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CHEMISTRY AND CHEMICAL ENGINEERING DIVISION
DEPARTMENT OF ANALYTICAL AND ENVIRONMENTAL CHEMISTRY

September 25, 2015

CH2M Hill Plateau Remediation Company
2420 Stevens Center Place
Richland, WA 99352

Attn: Scot Fitzgerald

Subject:

Contract No:	55865
SDG Number:	574656
SwRI Project Number:	20933.01.006
SwRI Task Order Number:	150521-8
SwRI Sample Receipt Number:	55397
Samples Received:	05.21.2015
Fraction:	TOC Characterization

Dear Mr. Fitzgerald:

Please find the enclosed results for the three (03) samples received on the above referenced date. If you should have any questions, please do not hesitate to call me at (210) 522-3242, radonna.spies@swri.org.

Sincerely,

Radonna Spies
Group Leader

APPROVED:

Michael J. Dammann
Director

RS: jz
Encl

Characterization of Total Organic Carbon in Groundwater from 200 East Wells

Analytical Report

Southwest Research Institute
Project 20933.01.006
Task Order #150521-8
SRR #55397

Prepared by

Radonna Spies
Group Leader
Analytical and Environmental Chemistry Department
Chemistry and Chemical Engineering Division

Prepared for

CH2M Hill Plateau Remediation Company (CHPRC)

INTRODUCTION

Eight containers of three water sample were received at SwRI on 5/21/2015. The chain of custody (COC) indicated the collection end date (CED) as 5/20/15. A copy of the COC is located in Appendix A. The samples were logged into the SwRI laboratory information system (LIMS) under SSR #55397 and assigned to Task Order #150521-8. The samples were received under Modification 1 to CHPRC Contract 55865, entitled "Characterization of Total Organic Carbon in Groundwater from Well 299-E27-10". Testing was performed per the modified SOW entitled: Characterization of Total Organic Carbon in Groundwater from 200 East Wells, Revision 1, 4/15/2015. SwRI and CHPRC sample identification numbers are shown in Table 1.

Table 1. Sample Login Information

SwRI Sample ID	Customer ID	CED
574656	B313X4	05/20/15
574657	B313X5	05/20/15
574658	B313X6	05/20/15

EXPERIMENTAL AND RESULTS

TOC

Initially, duplicate aliquots of the samples were analyzed for total organic carbon to confirm they contained TOC results comparable to historical data. A second set of aliquots of the sample were filtered using an Advantec Grade GC50 glass fiber filter; the GC50 is a binderless, fine-porosity (<0.45 micron particle retention) filter. Filtration was used to determine whether the organic carbon is dissolved, a solid particulate, or a mixture of both. The TOC determination was conducted following EPA SW846 Method 9060 using a Tekmar-Dohrmann Phoenix 8000 Analyzer. The Phoenix 8000 automatically removes inorganic carbon prior to the TOC determination. In the first chamber of the instrument the sample is acidified with phosphoric acid and sparged to remove the inorganic carbon. The acidified and sparged sample is then pumped into the UV reactor where the TOC is oxidized with persulfate. The CO_2 produced is measured using a non-dispersive infrared detector (NDIR). A third set of aliquots of the samples were pre-acidified and sparged with nitrogen prior to the Phoenix TOC analysis to ensure the inorganic carbon was being fully eliminated during the analysis.

Each TOC result is the average of replicate injections. Samples were analyzed in duplicate and a matrix spike performed. A procedure blank was taken through each sample preparation to document possible contamination. The Sample Analysis Data Sheets are located in Appendix B. Table 2 summarizes the sample and duplicate analysis results for each process, along with the average for comparison. The results indicate the organic carbon is dissolved and non-purgable (NPOC).

Table 2 TOC Results for Unfiltered, Filtered and Pre-Acidified and Sparged Samples

			TOC Concentration, mg/L		
SwRI ID	Sample	Date Analyzed	Unfiltered Result	Filtered Result	Unfiltered Pre Acidified and Sparged Result
574656	B313X4	6/10/15	1.51	1.59	1.49
	B313X4 Dup	6/10/15	1.52	1.62	1.49
	Average		**1.52**	**1.61**	**1.49**
574657 (Bottle 6)	B313X5	6/10/15	3.36	3.33	3.34
	B313X5 Dup	6/10/15	3.39	3.34	3.34
	Average		**3.38**	**3.34**	**3.34**
574658	B313X6	6/10/15	< 0.2	---	---
	B313X6 Dup	6/10/15	< 0.2	---	---
	Average		**< 0.2**	---	---
Reanalysis of B313X5 fourteen days after initial analysis on 6/10/15					
574657 (Bottle 3)	B313X5	6/24/15	0.858	---	---
	B313X5 Dup	6/24/15	0.879	---	---
	Average		**0.868**	---	---
574657 (Bottle 6)	B313X5	6/24/15	0.810	---	---
	B313X5 Dup	6/24/15	0.807	---	---
	Average		**0.809**	---	---
574657 (Bottle 7)	B313X5	6/24/15	0.822	---	---
	B313X5 Dup	6/24/15	0.836	---	---
	Average		0.829	---	---
	Overall Avg		**0.835**		
Reanalysis of B313X4 and B313X5 101 days after initial analysis on 6/10/15					
574656 (Bottle 2)	B313X4	9/19/15	1.55	---	---
	B313X4 Dup	9/19/15	1.56	---	---
	Average		**1.56**	---	---
574656 (Bottle 3)	B313X4	9/19/15	1.53	---	---
	B313X4 Dup	9/19/15	1.55	---	---
	Average		**1.54**	---	---
574657 (Bottle 1)	B313X5	9/19/15	0.729	---	---
	B313X5 Dup	9/19/15	0.733	---	---
	Average		**0.731**	---	---
574657 (Bottle 2)	B313X5	9/19/15	0.740	---	---
	B313X5 Dup	9/19/15	0.737	---	---
	Average		**0.739**	---	---

The TOC results in Table 2 for samples B313X4 and B313X5 agree with the historical values provided by CHRPC; however, sample B313X6 was found to have no TOC above the 0.2mg/L reporting limit. Samples from two different sample bottles were analyzed for B313X6, and each was also below the reporting limit. Per the client's instruction, SwRI proceeded with the concentration step for samples B313X4 and B313X5 but stopped work on B313X6. Two aliquots of samples B313X4 and B313X5 were concentrated 20-fold using a Labconco Rapidvap N2 Evaporation System, and a procedure blank was also concentrated. The RapidVap uses a stream of nitrogen directed downward onto the surface of the sample to reduce the partial pressure over the liquid to speed evaporation while also maintaining a vortex motion and heat to further increase the rate of evaporation. The system is enclosed to reduce the possibility of contamination from the environment. During the evaporation, large amounts of dissolved salts began to precipitate out. The concentrated samples were filtered prior to subsequent total organic carbon analyses. The concentrates were analyzed to confirm that TOC was not lost in the concentration process. When corrected for the degree of concentration, the value obtained for B313X4 concentrate agreed fairly well with the initial value, while the concentration-corrected value for the B313X5 concentrate was much lower than the initial concentration. To determine if TOC was lost during the concentration process, two fresh aliquots of B313X5 were concentrated and analyzed for TOC. Again, the concentration-corrected values were lower than expected. In the process of investigating the apparent low TOC recovery in the concentration procedure for B313X5, the original sample was reanalyzed. Fourteen days after the original analysis, the TOC concentration was determined to be 0.868 mg/L, which is significantly lower than the initial result of 3.38 mg/L, but is in good agreement with the values obtained after the 20x concentration. To confirm the lower TOC result, samples from two additional sample bottles were also analyzed, and the results confirmed the lower TOC value. Upon request of the client, two bottles of B313X4 and B313X5 were analyzed 106 days after initial analysis to see if TOC values remained the same or continued to decrease. The values obtained for B313X4 were identical to the values initially obtained. The values for B313X5 decreased a little from 0.868 mg/L on 6/24/15 to 0.731 mg/L on 9/19/15. It appears the TOC compounds potentially decomposed during the two weeks between the two sets of analyses . The reanalysis values are also presented in Table 2.

Table 3 contains the organic carbon results in found in the concentrates. The results were also corrected for the concentration factor (x20) to compare to the initial organic results found in Table 2. (Note: B313X5 the average result from the multiple bottle reanalyses was used). The procedure blanks were less than the reporting limit, and Sample Analysis Data Sheets are also located in Appendix B.

The concentration-corrected results agreed well with the initial TOC results; therefore, the concentrate samples were submitted for Mass Spectrometry analysis.

Table 3. TOC Results for Concentrated sample with Comparison to Initial Results

			TOC Concentration, mg/L			
SwRI ID	Sample	Date Analyzed	Concentrated Result	Result Corrected for the (x20) Concentration Factor	Original TOC Result	% RPD*
574656-1	B313X4	6/18/15	26.0	1.27	---	
574656-2	B313X4 Dup	6/24/15	23.7	1.17	---	
574656	Average		24.9	1.22	1.52	21.9%
574657-1	B313X5	6/24/15	13.8	0.670	---	
574657-2	B313X5 Dup	6/24/15	13.9	0.668	---	
574657	Average		13.9	0.668	0.835	22.2%

* RPD based on TOC concentrations from Table 1

MASS SPECTROMETRY

Liquid Chromatography-Mass Spectrometry (LC-MS)

Direct infusion mass spectrometry acquisition was performed without any chromatographic separation. Due to the concentrated dissolved salt content of the water samples, the results obtained from the direct infusion experiment were difficult to interpret. To compensate for the high dissolved salt content of the concentrated samples, an ultra high pressure liquid chromatography (UHPLC) column was added for the following experiments to provide chromatographic separation of the different species in the samples.

LC-MS analysis was conducted using Agilent 1290 UHPLC binary pump system with Agilent 6460 triple quadrupole mass spectrometer. The analytical column used was a Restek Pinnacle DB Aqueous C18 column (2.1 x 100 mm; 1.9 µm particle size). The temperature of the column was maintained at 55 ^{o}C. Mobile phases consisted of (A) water with 10 mM ammonium formate with 0.1% formic acid and (B) acetonitrile:methanol (8:2) with 0.1% formic acid. Gradient conditions were as follows:

Time (min)	% A	% B	Flowrate (mL/min)
0.0	94.0	6.0	0.30
10.0	0.0	100.0	0.35
14.0	0.0	100.0	0.50
15.0	94.0	6.0	0.30

The Agilent 6460 triple quadrupole mass spectrometer was fitted with the Agilent Jet Stream interface. The eluant exiting the UHPLC was vaporized using heated nitrogen gas to form an aerosol. A high voltage (3-4 kV in positive or negative polarity) was then applied to the aerosol to produce charged ions prior to entering the mass spectrometer. This ionization process is referred to as electrospray ionization

(ESI). In positive polarity (ESI+), molecular ion adducts such as $[M+H]^+$, $[M+Na]^+$ or $[M+NH_4]^+$ are formed. The first LC/MS experiment was conducted in positive polarity, and the mass spectrometer detector was set to scan from 100-1500 amu. Ion 262 was detected in the concentrated samples of B313X4, B313X5 and their duplicates. This ion was not detected in the procedure blank. The molecular weight of this compound was most likely 261 since m/z 262 was probably the $(M+H)^+$. With the odd number molecular weight, the compound presumably contained odd number of nitrogen in its structure.

A product ion scan experiment was performed to generate the product ions of the m/z 262 compound appearing at 3.4 minutes retention time. The first mass analyzer was used to select m/z 262 as the precursor ion. The precursor ion was passed into the collision cell and an inert gas (nitrogen) was used to induce fragmentation. The second mass analyzer acquired the mass spectra of the ions exiting the collision cell. The major product ions formed included 69, 86, 149, 174, 202 and 217. Evaluation of this mass spectrum suggested that the compound might be the herbicide imazapyr (CAS RN: 81334-34-1). The mass spectra from the product ion scan experiment of an imazapyr reference standard matched the spectra in the water samples. See Figures 1A-1E in Appendix C.

Besides imazapyr, another herbicide bromacil (CAS RN: 314-40-9) was detected in B313X4, B313X5 and their duplicates. During the full scan analysis, m/z 261 and 263 were detected at about 5 minutes retention time. The abundance of 261 and 263 was roughly equal suggesting that the structure contained bromine. A product ion scan experiment was performed to generate the product ions of m/z 261 and 263. The major product ions formed from m/z 263 were 207, 190 and 164. The product ions formed from m/z 261 included 205, 188 and 162. The mass spectra from the product ion scan of a bromacil reference standard matched the spectra in the water samples (see Figures 2A-2E in Appendix C). A procedure blank was analyzed in both the bromacil and imazapyr product ion scan experiments (Figure 3 in Appendix C), and the peak at 3.4 minutes retention time (imazapyr) and 5.0 minutes retention time (bromacil) were not present.

In addition to positive polarity experiments, ionization in negative polarity full scan mode was conducted. Chromatographic conditions were identical to the positive polarity full scan mode described in paragraph 2 of this section. The scan range in negative polarity was also from 100-1500 amu. A broad chromatographic peak was observed in both the B313X4 sample and the sample duplicate from about 2-4 minutes. The broad chromatographic peak was only observed in negative polarity mode suggesting that the compounds contained carboxylic acids functional groups. Similar mass spectra were observed for B313X5 but the broad peak was not as pronounced in this sample. The abundances of ions were also less in samples B313X5 compared to B313X4. For example, the intensities of m/z 409 were 8.5 and 7.2 x 10^3 in sample B313X4 and duplicate whereas in sample B313X5 and duplicate, the intensities were 0.6 and 1.6 x 10^3 (Figures 4A-4E). Based on the mass spectra results, dissolved organic matter such as fulvic acids and/or humic acids were most likely present in the samples, and the complexity of the mass spectra is similar to the spectra reported by Posiva in Finland. (http://www.posiva.fi/files/352/WR2007-23web.pdf)

CONCLUSION

Based on the analysis, the TOC exists as dissolved non-purgable (non-volatile) organic carbon (NPOC). It appears that fulvic acids and/or humic acids are likely present in the both B313X4 and B313X5 based on the LC-MS analysis. The broad chromatographic peak was only observed in negative polarity mode suggesting that the compounds contained carboxylic acids functional groups. In addition, the complexity of the mass spectra is similar to the spectra reported by Posiva in Finland.

As with the previous TOC characterization study reported to CHPRC in March, 2015, the LC-MS again detected a compound with m/z 261 in both B313X4 and B313X5 and their duplicate. With the odd number molecular weight, the compound presumably contains an odd number of nitrogen in its structure. In this study, the compound was identified as the herbicide imazapyr ($C_{13}H_{15}N_3O$). Additionally, bromacil, another herbicide, was detected in both samples.

Further analysis would be required to quantitate the imazapyr and bromacil to determine their contribution to the TOC concentration found in the samples. As for presence of fulvic acids and/or humic acids, SwRI recommends getting reference materials from the International Humic Substance Society in Minnesota (https://ihss.humicsubstances.org/orders.html) to compare against the spectra of the ground water sample. If additional water sample (1-5 L) can be obtained, the water sample can be passed through resins such as XAD-8 to concentrate the NPOC. Further analysis such as HPLC with UV and fluorescence detectors and/or LC/MS analysis using a size exclusion chromatography column will confirm the presence of fulvic acids and/or humic acids.

SOUTHWEST RESEARCH INSTITUTE
CLIENT: CH2M Hill Plateau Remediation
SwRI PROJECT#: 20933.01.006
SwRI TASK ORDER: 150521-8
SwRI SRR: 55397
SDG: 574656
VTSR: 05.21.2015

Appendix A

Chain of Custody (COC)

SEPTEMBER 25, 2015

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/ SAMPLE ANALYSIS REQUEST			F15-010-004	PAGE 1 OF 1
COLLECTOR: S.W. King/CHPRC	COMPANY CONTACT: FITZGERALD, SL	TELEPHONE NO.: 373-7495	PROJECT COORDINATOR: FITZGERALD, SL	PRICE CODE: 70	DATA TURNAROUND
SAMPLING LOCATION: 299-E27-10	PROJECT DESIGNATION: Characterization of Total Organic Carbon at well 299-E27-10		SAF NO.: F15-010	AIR QUALITY ☐	60 Days / 60 Days
ICE CHEST NO.: GWS-534	FIELD LOGBOOK NO.: HNF-N-506-74	ACTUAL SAMPLE DEPTH: N/A	COA: 302898	METHOD OF SHIPMENT: Commercial Carrier	ORIGINAL
SHIPPED TO: Southwest Research Institute	OFFSITE PROPERTY NO.: 5657		BILL OF LADING/AIR BILL NO.: 7736 4747 5638		

MATRIX*
A=Air
DL=Drum Liquids
DS=Drum Solids
L=Liquid
O=Oil
S=Soil
SE=Sediment
T=Tissue
V=Vegetation
W=Water
WI=Wipe
X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	Cool<6C
HOLDING TIME	6 Months
TYPE OF CONTAINER	aG
NO. OF CONTAINER(S)	8
VOLUME	1L
SAMPLE ANALYSIS	Generic Testing;

Client: CH2M Hill Plateau Remediation Company SwRI SRR #55397
SwRI Project # 20933.01.006 Case: 302898
VTSR: 05/21/15 08:30 Sample(s) Received: Intact
Battery Check: Y Background Check: <100 cpm (Lab 103)
Cooler/Container Wipe: <100 cpm Temp.: 1.2 °C (wet ice) / SN # 021056
Total cpm-mR/h (samples): <100 cpm; <0.5 mR/hr Wipe Frisk Description: Cooler(s) - 2
(see Radioactive Material Receiving Form for more information)

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B313X4	WATER	MAY 20 2015	0953	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: S.W. King/CHPRC	DATE/TIME: MAY 20 2015/1050	RECEIVED BY/STORED IN: M.A. White CHPRC	DATE/TIME: MAY 20 2015/1050
RELINQUISHED BY/REMOVED FROM: M.A. White CHPRC	DATE/TIME: MAY 20 2015 1400	RECEIVED BY/STORED IN: FEDEX	DATE/TIME:
RELINQUISHED BY/REMOVED FROM: FedEx	DATE/TIME: 5/21/15 0830	RECEIVED BY/STORED IN:	DATE/TIME: 5/21/15 0830
RELINQUISHED BY/REMOVED FROM	DATE/TIME:	RECEIVED BY/STORED IN	DATE/TIME:
RELINQUISHED BY/REMOVED FROM	DATE/TIME:	RECEIVED BY/STORED IN	DATE/TIME:
RELINQUISHED BY/REMOVED FROM	DATE/TIME:	RECEIVED BY/STORED IN	DATE/TIME:

SPECIAL INSTRUCTIONS

** Laboratory will perform all analyses outlined in SOW from the 8 generic testing bottles.

** Laboratory will provide copies of Chain of Custody, shipping documents, and laboratory receipt documents to ^CPP Sample Management (CPP_Sample_Management@rl.gov). When complete the final report will also be sent to ^CPP Sample Management.

LABORATORY SECTION	RECEIVED BY	TITLE: Tech.	DATE/TIME: 5/21/15 0830
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

PRINTED ON 4/28/2015

A-6002-618 (REV 2)

SEPTEMBER 25, 2015

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F15-010-003	PAGE 1 OF 1
COLLECTOR: S.W. King/CHPRC	COMPANY CONTACT: FITZGERALD, SL	TELEPHONE NO.: 373-7495	PROJECT COORDINATOR: FITZGERALD, SL	PRICE CODE: 70 / DATA TURNAROUND
SAMPLING LOCATION: 299-E27-10	PROJECT DESIGNATION: Characterization of Total Organic Carbon at well 299-E27-10		SAF NO.: F15-010	AIR QUALITY ☐ / 60 Days / 60 Days
ICE CHEST NO.: GWS-432	FIELD LOGBOOK NO.: HNF-N-506-74	ACTUAL SAMPLE DEPTH: N/A	COA: 302898	METHOD OF SHIPMENT: Commercial Carrier
SHIPPED TO: Southwest Research Institute	OFFSITE PROPERTY NO.: 5657		BILL OF LADING/AIR BILL NO.: 7736 4747 5970	ORIGINAL

MATRIX*
A=Air
DL=Drum Liquids
DS=Drum Solids
L=Liquid
O=Oil
S=Soil
SE=Sediment
T=Tissue
V=Vegetation
W=Water
WI=Wipe
X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	Cool<6C
HOLDING TIME	6 Months
TYPE OF CONTAINER	aG
NO. OF CONTAINER(S)	8
VOLUME	1L
SAMPLE ANALYSIS	Generic Testing;

Client: CH2M Hill Plateau Remediation Company SwRI SRR #55397
SwRI Project # 20933.01.006 Case: 302898
VTSR: 05/21/15 08:30 Sample(s) Received: Intact
Battery Check: Y Background Check: <100 cpm (Lab 103)
Cooler/Container Wipe: <100 cpm Temp.: 1.2 °C (wet ice) / SN # 021056
Total cpm-mR/h (samples): <100 cpm; <0.5 mR/hr Wipe Frisk Description: Cooler(s) - 2
(see Radioactive Material Receiving Form for more information)

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B313X5	WATER	MAY 20 2015	1020	✓

CHAIN OF POSSESSION	DATE/TIME	SIGN/ PRINT NAMES	DATE/TIME
RELINQUISHED BY/REMOVED FROM S.W. King/CHPRC	MAY 20 2015 1050	RECEIVED BY/STORED IN M.A. White CHPRC	MAY 20 2015 1050
RELINQUISHED BY/REMOVED FROM M.A. White CHPRC	MAY 20 2015	RECEIVED BY/STORED IN FEDEX	
RELINQUISHED BY/REMOVED FROM FEDEX	5/26/15 0830	RECEIVED BY/STORED IN	0830 5/21/15
RELINQUISHED BY/REMOVED FROM		RECEIVED BY/STORED IN	
RELINQUISHED BY/REMOVED FROM		RECEIVED BY/STORED IN	
RELINQUISHED BY/REMOVED FROM		RECEIVED BY/STORED IN	
RELINQUISHED BY/REMOVED FROM		RECEIVED BY/STORED IN	

SPECIAL INSTRUCTIONS

** Laboratory will perform all analyses outlined in SOW from the 8 generic testing bottles.

** Laboratory will provide copies of Chain of Custody, shipping documents, and laboratory receipt documents to ^CPP Sample Management (CPP_Sample_Management@rl.gov). When complete the final report will also be sent to ^CPP Sample Management.

LABORATORY SECTION	RECEIVED BY: RAT ARGUELLO	TITLE: SENIOR TECHNICIAN	DATE/TIME: 5.21.15 / 0845
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

PRINTED ON 4/28/2015

A-605-618 (REV 2)

SEPTEMBER 25, 2015

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F15-010-002	PAGE 1 OF 1
COLLECTOR S.W. King/CHPRC	COMPANY CONTACT FITZGERALD, SL	TELEPHONE NO. 373-7495	PROJECT COORDINATOR FITZGERALD, SL	PRICE CODE 70	DATA TURNAROUND
SAMPLING LOCATION 299-E27-10	PROJECT DESIGNATION Characterization of Total Organic Carbon at well 299-E27-10		SAF NO. F15-010	AIR QUALITY ☐	60 Days / 60 Days
ICE CHEST NO. GWS-534	FIELD LOGBOOK NO. HNF-N-506-74	ACTUAL SAMPLE DEPTH N/A	COA 302898	METHOD OF SHIPMENT Commercial Carrier	ORIGINAL
SHIPPED TO Southwest Research Institute	OFFSITE PROPERTY NO. 5657		BILL OF LADING/AIR BILL NO. bb 5/20/15 5657 7736 4747 5638		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	Cool<6C
A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other		HOLDING TIME	6 Months
		TYPE OF CONTAINER	aG
		NO. OF CONTAINER(S)	8
		VOLUME	1L
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	Generic Testing;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B313X6	WATER	MAY 20 2015	0915	✓

Client: CH2M Hill Plateau Remediation Company SwRI SRR #55397
SwRI Project # 20933.01.006 Case: 302898
VTSR: 05/21/15 08:30 Sample(s) Received: Intact
Battery Check: Y Background Check: <100 cpm (Lab 103)
Cooler/Container Wipe: <100 cpm Temp.: 1.2 °C (wet ice) / SN # 021056
Total cpm-mR/h (samples): <100 cpm; <0.5 mR/hr Wipe Frisk Description: Cooler(s) - 2
(see Radioactive Material Receiving Form for more information)

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM S.W. King/CHPRC	DATE/TIME MAY 20 2015	RECEIVED BY/STORED IN M.A. White CHPRC	DATE/TIME MAY 20 2015
RELINQUISHED BY/REMOVED FROM M.A. White CHPRC	DATE/TIME MAY 20 2015 1400	RECEIVED BY/STORED IN FEDEX	DATE/TIME
RELINQUISHED BY/REMOVED FROM Fed Ex	DATE/TIME 5/21/15 0830	RECEIVED BY/STORED IN	DATE/TIME 5/21/15 0830
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SPECIAL INSTRUCTIONS

** Laboratory will perform all analyses outlined in SOW from the 8 generic testing bottles.

** Laboratory will provide copies of Chain of Custody, shipping documents, and laboratory receipt documents to ^CPP Sample Management (CPP_Sample_Management@rl.gov). When complete the final report will also be sent to ^CPP Sample Management.

LABORATORY SECTION	RECEIVED BY	TITLE Tech	DATE/TIME 5/21/15 0830
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

PRINTED ON 4/28/2015

A-6005-618 (REV 2)

SEPTEMBER 25, 2015

CHPRC PARTS AND TOOLS RETURN (PTR) FORM
PROJECT HANFORD, 2355 STEVENS DR., RICHLAND, WA 99354

REFERENCE BUSINESS PROCESS GUIDE - MATERIAL RETURNS

SECTION A - Material Information

Company CHPRC Date 5/20/15

One of the following is **REQUIRED**:

PO/Release No.

Contract/Rel. No.

P-Card Log No.

Other

Contract Specialist Name: D. Capelle

Phone Number: 5093720460

Material Coordinator/P-Card Holder Name

Phone Number

PTR No.: 5657

Total Pieces: 1

Line Item No.	Quantity	U/M	Q Level	Description (Catalog ID No., S/N, Gov. Tag No.)/Include Reason for Return	Unit Price	Value
1	1	EA		Cooler# GWS-534 Gross Weight: 93 lbs.		
2	1	EA		Cooler# GWS-432 Gross Weight: 55 lbs.		

RECEIVED MAY 21 2015

SECTION B - Financial Transaction Information

Passport **Purchase Order** Financial Transaction - Check One

- ☐ **Credit** - Return for Credit - PP Receipt Required
- ☐ **Replace** - Return for Replacement - PP Receipt Required
- ☐ **Inventory** - Return to PHMC Inventory
- ☐ **Return** - QA-Non-NCR Material (Credit)

*Requires identification of controlling Purchase Order, Contract, or PHMC Property Custodian accountable for the Govt. property in accordance with Regulations.

Contract/P-Card/Other - No Financial Transaction Created from PTR

- ☐ Credit - Contract/P-Card
- ☐ Repair
- ☐ Ship Supplier Owned Materials, Containers, Samples, etc.
- ☒ *Ship Govt. Owned Materials, Containers, Samples, etc.
- ☐ Other
- ☐ Core Charge - Return for Credit of Deposit
- ☐ Replace
- ☐ Over Shipment

SECTION C - Hazardous Material Information

Hazardous Material	☐ Yes ☒ No	*T&P Inspections (req'd) ☐ Yes ☒ No	Certified Free of Contamination ☐ Yes ☒ No
Radioactive Material	☒ Yes ☐ No	Include appropriate shipping document. Radioactive Material is also Hazardous.	Certifier's Name/Date
Rad. Control Survey	☐ Yes ☒ No		

Custodian: BE Briggs

Telephone: 5093737409

Current Location of Material:

Date Available to Ship: 05/20/2015

SECTION D - Vendor/Ship To Information

Ship To: Southwest Research Institute
620 Culebra Road
San Antonio, TX 78228-0510

Contractor:

Client: CH2M Hill Plateau Remediation Company SwRI SRR #55397
SwRI Project # 20933.01.006 Case: 302898
VTSR: 05/21/15 08:30 Sample(s) Received: Intact
Battery Check: Y Background Check: <100 cpm (Lab 103)
Cooler/Container Wipe: <100 cpm Temp.: 1.2 °C (wet ice) / SN # 021056
Total cpm-mR/h (samples): <100 cpm; <0.5 mR/hr Wipe Frisk Description: Cooler(s) - 2
(see Radioactive Material Receiving Form for more information)

Contact: Michael Dammann

Contact Phone: (210)522-5428

RA No.:

F.O.B.:

Item	% Cost	Cost Center	CACN	COA
All	100	2EK00	302898	JDBA

SECTION E - Shipping Information – To be completed by Shipping Department

Routing

B/L No. 773647475970

B/L Wt. 55 lbs

Frt. Collect

Acct. No.

SECTION F - OSD&D/Shipping Notice Information To be completed by Shipping/Procurement

By

Date Shipped

OSD&D No.

Shipping Notice No.

Receipt No.

 5.2015

A-6004-881 (REV 2)

SEPTEMBER 25, 2015

CHPRC PARTS AND TOOLS RETURN (PTR) FORM
PROJECT HANFORD, 2355 STEVENS DR., RICHLAND, WA 99354

REFERENCE BUSINESS PROCESS GUIDE - MATERIAL RETURNS

SECTION A - Material Information

Company CHPRC Date 5/20/15

One of the following is **REQUIRED**:

PO/Release No.

Contract/Rel. No.

P-Card Log No.

Other

Contract Specialist Name: D. Capelle

Phone Number: 5093720460

Material Coordinator/P-Card Holder Name

Phone Number

PTR No.: 5657

Total Pieces: 1

Line Item No.	Quantity	U/M	Q Level	Description (Catalog ID No., S/N, Gov. Tag No.)/Include Reason for Return	Unit Price	Value
1	1	EA		Cooler# GWS-534 Gross Weight: 93 lbs.		
2	1	EA		Cooler# GWS-432 Gross Weight: 55 lbs.		

RECEIVED MAY 21 2015

SECTION B - Financial Transaction Information

Passport Purchase Order Financial Transaction - Check One

- ☐ **Credit** - Return for Credit - PP Receipt Required
- ☐ **Replace** - Return for Replacement - PP Receipt Required
- ☐ **Inventory** - Return to PHMC Inventory
- ☐ **Return** - QA-Non-NCR Material (Credit)

*Requires identification of controlling Purchase Order, Contract, or PHMC Property Custodian accountable for the Govt. property in accordance with Regulations.

Contract/P-Card/Other - No Financial Transaction Created from PTR

- ☐ Credit - Contract/P-Card
- ☐ Repair
- ☐ Ship Supplier Owned Materials, Containers, Samples, etc.
- ☒ *Ship Govt. Owned Materials, Containers, Samples, etc.
- ☐ Other
- ☐ Core Charge - Return for Credit of Deposit
- ☐ Replace
- ☐ Over Shipment

SECTION C - Hazardous Material Information

Hazardous Material	☐ Yes ☒ No	
Radioactive Material	☒ Yes ☐ No	
Rad. Control Survey	☐ Yes ☒ No	

*T&P Inspections (req'd) ☐ Yes ☒ No

Include appropriate shipping document. Radioactive Material is also Hazardous.

Certified Free of Contamination ☐ Yes ☒ No

Certifier's Name/Date

Custodian: BE Briggs

Telephone: 5093737409

Current Location of Material:

Date Available to Ship: 05/20/2015

SECTION D - Vendor/Ship To Information

Ship To: Southwest Research Institute
620 Culebra Road
San Antonio, TX 78228-0510

Contractor:

Client: CH2M Hill Plateau Remediation Company SwRI SRR #55397
SwRI Project # 20933.01.006 Case: 302898
VTSR: 05/21/15 08:30 Sample(s) Received: Intact
Battery Check: Y Background Check: <100 cpm (Lab 103)
Cooler/Container Wipe: <100 cpm Temp.: 1.2 °C (wet ice) / SN # 021056
Total cpm-mR/h (samples): <100 cpm; <0.5 mR/hr Wipe Frisk Description: Cooler(s) - 2
(see Radioactive Material Receiving Form for more information)

Contact: Michael Dammann

Contact Phone: (210)522-5428

RA No.:

F.O.B.:

Item	% Cost	Cost Center	CACN	COA
All	100	2EK00	302898	JDBA

SECTION E - Shipping Information – To be completed by Shipping Department

Routing

B/L No. 773647475638

B/L Wt. 93 lbs

Frt. Collect

Acct. No.

SECTION F - OSD&D/Shipping Notice Information To be completed by Shipping/Procurement

By

Date Shipped

OSD&D No.

Shipping Notice No.

Receipt No.

bb 5.20.15

A-6004-881 (REV 2)

SEPTEMBER 25, 2015

From: (509) 373-7409
Barbara Briggs
CH2M
6267 Latah St

Richland, WA 99354

Origin ID: PSCA

FedEx Express

J15121502230 3uv

Ship Date: 20MAY15
ActWgt: 55.0 LB
CAD: 10706605/INET3610

Delivery Address Bar Code

Ref # PTR 5657
Invoice #
PO #
Dept #

SHIP TO: (210) 522-5428 BILL THIRD PARTY

Michael Dammann
Southwest Research Institute
620 Culebra Road

SAN ANTONIO, TX 78228

2 of 2

MPS# 7736 4747 5970
0263
Mstr# 7736 4747 5638 0291

XH SATA

THU - 21 MAY 10:30A
PRIORITY OVERNIGHT
DSR
78228
TX-US
SAT

537J3/C918/EE48

After printing this label:
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2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

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Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for a package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, i fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery loss.Maximum for items of extraordinary value is $500 for e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claim limits, see current FedEx Service Guide.

05-21-15
0845

Client: CH2M Hill Plateau Remediation Company SwRI SRR #55397
SwRI Project # 20933.01.006 Case: 302898
VTSR: 05/21/15 08:30 Sample(s) Received: Intact
Battery Check: Y Background Check: <100 cpm (Lab 103)
Cooler/Container Wipe: <100 cpm Temp.: 1.2 °C (wet ice) / SN # 021056
Total cpm-mR/h (samples): <100 cpm; <0.5 mR/hr Wipe Frisk Description: Cooler(s) - 2
(see Radioactive Material Receiving Form for more information)

SEPTEMBER 25, 2015

From: (509) 373-7409
Barbara Briggs
CH2M
6267 Latah St

Richland, WA 99354

Origin ID: PSCA

FedEx Express

J151215022309uv

Ship Date: 20MAY15
ActWgt: 93.0 LB
CAD: 107066051/INET3610

Delivery Address Bar Code

SHIP TO: (210) 522-5428

BILL THIRD PARTY

Michael Dammann
Southwest Research Institute
620 Culebra Road

SAN ANTONIO, TX 78228

Ref # PTR 5657
Invoice #
PO #
Dept #

1 of 2

TRK# 0201 7736 4747 5638

MASTER

XH SATA

THU - 21 MAY 10:30A
PRIORITY OVERNIGHT
DSR
78228
TX-US
SAT

537J3/C916/EE4B

After printing this label:
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2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charge your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for a package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, i fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written clair limits, see current FedEx Service Guide.

RECEIVED
MAY 21 2015

Client: CH2M Hill Plateau Remediation Company SwRI SRR #55397
SwRI Project # 20933.01.006 Case: 302898
VTSR: 05/21/15 08:30 Sample(s) Received: Intact
Battery Check: Y Background Check: <100 cpm (Lab 103)
Cooler/Container Wipe: <100 cpm Temp.: 1.2 °C (wet ice) / SN # 021056
Total cpm-mR/h (samples): <100 cpm; <0.5 mR/hr Wipe Frisk Description: Cooler(s) - 2
(see Radioactive Material Receiving Form for more information)

SOUTHWEST RESEARCH INSTITUTE
CLIENT: CH2M Hill Plateau Remediation
SwRI PROJECT#: 20933.01.006
SwRI TASK ORDER: 150521-8
SwRI SRR: 55397
SDG: 574656
VTSR: 05.21.2015

Appendix B

Total Organic Carbon (TOC) Data

010010

SEPTEMBER 25, 2015

Southwest Research Institute

Total Organic Carbon - (TOC)

Controlled Electronic Benchsheet

DSpeb 6/24/15

Client: CH2M Hill Plateau Remediation Company
Project #: 20933.01.006
TO#: 150521-8
Method: 9060M

Date: 06/10/15
Analyst: James Moken JM
RL = 0.2 mg/l
Sig Figs: 3

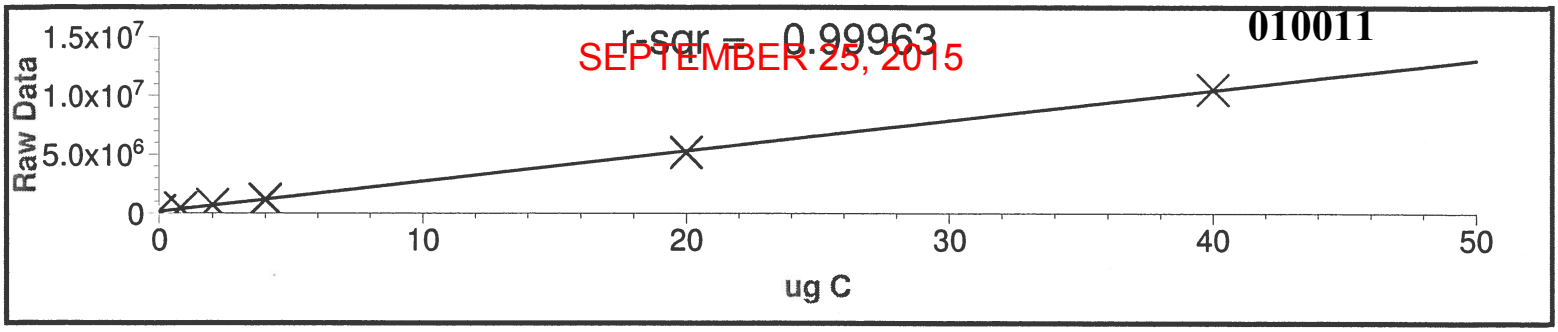
Calibration Source: 36-05-WCS10 Conc: 1000 mg/L
ICV/CCV Source: Inorg# 46391 TV = 82.0 mg/L
MS Source: 36-05-WCS10 Conc: 1000 mg/L

NOTES: EPP: 5000-R, 1000-2, 200-K F- means the sample was filtered. A- means the sample was pretreated with H2SO4
574656S - ((1000*0.150)/30) = 5 mg/L TOC
Sample 574656 had a wide, plump, peak rather than a uniform peak.
* Bottle 6

Seq #	Sample ID	Dilution Factor	Instument Reading, mg/L	TOC Conc.	Units	RL	%Rec	%RPD	Avg	
1	ICV DF10	10	8.4343	84.3	mg/L	2.00	103% R, TV =82.0 mg/L			
2	ICB	1	0.1322	<0.2	mg/L	0.200				
3	574656-1	1	1.5124	1.51	mg/L	0.200				
4	574656-2	1	1.5203	1.52	mg/L	0.200		0.660%	**1.52**	
5	574656D-1	1	1.5028	1.50	mg/L	0.200				**RPD**
6	574656D-2	1	1.5043	1.50	mg/L	0.200		0.00%	**1.50**	**0.995%**
7	574656S-1	1	6.4670	6.47	mg/L	0.200				
8	574656S-2	1	6.4756	6.48	mg/L	0.200	99.2%	0.154%	**6.48**	
9	PBF-1	1	0.1264	<0.2	mg/L	0.200				
10	PBF-2	1	0.1059	<0.2	mg/L	0.200		0.00%	**0.00**	
11 *	574657-1	1	3.3598	3.36	mg/L	0.200				
12	574657-2	1	3.3933	3.39	mg/L	0.200		0.889%	**3.38**	
13	574658-1	1	0.1437	<0.2	mg/L	0.200				
14	574658-2	1	0.1343	<0.2	mg/L	0.200		0.00%	**0.00**	
15	574656F-1	1	1.5872	1.59	mg/L	0.200				
16	574656F-2	1	1.6224	1.62	mg/L	0.200		1.87%	**1.61**	
17	574656FD-1	1	1.5249	1.52	mg/L	0.200				**RPD**
18	574656FD-2	1	1.5363	1.54	mg/L	0.200		1.31%	**1.53**	**4.78%**
19	574656FS-1	1	6.3267	6.33	mg/L	0.200				
20	574656FS-2	1	6.3365	6.34	mg/L	0.200	94.6%	0.158%	**6.34**	
21	CCV DF10	10	8.2716	82.7	mg/L	2.00	101% R, TV =82.0 mg/L			
22	CCB	1	0.0786	<0.2	mg/L	0.200				
23	574657F-1	1	3.3281	3.33	mg/L	0.200				
24	574657F-2	1	3.3439	3.34	mg/L	0.200		0.300%	**3.34**	
25	574656A-1	1	1.4916	1.49	mg/L	0.200				
26	574656A-2	1	1.4852	1.49	mg/L	0.200		0.00%	**1.49**	
27	574656AD-1	1	1.4615	1.46	mg/L	0.200				**RPD**
28	574656AD-2	1	1.4880	1.49	mg/L	0.200		2.03%	**1.48**	**1.01%**
29	574656AS-1	1	6.2815	6.28	mg/L	0.200				
30	574656AS-2	1	6.3015	6.30	mg/L	0.200	96.0%	0.318%	**6.29**	
31	574657A-1	1	3.3445	3.34	mg/L	0.200				
32	574657A-2	1	3.3431	3.34	mg/L	0.200		0.00%	**3.34**	
33	574658 B2-1	1	0.1705	<0.2	mg/L	0.200				
34	574658 B2-2	1	0.1599	<0.2	mg/L	0.200		0.00%	**0.00**	
35	CCV2 DF10	10	8.2758	82.8	mg/L	2.00	101% R, TV =82.0 mg/L			
36	CCB2	1	0.1109	<0.2	mg/L	0.200				

Conc. mg/L = Instrument Reading, mg/L x Dilution Factor

Sample calculation; 574656-1
1.5124 x 1 = 1.51 mg/L


010011
r-sqr = 0.99963
SEPTEMBER 25, 2015
Raw Data
1.5x10^7
1.0x10^7
5.0x10^6
0
0
10
20
30
40
50
ug C

Calibration Report

SEPTEMBER 25, 2015

Cal. Curve ID: 150610OC
Created: 06/10/2015 17:15
Calibration Factor (m): 2.570e+05
Y Intercept (b): 170691
r-squared: 0.99963

Standard ID	Y Raw Data	X Expected ug C	Measured ug C	Message	Date & Time
S0	213775	0.000	0.168		06/10/2015 16:40
S0.2	418303	0.800	0.964		06/10/2015 16:46
S0.5	698689	2.000	2.055		06/10/2015 16:53
S1	1170333	4.000	3.890		06/10/2015 17:00
S5	5166000	20.000	19.439		06/10/2015 17:07
S10	10523321	40.000	40.286		06/10/2015 17:14

Multiple Analysis Report

SEPTEMBER 25, 2015

Sample ID	Result	Std. Dev.	RSD	Mode
BLK	0.2305	0.0046	1.99	TOC
S0	213775			TOC
S0.2	418303			TOC
S0.5	698689			TOC
S1	1170333			TOC
S5	5166000			TOC
S10	10523321			TOC
ICV DF10	8.4343			TOC
ICB	0.1322			TOC
574656	1.5164	0.0056	0.37	TOC
574656D	1.5036	0.0011	0.07	TOC
574656S	6.4713	0.0061	0.09	TOC
PBF	0.1161	0.0145	12.48	TOC
574657	3.3766	0.0237	0.70	TOC
574658	0.1390	0.0066	4.78	TOC
574656F	1.6048	0.0249	1.55	TOC
574656FD	1.5306	0.0081	0.53	TOC
574656FS	6.3316	0.0069	0.11	TOC
CCV DF10	8.2716			TOC
CCB	0.0786			TOC
574657F	3.3360	0.0112	0.33	TOC
574656A	1.4884	0.0045	0.30	TOC
574656ad	1.4748	0.0187	1.27	TOC
574656AS	6.2915	0.0141	0.22	TOC
574657A	3.3438	0.0010	0.03	TOC
574658 2ndb	0.1652	0.0075	4.54	TOC
CCV2 DF10	8.2758			TOC
CCB2	0.1109			TOC

Detailed Analysis Report

SEPTEMBER 25, 2015

Sample ID: BLK
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101622
Timestamp: 06/10/2015 16:34
Sample Type: Sample

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.2337	0.9347	224324	10.816	11.810	64
2	0.2272	0.9086	218073	10.772	11.771	64

Mean: 0.2305 Std Dev: 0.0046 RSD: 1.99

Sample ID: S0
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101622
Timestamp: 06/10/2015 16:40
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			213775	10.824	11.823	63

Sample ID: S0.2
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101622
Timestamp: 06/10/2015 16:46
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			418303	10.911	11.907	69

Sample ID: S0.5
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101622
Timestamp: 06/10/2015 16:53
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			698689	10.944	11.940	74

Sample ID: S1
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101622
Timestamp: 06/10/2015 17:00
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			1170333	10.952	11.947	79

Sample ID: S5
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101622
Timestamp: 06/10/2015 17:07
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning	Ending	Integration

SEPTEMBER 25, 2015

			Baseline	Baseline	Time
1		5166000	10.950	11.950	103

Sample ID: S10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101622
Timestamp: 06/10/2015 17:14
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			10523321	11.080	12.080	124

Sample ID: ICV DF10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101718
Timestamp: 06/10/2015 17:26
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	8.4343	33.7372	8840470	11.187	12.185	137

Sample ID: ICB
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101718
Timestamp: 06/10/2015 17:32
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.1322	0.5288	306580	11.291	12.284	64

Sample ID: 574656
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101733
Timestamp: 06/10/2015 17:47
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.5124	6.0496	1725313	11.301	12.299	123
2	1.5203	6.0813	1733461	11.482	12.480	121

Mean: 1.5164 Std Dev: 0.0056 RSD: 0.37

Sample ID: 574656D
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101733
Timestamp: 06/10/2015 18:01
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.5028	6.0111	1715413	11.389	12.384	123
2	1.5043	6.0171	1716974	11.335	12.331	121

Mean: 1.5036 Std Dev: 0.0011 RSD: 0.07

Sample ID: 574656S

Mode: TOC

SEPTEMBER 25, 2015

Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1
Filename: 06101733
Timestamp: 06/10/2015 18:16
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	6.4670	25.8680	6818262	11.236	12.234	136
2	6.4756	25.9024	6827097	11.360	12.357	134

Mean: 6.4713 Std Dev: 0.0061 RSD: 0.09

Sample ID: PBF
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1
Mode: TOC
Filename: 06101733
Timestamp: 06/10/2015 18:29
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.1264	0.5057	300655	11.280	12.277	67
2	0.1059	0.4236	279543	11.235	12.234	69

Mean: 0.1161 Std Dev: 0.0145 RSD: 12.48

Sample ID: 574657
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1
Mode: TOC
Filename: 06101830
Timestamp: 06/10/2015 18:43
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	3.3598	13.4392	3624290	11.380	12.375	104
2	3.3933	13.5731	3658709	11.358	12.357	103

Mean: 3.3766 Std Dev: 0.0237 RSD: 0.70

Sample ID: 574658
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1
Mode: TOC
Filename: 06101830
Timestamp: 06/10/2015 18:56
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.1437	0.5749	318437	11.377	12.377	65
2	0.1343	0.5372	308738	11.365	12.360	65

Mean: 0.1390 Std Dev: 0.0066 RSD: 4.78

Sample ID: 574656F
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1
Mode: TOC
Filename: 06101830
Timestamp: 06/10/2015 19:10
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.5872	6.3490	1802248	11.289	12.285	126
2	1.6224	6.4895	1838357	11.340	12.336	131

Mean: 1.6048 Std Dev: 0.0249 RSD: 1.55

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Sample ID: 574656FD
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101830
Timestamp: 06/10/2015 19:25
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.5249	6.0995	1738131	11.509	12.509	124
2	1.5363	6.1453	1749911	11.445	12.445	125

Mean: 1.5306 Std Dev: 0.0081 RSD: 0.53

Sample ID: 574656FS
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101830
Timestamp: 06/10/2015 19:40
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	6.3267	25.3068	6674037	11.447	12.441	139
2	6.3365	25.3460	6684096	11.470	12.466	137

Mean: 6.3316 Std Dev: 0.0069 RSD: 0.11

Sample ID: CCV DF10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101942
Timestamp: 06/10/2015 19:49
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	8.2716	33.0862	8673183	11.424	12.422	122

Sample ID: CCB
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101942
Timestamp: 06/10/2015 19:56
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0786	0.3144	251494	11.405	12.396	61

Sample ID: 574657F
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101942
Timestamp: 06/10/2015 20:10
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	3.3281	13.3126	3591753	11.372	12.370	106
2	3.3439	13.3757	3607976	11.323	12.318	108

Mean: 3.3360 Std Dev: 0.0112 RSD: 0.33

SEPTEMBER 25, 2015

Sample ID: 574656A
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1
Mode: TOC
Filename: 06101942
Timestamp: 06/10/2015 20:24
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.4916	5.9664	1703946	11.375	12.369	127
2	1.4852	5.9408	1697367	11.236	12.229	129

Mean: 1.4884 Std Dev: 0.0045 RSD: 0.30

Sample ID: 574656ad
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1
Mode: TOC
Filename: 06101942
Timestamp: 06/10/2015 20:39
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.4615	5.8461	1673010	11.319	12.318	128
2	1.4880	5.9519	1700218	11.269	12.266	129

Mean: 1.4748 Std Dev: 0.0187 RSD: 1.27

Sample ID: 574656AS
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1
Mode: TOC
Filename: 06101942
Timestamp: 06/10/2015 20:54
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	6.2815	25.1258	6627526	11.268	12.268	142
2	6.3015	25.2058	6648090	11.311	12.309	143

Mean: 6.2915 Std Dev: 0.0141 RSD: 0.22

Sample ID: 574657A
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1
Mode: TOC
Filename: 06101942
Timestamp: 06/10/2015 21:08
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	3.3445	13.3779	3608548	11.437	12.430	109
2	3.3431	13.3725	3607151	11.407	12.405	108

Mean: 3.3438 Std Dev: 0.0010 RSD: 0.03

Sample ID: 574658 2ndb
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1
Mode: TOC
Filename: 06101942
Timestamp: 06/10/2015 21:21
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time

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1	0.1705	0.6821	345985	11.395	12.391	65
2	0.1599	0.6394	335008	11.354	12.347	66

Mean: 0.1652 Std Dev: 0.0075 RSD: 4.54

Sample ID: CCV2 DF10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101942
Timestamp: 06/10/2015 21:28
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	8.2758	33.1031	8677517	11.384	12.381	131

Sample ID: CCB2
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150610OC
Operator ID: USER1

Mode: TOC
Filename: 06101942
Timestamp: 06/10/2015 21:35
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.1109	0.4437	284702	11.431	12.425	63

Work continued from Page

SWRI 46-01 100ppm TOC std

2mL of 1000ppm TOC std (#36-05-WCS11) to FV. 20mL with DI H2O

TOC std	TOC conc	amount of 100ppm added	FV.
S0	0mg/L	0mL	20mL
S0.2	0.2mg/L	0.04mL	20mL
S0.5	0.5mg/L	0.1mL	20mL
S1.0	1.0mg/L	0.2mL	20mL
S5.0	5.0mg/L	1.0mL	20mL
S10.0	10.0mg/L	2.0mL	20mL

Acid Reagent: 36-03-WCS11

TOC Reagent: 36-01-WCS11

NDIR: 10.8

Epp: 5000-R, 1000-2, 200 k

ICV/CCV DF200 TV = 82mg/L

0.1mL ERA std (#46391) to FV. 20mL with DI H_2O

DAM 6/10/15

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Work continued to Page

SIGNATURE DATE 6/10/15

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE 6/11/15

SEPTEMBER 25, 2015

Southwest Research Institute

Total Organic Carbon - (TOC)

Controlled Electronic Benchsheet

7/14/15

Client: CH2M Hill Plateau Remediation Company
Project #: 20933.01.006
TO#: 150521-8
Method: 9060M

Date: 06/18/15
Analyst: James Moken
RL = 0.2 mg/l
Sig Figs: 3

Calibration Source: 36-05-WCS11 Conc: 1000 mg/L
ICV/CCV Source: Inorg #46391 TV = 82.0 mg/L
MS Source: 36-05-WCS11 Conc: 1000 mg/L

NOTES: EPP: 5000-R, 1000-2, 200-K C - Concentrated sample

Seq #	Sample ID	Dilution Factor	Instument Reading, mg/L	TOC Conc.	Units	RL	%Rec	%RPD	Avg	Uncert
1	ICV DF10	10	8.2929	82.9	mg/L	2.00	101% R, TV =82.0 mg/L			**5.07**
2	ICB	1	0.1169	<0.20	mg/L	0.200				**0.100**
1	PB DF20-1	20	0.4310	8.62	mg/L	4.00	VOID: Wrong vial injected			
2	PB DF20-2	20	0.4421	8.84	mg/L	4.00	VOID: Wrong vial injected			
3	574656C-1	20	1.3098	26.2	mg/L	4.00				
4	574656C-2	20	1.2863	25.7	mg/L	4.00		1.93%	**26.0**	**2.53**
5	574657C-1	20	0.6962	13.9	mg/L	4.00	VOID: Redo Blowdown			
6	574657C-2	20	0.7130	14.3	mg/L	4.00	VOID: Redo Blowdown			
7	574657DC-1	20	1.1267	22.5	mg/L	4.00	VOID: Redo Blowdown			
8	574657DC-2	20	1.1214	22.4	mg/L	4.00	VOID: Redo Blowdown			
3	PBR-1	20	0.0544	<4.00	mg/L	4.00				
4	PBR-2	20	0.0406	<4.00	mg/L	4.00				
5	574657CF-1	20	0.9154	18.3	mg/L	4.00	VOID: Redo Blowdown			
6	574657CF-2	20	0.9250	18.5	mg/L	4.00	VOID: Redo Blowdown			
7	CCV DF10	10	8.0792	80.8	mg/L	2.00	98.5% R, TV =82.0 mg/L			**4.95**
8	CCB	1	0.1015	<0.20	mg/L	0.20				**0.100**

Sample calculation; 574656C-1

1.3098 x 20 = 26.2 mg/L

Conc. mg/L = Instrument Reading, mg/L x Dilution Factor

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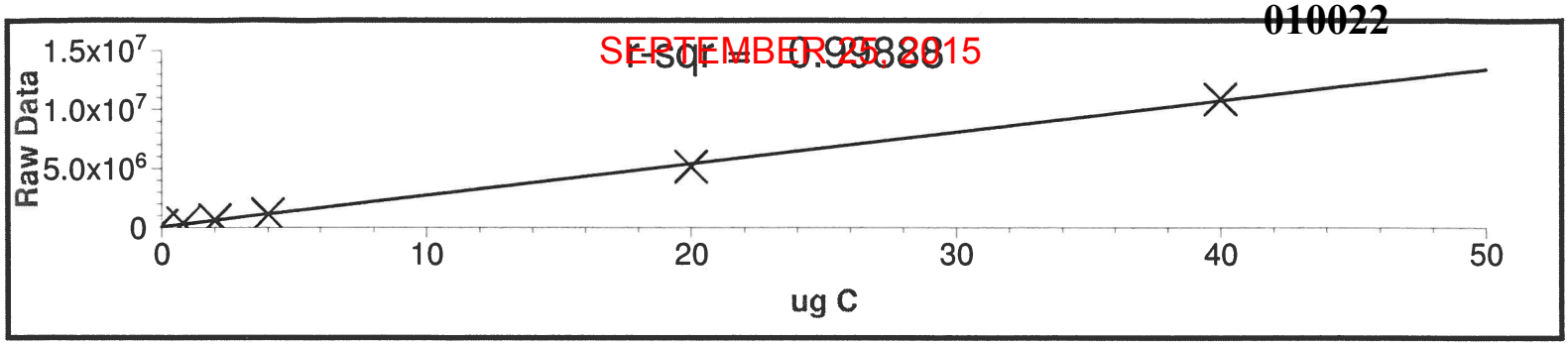

SEPTEMBER 25, 2015

Calibration Report

Cal. Curve ID: 160618OC
Created: 06/18/2015 15:40
Calibration Factor (m): 2.670e+05
Y Intercept (b): 82605
r-squared: 0.99888

Standard ID	Y Raw Data	X Expected ug C	Measured ug C	Message	Date & Time
S0	164550	0.000	0.307		06/18/2015 15:06
S0.2	359389	0.800	1.037		06/18/2015 15:12
S0.5	631930	2.000	2.058		06/18/2015 15:18
S1	1123438	4.000	3.898		06/18/2015 15:25
S5	5154176	20.000	18.996		06/18/2015 15:32
S10	10896738	40.000	40.505		06/18/2015 15:39

Multiple Analysis Report

Sample ID	Result	Std. Dev.	RSD	Mode
BLK	0.1926	0.0160	8.30	TOC
S0	164550			TOC
S0.2	359389			TOC
S0.5	631930			TOC
S1	1123438			TOC
S5	5154175			TOC
S10	10896738			TOC
ICV DF10	8.2929			TOC
ICB	0.1169			TOC
PB DF20	0.4365	0.0078	1.80	TOC
574656 DF20	1.2980	0.0166	1.28	TOC
574657 DF20	0.7046	0.0119	1.69	TOC
574657D DF20	1.1241	0.0037	0.33	TOC
PBR DF20	0.0475	0.0098	20.54	TOC
574657F DF20	0.9202	0.0068	0.74	TOC
CCV DF10	8.0792			TOC
CCB	0.1015			TOC

SEPTEMBER 25, 2015

Detailed Analysis Report

Sample ID: BLK
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181448
Timestamp: 06/18/2015 14:59
Sample Type: Sample

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.2039	0.8157	195763	15.189	16.179	53
2	0.1813	0.7253	174081	14.737	15.734	52

Mean: 0.1926 Std Dev: 0.0160 RSD: 8.30

Sample ID: S0
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181448
Timestamp: 06/18/2015 15:06
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			164550	14.510	15.500	52

Sample ID: S0.2
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181448
Timestamp: 06/18/2015 15:12
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			359389	14.192	15.184	60

Sample ID: S0.5
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181448
Timestamp: 06/18/2015 15:18
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			631930	13.992	14.992	66

Sample ID: S1
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181448
Timestamp: 06/18/2015 15:25
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			1123438	13.912	14.895	70

Sample ID: S5
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181448
Timestamp: 06/18/2015 15:32
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning	Ending	Integration

		Baseline	Baseline	Time
1	5154175	13.720	14.719	92

Sample ID: S10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181448
Timestamp: 06/18/2015 15:39
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			10896738	13.780	14.777	106

Sample ID: ICV DF10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181543
Timestamp: 06/18/2015 15:50
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	8.2929	33.1717	8938949	13.482	14.477	106

Sample ID: ICB
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181543
Timestamp: 06/18/2015 15:56
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.1169	0.4675	207432	13.332	14.330	54

Sample ID: PB DF20
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181543
Timestamp: 06/18/2015 16:09
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.4310	1.7241	542901	13.107	14.102	66
2	0.4421	1.7684	554730	12.908	13.903	66

Mean: 0.4365 Std Dev: 0.0078 RSD: 1.80

Sample ID: 574656 DF20
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1

Mode: TOC
Filename: 06181543
Timestamp: 06/18/2015 16:22
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.3098	5.2393	1481419	12.948	13.941	101
2	1.2863	5.1451	1456270	12.906	13.903	100

Mean: 1.2980 Std Dev: 0.0166 RSD: 1.28

Sample ID: 574657 DF20

Mode: TOC

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Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1
Filename: 06181543
Timestamp: 06/18/2015 16:35
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.6962	2.7846	826057	12.882	13.874	77
2	0.7130	2.8521	844066	12.777	13.773	79

Mean: 0.7046 Std Dev: 0.0119 RSD: 1.69

Sample ID: 574657D DF20
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1
Mode: TOC
Filename: 06181543
Timestamp: 06/18/2015 16:48
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1267	4.5067	1285816	12.817	13.813	90
2	1.1214	4.4855	1280174	12.896	13.889	88

Mean: 1.1241 Std Dev: 0.0037 RSD: 0.33

Sample ID: PBR DF20
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1
Mode: TOC
Filename: 06181543
Timestamp: 06/18/2015 17:01
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0544	0.2175	140674	12.841	13.829	54
2	0.0406	0.1624	125954	12.587	13.581	54

Mean: 0.0475 Std Dev: 0.0098 RSD: 20.54

Sample ID: 574657F DF20
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1
Mode: TOC
Filename: 06181543
Timestamp: 06/18/2015 17:14
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.9154	3.6615	1060178	12.550	13.546	89
2	0.9250	3.6998	1070398	12.688	13.682	88

Mean: 0.9202 Std Dev: 0.0068 RSD: 0.74

Sample ID: CCV DF10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 160618OC
Operator ID: USER1
Mode: TOC
Filename: 06181543
Timestamp: 06/18/2015 17:22
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	8.0792	32.3170	8710746	12.690	13.684	114

54 TITLE TAP 01-0406-159
TO# 150521-8

SEPTEMBER 25, 2015

PROJECT NO. 20933.01.006
BOOK NO. 15-0406-12

Work continued from Page

SWRI

54-01 100ppm TOC std

2mL of 1000ppm TOC std (36-05-WC511) to F.V. 20mL with DI H_2O

TOC std	TOC conc	amount of 100ppm std	F.V
S0	0mg/L	0mL	20mL
S0.2	0.2mg/L	0.04mL	20mL
S0.5	0.5mg/L	0.1mL	20mL
S1.0	1.0mg/L	0.2mL	20mL
S5.0	5.0mg/L	1.0mL	20mL
S10.0	10.0mg/L	2.0mL	20mL

Acid Reagent: 36-03-WC511

TOC Reagent: 36-04-WC511

NDIR: K-15

Epp: 5000-R, 1000-2, 200-K

54-02 DF 200 mg/L TV = 82 mg/L

0.1mL of ERA std (#46391) to F.V 20mL with DI H_2O

JAM 6/24/15

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Work continued to Page 55

SIGNATURE Dana Grech DATE 6/18/15

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE 6/24/15

SEPTEMBER 25, 2015

Southwest Research Institute

Total Organic Carbon - (TOC)

Controlled Electronic Benchsheet

R Spies 7/14/15

Client: CH2M Hill Plateau Remediation Company
Project #: 20933.01.006
TO#: 150521-8
Method: 9060M

Date: 06/24/15
Analyst: James Moken JM
RL = 0.2 mg/l
Sig Figs: 3

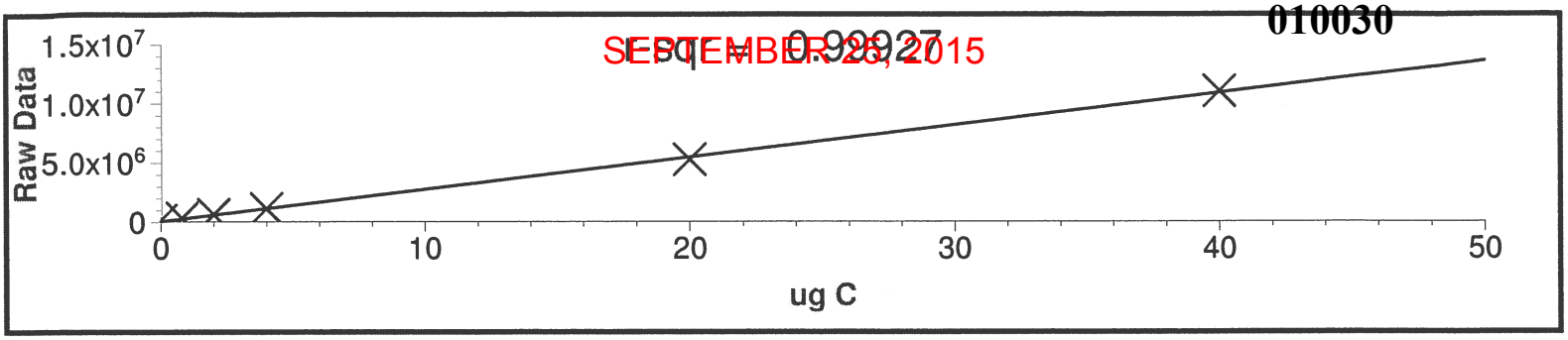
Calibration Source: 36-05-WCS11 — Conc: 1000 mg/L
ICV/CCV Source: Inorg #46391 — TV = 82.0 mg/L
MS Source: 36-05-WCS11 — Conc: 1000 mg/L

NOTES: EPP: 5000-R, 1000-2, 200-K — C - Concentrated sample — B6 - bottle 6 — B3 - bottle 3
SP- Sparged — B7 - bottle 7

Seq #	Sample ID	Dilution Factor	Instument Reading, mg/L	TOC Conc.	Units	RL	%Rec	%RPD	Avg	Uncert
1	ICV DF10	10	8.3044	83.0	mg/L	2.00	101% R, TV =82.0 mg/L			**5.08**
2	ICB	1	0.1041	<0.20	mg/L	0.200				**0.100**
1	574656-1	1	1.5692	1.57	mg/L	0.200				
2	574656-2	1	1.5630	1.56	mg/L	0.200		0.639%	**1.57**	**0.137**
3	574657-1 B3	1	0.8575	0.858	mg/L	0.200				
4	574657-2 B3	1	0.8788	0.879	mg/L	0.200		2.45%	**0.868**	**0.113**
5	574656-1 Sp	1	1.7529	1.75	mg/L	0.200				
6	574656-2 Sp	1	1.7404	1.74	mg/L	0.200		0.573%	**1.75**	**0.145**
7	574657-1 Sp	1	0.8755	0.876	mg/L	0.200				
8	574657-2 Sp	1	0.9109	0.911	mg/L	0.200		3.96%	**0.893**	**0.113**
3	574657-1 B6	1	0.8099	0.810	mg/L	0.200				
4	574657-2 B6	1	0.8071	0.807	mg/L	0.200		0.346%	**0.809**	**0.111**
5	574657-1 B7	1	0.8221	0.822	mg/L	0.200				
6	574657-2 B7	1	0.8356	0.836	mg/L	0.200		1.63%	**0.829**	**0.112**
7	574658-1	1	0.1572	<0.20	mg/L	0.200				
8	574658-2	1	0.1509	<0.20	mg/L	0.200		0.00%	**0.00**	**0.100**
9	PB-1 C	20	0.0931	<4.00	mg/L	4.00				
10	PB-2 C	20	0.0888	<4.00	mg/L	4.00		0.00%	**0.00**	**2.00**
5	574657-1 C	20	0.6845	13.7	mg/L	4.00				
6	574657-2 C	20	0.6878	13.8	mg/L	4.00		0.727%	**13.8**	**2.16**
7	574657D-1 C	20	0.6871	13.7	mg/L	4.00				
8	574657D-2 C	20	0.6999	14.0	mg/L	4.00		2.17%	**13.9**	**2.17**
9	574656D-1 C	20	1.1875	23.8	mg/L	4.00				
10	574656D-2 C	20	1.1796	23.6	mg/L	4.00		0.844%	**23.7**	**2.45**
11	CCV DF10	10	8.2022	82.0	mg/L	2.00	100% R, TV =82.0 mg/L			**5.02**
12	CCB	1	0.0958	<0.20	mg/L	0.200				**0.100**

Sample ID	Sample TOC value (mg/L)	TOC concentrated (mg/L)	Total Volume Concentrated (mL)	Final Volume (mL)	TOC recalculated (mg/L)	RPD
574656	1.52	26.0	410	20	1.27	18.1%
574656D		23.7	202	10	1.17	25.7%
		9.26%			7.78%	
574657	0.868	13.8	206	10	0.670	25.8%
574657D		13.9	208	10	0.668	26.0%
		0.722%			0.244%	

Conc. mg/L = Instrument Reading, mg/L x Dilution Factor


SEPTEMBER 28, 2015
r = 0.99927
Raw Data
1.5x10^7
1.0x10^7
5.0x10^6
0
0
10
20
30
40
50
ug C

SEPTEMBER 25, 2015

Calibration Report

Cal. Curve ID: 150624OC
Created: 06/24/2015 16:09
Calibration Factor (m): 2.708e+05
Y Intercept (b): 40826
r-squared: 0.99927

Standard ID	Y Raw Data	X Expected ug C	Measured ug C	Message	Date & Time
S0	122842	0.000	0.303		06/24/2015 15:31
S0.2	303755	0.800	0.971		06/24/2015 15:38
S0.5	597738	2.000	2.056		06/24/2015 15:44
S1	1085365	4.000	3.857		06/24/2015 15:51
S5	5244180	20.000	19.211		06/24/2015 15:58
S10	10983795	40.000	40.402		06/24/2015 16:05

SEPTEMBER 25, 2015

Multiple Analysis Report

Sample ID	Result	Std. Dev.	RSD	Mode
BLK	0.1014	0.0047	4.60	TOC
S0	122842			TOC
S0.2	303755			TOC
S0.5	597739			TOC
S1	1085365			TOC
S5	5244179			TOC
S10	10983795			TOC
ICV DF10	8.3044			TOC
ICB	0.1041			TOC
574656	1.5661	0.0044	0.28	TOC
574657	0.8681	0.0151	1.73	TOC
574656 SPARGE	1.7466	0.0088	0.51	TOC
574657 SPRGE	0.8932	0.0250	2.80	TOC
574657 B6	0.8085	0.0020	0.24	TOC
574657 B7	0.8289	0.0095	1.15	TOC
574658	0.1540	0.0045	2.89	TOC
PB DF20 BD	0.0909	0.0030	3.34	TOC
574657 DF20 BD	0.6861	0.0023	0.34	TOC
574657D DF20 BD	0.6935	0.0091	1.31	TOC
574656D DF20 BD	1.1836	0.0056	0.47	TOC
CCV DF10	8.2022			TOC
CCB	0.0958			TOC

SEPTEMBER 25, 2015

Detailed Analysis Report

Sample ID: BLK
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241513
Timestamp: 06/24/2015 15:25
Sample Type: Sample

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.1047	0.4189	100542	11.927	12.913	54
2	0.0981	0.3924	94182	11.778	12.772	53

Mean: 0.1014 Std Dev: 0.0047 RSD: 4.60

Sample ID: S0
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241513
Timestamp: 06/24/2015 15:31
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			122842	11.749	12.744	56

Sample ID: S0.2
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241513
Timestamp: 06/24/2015 15:38
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			303755	11.739	12.734	63

Sample ID: S0.5
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241513
Timestamp: 06/24/2015 15:44
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			597739	11.708	12.696	69

Sample ID: S1
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241513
Timestamp: 06/24/2015 15:51
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			1085365	11.694	12.683	76

Sample ID: S5
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241513
Timestamp: 06/24/2015 15:58
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning	Ending	Integration

SEPTEMBER 25, 2015

			Baseline	Baseline	Time
1		5244179	11.704	12.703	103

Sample ID: S10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241513
Timestamp: 06/24/2015 16:05
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			10983795	11.805	12.801	119

Sample ID: ICV DF10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241611
Timestamp: 06/24/2015 16:18
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	8.3044	33.2176	9037783	11.768	12.768	120

Sample ID: ICB
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241611
Timestamp: 06/24/2015 16:24
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.1041	0.4164	153601	11.813	12.806	54

Sample ID: 574656
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241611
Timestamp: 06/24/2015 16:39
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.5692	6.2768	1740880	11.729	12.723	117
2	1.5630	6.2522	1734220	11.808	12.808	117

Mean: 1.5661 Std Dev: 0.0044 RSD: 0.28

Sample ID: 574657
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241611
Timestamp: 06/24/2015 16:53
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.8575	3.4302	969884	11.844	12.843	103
2	0.8788	3.5153	992941	11.910	12.910	104

Mean: 0.8681 Std Dev: 0.0151 RSD: 1.73

Sample ID: 574656 SPARGE

Mode: TOC

SEPTEMBER 25, 2015

Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1
Filename: 06241611
Timestamp: 06/24/2015 17:07
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.7529	7.0118	1939959	11.804	12.801	120
2	1.7404	6.9615	1926333	11.844	12.844	118

Mean: 1.7466 Std Dev: 0.0088 RSD: 0.51

Sample ID: 574657 SPRGE
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1
Mode: TOC
Filename: 06241710
Timestamp: 06/24/2015 17:24
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.8755	3.5021	989363	11.889	12.886	105
2	0.9109	3.6437	1027729	11.931	12.929	110

Mean: 0.8932 Std Dev: 0.0250 RSD: 2.80

Sample ID: 574657 B6
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1
Mode: TOC
Filename: 06241726
Timestamp: 06/24/2015 17:39
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.8099	3.2396	918258	11.845	12.840	91
2	0.8071	3.2283	915199	11.916	12.912	91

Mean: 0.8085 Std Dev: 0.0020 RSD: 0.24

Sample ID: 574657 B7
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1
Mode: TOC
Filename: 06241726
Timestamp: 06/24/2015 17:52
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.8221	3.2885	931522	11.927	12.924	100
2	0.8356	3.3426	946160	11.941	12.939	101

Mean: 0.8289 Std Dev: 0.0095 RSD: 1.15

Sample ID: 574658
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1
Mode: TOC
Filename: 06241726
Timestamp: 06/24/2015 18:05
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.1572	0.6287	211112	12.000	12.997	63
2	0.1509	0.6036	204308	11.923	12.918	62

Mean: 0.1540 Std Dev: 0.0045 RSD: 2.89

Sample ID: PB DF20 BD
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1
Mode: TOC
Filename: 06241726
Timestamp: 06/24/2015 18:17
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0931	0.3725	141723	11.967	12.959	58
2	0.0888	0.3553	137059	11.933	12.932	58

Mean: 0.0909 Std Dev: 0.0030 RSD: 3.34

Sample ID: 574657 DF20 BD
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1
Mode: TOC
Filename: 06241726
Timestamp: 06/24/2015 18:30
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.6845	2.7379	782387	11.938	12.932	80
2	0.6878	2.7511	785952	11.886	12.882	80

Mean: 0.6861 Std Dev: 0.0023 RSD: 0.34

Sample ID: 574657D DF20 BD
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1
Mode: TOC
Filename: 06241726
Timestamp: 06/24/2015 18:43
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.6871	2.7485	785262	11.992	12.988	75
2	0.6999	2.7996	799103	11.975	12.967	75

Mean: 0.6935 Std Dev: 0.0091 RSD: 1.31

Sample ID: 574656D DF20 BD
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1
Mode: TOC
Filename: 06241726
Timestamp: 06/24/2015 18:57
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1875	4.7501	1327378	11.962	12.957	99
2	1.1796	4.7184	1318791	11.886	12.884	99

Mean: 1.1836 Std Dev: 0.0056 RSD: 0.47

Sample ID: CCV DF10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1
Mode: TOC
Filename: 06241726
Timestamp: 06/24/2015 19:04
Sample Type: Cal. Verification

SEPTEMBER 25, 2015

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	8.2022	32.8087	8927036	11.971	12.967	129

Sample ID: CCB
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150624OC
Operator ID: USER1

Mode: TOC
Filename: 06241726
Timestamp: 06/24/2015 19:10
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0958	0.3831	144581	12.042	13.035	54

57-01 100ppm TOC

2mL of 1000ppm TOC std (#36-03-wcs11) to F.V. 20mL with DI H_2O

TOC std	TOC conc	amount of 100ppm added	FV
S0	0mg/L	0mL	20mL
S0.2	0.2mg/L	0.04mL	20mL
S0.5	0.5mg/L	0.1mL	20mL
S1.0	1.0mg/L	0.2mL	20mL
S5.0	5.0mg/L	1.0mL	20mL
S10.0	10.0mg/L	2.0mL	20mL

Acid Reagent: 36-03-wcs11

TOC Reagent: 36-04-wcs11

NDIR:

Epp: 5000-R, 1000-2, 200-L

57-02 ICV/CCV DF 200mg/L TV = 82mg/L

0.1mL of EBA std (#46391) to F.V. 20mL with DI H_2O

JAM 6/24/15

SEPTEMBER 25, 2015

Southwest Research Institute

Total Organic Carbon - (TOC)

Controlled Electronic Benchsheet

Client: Div. 01, CH2M
Project #: 17992.02.005, 20933.01.006
TO#: 150921-1, 150521-8
Method: EPA 415.1, 9060M

√ M. Grabaldon 9/21/15

Date: 9/18/15, 9/19/15
Analyst: James Moken JM
RL = 0.2 mg/l
Sig Figs: 3

Calibration Source: 36-05-WCS11
ICV/CCV Source: 49871
MS Source: NA

Conc: 1000 mg/L
TV = 25.0 mg/L

NOTES: EPP: 5000-R, 1000-2, 200-K Due to limited sample, samples were only injected once.

Seq #	Sample ID	Dilution Factor	Instument Reading, mg/L	TOC Conc.	Units	RL	%Rec	%RPD	Avg	Uncert
1	ICV	10	2.4305	24.3	mg/L	2.00	97.2% R, TV =25.0 mg/L			1.77
2	ICB	1	0.0537	<0.20	mg/L	0.200				0.100
3	582691	1	1.0202	1.02	mg/L	0.200				0.117
4	582692	1	1.0452	1.05	mg/L	0.200				0.118
5	582693	1	1.5582	1.56	mg/L	0.200				0.137
6	582694	1	1.0522	1.05	mg/L	0.200				0.118
7	582695	1	1.1505	1.15	mg/L	0.200				0.121
8	582696	1	1.0981	1.10	mg/L	0.200				0.120
9	582697	1	1.0934	1.09	mg/L	0.200				0.119
10	582698	1	1.0796	1.08	mg/L	0.200				0.119
11	582699	1	1.0822	1.08	mg/L	0.200				0.119
12	582700	1	1.0491	1.05	mg/L	0.200				0.118
13	CCV	10	2.4593	24.6	mg/L	2.00	98.4% R, TV =25.0 mg/L			1.78
14	CCB	1	0.0675	<0.20	mg/L	0.200				0.100
15	582701	1	1.0493	1.05	mg/L	0.200				0.118
16	582702	1	1.0115	1.01	mg/L	0.200				0.117
17	582703	1	1.0330	1.03	mg/L	0.200				0.118
18	582704	1	1.0300	1.03	mg/L	0.200				0.118
19	582705	1	1.0461	1.05	mg/L	0.200				0.118
20	582706	1	1.0663	1.07	mg/L	0.200				0.119
21	582707	1	1.0714	1.07	mg/L	0.200				0.119
22	582708	1	1.0632	1.06	mg/L	0.200				0.119
23	582709	1	1.1304	1.13	mg/L	0.200				0.121
24	582710	1	1.4442	1.44	mg/L	0.200				0.132
25	CCV2	10	2.3805	23.8	mg/L	2.00	95.2% R, TV =25.0 mg/L			1.74
26	CCB2	1	0.0618	<0.20	mg/L	0.200				0.100
27	582711	1	0.9832	0.983	mg/L	0.200				0.116
28	582712	1	1.0057	1.01	mg/L	0.200				0.117
29	582713	1	1.0216	1.02	mg/L	0.200				0.117
30	582714	1	1.0462	1.05	mg/L	0.200				0.118
31	582715	1	1.0149	1.01	mg/L	0.200				0.117
32	582716	1	1.1412	1.14	mg/L	0.200				0.121
33	582717	1	1.0884	1.09	mg/L	0.200				0.119
34	582718	1	1.0427	1.04	mg/L	0.200				0.118
35	582719	1	1.0345	1.03	mg/L	0.200				0.118
36	582720	1	1.0402	1.04	mg/L	0.200				0.118
37	CCV3	10	2.4325	24.3	mg/L	2.00	97.2% R, TV =25.0 mg/L			1.77
38	CCB3	1	0.0540	<0.20	mg/L	0.200				0.100

Conc. mg/L = Instrument Reading, mg/L x Dilution Factor

Southwest Research Institute

Total Organic Carbon - (TOC)

Controlled Electronic Benchsheet

Client: Div. 01, CH2M
Project #: 17992.02.005, 20933.01.006
TO#: 150921-1, 150521-8
Method: EPA 415.1, 9060M

Date: 9/18/15, 9/19/15
Analyst: James Moken
RL = 0.2 mg/l
Sig Figs: 3

39	582721	1	0.9940	0.994 mg/L	0.200			0.116
40	582722	1	1.0321	1.03 mg/L	0.200			0.118
41	582723	1	1.0910	1.09 mg/L	0.200			0.119
42	582724	1	1.1038	1.10 mg/L	0.200			0.120
43	582725	1	1.1212	1.12 mg/L	0.200			0.120
44	582726	1	1.5226	1.52 mg/L	0.200			0.135
45	582727	1	1.1709	1.17 mg/L	0.200			0.122
46	582728	1	1.1092	1.11 mg/L	0.200			0.120
47	582744	1	1.0871	1.09 mg/L	0.200			0.119
48	582745	1	1.0646	1.06 mg/L	0.200			0.119
49	CCV4	10	2.3964	24.0 mg/L	2.00	96.0% R, TV =25.0 mg/L		1.75
50	CCB4	1	0.0742	<0.20 mg/L	0.200			0.100
51	582746	1	0.9967	1.00 mg/L	0.200			0.117
52	582747	1	1.0305	1.03 mg/L	0.200			0.118
53	582748	1	1.0441	1.04 mg/L	0.200			0.118
54	582749	1	1.0443	1.04 mg/L	0.200			0.118
55	582750	1	1.0449	1.04 mg/L	0.200			0.118
56	582751	1	1.1045	1.10 mg/L	0.200			0.120
57	582752	1	1.1928	1.19 mg/L	0.200			0.123
58	582753	1	1.1019	1.10 mg/L	0.200			0.120
59	CCV5	10	2.4820	24.8 mg/L	2.000	99.2% R, TV =25.0 mg/L		1.79
60	CCB5	1	0.0696	<0.20 mg/L	0.200			0.100
61	blank-1	1	0.5870	0.587 mg/L	0.20	Instrument cleaning		
62	blank-2	1	0.0552	<0.20 mg/L	0.200	Instrument cleaning		
63	ICV	10	2.4027	24.0 mg/L	2.000	96.0% R, TV =25.0 mg/L		1.75
64	ICB	1	0.0525	<0.20 mg/L	0.200			0.100
65	583056	1	1.0140	1.01 mg/L	0.200			0.117
66	583057	1	1.0070	1.01 mg/L	0.200			0.117
67	583050	1	1.0319	1.03 mg/L	0.200			0.118
68	583051	1	1.2300	1.23 mg/L	0.200			0.124
69	583052	1	1.0676	1.07 mg/L	0.200			0.119
70	583053	1	1.0740	1.07 mg/L	0.200			0.119
71	583054	1	16.2792	16.3 mg/L	0.20	VOID Over curve need additional cleaning		
72	583055	1	82.8709	82.9 mg/L	0.200	VOID Over curve need additional cleaning		
73	CCV	10	2.6218	26.2 mg/L	2.000	105% R, TV =25.0 mg/L		1.86
74	CCB	1	0.0980	<0.20 mg/L	0.200			0.100
75	blank-1	1	0.0643	<0.20 mg/L	0.200	Instrument cleaning		0.100
76	blank-2	1	0.0460	<0.20 mg/L	0.200	Instrument cleaning		0.100
77	574656-3-1	1	1.5298	1.53 mg/L	0.200			
78	574656-3-2	1	1.5505	1.55 mg/L	0.200	1.30%	1.54	0.136
79	574656-3D-1	1	1.5536	1.55 mg/L	0.200			
80	574656-3D-2	1	1.5618	1.56 mg/L	0.200	0.643%	1.56	0.137
81	574656-2-1	1	1.5441	1.54 mg/L	0.200			
82	574656-2-2	1	1.5518	1.55 mg/L	0.200	0.647%	1.55	0.136
83	574657-1-1	1	0.7292	0.729 mg/L	0.200			
84	574657-1-2	1	0.7326	0.733 mg/L	0.200	0.465%	0.731	0.109
85	574657-2-1	1	0.7402	0.740 mg/L	0.200			
86	574657-2-2	1	0.7372	0.737 mg/L	0.200	0.406%	0.739	0.109
87	LOD	1	0.2395	0.240 mg/L	0.200	120% TV = 0.2		

Conc. mg/L = Instrument Reading, mg/L x Dilution Factor

SEPTEMBER 25, 2015

Southwest Research Institute

Total Organic Carbon - (TOC)

Controlled Electronic Benchsheet

Client: Div. 01, CH2M
Project #: 17992.02.005, 20933.01.006
TO#: 150921-1, 150521-8
Method: EPA 415.1, 9060M

Date: 9/18/15, 9/19/15
Analyst: James Moken
RL = 0.2 mg/l
Sig Figs: 3

88	LOQ1	1	0.4071	0.407 mg/L	0.200	102% TV = 0.4	
89	LOQ2	1	0.4013	0.401 mg/L	0.200	100% TV = 0.4	
90	LOQ3	1	0.4045	0.405 mg/L	0.200	101% TV = 0.4	
91	CCV2	10	2.3977	24.0 mg/L	2.00	96.0% R, TV =25.0 mg/L	**1.75**
92	CCB2	1	0.0573	<0.20 mg/L	0.200		**0.100**

Sample calculation; 582691

1.0202 x 1 = 1.02 mg/L

Conc. mg/L = Instrument Reading, mg/L x Dilution Factor

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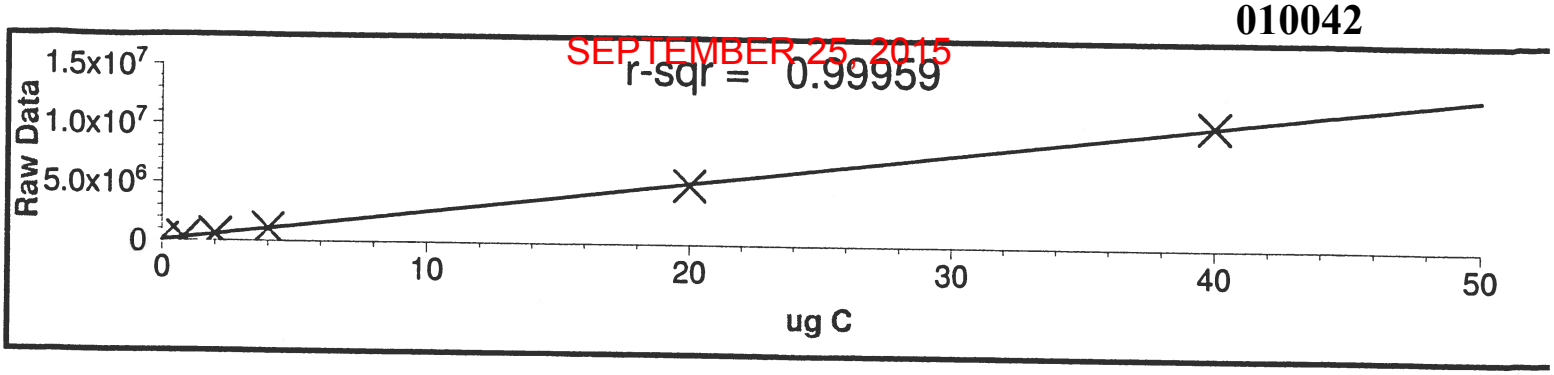

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Calibration Report

Cal. Curve ID: 150918OC
Created: 09/18/2015 10:45
Calibration Factor (m): 2.571e+05
Y Intercept (b): 54734
r-squared: 0.99959

Standard ID	Y Raw Data	X Expected ug C	Measured ug C	Message	Date & Time
S0	99095	0.000	0.173		09/18/2015 10:10
S0.2	294735	0.800	0.934		09/18/2015 10:16
S0.5	587903	2.000	2.074		09/18/2015 10:23
S1	1062759	4.000	3.921		09/18/2015 10:30
S5	5040522	20.000	19.394		09/18/2015 10:37
S10	10415879	40.000	40.304		09/18/2015 10:44

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Multiple Analysis Report

Sample ID	Result	Std. Dev.	RSD	Mode
BLK	0.0896	0.0030	3.31	TOC
S0	99095			TOC
S0.2	294735			TOC
S0.5	587903			TOC
S1	1062759			TOC
S5	5040523			TOC
S10	10415879			TOC
ICV DF10	2.4305			TOC
ICB	0.0537			TOC
582691	1.0202			TOC
582692	1.0452			TOC
582693	1.5582			TOC
582694	1.0522			TOC
582695	1.1505			TOC
582696	1.0981			TOC
582697	1.0934			TOC
582698	1.0796			TOC
582699	1.0822			TOC
582700	1.0491			TOC
CCV2 DF10	2.4593			TOC
CCB2 (C1) 9/21/15	0.0675			TOC
582701 mG	1.0493			TOC
582702	1.0115			TOC
582703	1.0330			TOC
582704	1.0300			TOC
582705	1.0461			TOC
582706	1.0663			TOC
582707	1.0714			TOC
582708	1.0632			TOC
582709	1.1304			TOC
582710	1.4442			TOC
CCV3 DF10	2.3805			TOC
CCB3 (C1) 9/21/15	0.0618			TOC
582711 mG	0.9832			TOC
582712	1.0057			TOC
582713	1.0216			TOC
582714	1.0462			TOC
582715	1.0149			TOC
582716	1.1412			TOC
582717	1.0884			TOC
582718	1.0427			TOC
582719	1.0345			TOC
582720	1.0402			TOC
CCV4 DF10	2.4325			TOC
CCB4	0.0540			TOC
582721	0.9940			TOC
582722	1.0321			TOC
582723	1.0910			TOC
582724	1.1038			TOC
582725	1.1212			TOC
582726	1.5226			TOC
582727	1.1709			TOC
582728	1.1092			TOC
582744	1.0871			TOC
582745	1.0646			TOC
CCV5 DF10	2.3964			TOC
CCB5 (C1) 9/21/15	0.0742			TOC
582746 mG	0.9967			TOC

582747	1.0305			TOC
582748	1.0441			TOC
582749	1.0443			TOC
582750	1.0449			TOC
582751	1.1045			TOC
582752	1.1928			TOC
582753	1.1019			TOC
CCV5 DF10	2.4820			TOC
CCB5	0.0696			TOC
blank	0.3211	0.3760	117.11	TOC
ICV DF10	2.4027			TOC
ICB	0.0525			TOC
p74-B1 583056	1.0140			TOC
p74-B2 583057	1.0070			TOC
p74-1 583050	1.0319			TOC
p74-2 583051	1.2300			TOC
p74-3 583052	1.0676			TOC
p74-4 583053	1.0740			TOC
p74-5 583054	16.2792			TOC
p74-6 583055	82.8709			TOC
CCV DF10	2.6218			TOC
CCB	0.0980			TOC
blank	0.0552	0.0129	23.46	TOC
574656-3	1.5402	0.0146	0.95	TOC
574656-3D	1.5577	0.0058	0.37	TOC
574656-2	1.5480	0.0054	0.35	TOC
574657-1	0.7309	0.0024	0.33	TOC
574657-2	0.7387	0.0021	0.29	TOC
lod	0.2395			TOC
loq1	0.4071			TOC
loq2	0.4013			TOC
loq3	0.4045			TOC
CCV2 DF10	2.3977			TOC
CCB2	0.0573			TOC

(c1) 9/21/15 MG

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Detailed Analysis Report

Sample ID: BLK
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09180952
Timestamp: 09/18/2015 10:04
Sample Type: Sample

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0917	0.3667	88002	12.143	13.135	55
2	0.0875	0.3498	83962	12.061	13.052	55

Mean: 0.0896 Std Dev: 0.0030 RSD: 3.31

Sample ID: S0
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09180952
Timestamp: 09/18/2015 10:10
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			99095	11.997	12.991	56

Sample ID: S0.2
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09180952
Timestamp: 09/18/2015 10:16
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			294735	11.960	12.955	66

Sample ID: S0.5
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09180952
Timestamp: 09/18/2015 10:23
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			587903	11.939	12.935	72

Sample ID: S1
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09180952
Timestamp: 09/18/2015 10:30
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			1062759	11.892	12.887	81

Sample ID: S5
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09180952
Timestamp: 09/18/2015 10:37
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning	Ending	Integration

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				Baseline	Baseline	Time
1			5040523	11.957	12.955	104

Sample ID: S10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09180952
Timestamp: 09/18/2015 10:44
Sample Type: TOC Standard

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1			10415879	12.065	13.064	126

Sample ID: ICV DF10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181045
Timestamp: 09/18/2015 10:52
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	2.4305	9.7220	2553992	12.103	13.102	91

Sample ID: ICB
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181045
Timestamp: 09/18/2015 10:58
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0537	0.2146	109913	11.955	12.954	54

Sample ID: 582691
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181059
Timestamp: 09/18/2015 11:05
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0202	4.0809	1103820	11.993	12.990	79

Sample ID: 582692
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181059
Timestamp: 09/18/2015 11:12
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0452	4.1810	1129556	12.025	13.025	79

Sample ID: 582693
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181059
Timestamp: 09/18/2015 11:19
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time

1	1.5582	6.2328	1657022	12.040	13.038	83

Sample ID: 582694
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181059
Timestamp: 09/18/2015 11:25
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0522	4.2087	1136689	11.966	12.961	79

Sample ID: 582695
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181059
Timestamp: 09/18/2015 11:32
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1505	4.6018	1237733	11.959	12.952	80

Sample ID: 582696
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181059
Timestamp: 09/18/2015 11:39
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0981	4.3924	1183910	11.995	12.994	78

Sample ID: 582697
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181059
Timestamp: 09/18/2015 11:45
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0934	4.3735	1179031	12.032	13.028	81

Sample ID: 582698
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181059
Timestamp: 09/18/2015 11:52
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0796	4.3184	1164870	12.014	13.007	81

Sample ID: 582699
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181059
Timestamp: 09/18/2015 11:59
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0822	4.3286	1167506	12.083	13.082	81

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Sample ID: 582700
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181059
Timestamp: 09/18/2015 12:06
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0491	4.1962	1133465	11.925	12.922	78

(c) 9/21/15

Sample ID: CCV~~8~~ DF10 mg
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 12:13
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	2.4593	9.8371	2583592	12.002	12.999	94

Sample ID: CCB~~8~~ (c) 9/21/15 9/21/15 mg
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 12:20
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0675	0.2701	124179	12.129	13.126	55

Sample ID: 582701
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 12:26
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0493	4.1973	1133740	11.989	12.987	79

Sample ID: 582702
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 12:33
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0115	4.0460	1094857	12.180	13.176	79

Sample ID: 582703
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 12:40
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0330	4.1319	1116927	12.185	13.184	79

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Sample ID: 582704
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 12:47
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0300	4.1198	1113827	12.080	13.076	81

Sample ID: 582705
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 12:53
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0461	4.1846	1130471	12.017	13.016	83

Sample ID: 582706
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 13:00
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0663	4.2652	1151192	12.112	13.111	79

Sample ID: 582707
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 13:07
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0714	4.2856	1156446	12.026	13.019	81

Sample ID: 582708
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 13:13
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0632	4.2527	1147992	12.040	13.036	80

Sample ID: 582709
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 13:20
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1304	4.5214	1217069	12.045	13.045	81

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Sample ID: 582710
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181207
Timestamp: 09/18/2015 13:27
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.4442	5.7768	1539790	12.071	13.069	90

Sample ID: CCV~~3~~2 DF10 (c) 9/21/15 MG
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 13:35
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	2.3805	9.5221	2502618	12.159	13.156	90

Sample ID: CCB~~3~~2 (a) 9/21/15 MG
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 13:41
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0618	0.2472	118292	12.110	13.106	55

Sample ID: 582711
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 13:48
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.9832	3.9330	1065791	12.129	13.123	79

Sample ID: 582712
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 13:55
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0057	4.0228	1088875	12.119	13.117	80

Sample ID: 582713
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 14:01
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0216	4.0862	1105190	12.118	13.115	79

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Sample ID: 582714
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 14:08
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0462	4.1848	1130544	12.055	13.054	81

Sample ID: 582715
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 14:15
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0149	4.0597	1098373	12.104	13.099	82

Sample ID: 582716
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 14:22
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1412	4.5646	1228171	12.044	13.043	84

Sample ID: 582717
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 14:28
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0884	4.3534	1173877	12.101	13.097	81

Sample ID: 582718
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 14:35
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0427	4.1710	1126980	12.114	13.111	81

Sample ID: 582719
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 14:42
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0345	4.1380	1118509	12.084	13.082	79

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Sample ID: 582720
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181329
Timestamp: 09/18/2015 14:49
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0402	4.1609	1124396	12.084	13.079	81

Sample ID: CCV~~4~~3 DF10 (C1) 9/21/15 MG
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181451
Timestamp: 09/18/2015 14:58
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	2.4325	9.7299	2556017	12.135	13.133	92

Sample ID: CCB~~4~~3 (C1) 9/21/15 MG
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181451
Timestamp: 09/18/2015 15:04
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0540	0.2161	110277	12.449	13.442	54

Sample ID: 582721
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181451
Timestamp: 09/18/2015 15:11
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.9940	3.9761	1076882	12.525	13.519	79

Sample ID: 582722
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181451
Timestamp: 09/18/2015 15:17
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0321	4.1286	1116081	12.624	13.621	80

Sample ID: 582723
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09181451
Timestamp: 09/18/2015 15:24
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0910	4.3642	1176649	12.640	13.636	79

Sample ID: 582724

Mode: TOC

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Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Filename: 09181451
Timestamp: 09/18/2015 15:31
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1038	4.4153	1189787	12.648	13.643	81

Sample ID: 582725
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181451
Timestamp: 09/18/2015 15:38
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1212	4.4849	1207680	12.574	13.570	82

Sample ID: 582726
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181451
Timestamp: 09/18/2015 15:45
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.5226	6.0902	1620367	12.302	13.299	85

Sample ID: 582727
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181451
Timestamp: 09/18/2015 15:51
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1709	4.6838	1258808	12.289	13.287	81

Sample ID: 582728
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181451
Timestamp: 09/18/2015 15:58
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1092	4.4369	1195344	12.238	13.234	80

Sample ID: 582744
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181451
Timestamp: 09/18/2015 16:05
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0871	4.3483	1172571	12.254	13.249	81

Sample ID: 582745
Method: TOC Range 0.1 - 20 ppm C
Mode: TOC
Filename: 09181451

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Cal. Curve: 150918OC
Operator ID: USER1
Timestamp: 09/18/2015 16:11
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0646	4.2583	1149437	12.184	13.180	81

Sample ID: CCV~~5~~ 4 DF10 (C1) 9/21/15 MG
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181614
Timestamp: 09/18/2015 16:20
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	2.3964	9.5857	2518950	12.178	13.175	93

Sample ID: CCB~~5~~ 4 (C1) 9/21/15 MG
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181614
Timestamp: 09/18/2015 16:27
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning	Ending	Integration
	Baseline	Baseline	Time			
1	0.0742	0.2969	131067	12.233	13.225	56

Sample ID: 582746
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181614
Timestamp: 09/18/2015 16:33
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.9967	3.9869	1079661	12.165	13.164	79

Sample ID: 582747
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181614
Timestamp: 09/18/2015 16:40
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0305	4.1219	1114358	12.163	13.161	80

Sample ID: 582748
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181614
Timestamp: 09/18/2015 16:47
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0441	4.1764	1128384	12.199	13.198	81

Sample ID: 582749
Method: TOC Range 0.1 - 20 ppm C
Mode: TOC
Filename: 09181614

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Cal. Curve: 150918OC
Operator ID: USER1
Timestamp: 09/18/2015 16:54
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0443	4.1771	1128546	12.225	13.217	80

Sample ID: 582750
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181614
Timestamp: 09/18/2015 17:00
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0449	4.1794	1129151	12.201	13.195	79

Sample ID: 582751
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181614
Timestamp: 09/18/2015 17:07
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1045	4.4181	1190500	12.192	13.187	81

Sample ID: 582752
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181614
Timestamp: 09/18/2015 17:14
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1928	4.7714	1281323	12.233	13.232	83

Sample ID: 582753
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181614
Timestamp: 09/18/2015 17:21
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.1019	4.4075	1187793	12.169	13.166	80

5 (c) 9/21/15 mg

Sample ID: CCV~~8~~ DF10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1
Mode: TOC
Filename: 09181721
Timestamp: 09/18/2015 17:28
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	2.4820	9.9279	2606920	12.222	13.219	91

Sample ID: CCB~~8~~5 (c) 9/21/15 mg
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Mode: TOC
Filename: 09181721
Timestamp: 09/18/2015 17:34

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Operator ID: USER1 Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0696	0.2782	126261	12.272	13.271	55

Sample ID: blank
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09190953
Timestamp: 09/19/2015 10:05
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.5870	2.3480	658339	11.732	12.731	82
2	0.0552	0.2208	111501	11.979	12.977	58

Mean: 0.3211 Std Dev: 0.3760 RSD: 117.11

Sample ID: ICV DF10
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09190953
Timestamp: 09/19/2015 10:12
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	2.4027	9.6108	2525416	11.898	12.895	94

Sample ID: ICB
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09190953
Timestamp: 09/19/2015 10:19
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0525	0.2102	108766	11.992	12.988	56

Sample ID: p74-B1 583056 cl SAM 9/21/15
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191023
Timestamp: 09/19/2015 10:30
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0140	4.0560	1097411	11.982	12.981	81

Sample ID: p74-B2 583057 cl SAM 9/21/15
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191023
Timestamp: 09/19/2015 10:36
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0070	4.0280	1090212	11.994	12.989	81

Sample ID: p74-1 583050 cl SAM 9/21/15 Mode: TOC

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Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Filename: 09191023
Timestamp: 09/19/2015 10:43
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0319	4.1276	1115827	12.026	13.019	81

Sample ID: p74-2 583051 CI SAM 9/21/15
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09191023
Timestamp: 09/19/2015 10:50
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.2300	4.9200	1319529	12.005	13.004	84

Sample ID: p74-3 583052 CI SAM 9/21/15
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09191023
Timestamp: 09/19/2015 10:57
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0676	4.2704	1152541	11.973	12.972	82

Sample ID: p74-4 583053 CI SAM 9/21/15
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1
tion

Mode: TOC
Filename: 09191023
Timestamp: 09/19/2015 11:03
Sample Type: Cal. Verifica

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.0740	4.2959	1159101	11.989	12.987	81

Sample ID: p74-5 583054 CI SAM 9/21/15
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09191023
Timestamp: 09/19/2015 11:11
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	16.2792	65.1169	16794542	12.073	13.072	139

Sample ID: p74-6 583055 CI SAM 9/21/15
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 1509180C
Operator ID: USER1

Mode: TOC
Filename: 09191023
Timestamp: 09/19/2015 11:22
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	82.8709	331.4836	85270232	12.163	13.162	320

Sample ID: CCV DF10

Mode: TOC

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Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Filename: 09191123
Timestamp: 09/19/2015 11:29
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	2.6218	10.4872	2750715	12.496	13.494	90

Sample ID: CCB
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191123
Timestamp: 09/19/2015 11:35
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0980	0.3919	155486	12.610	13.602	56

Sample ID: blank
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191141
Timestamp: 09/19/2015 11:52
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.0643	0.2571	120821	12.205	13.204	57
2	0.0460	0.1839	102005	12.193	13.184	55

Mean: 0.0552 Std Dev: 0.0129 RSD: 23.46

Sample ID: 574656-3
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191141
Timestamp: 09/19/2015 12:07
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.5298	6.1194	1627864	12.225	13.219	115
2	1.5505	6.2020	1649101	12.224	13.217	115

Mean: 1.5402 Std Dev: 0.0146 RSD: 0.95

Sample ID: 574656-3D
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191141
Timestamp: 09/19/2015 12:21
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.5536	6.2144	1652281	12.152	13.144	116
2	1.5618	6.2470	1660677	12.187	13.185	117

Mean: 1.5577 Std Dev: 0.0058 RSD: 0.37

Sample ID: 574656-2
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC

Mode: TOC
Filename: 09191141
Timestamp: 09/19/2015 12:35

SEPTEMBER 25, 2015

Operator ID: USER1 Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	1.5441	6.1763	1642488	12.166	13.159	117
2	1.5518	6.2071	1650405	12.165	13.161	117

Mean: 1.5480 Std Dev: 0.0054 RSD: 0.35

Sample ID: 574657-1
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191141
Timestamp: 09/19/2015 12:48
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.7292	2.9167	804540	12.216	13.210	83
2	0.7326	2.9304	808057	12.178	13.176	86

Mean: 0.7309 Std Dev: 0.0024 RSD: 0.33

Sample ID: 574657-2
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191141
Timestamp: 09/19/2015 13:01
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.7402	2.9608	815887	12.152	13.150	86
2	0.7372	2.9490	812839	12.204	13.199	85

Mean: 0.7387 Std Dev: 0.0021 RSD: 0.29

Sample ID: lod
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191307
Timestamp: 09/19/2015 13:13
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.2395	0.9579	300982	12.185	13.180	68

Sample ID: loq1
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191307
Timestamp: 09/19/2015 13:20
Sample Type: Cal. Verification

Rep #	ppm C	ug C	Raw Data	Beginning Baseline	Ending Baseline	Integration Time
1	0.4071	1.6284	473362	12.194	13.187	70

Sample ID: loq2
Method: TOC Range 0.1 - 20 ppm C
Cal. Curve: 150918OC
Operator ID: USER1

Mode: TOC
Filename: 09191307
Timestamp: 09/19/2015 13:26
Sample Type: Cal. Verification

TITLE TAP 01-0406-159
TO # 150921-1, 150521-8

PROJECT NO. 17492.02.005, 20933.01.606 **85**

BOOK NO. 15-0406-012

SWRI

Work continued from Page

85-01 100ppm TOC

2mL of 1000ppm TOC std (#36-05-WCS11) to F.V. 20mL with DI H_2O

TOC std	TOC conc	amount of 100ppm std	F.V
S0	0mg/L	0mL	20mL
~~S0.1~~ TE SAM 9/18/15			
S0.2	0.2mg/L	0.04mL	20mL
S0.5	0.5mg/L	0.1mL	20mL
S1.0	1.0mg/L	0.2mL	20mL
S5.0	5.0mg/L	1.0mL	20mL
S10.0	10.0mg/L	2.0mL	20mL

Acid Reagent: 115-01-WCS11

TOC Reagent: 102-01-WCS11

NDIR: 12.0

Epp: 5000-R, 1000-2, 200-1

85-02 ICV/CCV TV = 25mg/L

2mL of TOC std (#49871) to F.V. 20mL with DI H_2O

Epp. 5000-R

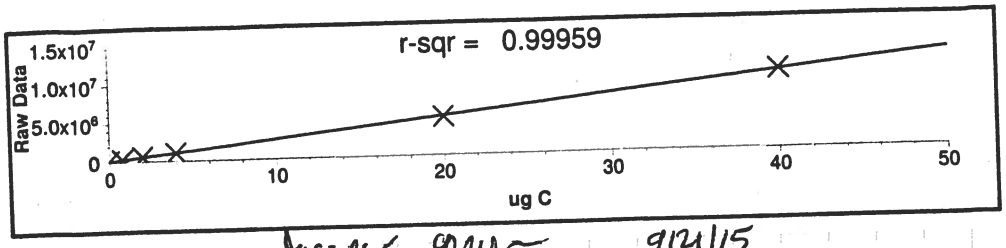
MG 9/21/15

www.scientificbindery88yrs.com

Work continued to Page

SIGNATURE Jamar Mah DATE 9/18/15

DISCLOSED TO AND UNDERSTOOD BY M. Grabedder DATE WITNESS DATE 9/25/15



James Mah 9/24/15

Calibration Report

Cal. Curve ID: 1509180C
Created: 09/18/2015 10:45
Calibration Factor (m): 2.571e+05
Y Intercept (b): 54734
r-squared: 0.99959

Standard ID	Y Raw Data	X Expected ug C	Measured ug C	Message	Date & Time
S0	99095	0.000	0.173		09/18/2015 10:10
S0.2	294735	0.800	0.934		09/18/2015 10:16
S0.5	587903	2.000	2.074		09/18/2015 10:23
S1	1062759	4.000	3.921		09/18/2015 10:30
S5	5040522	20.000	19.394		09/18/2015 10:37
S10	10415879	40.000	40.304		09/18/2015 10:44

James Mah 9/24/15

582747		1.0305			TOC
582748		1.0441			TOC
582749		1.0443			TOC
582750		1.0449			TOC
582751		1.1045			TOC
582752		1.1928			TOC
582753		1.1019			TOC
CCV DF10	CI SAM 9/24/15	2.4820			TOC
CCB		0.0696			TOC
blank		0.3211	0.3760	117.11	TOC
ICV DF10		2.4027			TOC
ICB		0.0525			TOC
p74-B1 583056		1.0140			TOC
p74-B2 583057	CI SAM 9/24/15	1.0070			TOC
p74-1 583050		1.0319			TOC
p74-2 583051		1.2300			TOC
p74-3 583052		1.0676			TOC
p74-4 583053		1.0740			TOC
p74-5 583054		16.2792			TOC
p74-6 583055		82.8709			TOC
CCV DF10		2.6218			TOC
CCB		0.0980			TOC
blank		0.0552	0.0129	23.46	TOC
574656-3		1.5402	0.0146	0.95	TOC
574656-3D		1.5577	0.0058	0.37	TOC
574656-2		1.5480	0.0054	0.35	TOC
574657-1		0.7309	0.0024	0.33	TOC
574657-2		0.7387	0.0021	0.29	TOC
lod		0.2395			TOC
loq1		0.4071			TOC
loq2		0.4013			TOC
loq3		0.4045			TOC
CCV2 DF10		2.3977			TOC
CCB2		0.0573			TOC

SOUTHWEST RESEARCH INSTITUTE
CLIENT: CH2M Hill Plateau Remediation
SwRI PROJECT#: 20933.01.006
SwRI TASK ORDER: 150521-8
SwRI SRR: 55397
SDG: 574656
VTSR: 05.21.2015

Appendix C

LC-MS Data

Figure 1A: Chromatogram of Imazapyr reference standard and product ion mass spectra of m/z 262

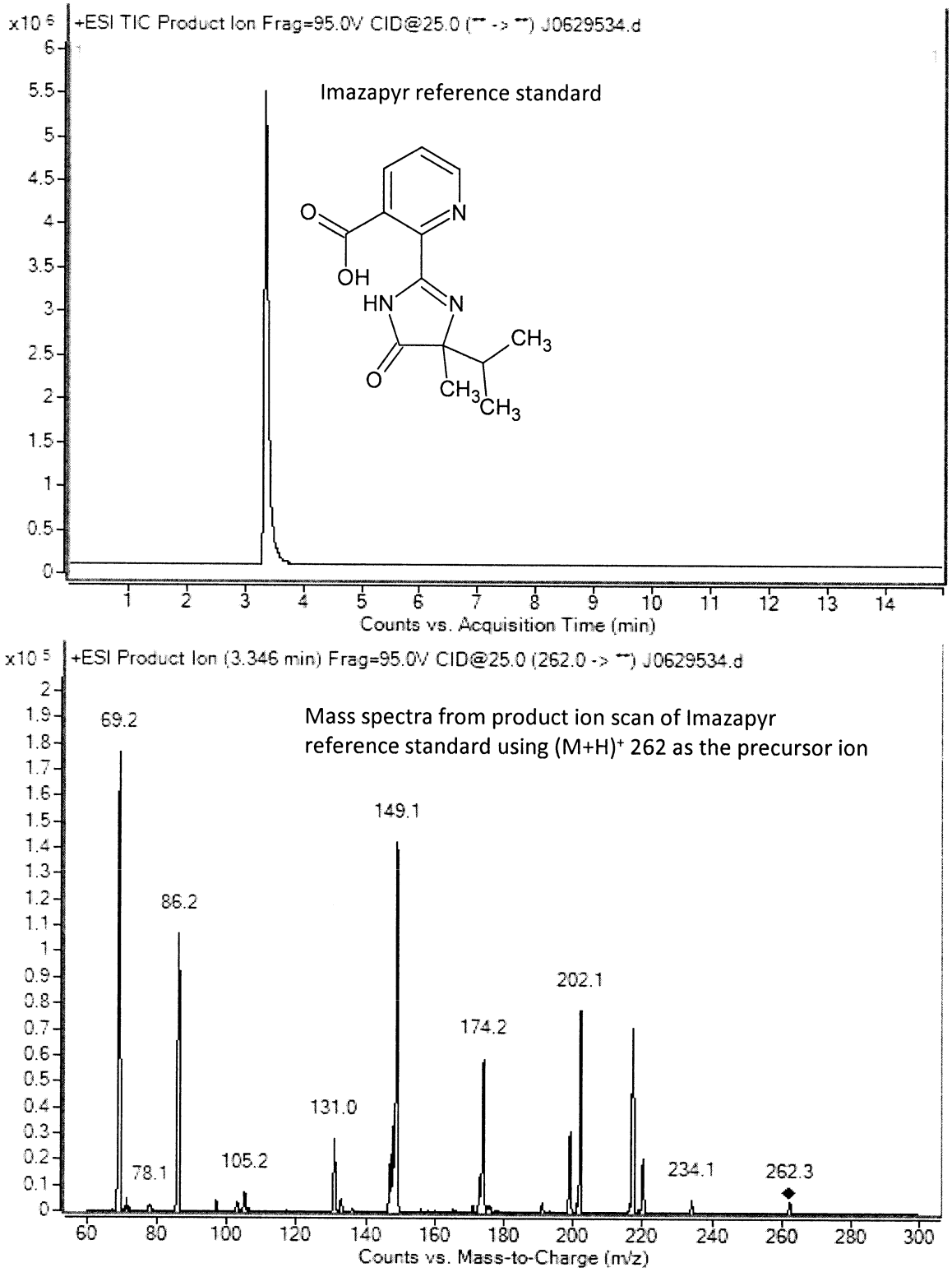


Figure 1B: Chromatogram of Imazapyr in B313X4 sample and product ion mass spectra of m/z 262

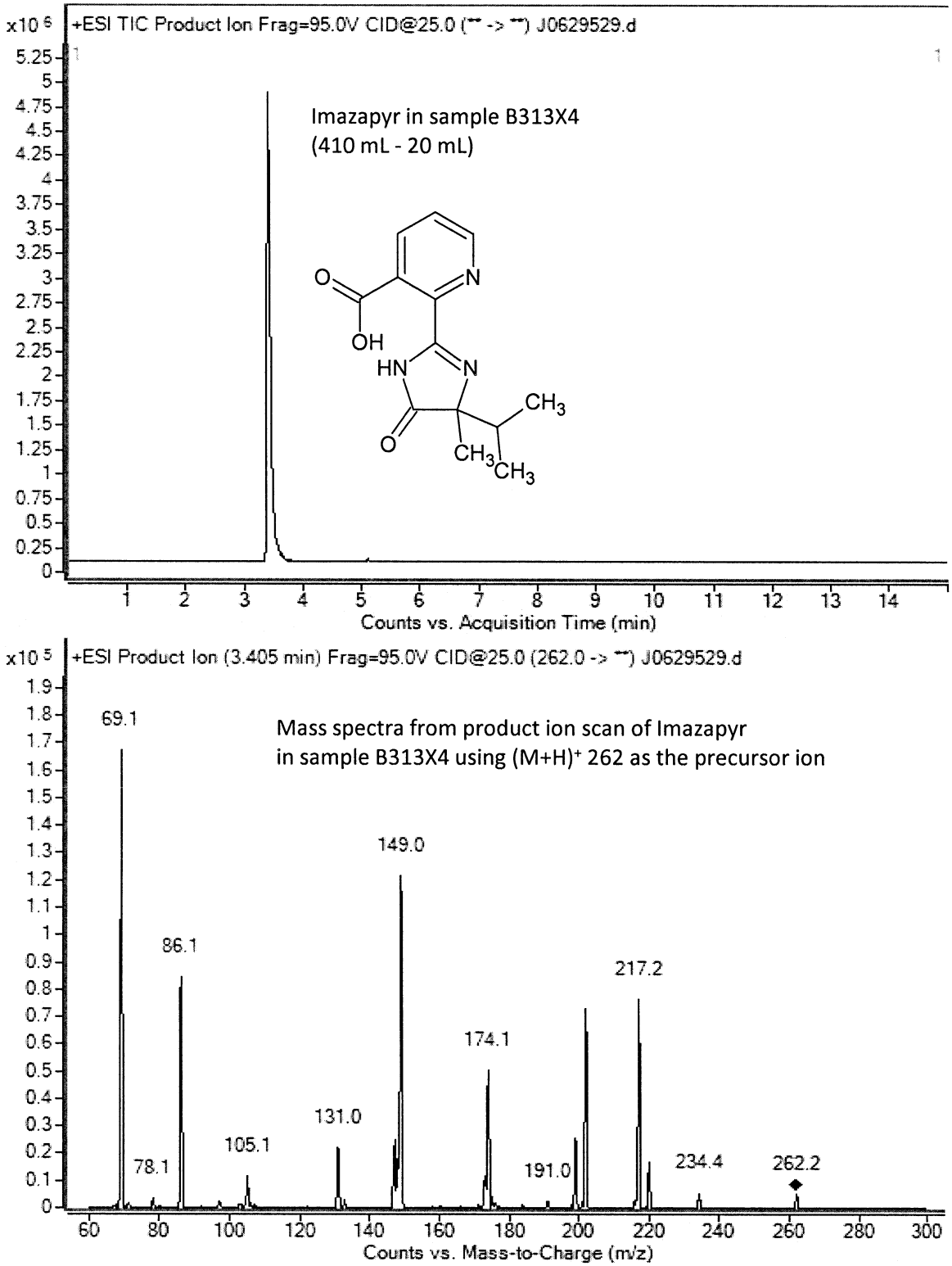
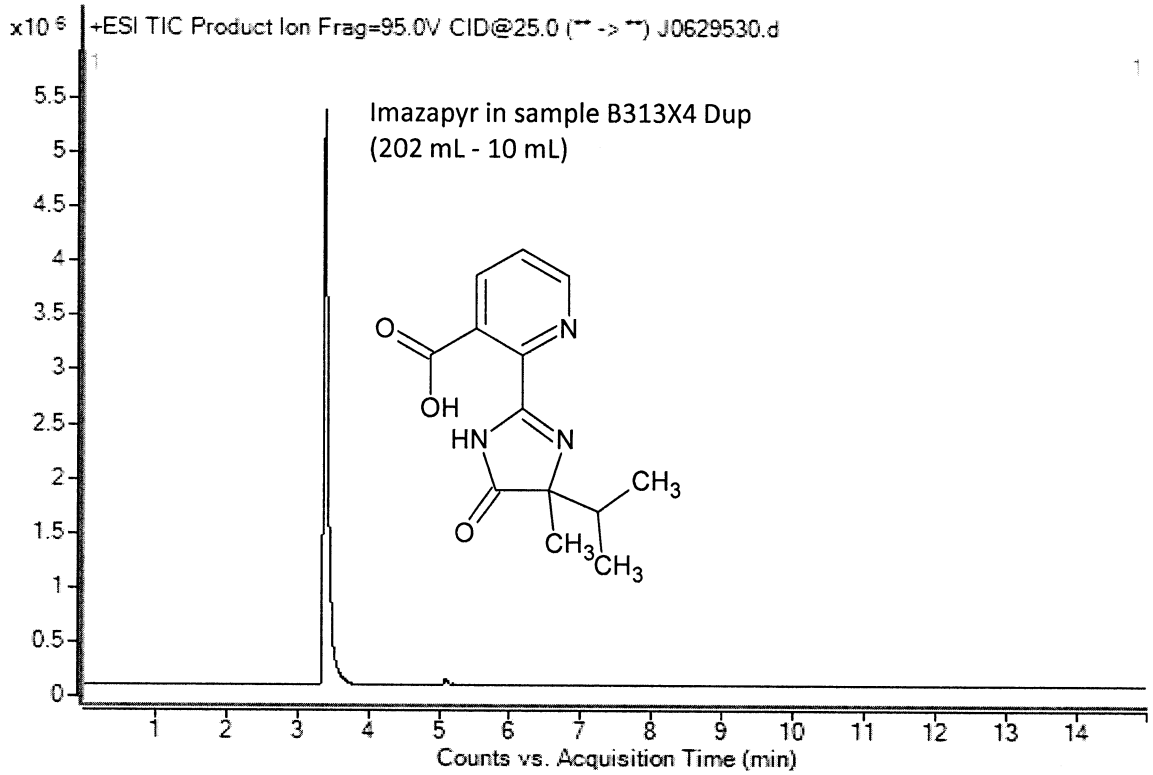


Figure 1C: Chromatogram of Imazapyr in B313X4 sample duplicate and product ion mass spectra of m/z 262



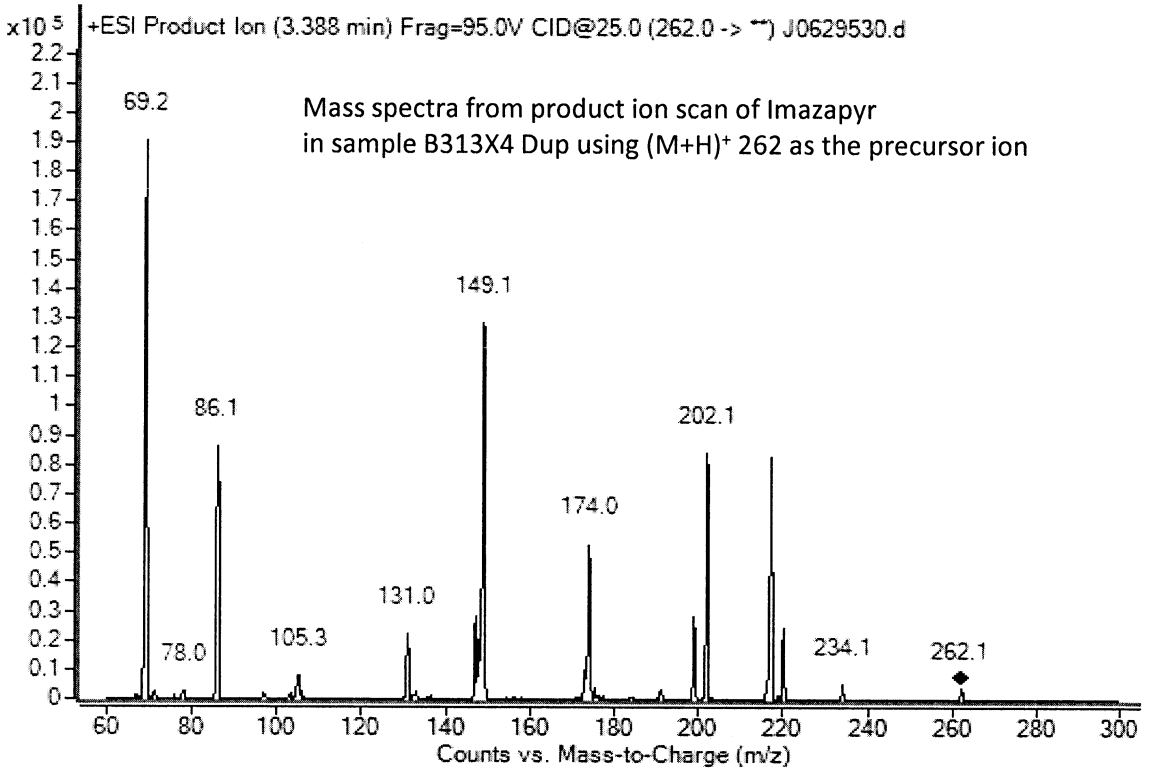


Figure 1D: Chromatogram of Imazapyr in B313X5 sample and product ion mass spectra of m/z 262

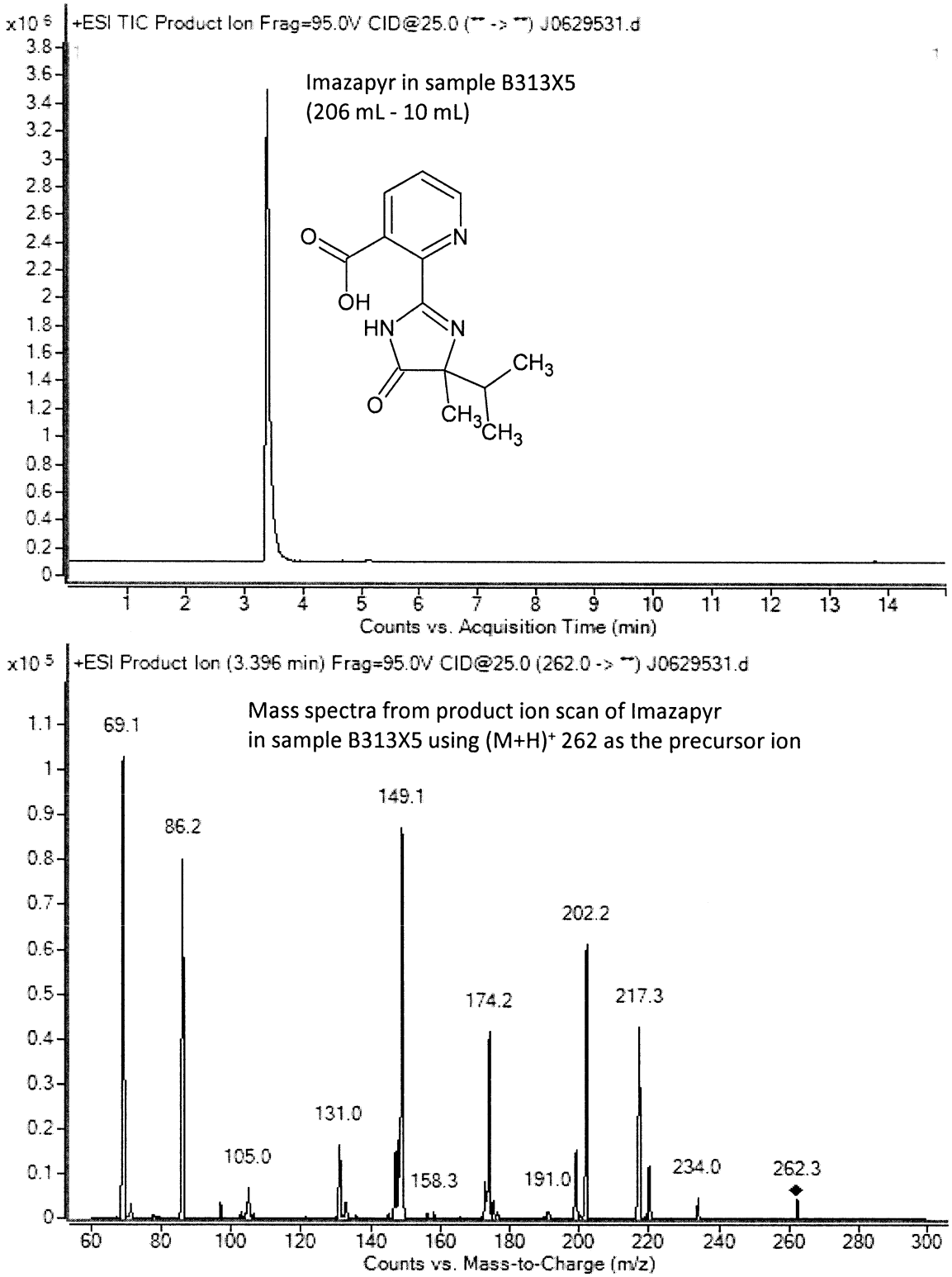


Figure 1E: Chromatogram of Imazapyr in B313X5 sample duplicate and product ion mass spectra of m/z 262

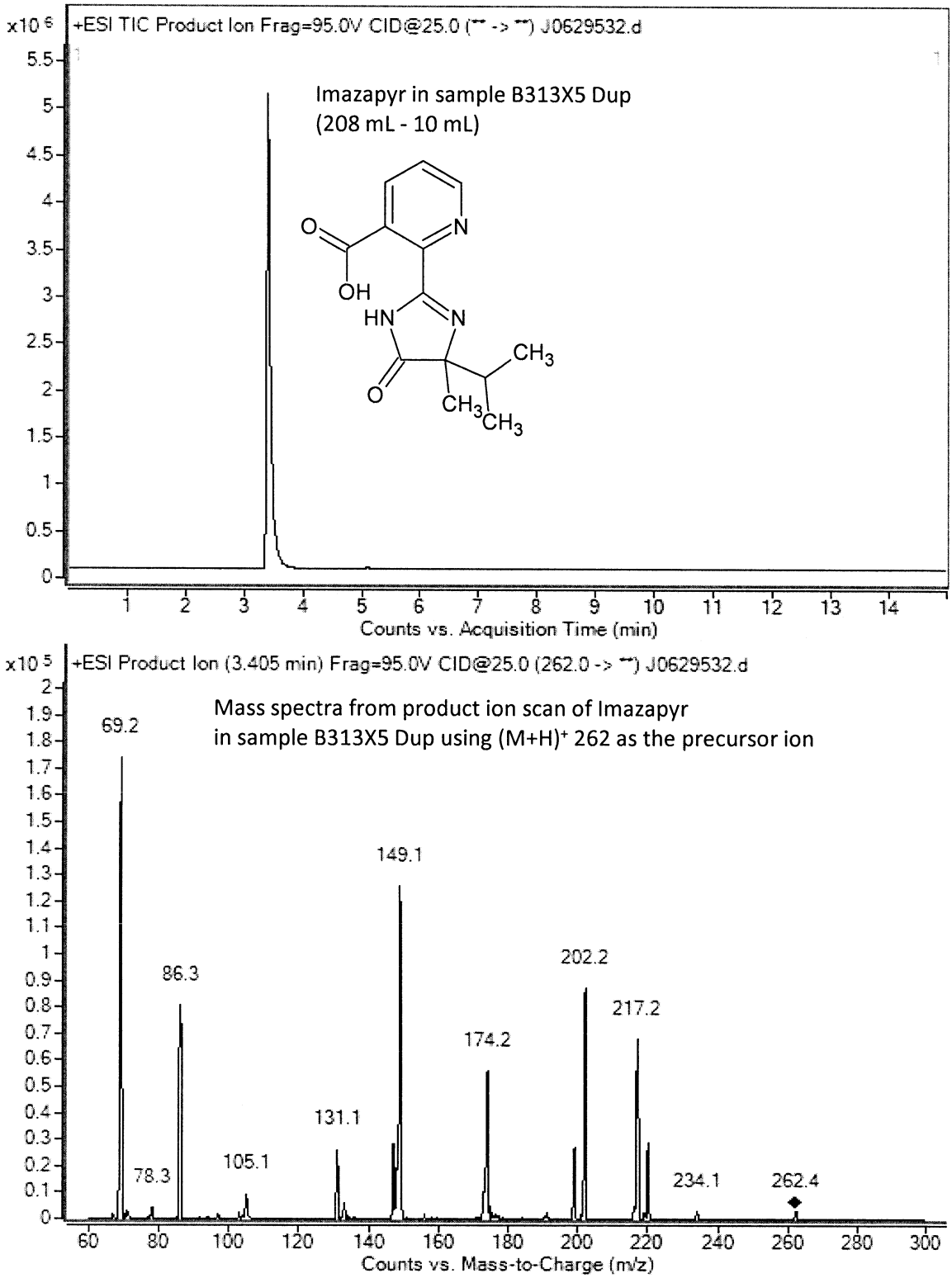


Figure 2A: Chromatogram of Bromacil reference standard and product ion mass spectra of m/z 261 and 263

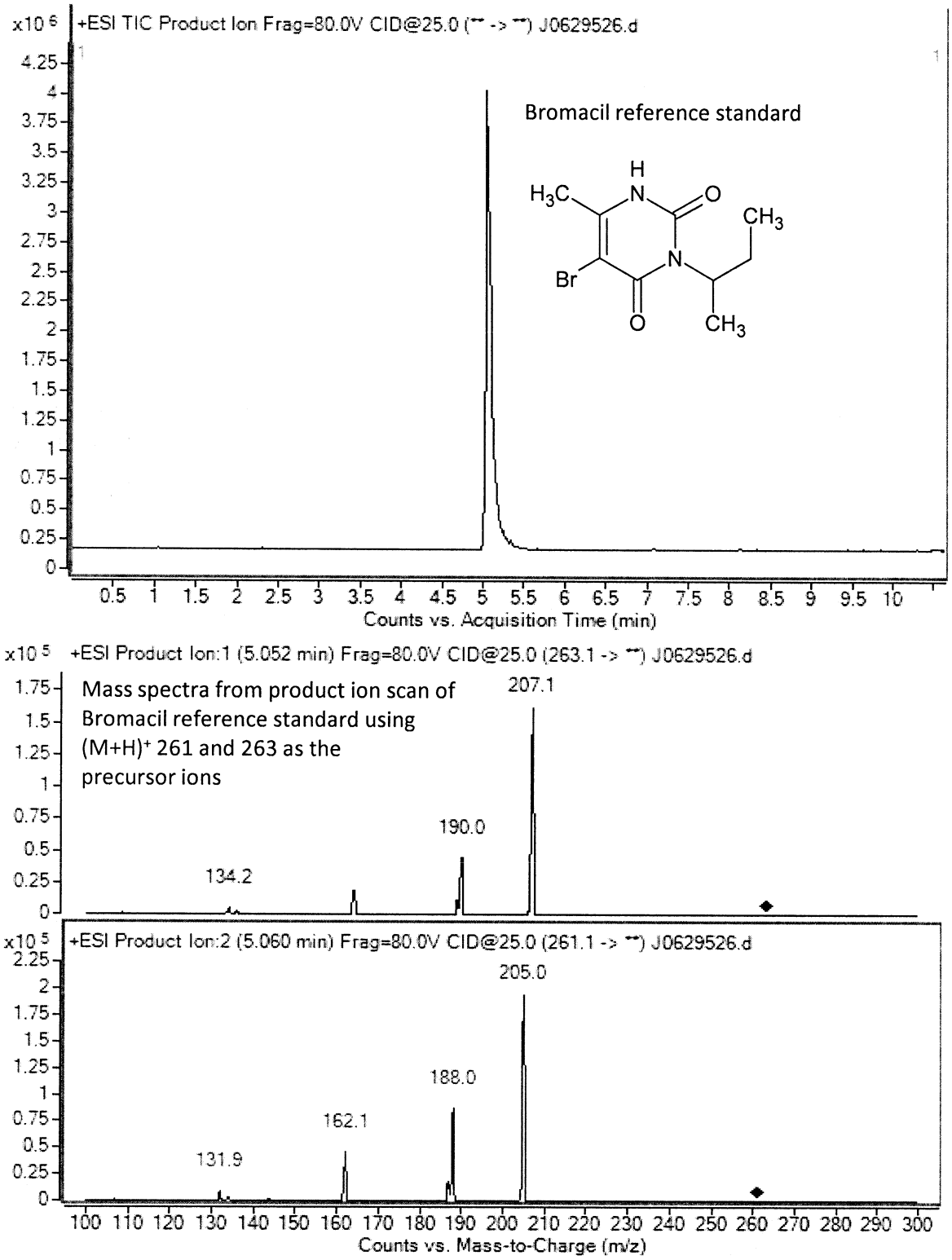


Figure 2B: Chromatogram of Bromacil in B313X4 sample and product ion mass spectra of m/z 261 and 263

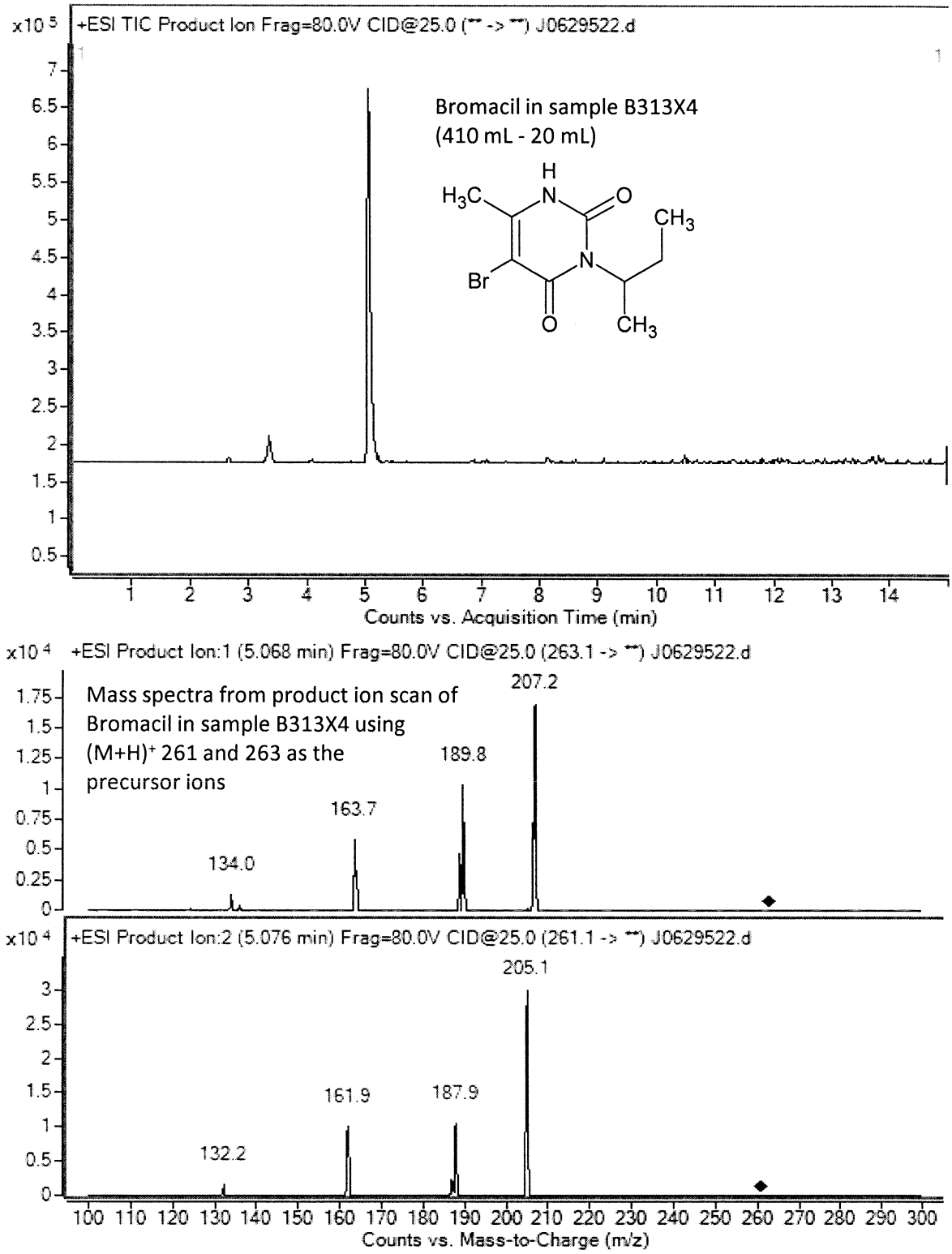


Figure 2C: Chromatogram of Bromacil in B313X4 sample duplicate and product ion mass spectra of m/z 261 and 263

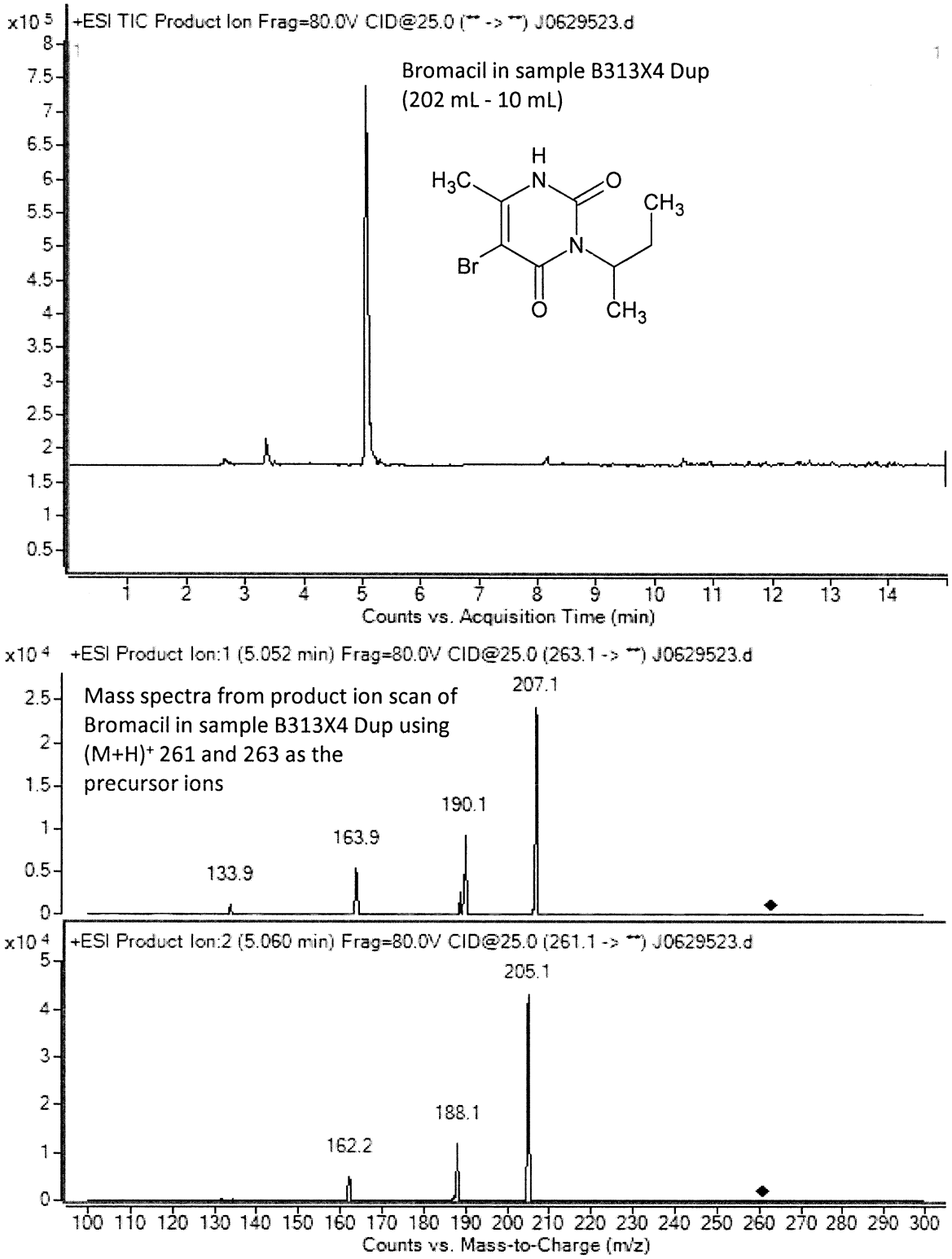


Figure 2D: Chromatogram of Bromacil in B313X5 sample and product ion mass spectra of m/z 261 and 263

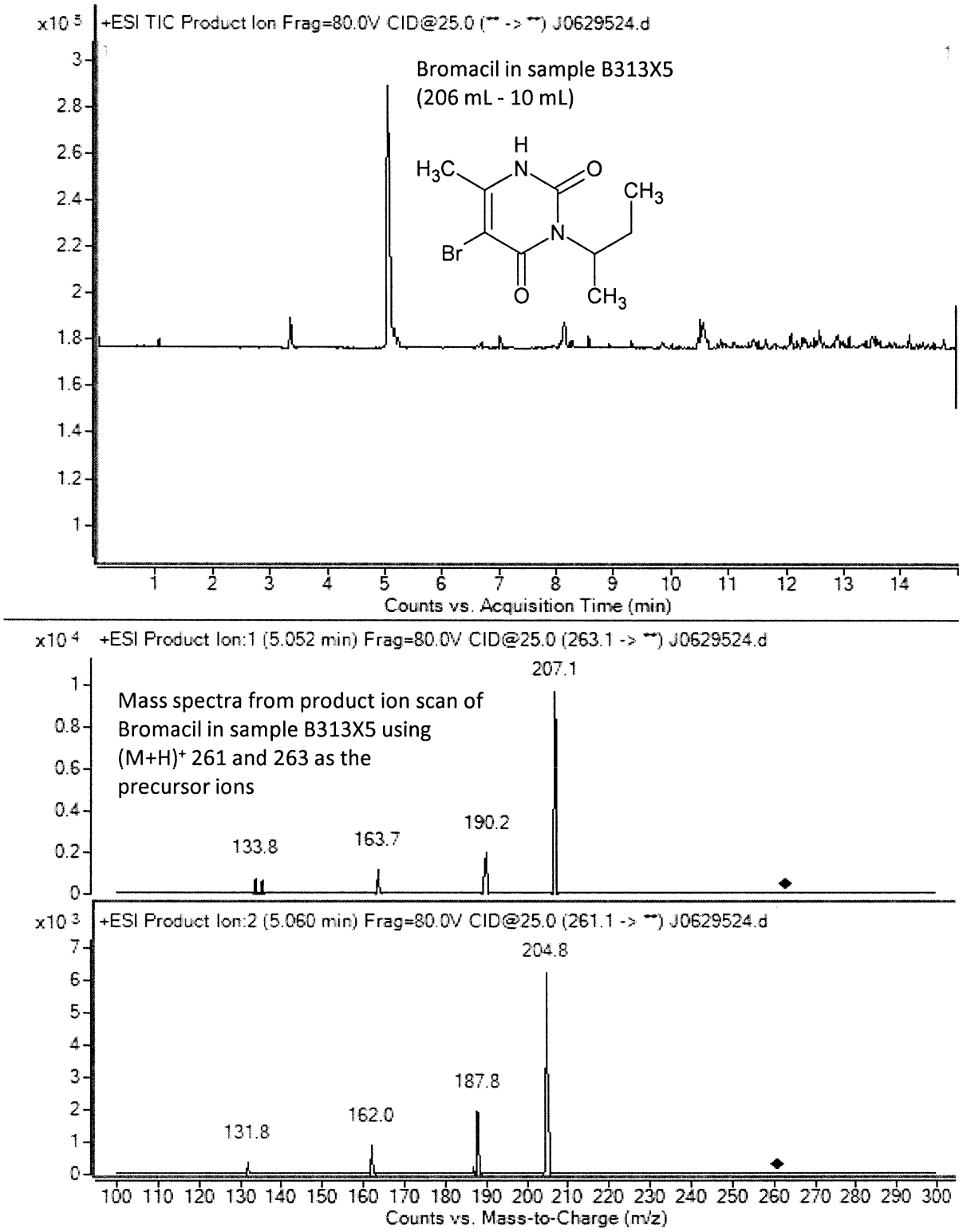


Figure 2E: Chromatogram of Bromacil in B313X5 sample duplicate and product ion mass spectra of m/z 261 and 263

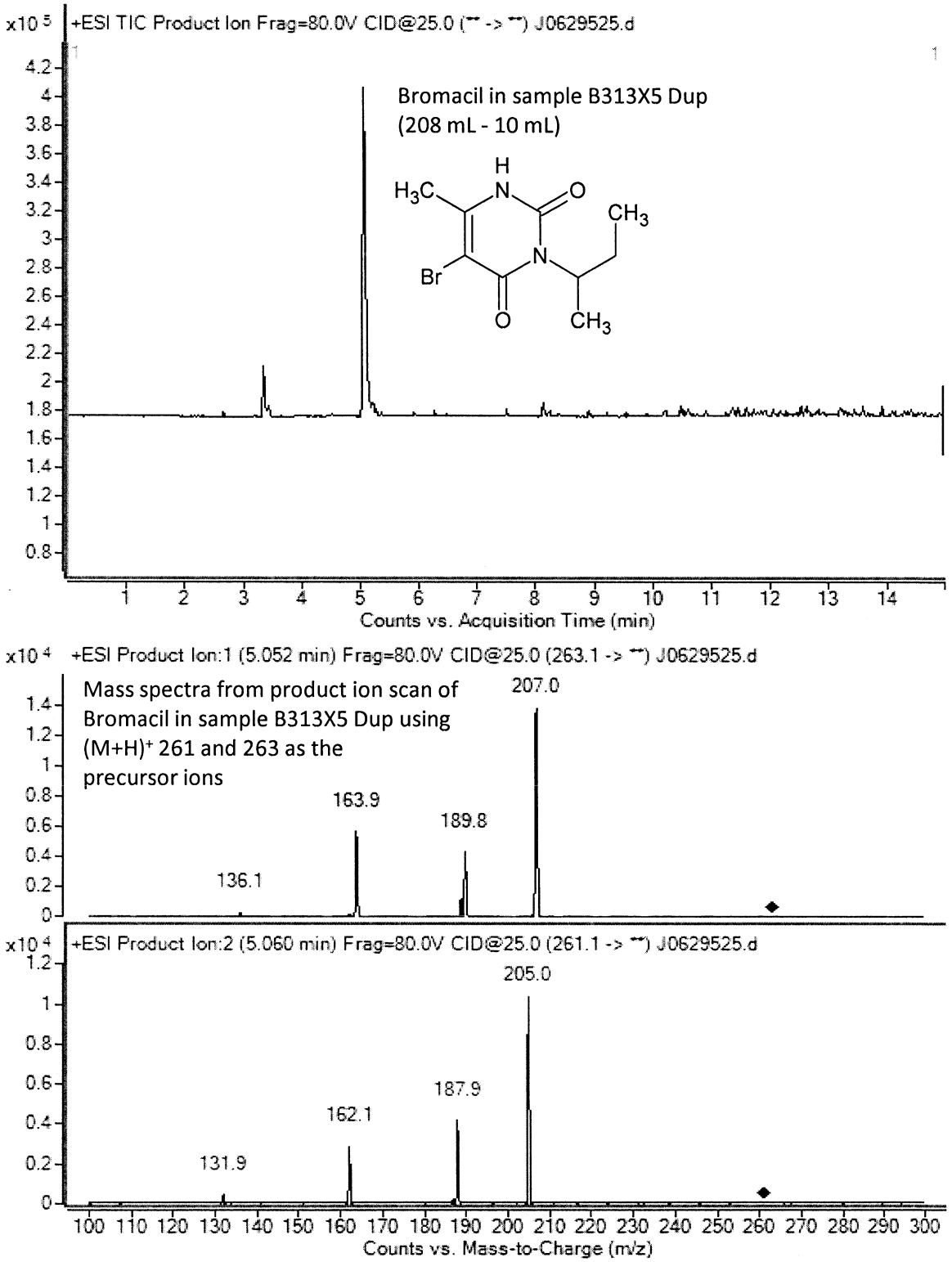


Figure E: Chromatograms of procedure blank in Imazapyr and Bromacil confirmation analyses

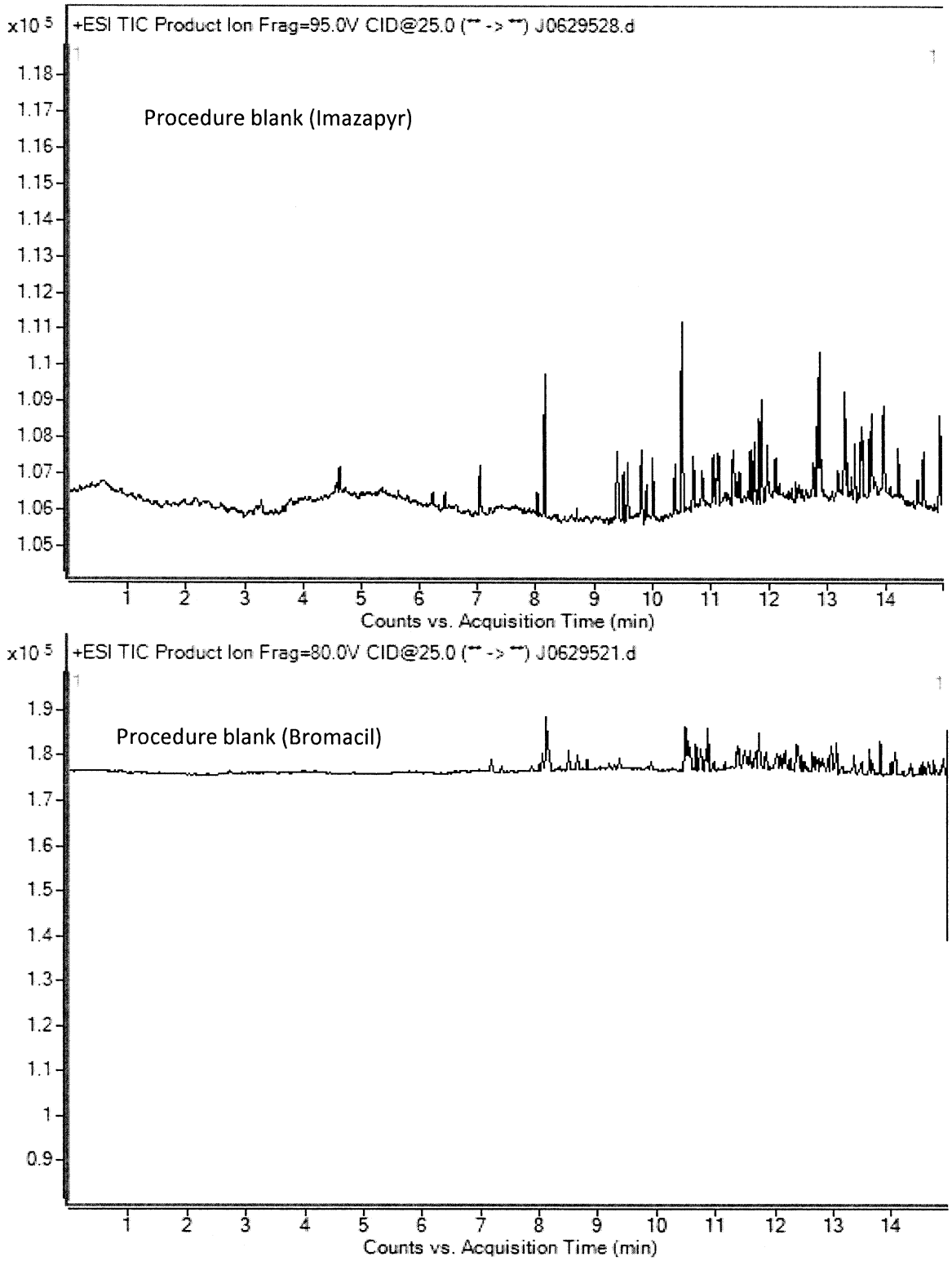


Figure 3: Chromatograms of procedure blank in Imazapyr and Bromacil confirmation analyses

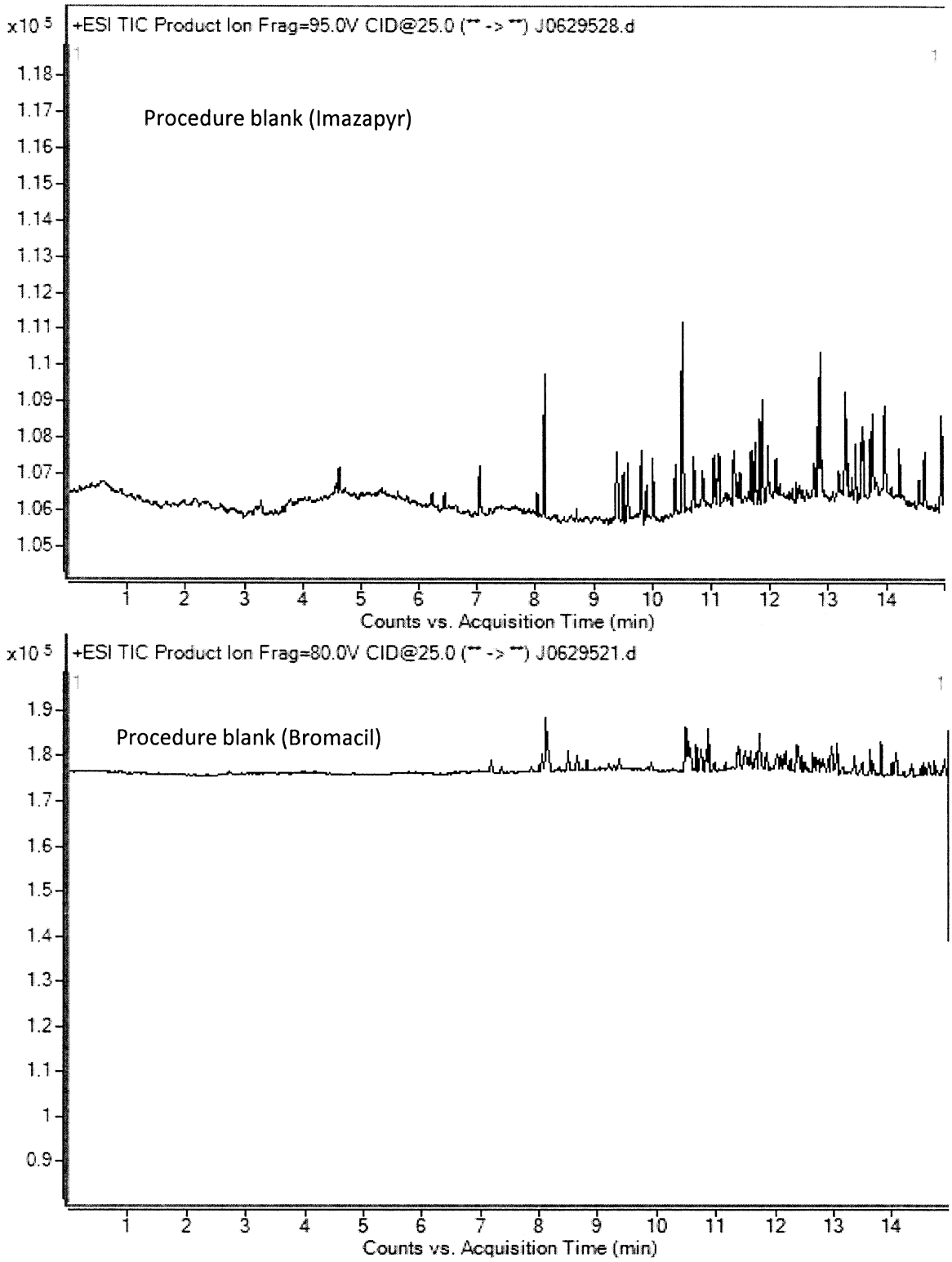


Figure 4A: Total ion chromatograms (TIC) of B313X4 in negative electrospray ionization mode and mass spectra of the broad peak from 2 – 4.5 minutes.

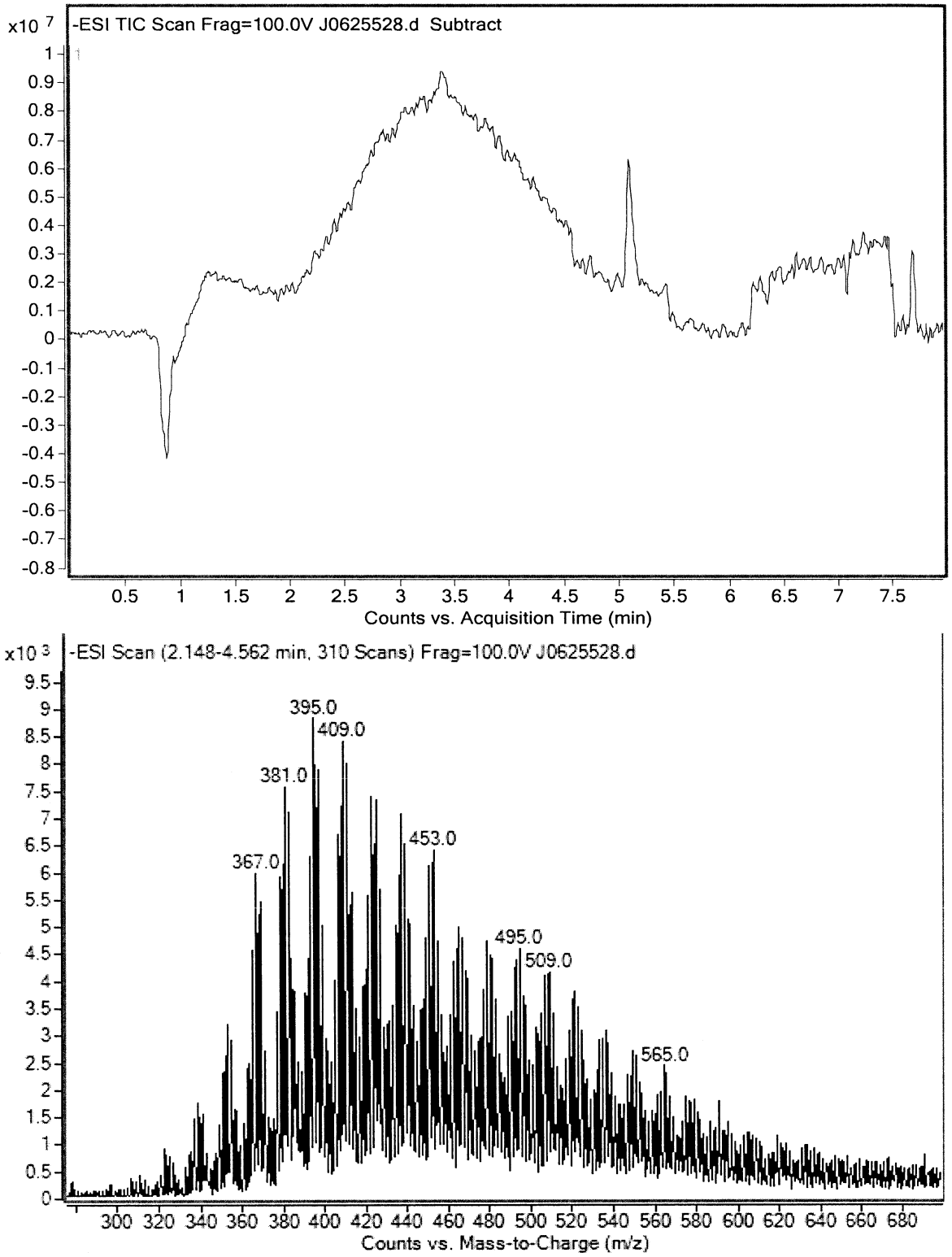
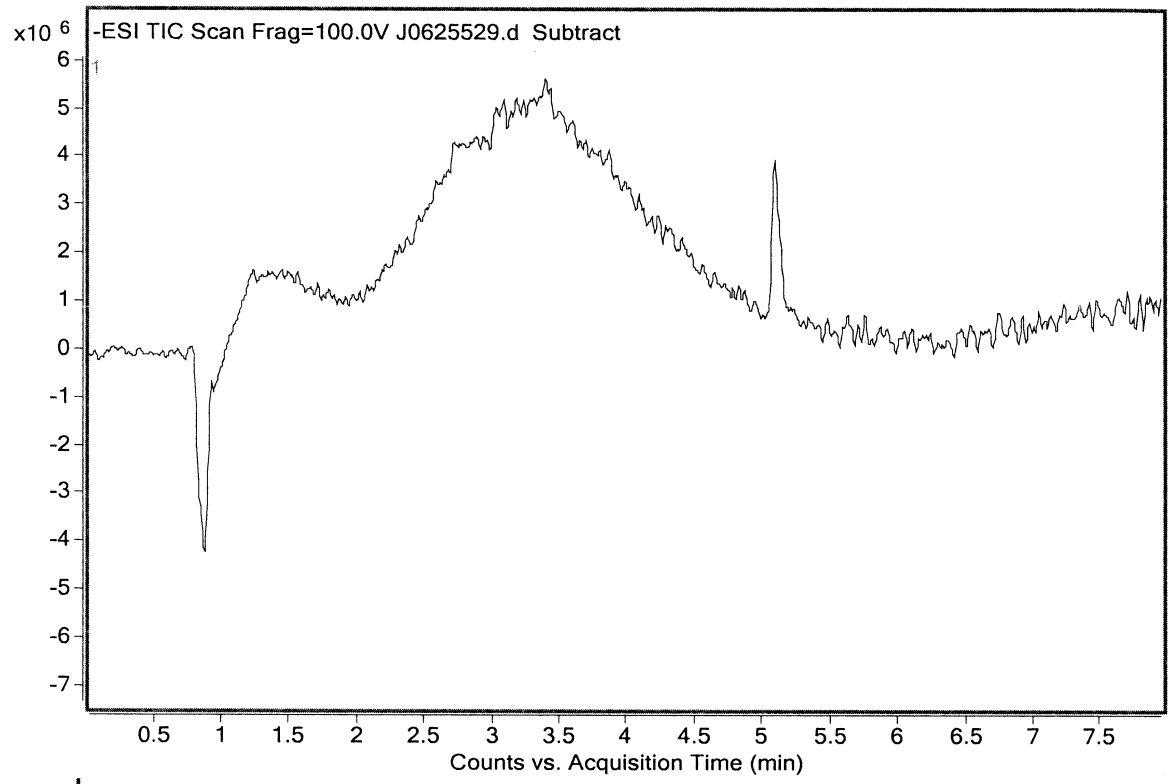


Figure 4B: Total ion chromatograms (TIC) of B313X4 duplicate in negative electrospray ionization mode and mass spectra of the broad peak from 2 – 4.5 minutes.



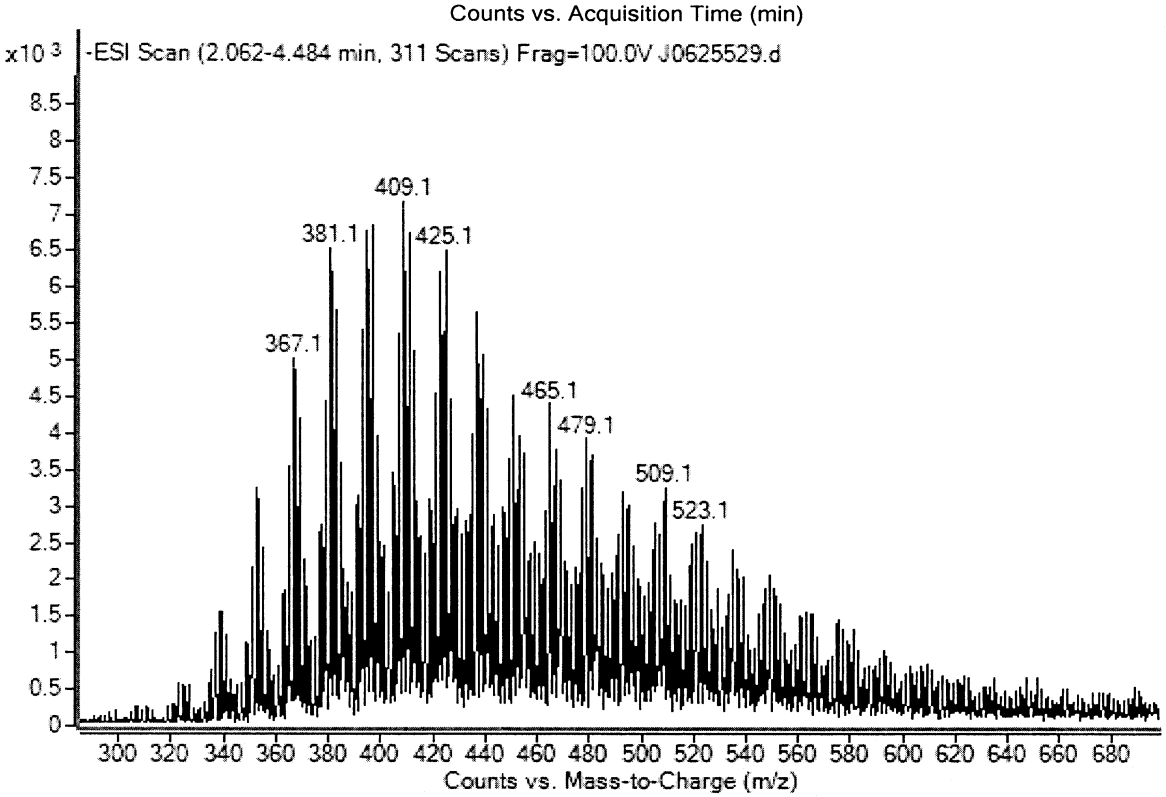


Figure 4C: Total ion chromatograms (TIC) of B313X5 in negative electrospray ionization mode and mass spectra of the broad peak from 2 – 4.5 minutes.

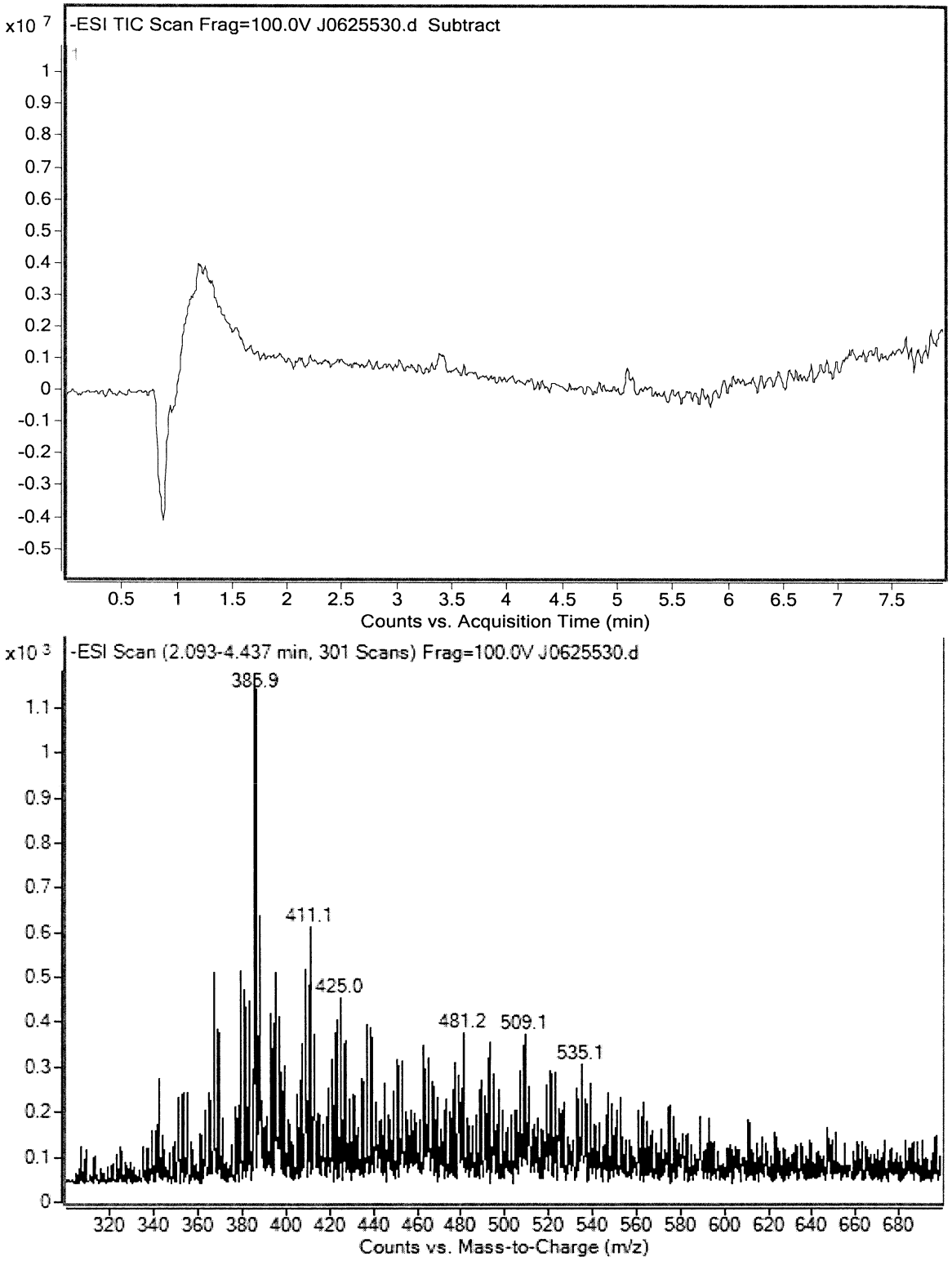


Figure 4D: Total ion chromatograms (TIC) of B313X5 duplicate in negative electrospray ionization mode and mass spectra of the broad peak from 2 – 4.5 minutes.

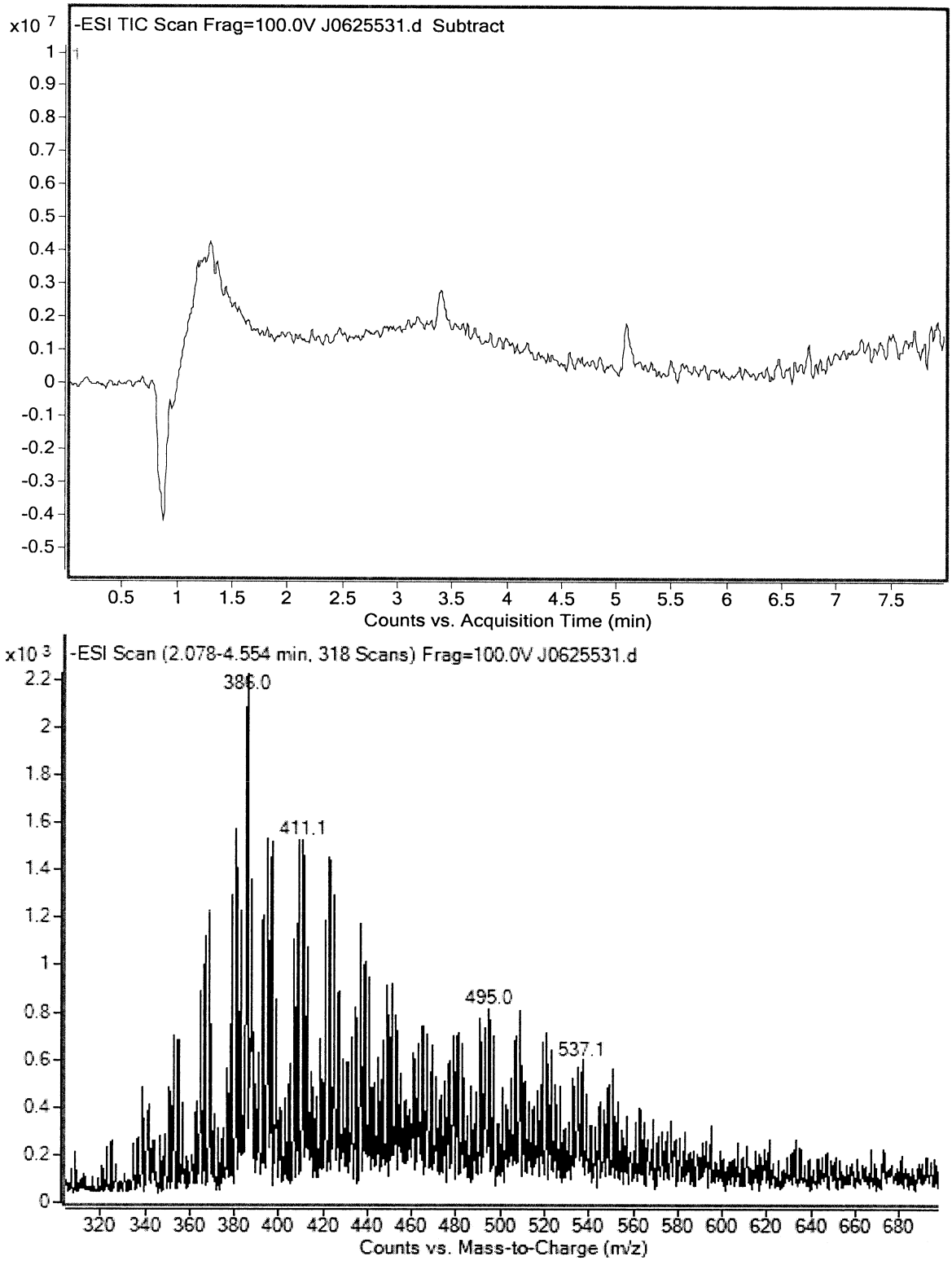
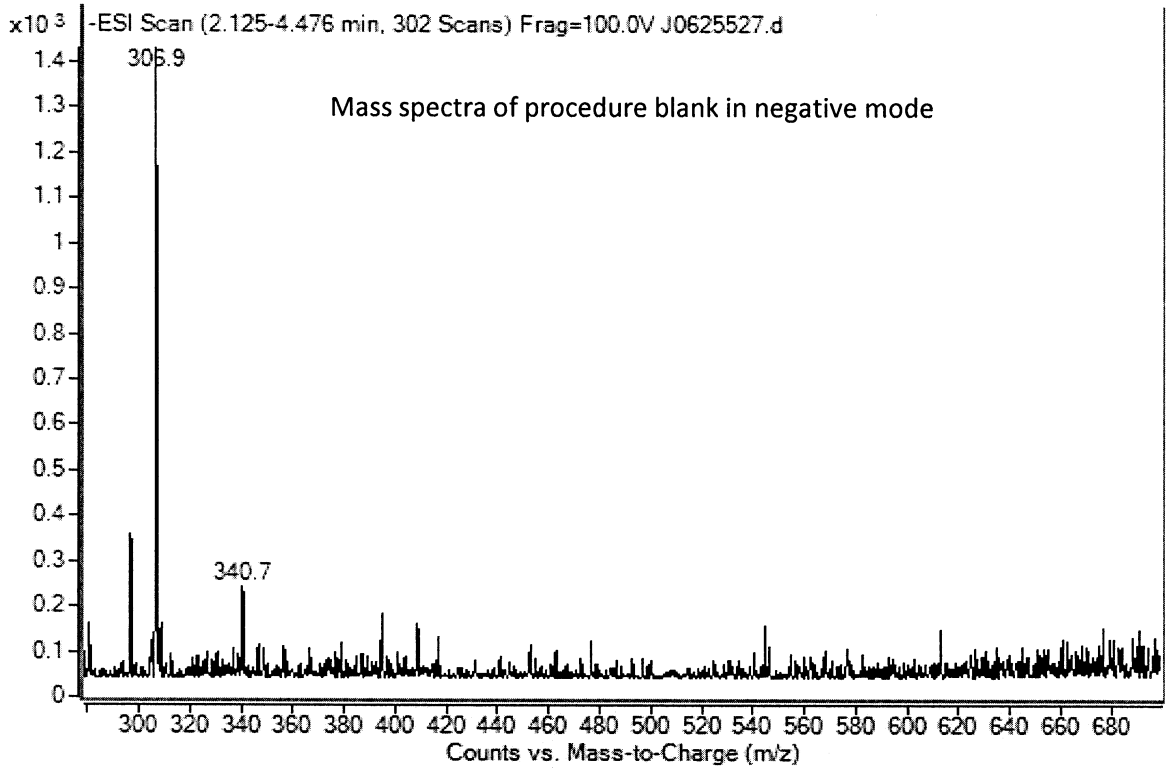
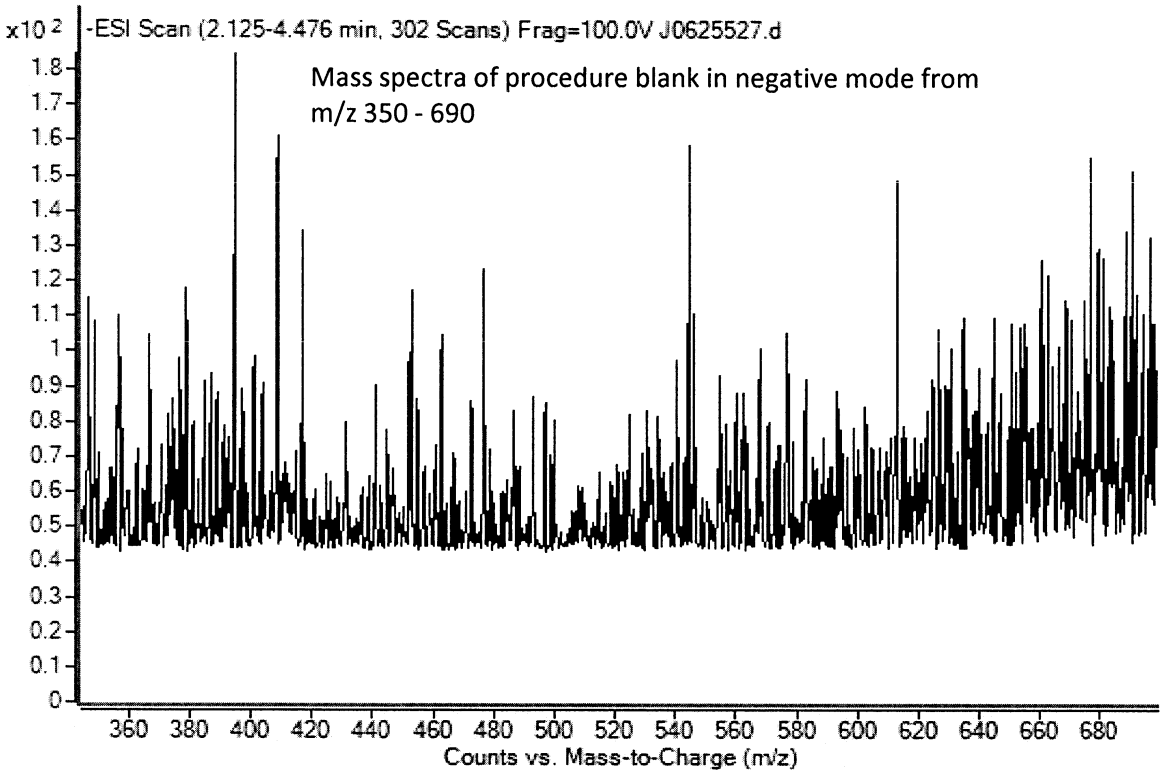


Figure 4E: Mass spectra of procedure blank in negative electrospray ionization mode from 2 – 4.5 minutes.





SOUTHWEST RESEARCH INSTITUTE
CLIENT: CH2M Hill Plateau Remediation
SwRI PROJECT#: 20933.01.006
SwRI TASK ORDER: 150521-8
SwRI SRR: 55397
SDG: 574656
VTSR: 05.21.2015

Sample Receipt Paperwork

SEPTEMBER 25, 2015

Sample Receipt

Southwest Research Institute

Sample Receipt Number: 55397

VTSR: 05/21/15

Time: 08:30:00

Project: 20933.01.006
Case #: 302898
Client: CH2M Hill Plateau Remediation Company

Manager: SPIES, RADONNA
Logged in by: SDOUGLAS
Creation Date: 05/21/15

Notes

Samples were received intact. (wet ice)

Fed Ex Tracking #:
773647475638 - 1.5 °C
773647475970 - 1.2 °C

Parameters: Analysis/located on Task Order.

See chain-of-custody as part of the SRR system for more information.

Phases:
001 - admin
006 - wetchem

Backaround CPM: <100 cpm
Container Wipe CPM: <100 cpm
Total CPM: <100

System ID	Customer ID	CED	Matrix	Containers	Special Reqs.
574656	B313X4	05/20/15	Water	8	
574657	B313X5	05/20/15	Water	8	
574658	B313X6	05/20/15	Water	8	

Containers: 24 **Samples: 3**

These documents are associated with this receipt: 179250[COC for SRR 55397], 179251[SRR Paperwork for SRR 55397]

Thermometer: 021056
Temperature: 1.2

Page Printed: 09/25/2015 13:57
ver: (7/18/2014)

55397 CH2M Hill Plateau Remediatio

Southwest Research Institute

Laboratory Task Order

SEPTEMBER 25, 2015

TO #: 150521-8 Revision: 0

010083

Project(s): 20933.01.006
Manager(s): SPIES, RADONNA
To Client: 07/10/15

SDG: 574656
VTSR: 05/21/15
CASE: 302898

SRR #'s: 55397
Client(s): CH2M Hill Plateau Remediation Company

Instructions

CH2M Hill Plateau Remediation Company (CHPRC) - RFP 273912

Characterization of Total Organic Carbon in Groundwater from Well 299-E27-10
See previous Task Order, 141222-2

Contacts:
Chris Sutton _ Chris_Sutton@rl.gov
Scot L Fitzgerald

4. TOC Measurement - The Contractor will analyze each of the filtered and non-filtered samples in Step 3 using method 9060 or the equivalent. This analysis will confirm that the Contractor is able to get the same result as historical data, and will indicate whether the organic matter is dissolved or particulate in nature or a mixture of both.
12. Mass Spectrometry Analysis - The concentrate will be analyzed by three different methods. The first method will utilize direct injection GC-MS to identify peaks that could represent the concentrated organic matter. Using the second method, the concentrated organic matter sample will undergo analysis by LC-MS/MS. Third, the concentrated organic sample will be analyzed via direct infusion into the mass spectrometer portion of an electro-spray mass spectrometer.

Documents Related to this task order: 179250[COC for SRR 55397], 179251[SRR Paperwork for SRR 55397]

Deliverables --> Hard Copy: -YES- EDD: no PDF: -YES-

Test: flowinj msms
Section: TDG
Holding: 14 days from CED
Direct flow injection onto MS/MS ESI
Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
574656		1	Water	B313X4	20 May 15	03 Jun 15
574656		2	Water	B313X4	20 May 15	03 Jun 15
574656		3	Water	B313X4	20 May 15	03 Jun 15
574656		4	Water	B313X4	20 May 15	03 Jun 15
574656		5	Water	B313X4	20 May 15	03 Jun 15
574656		6	Water	B313X4	20 May 15	03 Jun 15
574656		7	Water	B313X4	20 May 15	03 Jun 15
574656		8	Water	B313X4	20 May 15	03 Jun 15
574657		1	Water	B313X5	20 May 15	03 Jun 15
574657		2	Water	B313X5	20 May 15	03 Jun 15
574657		3	Water	B313X5	20 May 15	03 Jun 15
574657		4	Water	B313X5	20 May 15	03 Jun 15
574657		5	Water	B313X5	20 May 15	03 Jun 15
574657		6	Water	B313X5	20 May 15	03 Jun 15
574657		7	Water	B313X5	20 May 15	03 Jun 15
574657		8	Water	B313X5	20 May 15	03 Jun 15
574658		1	Water	B313X6	20 May 15	03 Jun 15
574658		2	Water	B313X6	20 May 15	03 Jun 15
574658		3	Water	B313X6	20 May 15	03 Jun 15
574658		4	Water	B313X6	20 May 15	03 Jun 15
574658		5	Water	B313X6	20 May 15	03 Jun 15
574658		6	Water	B313X6	20 May 15	03 Jun 15
574658		7	Water	B313X6	20 May 15	03 Jun 15
574658		8	Water	B313X6	20 May 15	03 Jun 15

Test: GC/MS TIC
Section: BNA
Holding: 28 days from CED
Analysis by GC/MS for TIC Screen
Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
574656		1	Water	B313X4	20 May 15	17 Jun 15

Southwest Research Institute

Laboratory Task Order

SEPTEMBER 25, 2015

TO #: 150521-8 Revision: 0

010084

Project(s): 20933.01.006
Manager(s): SPIES, RADONNA
To Client: 07/10/15

SDG: 574656
VTSR: 05/21/15
CASE: 302898

SRR #'s: 55397
Client(s): CH2M Hill Plateau Remediation Company

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
574656		2	Water	B313X4	20 May 15	17 Jun 15
574656		3	Water	B313X4	20 May 15	17 Jun 15
574656		4	Water	B313X4	20 May 15	17 Jun 15
574656		5	Water	B313X4	20 May 15	17 Jun 15
574656		6	Water	B313X4	20 May 15	17 Jun 15
574656		7	Water	B313X4	20 May 15	17 Jun 15
574656		8	Water	B313X4	20 May 15	17 Jun 15
574657		1	Water	B313X5	20 May 15	17 Jun 15
574657		2	Water	B313X5	20 May 15	17 Jun 15
574657		3	Water	B313X5	20 May 15	17 Jun 15
574657		4	Water	B313X5	20 May 15	17 Jun 15
574657		5	Water	B313X5	20 May 15	17 Jun 15
574657		6	Water	B313X5	20 May 15	17 Jun 15
574657		7	Water	B313X5	20 May 15	17 Jun 15
574657		8	Water	B313X5	20 May 15	17 Jun 15
574658		1	Water	B313X6	20 May 15	17 Jun 15
574658		2	Water	B313X6	20 May 15	17 Jun 15
574658		3	Water	B313X6	20 May 15	17 Jun 15
574658		4	Water	B313X6	20 May 15	17 Jun 15
574658		5	Water	B313X6	20 May 15	17 Jun 15
574658		6	Water	B313X6	20 May 15	17 Jun 15
574658		7	Water	B313X6	20 May 15	17 Jun 15
574658		8	Water	B313X6	20 May 15	17 Jun 15

Test: LCMSMS
Section: TDG

Holding: 14 days from CED
LC-MS/MS analysis

Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
574656		1	Water	B313X4	20 May 15	03 Jun 15
574656		2	Water	B313X4	20 May 15	03 Jun 15
574656		3	Water	B313X4	20 May 15	03 Jun 15
574656		4	Water	B313X4	20 May 15	03 Jun 15
574656		5	Water	B313X4	20 May 15	03 Jun 15
574656		6	Water	B313X4	20 May 15	03 Jun 15
574656		7	Water	B313X4	20 May 15	03 Jun 15
574656		8	Water	B313X4	20 May 15	03 Jun 15
574657		1	Water	B313X5	20 May 15	03 Jun 15
574657		2	Water	B313X5	20 May 15	03 Jun 15
574657		3	Water	B313X5	20 May 15	03 Jun 15
574657		4	Water	B313X5	20 May 15	03 Jun 15
574657		5	Water	B313X5	20 May 15	03 Jun 15
574657		6	Water	B313X5	20 May 15	03 Jun 15
574657		7	Water	B313X5	20 May 15	03 Jun 15
574657		8	Water	B313X5	20 May 15	03 Jun 15
574658		1	Water	B313X6	20 May 15	03 Jun 15
574658		2	Water	B313X6	20 May 15	03 Jun 15
574658		3	Water	B313X6	20 May 15	03 Jun 15
574658		4	Water	B313X6	20 May 15	03 Jun 15
574658		5	Water	B313X6	20 May 15	03 Jun 15
574658		6	Water	B313X6	20 May 15	03 Jun 15
574658		7	Water	B313X6	20 May 15	03 Jun 15
574658		8	Water	B313X6	20 May 15	03 Jun 15

Southwest Research Institute

Laboratory Task Order

SEPTEMBER 23, 2015

TO #: 150521-8 Revision: 0

010085

Project(s): 20933.01.006
Manager(s): SPIES, RADONNA
To Client: 07/10/15

SDG: 574656
VTSR: 05/21/15
CASE: 302898

SRR #'s: 55397
Client(s): CH2M Hill Plateau Remediation Company

Test: TOC_9060M
Section: WETCHEM

Holding: 28 days from CED

TOC by 9060 (modified)

Cnt: 3

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
574656		1	Water	B313X4	20 May 15	17 Jun 15
574656		2	Water	B313X4	20 May 15	17 Jun 15
574656		3	Water	B313X4	20 May 15	17 Jun 15
574656		4	Water	B313X4	20 May 15	17 Jun 15
574656		5	Water	B313X4	20 May 15	17 Jun 15
574656		6	Water	B313X4	20 May 15	17 Jun 15
574656		7	Water	B313X4	20 May 15	17 Jun 15
574656		8	Water	B313X4	20 May 15	17 Jun 15
574657		1	Water	B313X5	20 May 15	17 Jun 15
574657		2	Water	B313X5	20 May 15	17 Jun 15
574657		3	Water	B313X5	20 May 15	17 Jun 15
574657		4	Water	B313X5	20 May 15	17 Jun 15
574657		5	Water	B313X5	20 May 15	17 Jun 15
574657		6	Water	B313X5	20 May 15	17 Jun 15
574657		7	Water	B313X5	20 May 15	17 Jun 15
574657		8	Water	B313X5	20 May 15	17 Jun 15
574658		1	Water	B313X6	20 May 15	17 Jun 15
574658		2	Water	B313X6	20 May 15	17 Jun 15
574658		3	Water	B313X6	20 May 15	17 Jun 15
574658		4	Water	B313X6	20 May 15	17 Jun 15
574658		5	Water	B313X6	20 May 15	17 Jun 15
574658		6	Water	B313X6	20 May 15	17 Jun 15
574658		7	Water	B313X6	20 May 15	17 Jun 15
574658		8	Water	B313X6	20 May 15	17 Jun 15

SEPTEMBER 25, 2015

Southwest Research Institute

Traffic Report

Sample Custodian Signature: _____

1. Custody Seal — Present
2. Chain of Custody — Present
3. Sample Tags — Not Present
   Sample Tag Numbers — Not on COC
4. SMO Forms — Present

Client: CH2M Hill Plateau Remediation Company

Project: 20933.01.006

Case: 302898 / SDG: _____

Sample Receipt: 55397

Airbill: 773647475638, 773647475970

Custody Seal #(s): N/A

Date Received	Time Received	COC Record	SMO Sample #	Corresponding		Traffic Rpt, Tags, COC Agree	Sample Condition
				Sample Tag #	SwRI #		
05/21/15	08:30:00	F15-010-004	B313X4	N/A	574656	YES	Intact
05/21/15	08:30:00	F15-010-003	B313X5	N/A	574657	YES	Intact
05/21/15	08:30:00	F15-010-002	B313X6	N/A	574658	YES	Intact

SEPTEMBER 25, 2015

SAMPLE LOG-IN SHEET

Lab Name: Southwest Research Institute	Page 1 of 1
Received By (Print Name): STEVEN DOUGLAS	Log-in Date: 05/21/2015
Received By (Signature):	
Case Number: 302898	Sample Delivery Group No.: N/A
SAS Number: N/A	
Remarks: 20933.01.006	

1.	Custody Seal(s)	Present/Absent* Intact/Broken
2.	Custody Seal Nos.	N/A
3.	Chain-of Custody Records	Present/Absent*
4.	Traffic Reports or Packing Lists	Present/Absent*
5.	Airbill	Airbill/Sticker Present/Absent*
6.	Airbill No.	773647475638, 773647475970
7.	Sample Tags	Present/Absent*
	Sample Tag Numbers	Listed/Not listed on Chain of Custody
8.	Sample Condition	Intact/Broken*/Leaking
9.	Cooler Temperature	1.2C
10.	Does Information on custody records, traffic reports, and sample tags agree?	Yes/No*
11.	Date Received at Lab	05/21/2015
12.	Time Received	08:30:00

EPA Sample #	Corresponding Sample Tag #	Corresponding Assigned Lab #	Remarks: Condition of Sample Shipment, etc
B313X4	N/A	574656	Intact
B313X5	N/A	574657	Intact
B313X6	N/A	574658	Intact

Sample Transfer	
Fraction: ORG	Fraction:
Area #: R.40	Area #:
By: STEVEN DOUGLAS	By:
On: 05/21/2015	On:

* Contact SMO and attach record of resolution

Reviewed By:	Logbook No.: Sample Receipt (55397)
Date: 5.21.15	Logbook Page No.: 9096 SEC 10R3

FORM DC-1

OLMO4.2