	47144	1.010	ng	99
100) n-Butylbenzene	20.79	91	48255	0.968	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 09\23\09231730.D
Acq On : 23 Sep 2017 18:19
Sample : 1.0ng TO-15 ICAL Std
Misc : S31-09111702/S31-09231704 (10/22)

Vial: 15
Operator: WA
Inst : MS13

Quant Time: Sep 25 06:25:03 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:24:19 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 09\23\09231731.D
 Acq On : 23 Sep 2017 18:53
 Sample : 5.0ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231704 (10/22)

Vial: 15
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:05 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

WA 9/25/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.14	130	104411	12.500	ng	0.00
37) 1,4-Difluorobenzene (IS2)	13.23	114	509220	12.500	ng	0.00
56) Chlorobenzene-d5 (IS3)	17.52	82	195452	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.97	65	133980	12.229	ng	-0.01
Spiked Amount	12.500	Range 70 - 130	Recovery	=	97.84%	
57) Toluene-d8 (SS2)	15.66	98	507198	11.973	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	95.76%	
73) Bromofluorobenzene (SS3)	18.91	174	196264	15.393	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	123.12%	

Target Compounds

						Qvalue
2) Propene	4.36	42	56086	4.147	ng	100
3) Dichlorodifluoromethan...	4.52	85	95009	4.790	ng	100
4) Chloromethane	4.77	50	66972	4.076	ng	100
5) 1,2-Dichloro-1,1,2,2-t...	5.04	135	50792	4.521	ng	99
6) Vinyl Chloride	5.18	62	65316	4.146	ng	99
7) 1,3-Butadiene	5.43	54	50325	4.725	ng	99
8) Bromomethane	5.84	94	39092	4.166	ng	99
9) Chloroethane	6.16	64	34527	4.393	ng	98
10) Ethanol	6.50	45	178722	21.789	ng	99
11) Acetonitrile	6.75	41	94357	3.912	ng	99
12) Acrolein	6.93	56	31408	4.085	ng	97
13) Acetone	7.13	58	186097	21.756	ng	100
14) Trichlorofluoromethane	7.38	101	81885	4.730	ng	99
15) 2-Propanol (Isopropanol)	7.60	45	251246	8.691	ng	100
16) Acrylonitrile	7.85	53	66155	4.521	ng	98
17) 1,1-Dichloroethene	8.30	96	50103	4.594	ng	99
18) 2-Methyl-2-Propanol (t...	8.45	59	255693	9.465	ng	100
19) Methylene Chloride	8.50	84	50418	4.304	ng	100
20) 3-Chloro-1-propene (Al...	8.66	41	73775	4.180	ng	99
21) Trichlorotrifluoroethane	8.91	151	51098	4.852	ng	99
22) Carbon Disulfide	8.76	76	188929	4.428	ng	100
23) trans-1,2-Dichloroethene	9.73	61	70420	4.607	ng	99
24) 1,1-Dichloroethane	9.98	63	83881	4.327	ng	100
25) Methyl tert-Butyl Ether	10.08	73	154728	4.648	ng	99
26) Vinyl Acetate	10.22	86	55689	25.333	ng	# 92
27) 2-Butanone (MEK)	10.47	72	35051	4.406	ng	98
28) cis-1,2-Dichloroethene	10.97	61	66198	4.496	ng	99
29) Diisopropyl Ether	11.26	87	51925	4.854	ng	# 91
30) Ethyl Acetate	11.27	61	37002	9.202	ng	98
31) n-Hexane	11.25	57	82501	4.163	ng	100
32) Chloroform	11.30	83	83567	4.598	ng	99
34) Tetrahydrofuran (THF)	11.72	72	34882	3.957	ng	99
35) Ethyl tert-Butyl Ether	11.85	87	63058	4.727	ng	99
36) 1,2-Dichloroethane	12.09	62	60802	4.676	ng	100
38) 1,1,1-Trichloroethane	12.37	97	77779	4.858	ng	99
39) Isopropyl Acetate	12.79	61	63475	8.815	ng	100
40) 1-Butanol	12.80	56	103455	8.654	ng	99
41) Benzene	12.84	78	200766	4.355	ng	100
42) Carbon Tetrachloride	13.00	117	68916	4.930	ng	100
43) Cyclohexane	13.13	84	158942	9.263	ng	99
44) tert-Amyl Methyl Ether	13.48	73	146289	4.564	ng	99
45) 1,2-Dichloropropane	13.68	63	49373	4.506	ng	100
46) Bromodichloromethane	13.87	83	66269	4.679	ng	99
47) Trichloroethene	13.92	130	61351	4.564	ng	99
48) 1,4-Dioxane	13.90	88	43941	4.572	ng	99
49) 2,2,4-Trimethylpentane...	13.99	57	207805	4.372	ng	99
50) Methyl Methacrylate	14.13	100	45432	9.903	ng	99

Data File : I:\MS13\DATA\2017 09\23\09231731.D
 Acq On : 23 Sep 2017 18:53
 Sample : 5.0ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231704 (10/22)

Vial: 15
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:05 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

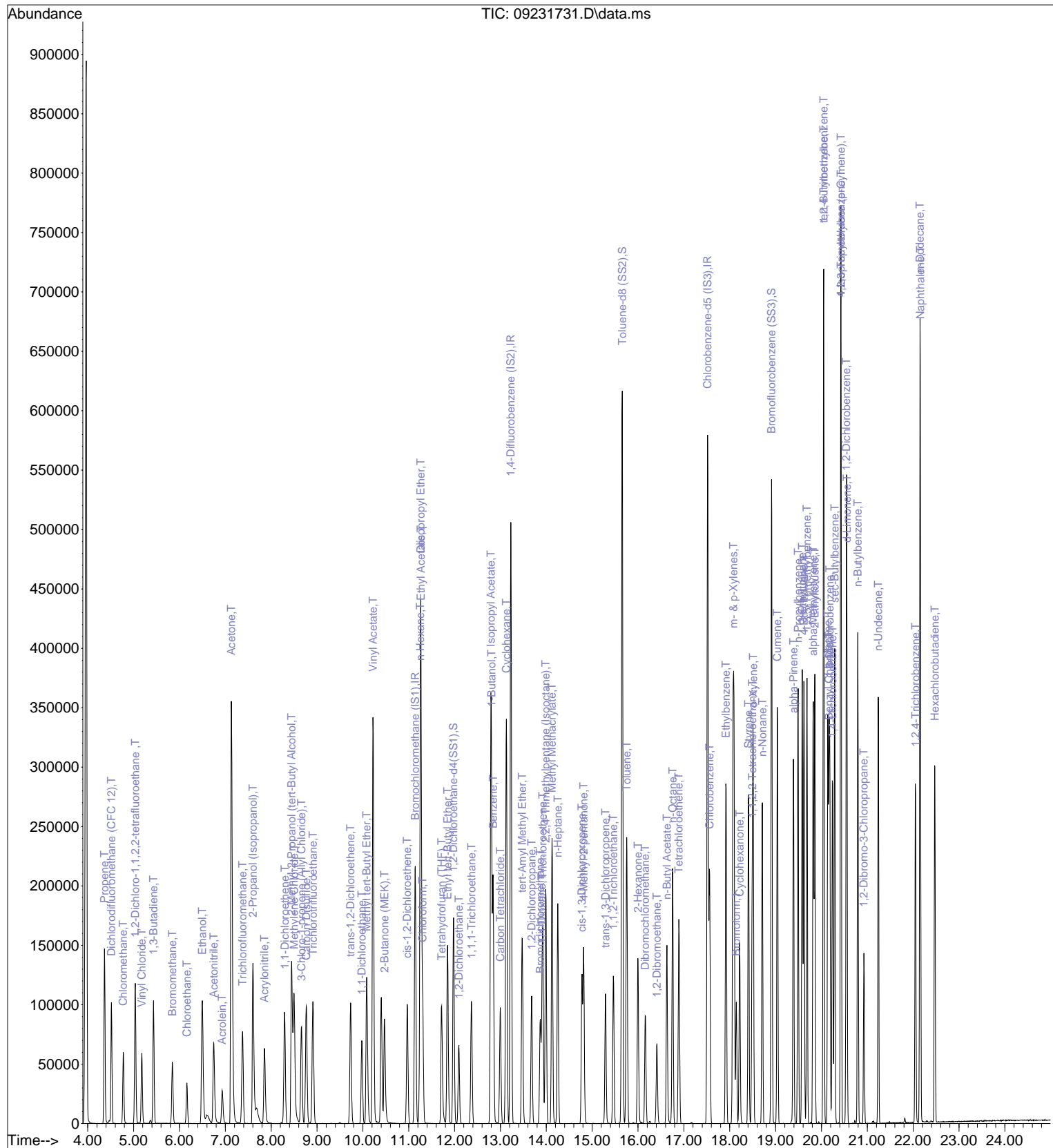
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	14.25	71	51063	4.537	ng	99
52) cis-1,3-Dichloropropene	14.77	75	87226	5.017	ng	99
53) 4-Methyl-2-pentanone	14.81	58	46977	4.281	ng	98
54) trans-1,3-Dichloropropene	15.29	75	73977	4.934	ng	100
55) 1,1,2-Trichloroethane	15.46	97	50329	4.696	ng	99
58) Toluene	15.75	91	211438	4.318	ng	99
59) 2-Hexanone	16.00	43	110744	4.211	ng	98
60) Dibromochloromethane	16.16	129	63587	4.855	ng	99
61) 1,2-Dibromoethane	16.41	107	57895	4.778	ng	99
62) n-Butyl Acetate	16.63	43	122487	4.257	ng	99
63) n-Octane	16.75	57	42766	4.095	ng	99
64) Tetrachloroethene	16.89	166	69222	4.930	ng	98
65) Chlorobenzene	17.56	112	150140	4.652	ng	100
66) Ethylbenzene	17.92	91	240501	4.544	ng	99
67) m- & p-Xylenes	18.08	91	371658	9.073	ng	98
68) Bromoform	18.14	173	57926	4.954	ng	99
69) Styrene	18.41	104	160650	4.749	ng	100
70) o-Xylene	18.51	91	187982	4.529	ng	99
71) n-Nonane	18.71	43	99206	4.097	ng	99
72) 1,1,2,2-Tetrachloroethane	18.49	83	86970	4.819	ng	100
74) Cumene	19.04	105	251198	4.719	ng	100
75) alpha-Pinene	19.39	93	128022	4.561	ng	99
76) n-Propylbenzene	19.49	91	294044	4.730	ng	100
77) 3-Ethyltoluene	19.58	105	254822	4.696	ng	100
78) 4-Ethyltoluene	19.62	105	235218	4.705	ng	100
79) 1,3,5-Trimethylbenzene	19.69	105	207592	4.700	ng	99
80) alpha-Methylstyrene	19.82	118	121114	4.819	ng	99
81) 2-Ethyltoluene	19.86	105	246958	4.726	ng	100
82) 1,2,4-Trimethylbenzene	20.05	105	209324	4.719	ng	100
83) n-Decane	20.14	57	104925	4.229	ng	100
84) Benzyl Chloride	20.16	91	174309	4.900	ng	100
85) 1,3-Dichlorobenzene	20.18	146	134511	4.861	ng	100
86) 1,4-Dichlorobenzene	20.24	146	135780	4.898	ng	100
87) sec-Butylbenzene	20.29	105	281063	4.730	ng	100
88) 4-Isopropyltoluene (p-...	20.43	119	269016	4.744	ng	100
89) 1,2,3-Trimethylbenzene	20.43	105	205219	4.604	ng	99
90) 1,2-Dichlorobenzene	20.54	146	128654	4.978	ng	100
91) d-Limonene	20.56	68	78813	4.261	ng	98
92) 1,2-Dibromo-3-Chloropr...	20.93	157	47401	4.998	ng	99
93) n-Undecane	21.24	57	110531	4.145	ng	100
94) 1,2,4-Trichlorobenzene	22.05	180	103186	5.188	ng	100
95) Naphthalene	22.16	128	305148	5.036	ng	100
96) n-Dodecane	22.15	57	101508	3.885	ng	99
97) Hexachlorobutadiene	22.47	225	68271	5.172	ng	100
98) Cyclohexanone	18.22	55	69520	4.162	ng	99
99) tert-Butylbenzene	20.05	119	212326	4.798	ng	100
100) n-Butylbenzene	20.79	91	220884	4.670	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 09\23\09231731.D
Acq On : 23 Sep 2017 18:53
Sample : 5.0ng TO-15 ICAL Std
Misc : S31-09111702/S31-09231704 (10/22)

Vial: 15
Operator: WA
Inst : MS13

Quant Time: Sep 25 06:25:05 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:24:19 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 09\23\09231732.D
 Acq On : 23 Sep 2017 19:28
 Sample : 25ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 16
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:07 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

USA 9/25/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.15	130	104271	12.500	ng	0.00
37) 1,4-Difluorobenzene (IS2)	13.23	114	496666	12.500	ng	0.00
56) Chlorobenzene-d5 (IS3)	17.52	82	191410	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.99	65	133341	12.187	ng	0.00
Spiked Amount	12.500	Range	70 - 130	Recovery	=	97.52%
57) Toluene-d8 (SS2)	15.66	98	496008	11.956	ng	0.00
Spiked Amount	12.500	Range	70 - 130	Recovery	=	95.68%
73) Bromofluorobenzene (SS3)	18.92	174	193025	15.458	ng	0.00
Spiked Amount	12.500	Range	70 - 130	Recovery	=	123.68%

Target Compounds

						Qvalue
2) Propene	4.35	42	303802	22.493	ng	100
3) Dichlorodifluoromethan...	4.50	85	523466	26.424	ng	100
4) Chloromethane	4.77	50	374131	22.803	ng	100
5) 1,2-Dichloro-1,1,2,2-t...	5.03	135	281275	25.072	ng	100
6) Vinyl Chloride	5.18	62	367637	23.370	ng	100
7) 1,3-Butadiene	5.43	54	295211	27.756	ng	100
8) Bromomethane	5.85	94	239128	25.520	ng	100
9) Chloroethane	6.16	64	193353	24.633	ng	100
10) Ethanol	6.53	45	982193	119.905	ng	100
11) Acetonitrile	6.77	41	521171	21.639	ng	100
12) Acrolein	6.94	56	179369	23.360	ng	100
13) Acetone	7.14	58	1009334	118.158	ng	100
14) Trichlorofluoromethane	7.38	101	443672	25.663	ng	100
15) 2-Propanol (Isopropanol)	7.62	45	1429175	49.506	ng	99
16) Acrylonitrile	7.86	53	375357	25.684	ng	100
17) 1,1-Dichloroethene	8.30	96	283538	26.036	ng	100
18) 2-Methyl-2-Propanol (t...	8.46	59	1457975	54.042	ng	100
19) Methylene Chloride	8.51	84	282284	24.130	ng	100
20) 3-Chloro-1-propene (Al...	8.67	41	423634	24.035	ng	100
21) Trichlorotrifluoroethane	8.91	151	287462	27.334	ng	100
22) Carbon Disulfide	8.77	76	1032258	24.225	ng	100
23) trans-1,2-Dichloroethene	9.74	61	396304	25.962	ng	100
24) 1,1-Dichloroethane	9.99	63	465046	24.022	ng	100
25) Methyl tert-Butyl Ether	10.08	73	860006	25.869	ng	100
26) Vinyl Acetate	10.23	86	325388	148.219	ng	100
27) 2-Butanone (MEK)	10.47	72	192825	24.269	ng	100
28) cis-1,2-Dichloroethene	10.97	61	375891	25.563	ng	100
29) Diisopropyl Ether	11.26	87	282582	26.451	ng	100
30) Ethyl Acetate	11.27	61	195988	48.803	ng	100
31) n-Hexane	11.25	57	403115	20.368	ng	100
32) Chloroform	11.31	83	473571	26.089	ng	100
34) Tetrahydrofuran (THF)	11.71	72	191338	21.735	ng	100
35) Ethyl tert-Butyl Ether	11.84	87	350170	26.284	ng	100
36) 1,2-Dichloroethane	12.10	62	338623	26.079	ng	100
38) 1,1,1-Trichloroethane	12.37	97	430221	27.548	ng	100
39) Isopropyl Acetate	12.79	61	339505	48.339	ng	100
40) 1-Butanol	12.81	56	582532	49.962	ng	100
41) Benzene	12.84	78	1080769	24.038	ng	100
42) Carbon Tetrachloride	13.00	117	391209	28.695	ng	100
43) Cyclohexane	13.13	84	866881	51.799	ng	100
44) tert-Amyl Methyl Ether	13.47	73	820551	26.249	ng	100
45) 1,2-Dichloropropane	13.68	63	265785	24.868	ng	100
46) Bromodichloromethane	13.87	83	371270	26.877	ng	100
47) Trichloroethene	13.93	130	337187	25.720	ng	100
48) 1,4-Dioxane	13.90	88	245273	26.163	ng	100
49) 2,2,4-Trimethylpentane...	13.99	57	1142142	24.639	ng	100
50) Methyl Methacrylate	14.13	100	247945	55.409	ng	100

Data File : I:\MS13\DATA\2017 09\23\09231732.D
 Acq On : 23 Sep 2017 19:28
 Sample : 25ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 16
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:07 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

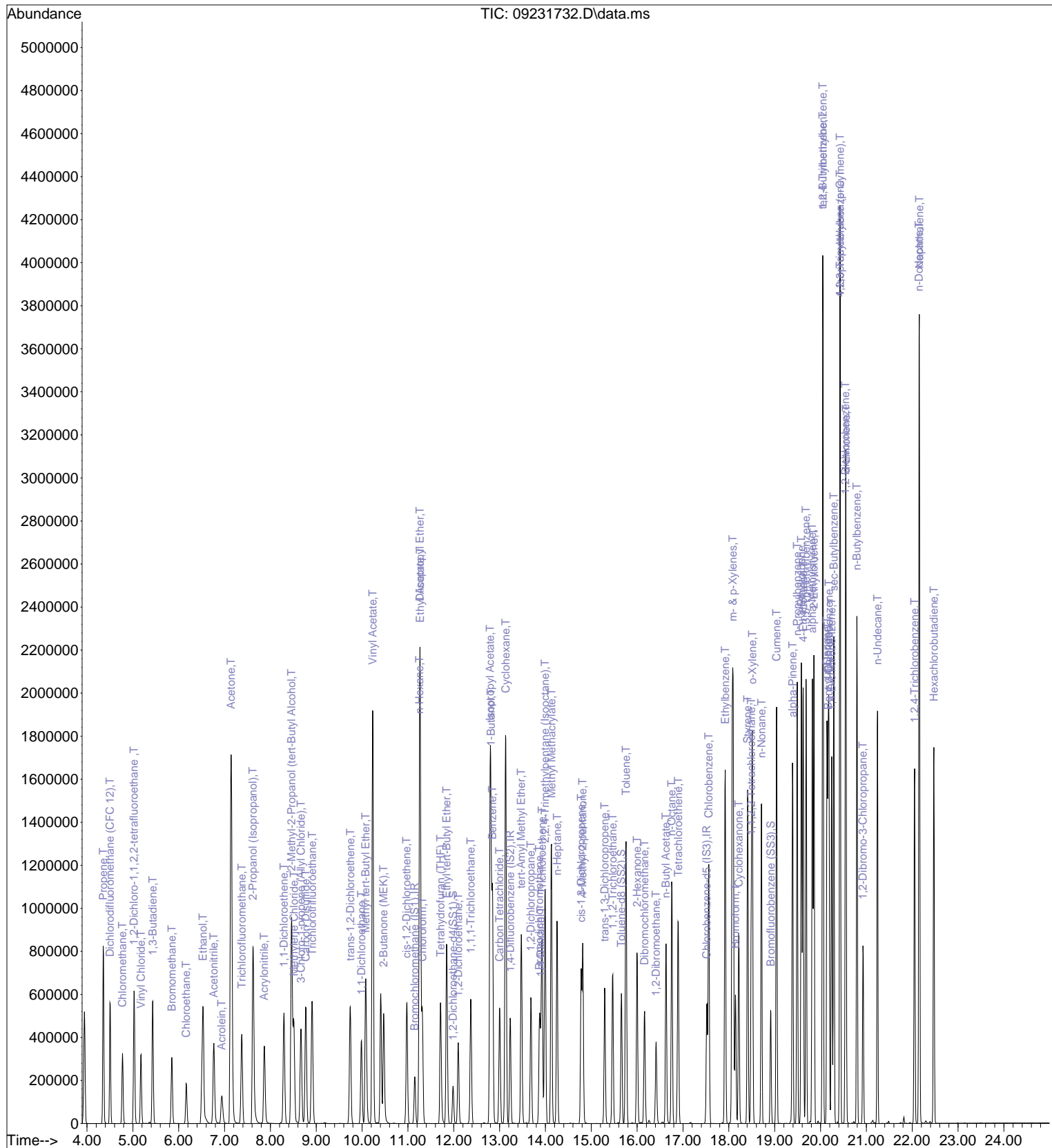
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	14.26	71	264274	24.076	ng	100
52) cis-1,3-Dichloropropene	14.78	75	485817	28.647	ng	100
53) 4-Methyl-2-pentanone	14.81	58	261316	24.414	ng	100
54) trans-1,3-Dichloropropene	15.29	75	419480	28.687	ng	100
55) 1,1,2-Trichloroethane	15.47	97	281896	26.970	ng	100
58) Toluene	15.76	91	1161212	24.214	ng	100
59) 2-Hexanone	16.00	43	609585	23.667	ng	100
60) Dibromochloromethane	16.16	129	362675	28.274	ng	100
61) 1,2-Dibromoethane	16.41	107	324262	27.324	ng	100
62) n-Butyl Acetate	16.63	43	684653	24.300	ng	100
63) n-Octane	16.75	57	229377	22.428	ng	100
64) Tetrachloroethene	16.90	166	380953	27.705	ng	100
65) Chlorobenzene	17.56	112	828101	26.197	ng	100
66) Ethylbenzene	17.92	91	1334681	25.751	ng	100
67) m- & p-Xylenes	18.09	91	2119170	52.827	ng	100
68) Bromoform	18.14	173	341935	29.860	ng	100
69) Styrene	18.41	104	911269	27.507	ng	100
70) o-Xylene	18.51	91	1052118	25.884	ng	100
71) n-Nonane	18.71	43	537959	22.684	ng	100
72) 1,1,2,2-Tetrachloroethane	18.49	83	497645	28.155	ng	100
74) Cumene	19.04	105	1401148	26.880	ng	100
75) alpha-Pinene	19.39	93	714706	26.002	ng	100
76) n-Propylbenzene	19.49	91	1635901	26.873	ng	100
77) 3-Ethyltoluene	19.58	105	1399347	26.331	ng	100
78) 4-Ethyltoluene	19.62	105	1344247	27.459	ng	100
79) 1,3,5-Trimethylbenzene	19.69	105	1162235	26.870	ng	100
80) alpha-Methylstyrene	19.82	118	690113	28.039	ng	100
81) 2-Ethyltoluene	19.86	105	1375887	26.884	ng	100
82) 1,2,4-Trimethylbenzene	20.05	105	1174511	27.039	ng	100
83) n-Decane	20.14	57	574731	23.656	ng	100
84) Benzyl Chloride	20.16	91	1050986	30.166	ng	100
85) 1,3-Dichlorobenzene	20.19	146	767099	28.310	ng	100
86) 1,4-Dichlorobenzene	20.24	146	779762	28.725	ng	100
87) sec-Butylbenzene	20.29	105	1575050	27.069	ng	100
88) 4-Isopropyltoluene (p-...	20.42	119	1505404	27.111	ng	100
89) 1,2,3-Trimethylbenzene	20.42	105	1161635	26.610	ng	100
90) 1,2-Dichlorobenzene	20.54	146	733542	28.980	ng	100
91) d-Limonene	20.56	68	440235	24.305	ng	100
92) 1,2-Dibromo-3-Chloropr...	20.93	157	275893	29.707	ng	100
93) n-Undecane	21.24	57	605181	23.176	ng	100
94) 1,2,4-Trichlorobenzene	22.05	180	597566	30.679	ng	100
95) Naphthalene	22.16	128	1741433	29.345	ng	100
96) n-Dodecane	22.15	57	574619	22.456	ng	100
97) Hexachlorobutadiene	22.47	225	385730	29.838	ng	100
98) Cyclohexanone	18.22	55	397745	24.317	ng	100
99) tert-Butylbenzene	20.05	119	1174318	27.099	ng	100
100) n-Butylbenzene	20.79	91	1234172	26.644	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 09\23\09231732.D
Acq On : 23 Sep 2017 19:28
Sample : 25ng TO-15 ICAL Std
Misc : S31-09111702/S31-09231702 (10/22)

Vial: 16
Operator: WA
Inst : MS13

Quant Time: Sep 25 06:25:07 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:24:19 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 09\23\09231733.D
 Acq On : 23 Sep 2017 20:03
 Sample : 50ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 16
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:09 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

07 9/25/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.15	130	110704	12.500	ng	0.00
37) 1,4-Difluorobenzene (IS2)	13.24	114	522250	12.500	ng	0.00
56) Chlorobenzene-d5 (IS3)	17.52	82	203153	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.99	65	138779	11.947	ng	0.00
Spiked Amount	12.500	Range	70 - 130	Recovery	=	95.60%
57) Toluene-d8 (SS2)	15.66	98	525217	11.928	ng	0.00
Spiked Amount	12.500	Range	70 - 130	Recovery	=	95.44%
73) Bromofluorobenzene (SS3)	18.92	174	207629	15.667	ng	0.00
Spiked Amount	12.500	Range	70 - 130	Recovery	=	125.36%

Target Compounds

						Qvalue
2) Propene	4.36	42	578412	40.336	ng	99
3) Dichlorodifluoromethan...	4.51	85	1002577	47.669	ng	100
4) Chloromethane	4.78	50	752748	43.214	ng	100
5) 1,2-Dichloro-1,1,2,2-t...	5.04	135	577957	48.524	ng	100
6) Vinyl Chloride	5.18	62	740828	44.356	ng	100
7) 1,3-Butadiene	5.44	54	607118	53.765	ng	100
8) Bromomethane	5.86	94	437260	43.953	ng	100
9) Chloroethane	6.17	64	379301	45.515	ng	100
10) Ethanol	6.56	45	1882878	216.503	ng	100
11) Acetonitrile	6.78	41	1021230	39.937	ng	100
12) Acrolein	6.95	56	346389	42.491	ng	99
13) Acetone	7.16	58	1904875	210.037	ng	98
14) Trichlorofluoromethane	7.38	101	865333	47.144	ng	100
15) 2-Propanol (Isopropanol)	7.65	45	2730536	89.088	ng	100
16) Acrylonitrile	7.88	53	735402	47.396	ng	99
17) 1,1-Dichloroethene	8.30	96	560292	48.459	ng	99
18) 2-Methyl-2-Propanol (t...	8.49	59	2771076	96.746	ng	100
19) Methylene Chloride	8.52	84	553297	44.549	ng	98
20) 3-Chloro-1-propene (Al...	8.67	41	824521	44.060	ng	99
21) Trichlorotrifluoroethane	8.91	151	567520	50.828	ng	100
22) Carbon Disulfide	8.78	76	2033611	44.951	ng	100
23) trans-1,2-Dichloroethene	9.74	61	778514	48.037	ng	100
24) 1,1-Dichloroethane	9.99	63	910196	44.285	ng	100
25) Methyl tert-Butyl Ether	10.08	73	1684929	47.737	ng	100
26) Vinyl Acetate	10.24	86	646059	277.189	ng	# 89
27) 2-Butanone (MEK)	10.48	72	381390	45.213	ng	98
28) cis-1,2-Dichloroethene	10.98	61	733636	46.993	ng	98
29) Diisopropyl Ether	11.27	87	465967	41.083	ng	# 75
30) Ethyl Acetate	11.28	61	376113	88.214	ng	100
31) n-Hexane	11.26	57	763389	36.330	ng	99
32) Chloroform	11.32	83	924853	47.990	ng	100
34) Tetrahydrofuran (THF)	11.71	72	377278	40.366	ng	99
35) Ethyl tert-Butyl Ether	11.85	87	686802	48.556	ng	99
36) 1,2-Dichloroethane	12.10	62	658631	47.777	ng	100
38) 1,1,1-Trichloroethane	12.38	97	838787	51.078	ng	100
39) Isopropyl Acetate	12.80	61	657353	89.010	ng	97
40) 1-Butanol	12.83	56	1133888	92.486	ng	99
41) Benzene	12.85	78	2097137	44.359	ng	100
42) Carbon Tetrachloride	13.00	117	769288	53.663	ng	100
43) Cyclohexane	13.13	84	1676764	95.285	ng	99
44) tert-Amyl Methyl Ether	13.48	73	1603140	48.771	ng	100
45) 1,2-Dichloropropane	13.69	63	525674	46.775	ng	100
46) Bromodichloromethane	13.87	83	731005	50.327	ng	100
47) Trichloroethene	13.93	130	667603	48.428	ng	100
48) 1,4-Dioxane	13.90	88	483409	49.039	ng	98
49) 2,2,4-Trimethylpentane...	13.99	57	2219413	45.533	ng	99
50) Methyl Methacrylate	14.13	100	489584	104.049	ng	98

Data File : I:\MS13\DATA\2017 09\23\09231733.D
 Acq On : 23 Sep 2017 20:03
 Sample : 50ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 16
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:09 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

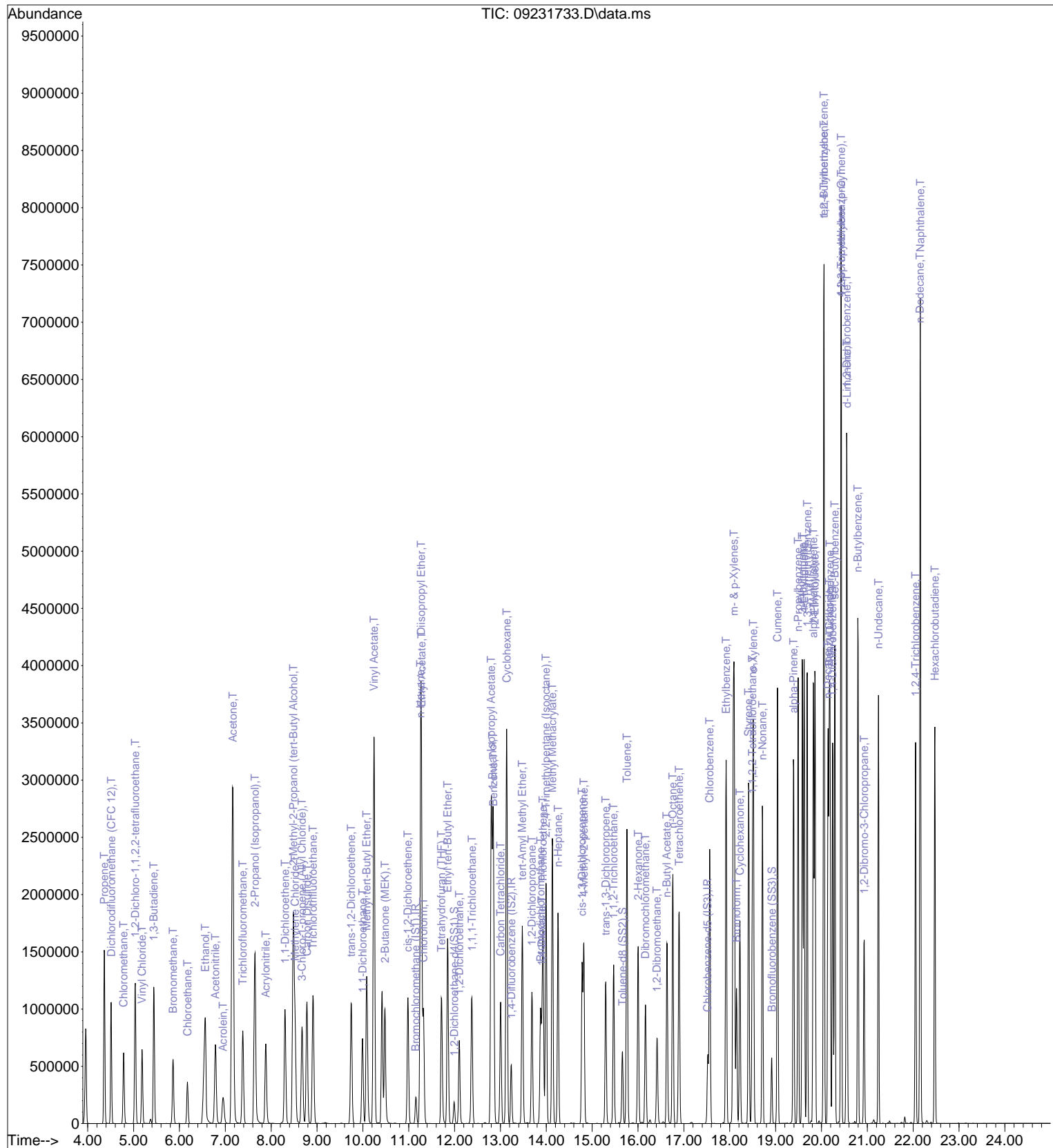
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	14.26	71	512998	44.445	ng	99
52) cis-1,3-Dichloropropene	14.78	75	959045	53.781	ng	100
53) 4-Methyl-2-pentanone	14.82	58	508406	45.171	ng	99
54) trans-1,3-Dichloropropene	15.30	75	837066	54.440	ng	99
55) 1,1,2-Trichloroethane	15.47	97	555162	50.512	ng	99
58) Toluene	15.76	91	2266660	44.533	ng	99
59) 2-Hexanone	16.00	43	1179715	43.155	ng	100
60) Dibromochloromethane	16.16	129	714451	52.479	ng	99
61) 1,2-Dibromoethane	16.41	107	644224	51.147	ng	100
62) n-Butyl Acetate	16.63	43	1334212	44.617	ng	100
63) n-Octane	16.76	57	443255	40.836	ng	99
64) Tetrachloroethene	16.90	166	755374	51.759	ng	100
65) Chlorobenzene	17.56	112	1625414	48.449	ng	100
66) Ethylbenzene	17.92	91	2579854	46.898	ng	100
67) m- & p-Xylenes	18.09	91	4103402	96.378	ng	100
68) Bromoform	18.15	173	680632	56.002	ng	99
69) Styrene	18.41	104	1777341	50.549	ng	99
70) o-Xylene	18.51	91	2046442	47.436	ng	99
71) n-Nonane	18.71	43	1020069	40.527	ng	99
72) 1,1,2,2-Tetrachloroethane	18.50	83	975529	52.002	ng	100
74) Cumene	19.04	105	2702298	48.845	ng	100
75) alpha-Pinene	19.39	93	1398742	47.947	ng	100
76) n-Propylbenzene	19.49	91	3121065	48.306	ng	99
77) 3-Ethyltoluene	19.58	105	2844127	50.424	ng	100
78) 4-Ethyltoluene	19.62	105	2463882	47.421	ng	100
79) 1,3,5-Trimethylbenzene	19.69	105	2257888	49.183	ng	100
80) alpha-Methylstyrene	19.83	118	1353176	51.800	ng	100
81) 2-Ethyltoluene	19.86	105	2668802	49.133	ng	100
82) 1,2,4-Trimethylbenzene	20.06	105	2266238	49.156	ng	100
83) n-Decane	20.14	57	1093910	42.423	ng	99
84) Benzyl Chloride	20.17	91	2083883	56.355	ng	99
85) 1,3-Dichlorobenzene	20.19	146	1499437	52.138	ng	100
86) 1,4-Dichlorobenzene	20.24	146	1540039	53.452	ng	100
87) sec-Butylbenzene	20.29	105	3022687	48.945	ng	99
88) 4-Isopropyltoluene (p-...	20.43	119	2853226	48.413	ng	99
89) 1,2,3-Trimethylbenzene	20.43	105	2237965	48.303	ng	100
90) 1,2-Dichlorobenzene	20.55	146	1432296	53.314	ng	100
91) d-Limonene	20.56	68	840427	43.717	ng	99
92) 1,2-Dibromo-3-Chloropr...	20.93	157	548409	55.637	ng	99
93) n-Undecane	21.24	57	1147181	41.392	ng	99
94) 1,2,4-Trichlorobenzene	22.05	180	1190223	57.574	ng	100
95) Naphthalene	22.16	128	3379558	53.658	ng	99
96) n-Dodecane	22.15	57	1074060	39.548	ng	99
97) Hexachlorobutadiene	22.47	225	772571	56.308	ng	99
98) Cyclohexanone	18.22	55	787398	45.356	ng	100
99) tert-Butylbenzene	20.06	119	2253968	49.007	ng	99
100) n-Butylbenzene	20.79	91	2359564	47.995	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 09\23\09231733.D
 Acq On : 23 Sep 2017 20:03
 Sample : 50ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 16
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:09 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 09\23\09231734.D
 Acq On : 23 Sep 2017 20:38
 Sample : 100ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 16
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:11 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

~~107A~~ 9/25/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.17	130	112603	12.500	ng	0.02
37) 1,4-Difluorobenzene (IS2)	13.24	114	539108	12.500	ng	0.01
56) Chlorobenzene-d5 (IS3)	17.52	82	208482	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	12.00	65	139853	11.836	ng	0.01
Spiked Amount	12.500	Range	70 - 130	Recovery	=	94.72%
57) Toluene-d8 (SS2)	15.66	98	536601	11.875	ng	0.00
Spiked Amount	12.500	Range	70 - 130	Recovery	=	95.04%
73) Bromofluorobenzene (SS3)	18.92	174	209911	15.434	ng	0.00
Spiked Amount	12.500	Range	70 - 130	Recovery	=	123.44%

Target Compounds

						Qvalue
2) Propene	4.36	42	1244962	85.355	ng	99
3) Dichlorodifluoromethan...	4.51	85	1930717	90.251	ng	100
4) Chloromethane	4.79	50	1358122	76.652	ng	100
5) 1,2-Dichloro-1,1,2,2-t...	5.04	135	1171706	96.716	ng	100
6) Vinyl Chloride	5.19	62	1493757	87.929	ng	99
7) 1,3-Butadiene	5.45	54	1201440	104.603	ng	99
8) Bromomethane	5.87	94	933421	92.245	ng	99
9) Chloroethane	6.18	64	745515	87.952	ng	100
10) Ethanol	6.60	45	3640452	411.539	ng	99
11) Acetonitrile	6.81	41	2034091	78.205	ng	100
12) Acrolein	6.96	56	688076	82.982	ng	99
13) Acetone	7.18	58	3581165	388.210	ng	94
14) Trichlorofluoromethane	7.39	101	1729613	92.642	ng	100
15) 2-Propanol (Isopropanol)	7.68	45	4749770	152.356	ng	100
16) Acrylonitrile	7.90	53	1467204	92.965	ng	100
17) 1,1-Dichloroethene	8.31	96	1116550	94.940	ng	98
18) 2-Methyl-2-Propanol (t...	8.51	59	4468277	153.369	ng	100
19) Methylene Chloride	8.53	84	1077152	85.264	ng	96
20) 3-Chloro-1-propene (Al...	8.68	41	1622706	85.251	ng	98
21) Trichlorotrifluoroethane	8.92	151	1135741	100.003	ng	99
22) Carbon Disulfide	8.79	76	4006740	87.071	ng	100
23) trans-1,2-Dichloroethene	9.75	61	1536261	93.193	ng	99
24) 1,1-Dichloroethane	10.00	63	1805074	86.343	ng	100
25) Methyl tert-Butyl Ether	10.09	73	3315112	92.339	ng	100
26) Vinyl Acetate	10.26	86	1274535	537.611	ng	# 70
27) 2-Butanone (MEK)	10.49	72	761191	88.715	ng	95
28) cis-1,2-Dichloroethene	10.99	61	1443525	90.906	ng	97
29) Diisopropyl Ether	11.27	87	885171	76.726	ng	# 80
30) Ethyl Acetate	11.29	61	722751	166.657	ng	97
31) n-Hexane	11.26	57	1504746	70.404	ng	100
32) Chloroform	11.33	83	1835076	93.615	ng	99
34) Tetrahydrofuran (THF)	11.72	72	749300	78.818	ng	98
35) Ethyl tert-Butyl Ether	11.85	87	1356052	94.254	ng	98
36) 1,2-Dichloroethane	12.11	62	1294051	92.287	ng	100
38) 1,1,1-Trichloroethane	12.38	97	1667082	98.342	ng	99
39) Isopropyl Acetate	12.80	61	1261563	165.483	ng	# 93
40) 1-Butanol	12.85	56	2165148	171.078	ng	# 1
41) Benzene	12.86	78	3988549	81.728	ng	99
42) Carbon Tetrachloride	13.01	117	1529079	103.328	ng	100
43) Cyclohexane	13.14	84	3242036	178.473	ng	97
44) tert-Amyl Methyl Ether	13.48	73	3121147	91.983	ng	100
45) 1,2-Dichloropropane	13.69	63	1037604	89.439	ng	100
46) Bromodichloromethane	13.88	83	1453584	96.945	ng	100
47) Trichloroethene	13.93	130	1337079	93.960	ng	100
48) 1,4-Dioxane	13.91	88	959586	94.301	ng	98
49) 2,2,4-Trimethylpentane...	14.00	57	4260220	84.670	ng	100
50) Methyl Methacrylate	14.14	100	970809	199.870	ng	97

Data File : I:\MS13\DATA\2017 09\23\09231734.D
 Acq On : 23 Sep 2017 20:38
 Sample : 100ng TO-15 ICAL Std
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 16
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 06:25:11 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:24:19 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

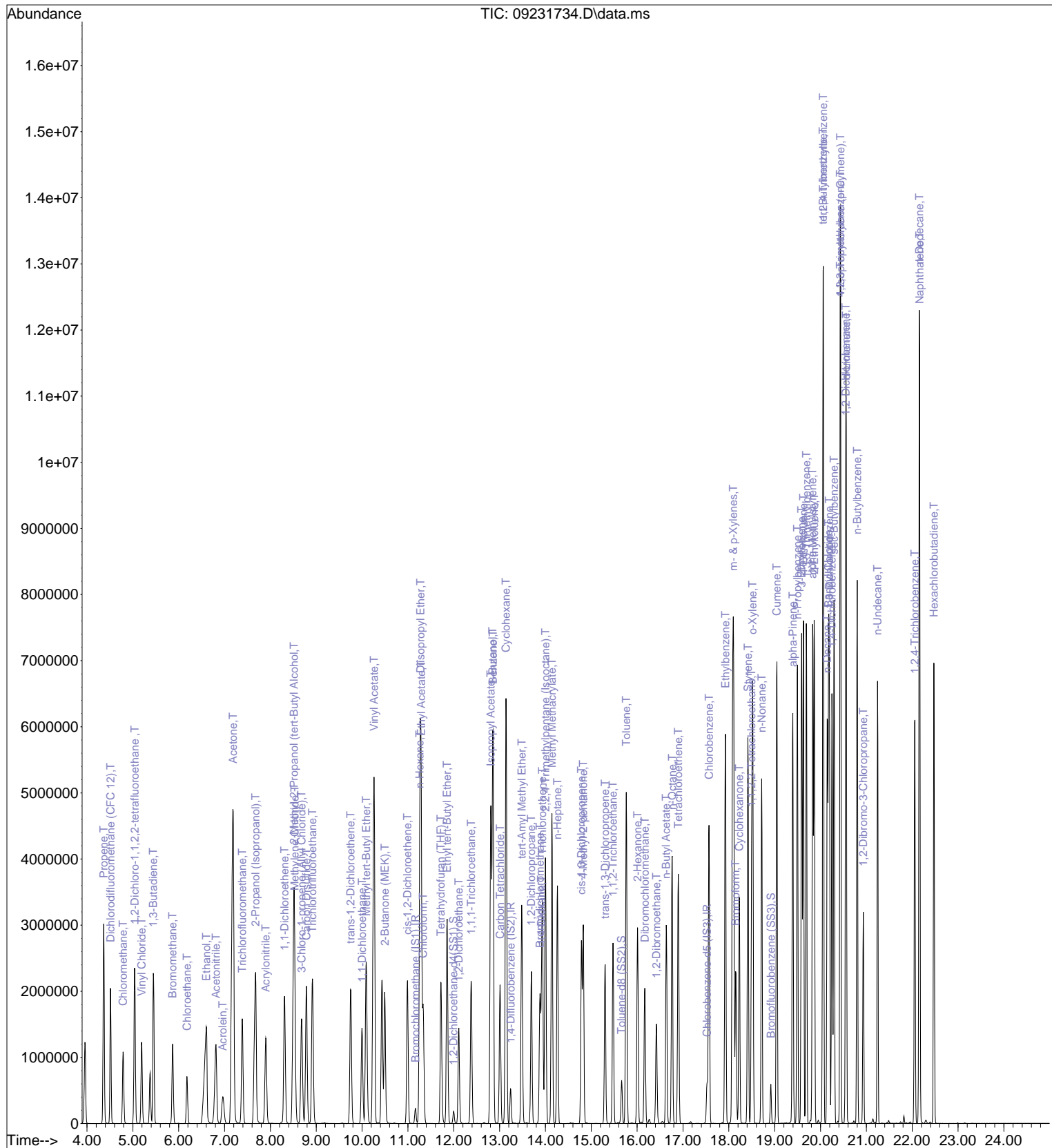
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	14.26	71	1015696	85.247	ng	99
52) cis-1,3-Dichloropropene	14.79	75	1902431	103.347	ng	100
53) 4-Methyl-2-pentanone	14.82	58	995026	85.642	ng	97
54) trans-1,3-Dichloropropene	15.30	75	1670148	105.225	ng	99
55) 1,1,2-Trichloroethane	15.47	97	1112522	98.058	ng	100
58) Toluene	15.76	91	4446892	85.135	ng	99
59) 2-Hexanone	16.01	43	2293664	81.759	ng	99
60) Dibromochloromethane	16.17	129	1436264	102.803	ng	99
61) 1,2-Dibromoethane	16.42	107	1293891	100.101	ng	99
62) n-Butyl Acetate	16.63	43	2568297	83.691	ng	99
63) n-Octane	16.77	57	859618	77.170	ng	98
64) Tetrachloroethene	16.90	166	1530722	102.205	ng	100
65) Chlorobenzene	17.57	112	3196953	92.855	ng	99
66) Ethylbenzene	17.93	91	4959359	87.850	ng	99
67) m- & p-Xylenes	18.10	91	7814484	178.849	ng	99
68) Bromoform	18.15	173	1369498	109.802	ng	100
69) Styrene	18.42	104	3465232	96.035	ng	99
70) o-Xylene	18.52	91	3936649	88.918	ng	99
71) n-Nonane	18.72	43	1897023	73.441	ng	97
72) 1,1,2,2-Tetrachloroethane	18.50	83	1890768	98.214	ng	100
74) Cumene	19.05	105	5121296	90.204	ng	98
75) alpha-Pinene	19.39	93	2706661	90.410	ng	100
76) n-Propylbenzene	19.50	91	5788998	87.308	ng	97
77) 3-Ethyltoluene	19.59	105	5078250	87.731	ng	98
78) 4-Ethyltoluene	19.63	105	4901355	91.922	ng	98
79) 1,3,5-Trimethylbenzene	19.69	105	4316682	91.626	ng	99
80) alpha-Methylstyrene	19.83	118	2611447	97.412	ng	99
81) 2-Ethyltoluene	19.86	105	5032304	90.277	ng	98
82) 1,2,4-Trimethylbenzene	20.06	105	4218137	89.155	ng	100
83) n-Decane	20.15	57	2023535	76.470	ng	98
84) Benzyl Chloride	20.17	91	3974216	104.728	ng	98
85) 1,3-Dichlorobenzene	20.19	146	2916863	98.832	ng	100
86) 1,4-Dichlorobenzene	20.25	146	2990749	101.150	ng	99
87) sec-Butylbenzene	20.29	105	5611198	88.537	ng	97
88) 4-Isopropyltoluene (p-...	20.44	119	5134803	84.900	ng	96
89) 1,2,3-Trimethylbenzene	20.43	105	4172187	87.748	ng	99
90) 1,2-Dichlorobenzene	20.55	146	2732518	99.112	ng	99
91) d-Limonene	20.56	68	1536834	77.898	ng	95
92) 1,2-Dibromo-3-Chloropr...	20.93	157	1085227	107.284	ng	98
93) n-Undecane	21.24	57	2118053	74.470	ng	98
94) 1,2,4-Trichlorobenzene	22.06	180	2328688	109.764	ng	100
95) Naphthalene	22.16	128	6159921	95.302	ng	98
96) n-Dodecane	22.16	57	1893594	67.941	ng	96
97) Hexachlorobutadiene	22.47	225	1545155	109.739	ng	99
98) Cyclohexanone	18.23	55	1524906	85.592	ng	99
99) tert-Butylbenzene	20.06	119	4206285	89.118	ng	99
100) n-Butylbenzene	20.80	91	4422843	87.663	ng	98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 09\23\09231734.D
Acq On : 23 Sep 2017 20:38
Sample : 100ng TO-15 ICAL Std
Misc : S31-09111702/S31-09231702 (10/22)

Vial: 16
Operator: WA
Inst : MS13

Quant Time: Sep 25 06:25:11 2017
Quant Method : I:\MS13\METHODS\R13092317.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Mon Sep 25 06:24:19 2017
Response via : Initial Calibration
DataAcq Meth:TO15.M



Data File : I:\MS13\DATA\2017 09\23\09231737.D
 Acq On : 23 Sep 2017 22:23
 Sample : 25ng TO-15 ICV Std
 Misc : S31-09111702/S31-09051703 (10/4)

Vial: 12
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 16:28:03 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

407 9/25/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev (Min)
1) Bromochloromethane (IS1)	11.15	130	109573	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	13.23	114	525712	12.500	ng	-0.01
56) Chlorobenzene-d5 (IS3)	17.52	82	202557	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.99	65	134386	12.189	ng	-0.01
Spiked Amount	12.500	Range	70 - 130	Recovery	=	97.52%
57) Toluene-d8 (SS2)	15.66	98	525350	12.412	ng	0.00
Spiked Amount	12.500	Range	70 - 130	Recovery	=	99.28%
73) Bromofluorobenzene (SS3)	18.92	174	202423	12.395	ng	0.00
Spiked Amount	12.500	Range	70 - 130	Recovery	=	99.20%

Target Compounds

	R.T.	QIon	Response	Conc	Units	Qvalue
2) Propene	4.35	42	296942	25.476	ng	99
3) Dichlorodifluoromethan...	4.50	85	498026	26.066	ng	100
4) Chloromethane	4.77	50	391000	27.386	ng	100
5) 1,2-Dichloro-1,1,2,2-t...	5.03	135	300785	28.305	ng	100
6) Vinyl Chloride	5.17	62	387269	28.643	ng	99
7) 1,3-Butadiene	5.43	54	302255	29.372	ng	100
8) Bromomethane	5.85	94	256031	28.130	ng	100
9) Chloroethane	6.16	64	195252	27.758	ng	99
10) Ethanol	6.52	45	899453	127.129	ng	99
11) Acetonitrile	6.76	41	482107	27.383	ng	100
12) Acrolein	6.94	56	169721	26.568	ng	100
13) Acetone	7.14	58	968795	128.293	ng	97
14) Trichlorofluoromethane	7.38	101	426815	26.117	ng	99
15) 2-Propanol (Isopropanol)	7.61	45	1346954	54.815	ng	99
16) Acrylonitrile	7.86	53	361031	27.471	ng	100
17) 1,1-Dichloroethene	8.29	96	277457	27.778	ng	97
18) 2-Methyl-2-Propanol (t...	8.46	59	1368664	55.686	ng	100
19) Methylene Chloride	8.51	84	276387	23.427	ng	98
20) 3-Chloro-1-propene (Al...	8.66	41	422987	29.590	ng	100
21) Trichlorotrifluoroethane	8.91	151	281953	27.534	ng	100
22) Carbon Disulfide	8.77	76	1018348	24.462	ng	100
23) trans-1,2-Dichloroethene	9.74	61	380194	29.060	ng	99
24) 1,1-Dichloroethane	9.98	63	466140	26.769	ng	100
25) Methyl tert-Butyl Ether	10.08	73	832717	27.683	ng	100
26) Vinyl Acetate	10.23	86	330696	145.740	ng	# 95
27) 2-Butanone (MEK)	10.47	72	190352	27.226	ng	97
28) cis-1,2-Dichloroethene	10.97	61	357966	27.839	ng	98
29) Diisopropyl Ether	11.26	87	276200	28.836	ng	100
30) Ethyl Acetate	11.27	61	192436	57.795	ng	100
31) n-Hexane	11.25	57	404612	25.605	ng	100
32) Chloroform	11.31	83	451399	27.001	ng	100
34) Tetrahydrofuran (THF)	11.71	72	185671	25.088	ng	99
35) Ethyl tert-Butyl Ether	11.84	87	339980	27.551	ng	100
36) 1,2-Dichloroethane	12.10	62	317754	27.148	ng	99
38) 1,1,1-Trichloroethane	12.37	97	406523	27.172	ng	99
39) Isopropyl Acetate	12.79	61	333972	54.469	ng	97
40) 1-Butanol	12.81	56	547467	55.897	ng	100
41) Benzene	12.84	78	1084615	26.645	ng	100
42) Carbon Tetrachloride	13.00	117	378809	28.043	ng	100
43) Cyclohexane	13.13	84	856458	54.968	ng	99
44) tert-Amyl Methyl Ether	13.47	73	796712	27.330	ng	100
45) 1,2-Dichloropropane	13.68	63	262191	27.734	ng	100
46) Bromodichloromethane	13.87	83	360779	28.014	ng	100
47) Trichloroethene	13.93	130	331196	26.877	ng	100
48) 1,4-Dioxane	13.90	88	238246	28.350	ng	99
49) 2,2,4-Trimethylpentane...	13.99	57	1120858	27.183	ng	98
50) Methyl Methacrylate	14.13	100	247723	56.180	ng	98

Data File : I:\MS13\DATA\2017 09\23\09231737.D
 Acq On : 23 Sep 2017 22:23
 Sample : 25ng TO-15 ICV Std
 Misc : S31-09111702/S31-09051703 (10/4)

Vial: 12
 Operator: WA
 Inst : MS13

Quant Time: Sep 25 16:28:03 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	14.25	71	264976	26.565	ng	99
52) cis-1,3-Dichloropropene	14.78	75	446486	28.531	ng	100
53) 4-Methyl-2-pentanone	14.81	58	254888	28.384	ng	99
54) trans-1,3-Dichloropropene	15.29	75	407441	30.054	ng	100
55) 1,1,2-Trichloroethane	15.46	97	276099	27.967	ng	100
58) Toluene	15.76	91	1136069	26.497	ng	100
59) 2-Hexanone	16.00	43	583871	28.033	ng	99
60) Dibromochloromethane	16.16	129	348649	28.505	ng	100
61) 1,2-Dibromoethane	16.41	107	315705	28.437	ng	100
62) n-Butyl Acetate	16.63	43	665861	28.717	ng	100
63) n-Octane	16.75	57	224486	26.914	ng	99
64) Tetrachloroethene	16.89	166	374209	27.294	ng	100
65) Chlorobenzene	17.56	112	808836	27.084	ng	100
66) Ethylbenzene	17.92	91	1300700	27.091	ng	100
67) m- & p-Xylenes	18.09	91	1997024	53.328	ng	98
68) Bromoform	18.14	173	325156	28.770	ng	100
69) Styrene	18.41	104	870848	27.904	ng	99
70) o-Xylene	18.51	91	1018389	27.139	ng	99
71) n-Nonane	18.71	43	520138	27.206	ng	99
72) 1,1,2,2-Tetrachloroethane	18.49	83	476234	27.739	ng	100
74) Cumene	19.04	105	1361501	27.349	ng	100
75) alpha-Pinene	19.39	93	696152	27.827	ng	100
76) n-Propylbenzene	19.49	91	1573726	27.638	ng	100
77) 3-Ethyltoluene	19.58	105	1322924	26.198	ng	100
78) 4-Ethyltoluene	19.62	105	1336697	28.742	ng	100
79) 1,3,5-Trimethylbenzene	19.69	105	1113824	27.220	ng	100
80) alpha-Methylstyrene	19.82	118	649628	26.746	ng	100
81) 2-Ethyltoluene	19.86	105	1325379	27.465	ng	100
82) 1,2,4-Trimethylbenzene	20.05	105	1123012	27.707	ng	100
83) n-Decane	20.14	57	560450	28.956	ng	100
84) Benzyl Chloride	20.16	91	997482	28.574	ng	100
85) 1,3-Dichlorobenzene	20.19	146	726455	27.471	ng	100
86) 1,4-Dichlorobenzene	20.24	146	733376	27.073	ng	100
87) sec-Butylbenzene	20.29	105	1515409	27.319	ng	100
88) 4-Isopropyltoluene (p-...	20.43	119	1462939	27.096	ng	100
89) 1,2,3-Trimethylbenzene	20.43	105	1148300	28.156	ng	100
90) 1,2-Dichlorobenzene	20.54	146	690478	27.621	ng	100
91) d-Limonene	20.56	68	423441	27.770	ng	99
92) 1,2-Dibromo-3-Chloropr...	20.93	157	256829	28.427	ng	99
93) n-Undecane	21.24	57	586075	26.699	ng	100
94) 1,2,4-Trichlorobenzene	22.05	180	532077	29.620	ng	99
95) Naphthalene	22.16	128	1469858	25.837	ng	100
96) n-Dodecane	22.15	57	568681	28.243	ng	100
97) Hexachlorobutadiene	22.47	225	352698	25.826	ng	99
98) Cyclohexanone	18.22	55	382071	27.928	ng	100
99) tert-Butylbenzene	20.05	119	1140703	27.352	ng	100
100) n-Butylbenzene	20.80	91	1170515	27.693	ng	100

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Initial Calibration Verification/LABORATORY CONTROL SAMPLE CHECK SHEET

Data File Name: 09231737.D

Acq. Method File: TO15.M

WA 9/25/17

Data File Path: I:\MS13\DATA\2017_09\23\

Sample Name: 25ng TO-15 ICV Std

Operator: WA

Misc Info: S31-09111702/S31-09051703 (

Date Acquired: 9/23/2017

22:23

Instrument Name: MS13

#	Compound Name	Ret. Time	Amt. (ng)	Spike Amt.(ng)	% Rec.	Lower Limit	Upper Limit	* OR Fail	ICV/AZ 70-130%
2)	Propene	4.35	25.476	26.275	97	52	127	*	*
3)	Dichlorodifluoromethane (CFC 1	4.50	26.066	26.600	98	68	109	*	*
4)	Chloromethane	4.77	27.386	26.250	104	51	130	*	*
5)	1,2-Dichloro-1,1,2,2-tetrafluoroet	5.03	28.305	26.325	108	66	114	*	*
6)	Vinyl Chloride	5.17	28.643	26.350	109	61	125	*	*
7)	1,3-Butadiene	5.43	29.372	26.225	112	62	144	*	*
8)	Bromomethane	5.85	28.130	26.225	107	73	123	*	*
9)	Chloroethane	6.16	27.758	26.250	106	69	122	*	*
10)	Ethanol	6.52	127.129	130.375	98	62	124	*	*
11)	Acetonitrile	6.76	27.383	26.200	105	57	114	*	*
12)	Acrolein	6.94	26.568	26.075	102	62	116	*	*
13)	Acetone	7.14	128.293	131.825	97	57	117	*	*
14)	Trichlorofluoromethane	7.38	26.117	26.025	100	63	98	FAIL	*
15)	2-Propanol (Isopropanol)	7.61	54.815	52.775	104	66	121	*	*
16)	Acrylonitrile	7.86	27.471	26.450	104	68	123	*	*
17)	1,1-Dichloroethene	8.29	27.778	26.675	104	76	118	*	*
18)	2-Methyl-2-Propanol (tert-Butyl Alc	8.46	55.686	53.350	104	74	126	*	*
19)	Methylene Chloride	8.51	23.427	26.600	88	60	118	*	*
20)	3-Chloro-1-propene (Allyl Chlorid	8.66	29.590	26.525	112	65	126	*	*
21)	Trichlorotrifluoroethane	8.91	27.534	26.750	103	73	114	*	*
22)	Carbon Disulfide	8.77	24.462	26.725	92	57	102	*	*
23)	trans-1,2-Dichloroethene	9.74	29.060	26.700	109	74	123	*	*
24)	1,1-Dichloroethane	9.98	26.769	26.525	101	69	111	*	*
25)	Methyl tert-Butyl Ether	10.08	27.683	26.625	104	69	113	*	*
26)	Vinyl Acetate	10.23	145.740	132.750	110	76	128	*	*
27)	2-Butanone (MEK)	10.47	27.226	26.450	103	63	127	*	*
28)	cis-1,2-Dichloroethene	10.97	27.839	26.475	105	72	117	*	*
29)	Diisopropyl Ether	11.26	28.836	26.600	108	64	118	*	*
30)	Ethyl Acetate	11.27	57.795	53.300	108	68	127	*	*
31)	n-Hexane	11.25	25.605	26.625	96	55	116	*	*
32)	Chloroform	11.31	27.001	26.500	102	70	109	*	*
34)	Tetrahydrofuran (THF)	11.71	25.088	26.550	94	72	113	*	*
35)	Ethyl tert-Butyl Ether	11.84	27.551	26.525	104	73	117	*	*
36)	1,2-Dichloroethane	12.10	27.148	26.500	102	69	113	*	*
38)	1,1,1-Trichloroethane	12.37	27.172	26.525	102	72	115	*	*
39)	Isopropyl Acetate	12.79	54.469	53.275	102	68	122	*	*
40)	1-Butanol	12.81	55.897	53.300	105	75	141	*	*
41)	Benzene	12.84	26.645	26.625	100	65	107	*	*
42)	Carbon Tetrachloride	13.00	28.043	26.700	105	71	113	*	*
43)	Cyclohexane	13.13	54.968	53.150	103	71	115	*	*
44)	tert-Amyl Methyl Ether	13.47	27.330	26.550	103	73	115	*	*
45)	1,2-Dichloropropane	13.68	27.734	26.525	105	71	115	*	*
46)	Bromodichloromethane	13.87	28.014	26.700	105	75	118	*	*
47)	Trichloroethene	13.93	26.877	26.550	101	68	114	*	*
48)	1,4-Dioxane	13.90	28.350	26.600	107	81	131	*	*
49)	2,2,4-Trimethylpentane (Isooctane)	13.99	27.183	26.525	102	68	112	*	*

Bold = 75 Compound List

* = Pass

Initial Calibration Verification/LABORATORY CONTROL SAMPLE CHECK SHEETData File Name: **09231737.D**

TO15.M

Data File Path: **I:\MS13\DATA\2017_09\23**Sample Name: **25ng TO-15 ICV Std**Operator: **WA**Misc Info: **S31-09111702/S31-09051703 (**Date Acquired: **9/23/2017****22:23**Instrument Name: **MS13**

#	Compound Name	Ret. Time	Amt. (ng)	Spike Amt.(ng)	% Rec.	Lower Limit	Upper Limit	* OR Fail	ICV/AZ 70-130%
50)	Methyl Methacrylate	14.13	56.180	52.950	106	72	130	*	*
51)	n-Heptane	14.25	26.565	26.625	100	68	116	*	*
52)	cis-1,3-Dichloropropene	14.78	28.531	26.025	110	77	126	*	*
53)	4-Methyl-2-pentanone	14.81	28.384	26.650	107	69	126	*	*
54)	trans-1,3-Dichloropropene	15.29	30.054	26.625	113	79	125	*	*
55)	1,1,2-Trichloroethane	15.46	27.967	26.500	106	75	119	*	*
58)	Toluene	15.76	26.497	26.400	100	59	118	*	*
59)	2-Hexanone	16.00	28.033	26.425	106	69	129	*	*
60)	Dibromochloromethane	16.16	28.505	26.450	108	74	136	*	*
61)	1,2-Dibromoethane	16.41	28.437	26.425	108	73	131	*	*
62)	n-Butyl Acetate	16.63	28.717	26.850	107	69	130	*	*
63)	n-Octane	16.75	26.914	26.525	101	66	120	*	*
64)	Tetrachloroethene	16.89	27.294	26.500	103	65	130	*	*
65)	Chlorobenzene	17.56	27.084	26.525	102	68	120	*	*
66)	Ethylbenzene	17.92	27.091	26.475	102	68	122	*	*
67)	m- & p-Xylenes	18.09	53.328	52.975	101	68	123	*	*
68)	Bromoform	18.14	28.770	26.525	108	69	130	*	*
69)	Styrene	18.41	27.904	26.350	106	71	133	*	*
70)	o-Xylene	18.51	27.139	26.400	103	68	122	*	*
71)	n-Nonane	18.71	27.206	26.500	103	65	120	*	*
72)	1,1,2,2-Tetrachloroethane	18.49	27.739	26.450	105	69	130	*	*
74)	Cumene	19.04	27.349	26.525	103	70	123	*	*
75)	alpha-Pinene	19.39	27.827	26.600	105	70	128	*	*
76)	n-Propylbenzene	19.49	27.638	26.750	103	69	125	*	*
77)	3-Ethyltoluene	19.58	26.198	26.450	99	67	128	*	*
78)	4-Ethyltoluene	19.62	28.742	26.425	109	67	130	*	*
79)	1,3,5-Trimethylbenzene	19.69	27.220	26.500	103	67	124	*	*
80)	alpha-Methylstyrene	19.82	26.746	26.525	101	67	141	*	*
81)	2-Ethyltoluene	19.86	27.465	26.700	103	67	124	*	*
82)	1,2,4-Trimethylbenzene	20.05	27.707	26.550	104	67	129	*	*
83)	n-Decane	20.14	28.956	26.625	109	66	124	*	*
84)	Benzyl Chloride	20.16	28.574	26.550	108	79	138	*	*
85)	1,3-Dichlorobenzene	20.19	27.471	26.475	104	65	136	*	*
86)	1,4-Dichlorobenzene	20.24	27.073	26.750	101	66	141	*	*
87)	sec-Butylbenzene	20.29	27.319	26.575	103	68	125	*	*
88)	4-Isopropyltoluene (p-Cymene)	20.43	27.096	26.600	102	68	131	*	*
89)	1,2,3-Trimethylbenzene	20.43	28.156	26.600	106	68	132	*	*
90)	1,2-Dichlorobenzene	20.54	27.621	26.750	103	67	136	*	*
91)	d-Limonene	20.56	27.770	26.625	104	71	134	*	*
92)	1,2-Dibromo-3-Chloropropane	20.93	28.427	26.300	108	73	136	*	*
93)	n-Undecane	21.24	26.699	26.775	100	68	132	*	*
94)	1,2,4-Trichlorobenzene	22.05	29.620	27.200	109	64	134	*	*
95)	Naphthalene	22.16	25.837	26.125	99	62	136	*	*
96)	n-Dodecane	22.15	28.243	26.825	105	61	137	*	*
97)	Hexachlorobutadiene	22.47	25.826	26.550	97	60	133	*	*
98)	Cyclohexanone	18.22	27.928	26.150	107	64	131	*	*
99)	tert-Butylbenzene	20.05	27.352	26.525	103	67	128	*	*
100)	n-Butylbenzene	20.80	27.693	26.575	104	68	128	*	*

Data File : I:\MS13\DATA\2017 10\07\10071701.D
 Acq On : 7 Oct 2017 1:56
 Sample : CCV R13100717 25ng
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 3
 Operator: WA
 Inst : MS13

Quant Time: Oct 07 07:26:42 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.33min
 Max. RRF Dev : 30% Max. Rel. Area : 200%

 10/7/17

	Compound	AvgRF	CCRF	%Dev	Area%	Dev (min)
1 IR	Bromochloromethane (IS1)	1.000	1.000	0.0	115	-0.02
2 T	Propene	1.182	1.265	-7.0	104	0.00
3 T	Dichlorodifluoromethane (CF	1.937	2.041	-5.4	98	0.00
4 T	Chloromethane	1.448	1.626	-12.3	105	0.00
5 T	1,2-Dichloro-1,1,2,2-tetra	1.078	1.107	-2.7	96	-0.01
6 T	Vinyl Chloride	1.371	1.492	-8.8	101	-0.01
7 T	1,3-Butadiene	1.043	1.142	-9.5	98	-0.01
8 T	Bromomethane	0.923	0.988	-7.0	98	-0.02
9 T	Chloroethane	0.713	0.796	-11.6	100	-0.01
10 T	Ethanol	0.717	0.793	-10.6	102	-0.07
11 T	Acetonitrile	1.785	2.136	-19.7	104	-0.05
12 T	Acrolein	0.625	0.675	-8.0	95	-0.02
13 T	Acetone	0.766	0.793	-3.5	100	-0.04
14 T	Trichlorofluoromethane	1.657	1.739	-4.9	99	-0.01
15 T	2-Propanol (Isopropanol)	2.492	2.883	-15.7	102	-0.06
16 T	Acrylonitrile	1.285	1.496	-16.4	101	-0.03
17 T	1,1-Dichloroethene	1.013	1.061	-4.7	95	-0.01
18 T	2-Methyl-2-Propanol (tert-B	2.492	2.868	-15.1	100	-0.06
19 T	Methylene Chloride	1.196	1.076	10.0	97	-0.02
20 T	3-Chloro-1-propene (Allyl C	1.450	1.727	-19.1	103	-0.01
21 T	Trichlorotrifluoroethane	1.038	1.047	-0.9	92	0.00
22 T	Carbon Disulfide	4.155	3.968	4.5	98	-0.01
23 T	trans-1,2-Dichloroethene	1.327	1.512	-13.9	99	-0.01
24 T	1,1-Dichloroethane	1.766	1.885	-6.7	99	-0.02
25 T	Methyl tert-Butyl Ether	3.050	3.308	-8.5	99	-0.01
26 T	Vinyl Acetate	0.222	0.259	-16.7	101	-0.03
27 T	2-Butanone (MEK)	0.684	0.757	-10.7	99	-0.02
28 T	cis-1,2-Dichloroethene	1.304	1.457	-11.7	99	-0.02
29 T	Diisopropyl Ether	0.971	1.063	-9.5	96	-0.01
30 T	Ethyl Acetate	0.338	0.385	-13.9	101	-0.02
31 T	n-Hexane	1.602	1.632	-1.9	104	0.00
32 T	Chloroform	1.695	1.823	-7.6	98	-0.02
33 S	1,2-Dichloroethane-d4 (SS1)	1.118	1.378	-23.3	124	-0.02
34 T	Tetrahydrofuran (THF)	0.750	0.737	1.7	98	-0.01
35 T	Ethyl tert-Butyl Ether	1.251	1.334	-6.6	97	-0.01
36 T	1,2-Dichloroethane	1.187	1.336	-12.6	100	-0.02
37 IR	1,4-Difluorobenzene (IS2)	1.000	1.000	0.0	113	-0.01
38 T	1,1,1-Trichloroethane	0.316	0.348	-10.1	98	0.00
39 T	Isopropyl Acetate	0.130	0.144	-10.8	101	-0.01
40 T	1-Butanol	0.207	0.243	-17.4	99	-0.04
41 T	Benzene	0.860	0.888	-3.3	98	-0.01
42 T	Carbon Tetrachloride	0.286	0.315	-10.1	96	-0.01
43 T	Cyclohexane	0.329	0.350	-6.4	97	-0.01
44 T	tert-Amyl Methyl Ether	0.616	0.681	-10.6	99	-0.01
45 T	1,2-Dichloropropane	0.200	0.224	-12.0	101	-0.01
46 T	Bromodichloromethane	0.272	0.305	-12.1	99	-0.01
47 T	Trichloroethene	0.260	0.262	-0.8	93	0.00
48 T	1,4-Dioxane	0.178	0.197	-10.7	96	-0.01
49 T	2,2,4-Trimethylpentane (Iso	0.871	0.965	-10.8	101	-0.01
50 T	Methyl Methacrylate	0.093	0.099	-6.5	95	-0.02
51 T	n-Heptane	0.211	0.221	-4.7	100	-0.01
52 T	cis-1,3-Dichloropropene	0.334	0.379	-13.5	98	-0.01
53 T	4-Methyl-2-pentanone	0.190	0.223	-17.4	102	-0.01
54 T	trans-1,3-Dichloropropene	0.293	0.347	-18.4	100	-0.01
55 T	1,1,2-Trichloroethane	0.209	0.227	-8.6	97	-0.01

Data File : I:\MS13\DATA\2017 10\07\10071701.D
 Acq On : 7 Oct 2017 1:56
 Sample : CCV R13100717 25ng
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 3
 Operator: WA
 Inst : MS13

Quant Time: Oct 07 07:26:42 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.33min
 Max. RRF Dev : 30% Max. Rel. Area : 200%

	Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
56 IR	Chlorobenzene-d5 (IS3)	1.000	1.000	0.0	120	0.00
57 S	Toluene-d8 (SS2)	2.322	2.510	-8.1	117	0.00
58 T	Toluene	2.352	2.304	2.0	96	-0.01
59 T	2-Hexanone	1.143	1.305	-14.2	105	-0.01
60 T	Dibromochloromethane	0.671	0.701	-4.5	94	0.00
61 T	1,2-Dibromoethane	0.609	0.633	-3.9	96	0.00
62 T	n-Butyl Acetate	1.272	1.451	-14.1	104	0.00
63 T	n-Octane	0.458	0.476	-3.9	101	-0.01
64 T	Tetrachloroethene	0.752	0.719	4.4	93	0.00
65 T	Chlorobenzene	1.638	1.583	3.4	94	0.00
66 T	Ethylbenzene	2.634	2.651	-0.6	96	-0.01
67 T	m- & p-Xylenes	2.054	2.086	-1.6	96	-0.01
68 T	Bromoform	0.620	0.642	-3.5	92	0.00
69 T	Styrene	1.712	1.737	-1.5	93	0.00
70 T	o-Xylene	2.058	2.089	-1.5	97	0.00
71 T	n-Nonane	1.049	1.153	-9.9	104	0.00
72 T	1,1,2,2-Tetrachloroethane	0.942	1.005	-6.7	98	0.00
73 S	Bromofluorobenzene (SS3)	0.896	0.960	-7.1	115	0.00
74 T	Cumene	2.731	2.736	-0.2	95	-0.01
75 T	alpha-Pinene	1.372	1.419	-3.4	96	0.00
76 T	n-Propylbenzene	3.123	3.221	-3.1	97	0.00
77 T	3-Ethyltoluene	2.770	2.787	-0.6	96	0.00
78 T	4-Ethyltoluene	2.551	2.610	-2.3	94	-0.01
79 T	1,3,5-Trimethylbenzene	2.245	2.285	-1.8	95	0.00
80 T	alpha-Methylstyrene	1.285	1.309	-1.9	92	0.00
81 T	2-Ethyltoluene	2.647	2.695	-1.8	96	0.00
82 T	1,2,4-Trimethylbenzene	2.223	2.334	-5.0	96	-0.01
83 T	n-Decane	1.062	1.196	-12.6	102	0.00
84 T	Benzyl Chloride	1.846	2.044	-10.7	96	-0.01
85 T	1,3-Dichlorobenzene	1.451	1.437	1.0	92	0.00
86 T	1,4-Dichlorobenzene	1.486	1.452	2.3	91	0.00
87 T	sec-Butylbenzene	3.043	3.092	-1.6	95	0.00
88 T	4-Isopropyltoluene (p-Cymen)	2.962	3.008	-1.6	94	-0.01
89 T	1,2,3-Trimethylbenzene	2.237	2.367	-5.8	96	0.00
90 T	1,2-Dichlorobenzene	1.371	1.361	0.7	93	0.00
91 T	d-Limonene	0.836	0.939	-12.3	99	0.00
92 T	1,2-Dibromo-3-Chloropropane	0.496	0.528	-6.5	93	0.00
93 T	n-Undecane	1.129	1.272	-12.7	102	0.00
94 T	1,2,4-Trichlorobenzene	0.985	1.062	-7.8	90	0.00
95 T	Naphthalene	3.009	3.268	-8.6	91	0.00
96 T	n-Dodecane	1.035	1.194	-15.4	101	0.00
97 T	Hexachlorobutadiene	0.749	0.727	2.9	92	0.00
98 T	Cyclohexanone	0.750	0.845	-12.7	102	-0.01
99 T	tert-Butylbenzene	2.288	2.308	-0.9	95	0.00
100 T	n-Butylbenzene	2.319	2.476	-6.8	97	0.00

(#) = Out of Range

SPCC's out = 0 CCC's out = 0

Data File : I:\MS13\DATA\2017 10\07\10071701.D
 Acq On : 7 Oct 2017 1:56
 Sample : CCV R13100717 25ng
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 3
 Operator: WA
 Inst : MS13

Quant Time: Oct 07 07:26:42 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

107/17

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.15	130	120026	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	13.23	114	563368	12.500	ng	-0.01
56) Chlorobenzene-d5 (IS3)	17.52	82	230409	12.500	ng	0.00

System Monitoring Compounds

33) 1,2-Dichloroethane-d4(...)	11.98	65	165374	13.693	ng	-0.02
Spiked Amount	12.500	Range 70 - 130	Recovery	=	109.52%	
57) Toluene-d8 (SS2)	15.66	98	578416	12.014	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	96.08%	
73) Bromofluorobenzene (SS3)	18.91	174	221205	11.908	ng	0.00
Spiked Amount	12.500	Range 70 - 130	Recovery	=	95.28%	

Target Compounds

						Qvalue
2) Propene	4.36	42	314964	24.669	ng	99
3) Dichlorodifluoromethan...	4.51	85	513477	24.535	ng	100
4) Chloromethane	4.78	50	392749	25.113	ng	100
5) 1,2-Dichloro-1,1,2,2-t...	5.03	135	271269	23.304	ng	100
6) Vinyl Chloride	5.18	62	369710	24.963	ng	100
7) 1,3-Butadiene	5.43	54	290393	25.762	ng	96
8) Bromomethane	5.85	94	235462	23.617	ng	99
9) Chloroethane	6.17	64	193393	25.099	ng	100
10) Ethanol	6.53	45	1003617	129.498	ng	99
11) Acetonitrile	6.76	41	543105	28.161	ng	100
12) Acrolein	6.94	56	170744	24.400	ng	99
13) Acetone	7.14	58	1013691	122.548	ng	96
14) Trichlorofluoromethane	7.38	101	438671	24.505	ng	99
15) 2-Propanol (Isopropanol)	7.62	45	1458440	54.183	ng	100
16) Acrylonitrile	7.86	53	379305	26.348	ng	100
17) 1,1-Dichloroethene	8.30	96	270116	24.688	ng	94
18) 2-Methyl-2-Propanol (t...	8.46	59	1459462	54.209	ng	99
19) Methylene Chloride	8.51	84	273163	21.137	ng	94
20) 3-Chloro-1-propene (Al...	8.67	41	436848	27.898	ng	96
21) Trichlorotrifluoroethane	8.91	151	264624	23.591	ng	96
22) Carbon Disulfide	8.78	76	1012436	22.202	ng	100
23) trans-1,2-Dichloroethene	9.74	61	392479	27.386	ng	96
24) 1,1-Dichloroethane	9.98	63	462537	24.248	ng	100
25) Methyl tert-Butyl Ether	10.08	73	849800	25.791	ng	99
26) Vinyl Acetate	10.23	86	327989	131.959	ng	# 84
27) 2-Butanone (MEK)	10.47	72	191097	24.952	ng	91
28) cis-1,2-Dichloroethene	10.97	61	373140	26.492	ng	97
29) Diisopropyl Ether	11.26	87	271770	25.902	ng	# 84
30) Ethyl Acetate	11.27	61	197605	54.178	ng	97
31) n-Hexane	11.25	57	417538	24.122	ng	99
32) Chloroform	11.31	83	464391	25.359	ng	100
34) Tetrahydrofuran (THF)	11.71	72	188278	23.224	ng	94
35) Ethyl tert-Butyl Ether	11.84	87	339075	25.085	ng	94
36) 1,2-Dichloroethane	12.09	62	338449	26.398	ng	99
38) 1,1,1-Trichloroethane	12.37	97	422834	26.373	ng	99
39) Isopropyl Acetate	12.79	61	341867	52.029	ng	94
40) 1-Butanol	12.81	56	579371	53.230	ng	97
41) Benzene	12.84	78	1057835	24.250	ng	99
42) Carbon Tetrachloride	13.00	117	375732	25.956	ng	99
43) Cyclohexane	13.13	84	842444	50.455	ng	97
44) tert-Amyl Methyl Ether	13.47	73	810465	25.943	ng	98
45) 1,2-Dichloropropane	13.68	63	269020	26.554	ng	100
46) Bromodichloromethane	13.87	83	366550	26.560	ng	100
47) Trichloroethene	13.93	130	313179	23.716	ng	100
48) 1,4-Dioxane	13.90	88	236292	26.238	ng	96
49) 2,2,4-Trimethylpentane...	13.99	57	1152110	26.074	ng	99
50) Methyl Methacrylate	14.13	100	234742	47.938	ng	91

Data File : I:\MS13\DATA\2017 10\07\10071701.D
 Acq On : 7 Oct 2017 1:56
 Sample : CCV R13100717 25ng
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 3
 Operator: WA
 Inst : MS13

Quant Time: Oct 07 07:26:42 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M

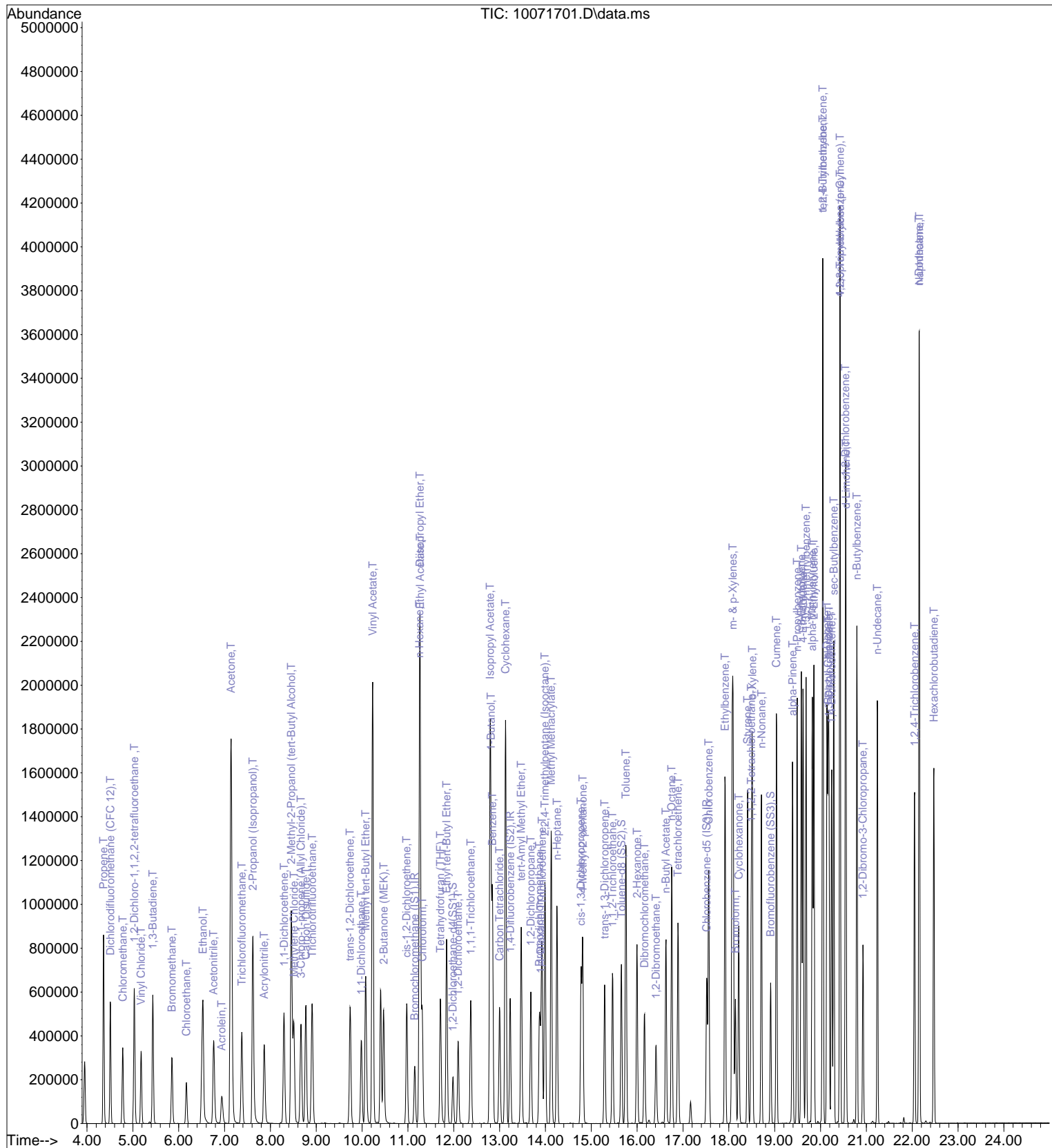
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
51) n-Heptane	14.25	71	264858	24.778	ng	98
52) cis-1,3-Dichloropropene	14.77	75	478470	27.785	ng	100
53) 4-Methyl-2-pentanone	14.81	58	265889	27.630	ng	95
54) trans-1,3-Dichloropropene	15.29	75	417531	27.652	ng	100
55) 1,1,2-Trichloroethane	15.46	97	272280	25.737	ng	99
58) Toluene	15.75	91	1118966	22.944	ng	100
59) 2-Hexanone	16.00	43	637297	26.899	ng	97
60) Dibromochloromethane	16.16	129	342610	24.625	ng	99
61) 1,2-Dibromoethane	16.41	107	310152	24.559	ng	100
62) n-Butyl Acetate	16.63	43	714314	27.082	ng	98
63) n-Octane	16.75	57	232689	24.525	ng	96
64) Tetrachloroethene	16.89	166	352422	22.598	ng	100
65) Chlorobenzene	17.56	112	777732	22.894	ng	100
66) Ethylbenzene	17.92	91	1285037	23.530	ng	98
67) m- & p-Xylenes	18.09	91	2040764	47.909	ng	98
68) Bromoform	18.14	173	314593	24.471	ng	100
69) Styrene	18.41	104	846727	23.852	ng	99
70) o-Xylene	18.51	91	1015707	23.796	ng	98
71) n-Nonane	18.71	43	560067	25.753	ng	96
72) 1,1,2,2-Tetrachloroethane	18.49	83	489688	25.075	ng	100
74) Cumene	19.04	105	1326453	23.424	ng	99
75) alpha-Pinene	19.39	93	683780	24.028	ng	98
76) n-Propylbenzene	19.49	91	1579168	24.381	ng	99
77) 3-Ethyltoluene	19.58	105	1348720	23.480	ng	99
78) 4-Ethyltoluene	19.62	105	1261703	23.850	ng	99
79) 1,3,5-Trimethylbenzene	19.69	105	1104715	23.734	ng	98
80) alpha-Methylstyrene	19.82	118	632976	22.910	ng	94
81) 2-Ethyltoluene	19.86	105	1316224	23.978	ng	99
82) 1,2,4-Trimethylbenzene	20.05	105	1130451	24.520	ng	98
83) n-Decane	20.14	57	583844	26.519	ng	98
84) Benzyl Chloride	20.16	91	1011571	25.475	ng	98
85) 1,3-Dichlorobenzene	20.19	146	709117	23.574	ng	99
86) 1,4-Dichlorobenzene	20.24	146	712027	23.107	ng	100
87) sec-Butylbenzene	20.29	105	1503196	23.823	ng	99
88) 4-Isopropyltoluene (p-...	20.43	119	1422216	23.158	ng	99
89) 1,2,3-Trimethylbenzene	20.43	105	1118940	24.120	ng	98
90) 1,2-Dichlorobenzene	20.54	146	679438	23.894	ng	100
91) d-Limonene	20.56	68	435073	25.083	ng	97
92) 1,2-Dibromo-3-Chloropr...	20.93	157	255774	24.888	ng	93
93) n-Undecane	21.24	57	617277	24.721	ng	98
94) 1,2,4-Trichlorobenzene	22.05	180	536842	26.273	ng	100
95) Naphthalene	22.16	128	1590178	24.573	ng	100
96) n-Dodecane	22.15	57	580919	25.363	ng	98
97) Hexachlorobutadiene	22.47	225	353959	22.786	ng	99
98) Cyclohexanone	18.22	55	404615	26.001	ng	97
99) tert-Butylbenzene	20.05	119	1116849	23.543	ng	100
100) n-Butylbenzene	20.80	91	1202459	25.010	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File : I:\MS13\DATA\2017 10\07\10071701.D
 Acq On : 7 Oct 2017 1:56
 Sample : CCV R13100717 25ng
 Misc : S31-09111702/S31-09231702 (10/22)

Vial: 3
 Operator: WA
 Inst : MS13

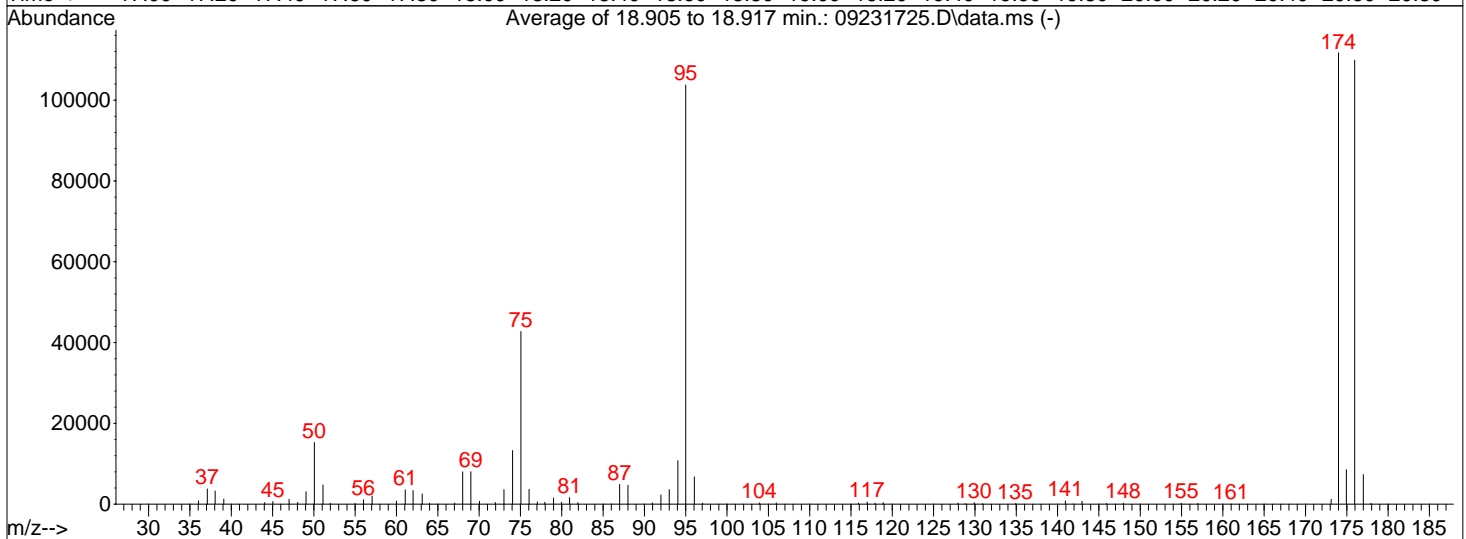
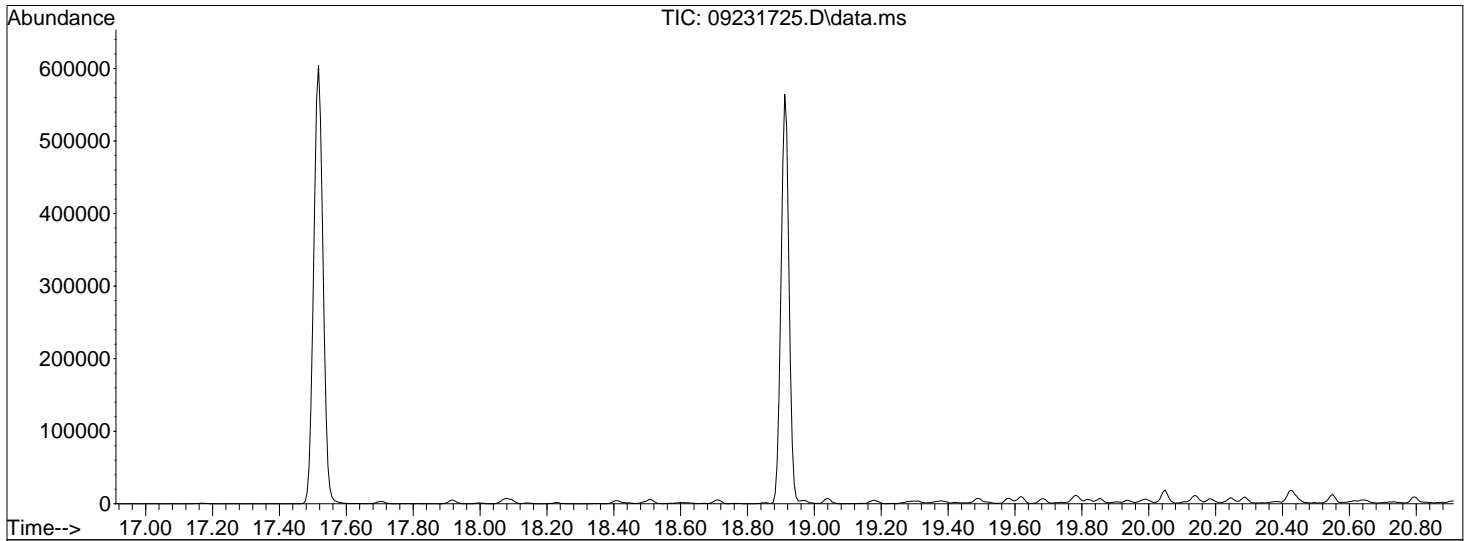
Quant Time: Oct 07 07:26:42 2017
 Quant Method : I:\MS13\METHODS\R13092317.M
 Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 QLast Update : Mon Sep 25 06:36:07 2017
 Response via : Initial Calibration
 DataAcq Meth:TO15.M



Data Path : I:\MS13\DATA\2017 09\23\
 Data File : 09231725.D
 Acq On : 23 Sep 2017 15:24
 Operator : WA
 Sample : BFB Std
 Misc : S31-09111702
 ALS Vial : 3 Sample Multiplier: 1

Integration File: LSCINT.P

Method : I:\MS13\METHODS\R13092317.M
 Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 Last Update : Mon Sep 25 06:36:07 2017



AutoFind: Scans 2639, 2640, 2641; Background Corrected with Scan 2632

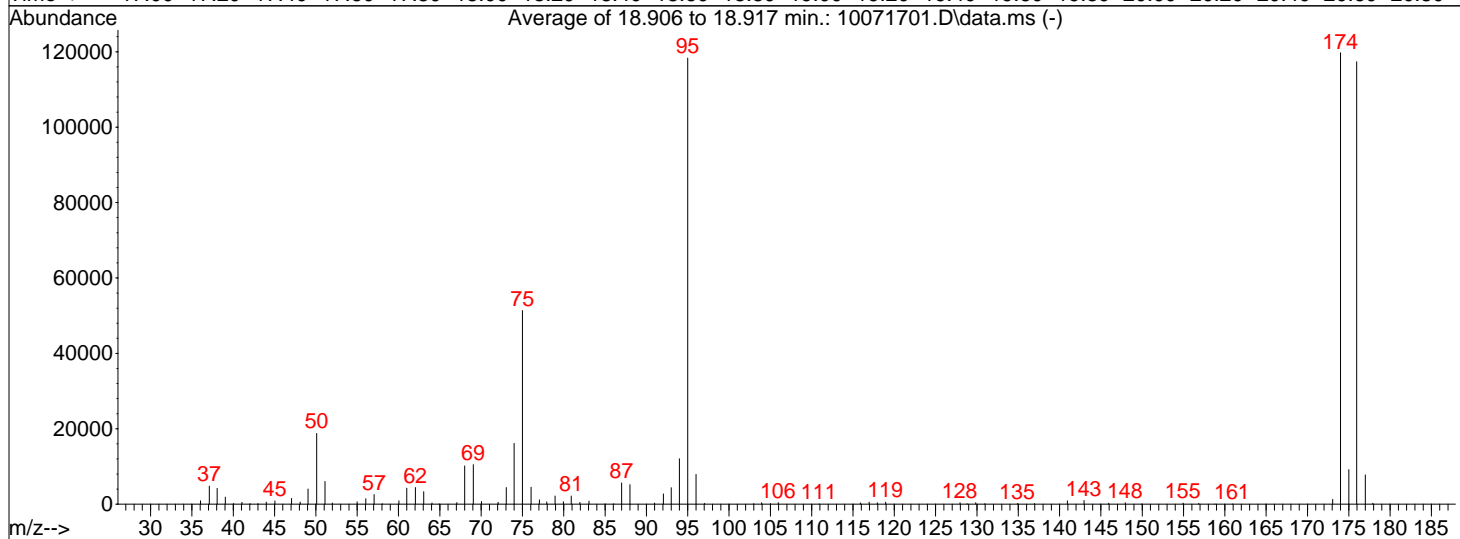
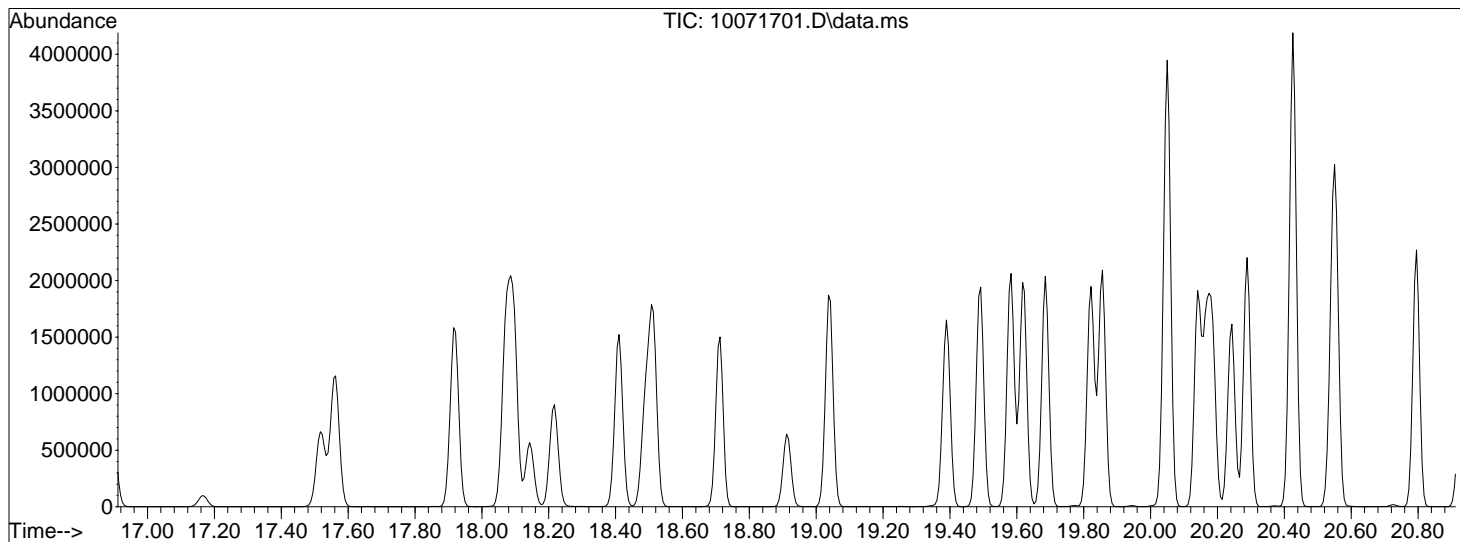
Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	14.7	15279	PASS
75	95	30	66	41.2	42723	PASS
95	95	100	100	100.0	103736	PASS
96	95	5	9	6.5	6762	PASS
173	174	0.00	2	1.1	1185	PASS
174	95	50	120	107.7	111699	PASS
175	174	4	9	7.6	8534	PASS
176	174	93	101	98.4	109899	PASS
177	176	5	9	6.7	7332	PASS

WA 9/25/17

Data Path : I:\MS13\DATA\2017 10\07\
 Data File : 10071701.D
 Acq On : 7 Oct 2017 1:56
 Operator : WA
 Sample : CCV R13100717 25ng
 Misc : S31-09111702/S31-09231702 (10/22)
 ALS Vial : 3 Sample Multiplier: 1

Integration File: LSCINT.P

Method : I:\MS13\METHODS\R13092317.M
 Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
 Last Update : Mon Sep 25 06:36:07 2017



AutoFind: Scans 2639, 2640, 2641; Background Corrected with Scan 2631

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	15.9	18760	PASS
75	95	30	66	43.4	51371	PASS
95	95	100	100	100.0	118344	PASS
96	95	5	9	6.7	7916	PASS
173	174	0.00	2	1.1	1269	PASS
174	95	50	120	101.2	119723	PASS
175	174	4	9	7.6	9148	PASS
176	174	93	101	98.0	117344	PASS
177	176	5	9	6.6	7753	PASS

WA 10/7/17

Injection Log

Directory: J:\MS13\DATA\2017_09\23\

	Date/Time	File Name	Sample ID	Misc Info	Operator	Vial	Comment
25	9/23/17 15:24	09231725.D	BFB Std	S31-09111702	WA	3	Passes
26	9/23/17 16:00	09231726.D	0.08ng TO-15 ICAL Std	S31-09111702/S31-09121704 (10/11)	WA	14	not used
27	9/23/17 16:34	09231727.D	0.10ng TO-15 ICAL Std	S31-09111702/S31-09121704 (10/11)	WA	14	
28	9/23/17 17:09	09231728.D	0.20ng TO-15 ICAL Std	S31-09111702/S31-09121704 (10/11)	WA	14	
29	9/23/17 17:44	09231729.D	0.40ng TO-15 ICAL Std	S31-09111702/S31-09121704 (10/11)	WA	14	
30	9/23/17 18:19	09231730.D	1.0ng TO-15 ICAL Std	S31-09111702/S31-09231704 (10/22)	WA	15	
31	9/23/17 18:53	09231731.D	5.0ng TO-15 ICAL Std	S31-09111702/S31-09231704 (10/22)	WA	15	
32	9/23/17 19:28	09231732.D	25ng TO-15 ICAL Std	S31-09111702/S31-09231702 (10/22)	WA	16	
33	9/23/17 20:03	09231733.D	50ng TO-15 ICAL Std	S31-09111702/S31-09231702 (10/22)	WA	16	
34	9/23/17 20:38	09231734.D	100ng TO-15 ICAL Std	S31-09111702/S31-09231702 (10/22)	WA	16	
35	9/23/17 21:13	09231735.D	Blank	S31-09111702	WA	3	
36	9/23/17 21:48	09231736.D	0.40ng TO-15 ICAL Std	S31-09111702/S31-09121704 (10/11)	WA	11	not used
37	9/23/17 22:23	09231737.D	25ng TO-15 ICV Std	S31-09111702/S31-09051703 (10/4)	WA	12	Passes all cmpnds
38	9/23/17 22:58	09231738.D	0.5ng Std Check	S31-09111702/S31-09201705 (10/19)	WA	3	
Saved as R13092317.M: ranges from 0.1ng ---> 100ng, except: Acrolein, Acrylonitrile, MEK, a-MeStyrene, Benzyl-C, naphthalene: 0.4ng ---> 100ng							
CS2, cis/trans-1,3-Dichloropropene: 0.2ng ---> 100ng; vinyl Acetate:2ng ---> 500ng; Undecane, Dodecane: 1.0ng ---> 100ng							

 9/25/17

Directory: I:\MS13\DATA\2017_10\07\

	Date/Time	File Name	Sample ID	Misc Info	Operator	Vial	Comment	
1	10/7/17 1:56	10071701.D	CCV R13100717_25ng	S31-09111702/S31-09231702 (10/22)	WA	3	Passes	
2	10/7/17 2:31	10071702.D	CCV C13100717_5ng	S31-09111702/S31-09191705 (10/18)	WA	16	Passes	
3	10/7/17 3:06	10071703.D	CCV R13100717_5ng	S31-09111702/S31-09121702 (10/11)	WA	15	Passes	
4	10/7/17 3:41	10071704.D	MB R13100717_1000mL	S31-09111702_AC00880	WA	3	Passes	
5	10/7/17 4:16	10071705.D	LCS R13100717_25ng	S31-09111702/S31-09201702 (10/18)	WA	3	Passes	
6	10/7/17 4:51	10071706.D	LCSD R13100717_25ng	S31-09111702/S31-09201702 (10/18)	WA	3	Passes	
7	10/7/17 5:26	10071707.D	P1704763-001 (50mL)	S31-09111702	WA	11		
8	10/7/17 6:00	10071708.D	Blank	S31-09111702	WA	4		
9	10/7/17 7:58	10071709.D	P1704815-001 (3.0mL)	S31-09111702	WA	4		
10	10/7/17 8:34	10071710.D	P1704815-002 (3.0mL)	S31-09111702	WA	4		
11	10/7/17 9:08	10071711.D	P1704815-002dup (3.0mL)	S31-09111702	WA	4	Passes for dup	
12	10/7/17 9:42	10071712.D	P1704820-001 (6.0mL)	S31-09111702	WA	4		
13	10/7/17 10:18	10071713.D	P1704763-001 (400mL)	S31-09111702	WA	11		
14	10/7/17 11:26	10071714.D	System	S31-09111702	WA	3		
15	10/7/17 12:00	10071715.D	P1704790-011 (1000mL)	S31-09111702	WA	4		
16	10/7/17 12:34	10071716.D	P1704790-001 (1000mL)	S31-09111702	WA	5		
17	10/7/17 13:09	10071717.D	P1704790-002 (1000mL) PF2	S31-09111702	WA	7		
18	10/7/17 13:44	10071718.D	P1704790-003 (1000mL)	S31-09111702	WA	6		
19	10/7/17 14:18	10071719.D	P1704790-004 (1000mL)	S31-09111702	WA	8		
20	10/7/17 14:53	10071720.D	System	S31-09111702	WA	3		
21	10/7/17 15:28	10071721.D	P1704790-005 (1000mL)	S31-09111702	WA	9		
22	10/7/17 16:03	10071722.D	P1704790-006 (1000mL)	S31-09111702	WA	10		
23	10/7/17 16:37	10071723.D	P1704790-007 (1000mL) PF2	S31-09111702	WA	11		
24	10/7/17 17:12	10071724.D	P1704790-008 (1000mL)	S31-09111702	WA	12		
25	10/7/17 17:46	10071725.D	System	S31-09111702	WA	3		
26	10/7/17 18:21	10071726.D	P1704790-009 (1000mL)	S31-09111702	WA	13		
27	10/7/17 18:55	10071727.D	P1704790-010 (1000mL)	S31-09111702	WA	14	IS-failed	
28	10/7/17 19:29	10071728.D	P1704815-003 (1000mL)	S31-09111702	WA	1		
29	10/7/17 20:04	10071729.D	P1704815-004 (1000mL)	S31-09111702	WA	2		
30	10/7/17 20:39	10071730.D	STD Check	S31-09111702	WA	3		
	LCS/LCSD: trichlorofluoromethane above current; w/in 130%							WA 10/9/17

APPENDIX E: Protocol for Discharging GWTP Effluent

DISCHARGE CRITERIA

The discharge criteria established for discharge to Harrison Bayou are:

Parameter	Discharge Criteria (µg/L)	
	Daily Average	Daily Maximum
Volatiles		
1,1,1-Trichloroethane	3,417	7,230
1,1,2-Trichloroethane	102.5	216.9
1,1-Dichloroethane	6,633	14,032
1,1-Dichloroethene	119	253
1,2-Dichloroethane	85	181
Acetone	1,132	2,395
Benzene	85	181
Carbon Tetrachloride	85	181
Chlorobenzene	22,300	47,180
Chloroform	1,708	3,615
Ethylbenzene	26,954	57,025
Xylenes	39.5	83.6
Methylene Chloride	803	1,699
Styrene	2,829	5,987
Tetrachloroethene	85.4	180.7
Toluene	1,980	4,189
Trichloroethene	85	181
Vinyl Chloride	34	72
Anions		
Chloride	*	*
Sulfate	*	*
Perchlorate	278	589
Metals		
Aluminum	777	1,644
Arsenic	365	772
Barium	1,000	2,000
Cadmium	1.6	3.4
Chromium, Total	355	752
Chromium, Hexavalent	58	124
Cobalt	5,433	11,495
Iron	1,132	2,395
Lead	2.2	4.6
Nickel	87	184
Manganese	7,323	15,494
Silver	1.4	3
Selenium	5.7	12
Vanadium	1,698	3,592
Zinc	146	310
Other		
Hexachlorobenzene	0.22	0.47
1,4-Dioxane		134.2
Oil and Grease		15
Chemical Oxygen Demand		200

*- Based upon flow in Harrison Bayou

PROTOCOL FOR DISCHARGING GWTP EFFLUENT

In accordance with the *Sampling and Analysis Plan, Groundwater Treatment Plant and Well Fields* (SAP) Table 2-2, indicator parameters for the FBR, such as temperature, pH and oxidation reduction potential (ORP), are monitored in real time to predict FBR performance and perchlorate removal. Based upon these indicator parameters, the operator of the GWTP can make adjustments such as:

- Bring the ion exchange system online;
- Increase or decrease the addition rate of electron donor (acetic acid);
- Increase or decrease the nutrient addition rate (urea or phosphoric acid); or
- Increase or decrease the FBR recirculation rate

Samples of the GWTP effluent are collected weekly, analyzed for perchlorate, nutrients (ammonia-nitrogen and ortho-phosphate), total organic carbon (TOC), chloride, and sulfate, with the results received from the laboratory 14 days later. Other parameters (e.g. Record of Decision metals and volatiles) are collected and analyzed in GWTP effluent samples according to the frequencies listed in Table 2-1 of the SAP.

As shown in Figure 1, groundwater is continuously extracted, treated, and discharged. If Harrison Bayou is flowing and indicator parameters are within their historical optimal ranges, then the ion exchange vessels can be bypassed and the GWTP effluent sample will be collected after the FBR. If Harrison Bayou is not flowing or the indicator parameters are not within historical optimal ranges, then the ion exchange vessels will be put on line, and the GWTP effluent sample will be collected between the lead and lag ion exchange vessel. Professional judgement may also be used as to when to bring the ion exchange vessels online, such as after a power outage or during anticipated cold temperatures when the FBR has historically not performed optimally.

If a parameter is measured in the effluent at a concentration above the discharge criteria, then a confirmation sample and an effluent sample after the lag ion exchange vessel will be collected and analyzed for the parameter with a 24-hour turnaround time. Corrective measures (e.g. increased nutrient or electron donor addition rates, bring ion exchange vessels on line) will be implemented as appropriate to bring the parameter back within the discharge criteria. ***If an upset condition in the FBR leads to high concentrations of perchlorate going into the lead ion exchange vessel and breaking through at the sample location between the vessels,, the lag vessel will still remove perchlorate before it is discharged to Harrison Bayou, the INF Pond, or LHAAP-18/24.*** It is estimated that the lag ion exchange vessel can remove all of the perchlorate from two weeks of typical groundwater extraction at a concentration of 920 µg/L. If the residual perchlorate concentration after the FBR and lead ion exchange vessel is only 600 µg/L, the lag ion exchange vessel could last almost 2.5 years before perchlorate would be detected in the discharged effluent.

If a parameter exceeds the discharge criteria by more than 40% (see Appendix A-2, SAP, Section 7c of Monitoring and Reporting Requirements) or reaches 920 µg/L of perchlorate, then the GWTP will be put into full recycle mode (no discharge) until the parameter is below the discharge criteria again. Appendix A-2 of the SAP requires GWTP data to be provided to TCEQ monthly including a list of noncompliance(s), if applicable.

Discharge to Harrison Bayou

As shown in Figure 1, the GWTP effluent will be discharged to Harrison Bayou as long as it has a measurable flow. The flowrate in Harrison Bayou is estimated by measuring the height of water with a staff gauge and velocity in feet/sec at intervals along the width as described in the Installation-Wide Work Plan, Standard Operating Procedures, Attachment 18 – Water Depth and Velocity Measurements (AECOM, July 2014).

The allowable flow rate of GWTP effluent that can be discharged to Harrison Bayou is given by:

$$Q_E \leq \frac{Q_S(C_C - C_A)}{(C_E - C_C)}$$

where Q_E = GWTP effluent flow

Q_S = Harrison Bayou flow

C_C = Criteria concentration (100 mg/L for chloride, 50 mg/L for sulfate)

C_A = Ambient concentration = 10 mg/L

C_E = Chloride or sulfate concentration in GWTP effluent

The allowable GWTP effluent flow will be the lower of the calculated values given the measured concentrations of chloride and sulfate in the discharge stream. For each day that GWTP effluent is discharged to Harrison Bayou, the measured Harrison Bayou flow, the allowable effluent flow, and the actual effluent flow are recorded.

Discharge to INF Pond

If Harrison Bayou is not flowing, then GWTP effluent will be discharged to the Intermediate-Range Nuclear Forces (INF) Pond for temporary storage until Harrison Bayou flow resumes. The INF Pond has a flexible membrane liner protected by a soil cover with a gravity discharge pipe (and valve) to Harrison Bayou. The INF Pond has a nominal capacity of 3 million gallons with a staff gage to measure the height of water stored in the pond. The GWTP operator maintains the INF Pond by visually inspecting for erosion, vegetative growth including tree growth along the anchor trench, and liner integrity and making necessary repairs. Periodically, accumulated debris must be removed from the influent and effluent piping to the INF Pond.

Prior to discharging to the INF Pond, a lead and lag ion exchange vessel will be brought online. The GWTP Operator will also confirm that the discharge valve is closed, will record the reading on the effluent totalizer, and will record the height of water using the staff gage. The GWTP Operator will then configure valves and pumps to direct GWTP effluent to the INF Pond. The height of water in the INF Pond and totalizer reading will be recorded at the beginning and end of each shift for the duration of active discharge. When the height of water in the pond reaches 3 feet below the height of the berm (freeboard), the GWTP Operator will stop discharging to the INF Pond and TCEQ will be notified. After the TCEQ acknowledges the INF Pond level, GWTP effluent may be discharged to the INF Pond again until 2 feet of freeboard is reached. The GWTP Operator will stop discharging to the INF Pond and TCEQ will be notified again. After the TCEQ acknowledges 2 feet of freeboard in the INF Pond,

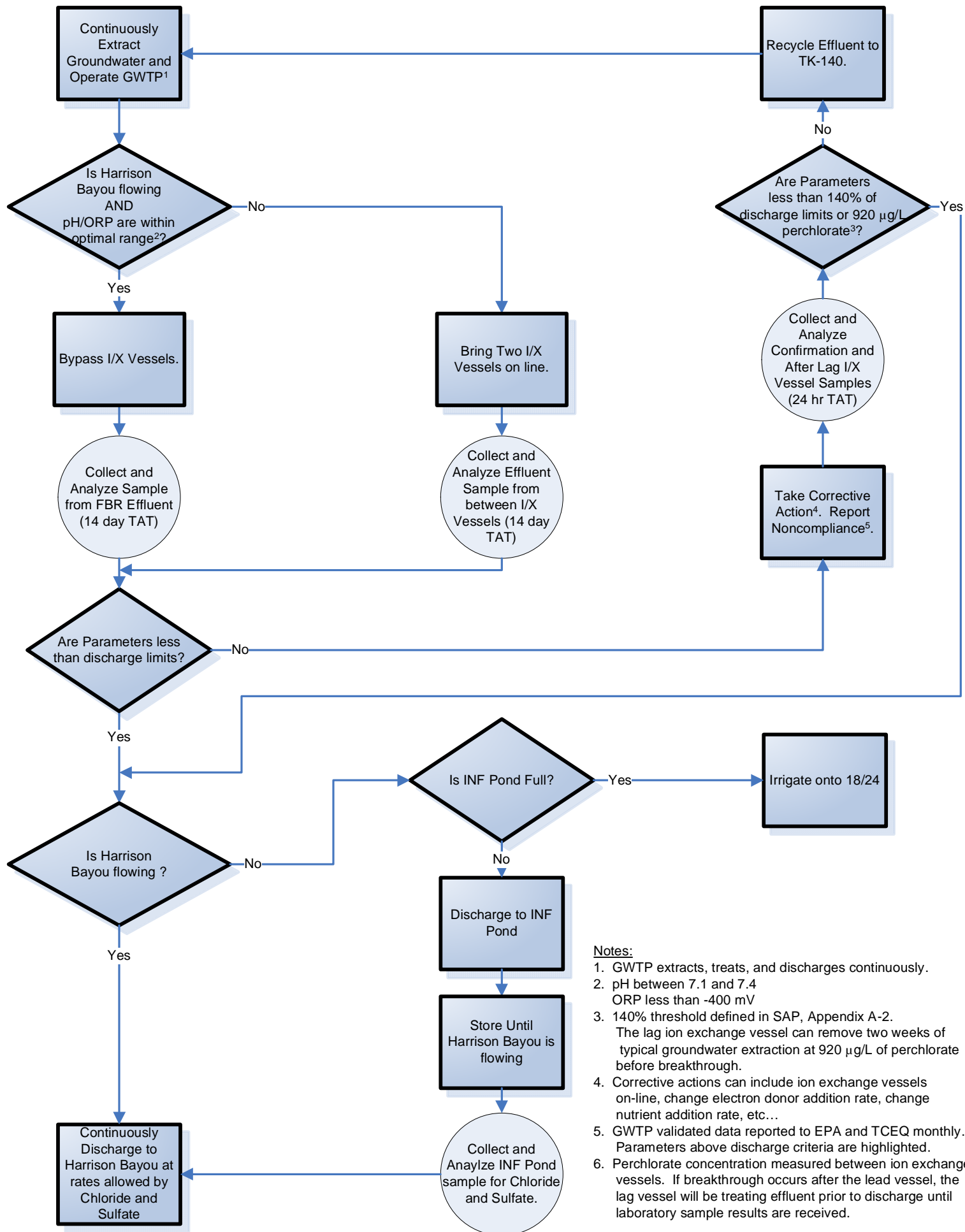
GWTP effluent may be discharged again until 1 foot of freeboard remains. No additional GWTP effluent can be accepted at the INF Pond until greater than 1 foot of freeboard is measured.

As soon as flow in Harrison Bayou returns, stored GWTP effluent from the INF Pond will be discharged. As with direct discharges from the GWTP to Harrison Bayou, the allowable flowrate of effluent from the INF Pond is calculated based upon the chloride and sulfate concentrations in the pond and the flow in Harrison Bayou. If effluent from the INF Pond and the GWTP are discharged simultaneously, total flow of both streams together should not exceed the calculated discharge level for either discharge location. For each day that INF Pond contents are discharged to Harrison Bayou, the measured Harrison Bayou flow, the allowable effluent flow, and the actual effluent flow are recorded.

Irrigation onto LHAAP-18/24

If Harrison Bayou is not flowing and the INF Pond has less than 1 foot of freeboard, then GWTP effluent will be irrigated onto LHAAP-18/24 using one of the three main sprinkler lines. To avoid pooling and runoff of irrigation water, only one line will be used for half a day at a time, with a separate line being used the second half of the day. If needed, the irrigation will occur 5 days a week for 8 hours each day (using 3 sprinklers in each line). If conditions are wet due to rain events, irrigation will not be conducted to avoid ponding and potential runoff, the GWTP will be put into recycle mode, and groundwater extraction will be interrupted if storage space is not available.

While irrigating, site inspections will be performed to ensure pooling and runoff are not occurring. During the irrigation activities, inspections will be performed twice a day, once approximately three hours and again approximately six hours into the 8-hour irrigation shift. The system will be inspected to ensure that the sprinkler heads are operating properly and not leaking large amounts of water. If ponding or runoff is observed, irrigation at that sprinkler line will cease, and irrigation at another sprinkler line will be started if possible. Volumes of GWTP effluent and twice daily inspections will be recorded daily and reported monthly until flow resumes in Harrison Bayou or greater than 1 foot of freeboard is available in the INF Pond.



- Notes:**
1. GWTP extracts, treats, and discharges continuously.
 2. pH between 7.1 and 7.4
ORP less than -400 mV
 3. 140% threshold defined in SAP, Appendix A-2.
The lag ion exchange vessel can remove two weeks of typical groundwater extraction at 920 µg/L of perchlorate before breakthrough.
 4. Corrective actions can include ion exchange vessels on-line, change electron donor addition rate, change nutrient addition rate, etc...
 5. GWTP validated data reported to EPA and TCEQ monthly. Parameters above discharge criteria are highlighted.
 6. Perchlorate concentration measured between ion exchange vessels. If breakthrough occurs after the lead vessel, the lag vessel will be treating effluent prior to discharge until laboratory sample results are received.

Figure 1. Continuous Discharge Protocol Flowchart