LABORATORY DATA CONSULTANTS, INC.
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Froehling & Robertson, Inc.
1735 Seibel Drive, NE
Roanoke, VA 24012
ATTN: Mr. Glenn Hargrove

August 9, 2018

SUBJECT: Wills Wharf, MD, Hexavalent Chromium Monitoring, Data Validation

Dear Mr. Hargrove,

Enclosed are the final validation reports for the fraction listed below. These SDGs were received on August 8, 2018. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #42853:

SDG #	Fraction
8072608, 8073136	Hexavalent Chromium

The data validation was performed under Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Air Monitoring Program Quality Assurance Project Plan, Wills Wharf Office Project, Baltimore Works Site, Baltimore, Maryland; April 2016
- USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review; January 2017

Please feel free to contact us if you have any questions.

Sincerely,

Christina Rink

Christina Rink
Project Manager/Senior Chemist

135 pages-EM 1 WEEK TAT Attachment 1

Level IV LDC #42853 (Froehling & Robertson, Inc. - Roanoke, VA / Wills Wharf, MD, Hexavalent Chromium Monitoring)

LDC	SDG#	DATE REC'D	(1) DATE DUE	Cr(VI) (ERG-MOR-063)																																	
Matrix:	Air/Water/Soil			A	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	8072608	08/08/18	08/15/18	6	0																																
B	8073136	08/08/18	08/15/18	12	0																																
Total	T/CR			18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18

Shaded cells indicate Level IV validation (all other cells are Level III validation).

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Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Wills Wharf, MD, Hexavalent Chromium Monitoring

LDC Report Date: August 9, 2018

Parameters: Hexavalent Chromium

Validation Level: Level IV

Laboratory: Eastern Research Group

Sample Delivery Group (SDG): 8072608

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
PWAM-FB (07/25/18)	8072608-04	Air	07/25/18
PWAM-TB (07/25/18)	8072608-05	Air	07/25/18
PWAM-2 (07/24/18)	8072608-07	Air	07/24/18
PWAM-3 (07/24/18)	8072608-08	Air	07/24/18
PWAM-FB (07/24/18)	8072608-09	Air	07/24/18
PWAM-TB (07/24/18)	8072608-10	Air	07/24/18
PWAM-2 (07/24/18)DUP	8072608-07DUP	Air	07/24/18

The date was appended to the sample ID to differentiate between samples.

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Air Monitoring Program Quality Assurance Project Plan, Wills Wharf Office Project, Baltimore Works Site, Baltimore, Maryland (April 2016) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Hexavalent Chromium by ERG-MOR-063

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

Samples PWAM-TB (07/25/18) and PWAM-TB (07/24/18) were identified as trip blanks. No contaminants were found.

Samples PWAM-FB (07/25/18) and PWAM-FB (07/24/18) were identified as field blanks. No contaminants were found.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicates (MSD) analyses were not required by the method.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

All sample result verifications were acceptable.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Wills Wharf, MD, Hexavalent Chromium Monitoring
Hexavalent Chromium - Data Qualification Summary - SDG 8072608

No Sample Data Qualified Due to QA/QC Exceedances in this SDG

Wills Wharf, MD, Hexavalent Chromium Monitoring
Hexavalent Chromium - Laboratory Blank Data Qualification Summary - SDG 8072608

No Sample Data Qualified Due to Laboratory Blank Contamination in this SDG

Wills Wharf, MD, Hexavalent Chromium Monitoring
Hexavalent Chromium - Field Blank Data Qualification Summary - SDG 8072608

No Sample Data Qualified Due to Field Blank Contamination in this SDG

LDC #: 42853A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/9/18
SDG #: 8072608 Level IV Page: 1 of 1
Laboratory: Eastern Research Group Reviewer: KP
2nd Reviewer:

METHOD: (Analyte) Hexavalent Chromium (ERG-MOR-063)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	ND	FB = 1,5 ; TB = 2,6
VI.	Matrix Spike/Matrix Spike Duplicates	N	Not Required
VII.	Duplicate sample analysis	A	7
VIII.	Laboratory control samples	A	LCS ID
IX.	Field duplicates	N	
X.	Sample result verification	A	
XI.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	PWAM-FB (07/25/18)	8072608-04	Air	07/25/18
2	PWAM-TB (07/25/18)	8072608-05	Air	07/25/18
3	PWAM-2 (07/24/18)	8072608-07	Air	07/24/18
4	PWAM-3 (07/24/18)	8072608-08	Air	07/24/18
5	PWAM-FB (07/24/18)	8072608-09	Air	07/24/18
6	PWAM-TB (07/24/18)	8072608-10	Air	07/24/18
7	PWAM-2 (07/24/18)DUP	8072608-07DUP	Air	07/24/18
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 42853A6

VALIDATION FINDINGS CHECKLIST

Reviewer: JB
2nd Reviewer:

Method: Inorganics (EPA Method See Cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 42853A6

Validation Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Reviewer: JB
2nd Reviewer:

Method: Inorganics, Method See Cover

The correlation coefficient (r) for the calibration of Cr6+ was recalculated. Calibration date: 7/31/13

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found X 100 / True

Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (ug/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	Cr6+	s1	0.05	0.0409659	99.992%	99.986%	Y
		s2	0.1	0.0844063			
		s3	0.2	0.1643402			
		s4	0.5	0.4059041			
		s5	1	0.7947568			
		s6	2	1.627154			
Calibration verification	Cr6+	ICV	FOUND: 6.4991 ug/mL	TRUE: 0.500 mg/mL	99.8%	99.8	Y
Calibration verification	Cr6+	CCV	FOUND: 0.5017 mg/mL	TRUE: 0.500 mg/mL	100%	100%	Y
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 42853A4

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: JB
2nd Reviewer:

METHOD: Inorganics, Method See Cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$$\%R = \frac{Found}{True} \times 100$$

Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$

Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Cr6+	0.4718 ng/m3	0.463 ng/m3	102%	102%	Y
	Matrix spike sample		(SSR-SR)				
Dup	Duplicate sample	Cr6+	0.0309 ng/m3	SR= 0.0330 ng/m3	6.57 RPD	6.45 RPD	Y

Comments:

LDC #: 42853A4

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JB
2nd reviewer:

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for $Cr6^+$ #4 reported with a positive detect were recalculated and verified using the following equation:

Concentration =

Recalculation:

$y = mx + b$

$y = 0.0606360$

$m = 0.8121710$

$b = 1.04E-3$

$Cr6+ \#4 = \frac{0.07337\ ng/mL \times 10mL}{21.95m^3} = 0.03342\ ng/m^3$

#	Sample ID	Analyte	Reported Concentration (ng/m^3)	Calculated Concentration (ng/m^3)	Acceptable (Y/N)
	3	$Cr6^+$	0.0330	0.0330	Y
	4	$Cr6^+$	0.0334	0.0334	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Wills Wharf, MD, Hexavalent Chromium Monitoring

LDC Report Date: August 9, 2018

Parameters: Hexavalent Chromium

Validation Level: Level IV

Laboratory: Eastern Research Group

Sample Delivery Group (SDG): 8073136

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
PWAM-FB (07/26/18)	8073136-04	Air	07/26/18
PWAM-TB (07/26/18)	8073136-05	Air	07/26/18
PWAM-1 (07/28/18)	8073136-06	Air	07/28/18
PWAM-2 (07/28/18)	8073136-07	Air	07/28/18
PWAM-3 (07/28/18)	8073136-08	Air	07/28/18
PWAM-FB (07/28/18)	8073136-09	Air	07/28/18
PWAM-TB (07/28/18)	8073136-10	Air	07/28/18
PWAM-1 (07/27/18)	8073136-11	Air	07/27/18
PWAM-2 (07/27/18)	8073136-12	Air	07/27/18
PWAM-3 (07/27/18)	8073136-13	Air	07/27/18
PWAM-FB (07/27/18)	8073136-14	Air	07/27/18
PWAM-TB (07/27/18)	8073136-15	Air	07/27/18
PWAM-3 (07/28/18)DUP	8073136-08DUP	Air	07/28/18

The date was appended to the sample ID to differentiate between samples.

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Air Monitoring Program Quality Assurance Project Plan, Wills Wharf Office Project, Baltimore Works Site, Baltimore, Maryland (April 2016) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Hexavalent Chromium by ERG-MOR-063

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

Samples PWAM-TB (07/26/18), PWAM-TB (07/28/18), and PWAM-TB (07/27/18) were identified as trip blanks. No contaminants were found.

Samples PWAM-FB (07/26/18), PWAM-FB (07/28/18), and PWAM-FB (07/27/18) were identified as field blanks. No contaminants were found.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicates (MSD) analyses were not required by the method.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

All sample result verifications were acceptable.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Wills Wharf, MD, Hexavalent Chromium Monitoring
Hexavalent Chromium - Data Qualification Summary - SDG 8073136

No Sample Data Qualified Due to QA/QC Exceedances in this SDG

Wills Wharf, MD, Hexavalent Chromium Monitoring
Hexavalent Chromium - Laboratory Blank Data Qualification Summary - SDG 8073136

No Sample Data Qualified Due to Laboratory Blank Contamination in this SDG

Wills Wharf, MD, Hexavalent Chromium Monitoring
Hexavalent Chromium - Field Blank Data Qualification Summary - SDG 8073136

No Sample Data Qualified Due to Field Blank Contamination in this SDG

LDC #: 42853B6 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/9/18
SDG #: 8073136 Level IV Page: 1 of 1
Laboratory: Eastern Research Group Reviewer: JB
2nd Reviewer: [signature]

METHOD: (Analyte) Hexavalent Chromium (ERG-MOR-063)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	ND	FB = 1, 6, 11 TB = 2, 7, 12
VI.	Matrix Spike/Matrix Spike Duplicates	N	Not Required
VII.	Duplicate sample analysis	A	13
VIII.	Laboratory control samples	A	LCS ID
IX.	Field duplicates	N	
X.	Sample result verification	A	
XI	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	PWAM-FB (07/26/18)	8073136-04	Air	07/26/18
2	PWAM-TB (07/26/18)	8073136-05	Air	07/26/18
3	PWAM-1 (07/28/18)	8073136-06	Air	07/28/18
4	PWAM-2 (07/28/18)	8073136-07	Air	07/28/18
5	PWAM-3 (07/28/18)	8073136-08	Air	07/28/18
6	PWAM-FB (07/28/18)	8073136-09	Air	07/28/18
7	PWAM-TB (07/28/18)	8073136-10	Air	07/28/18
8	PWAM-1 (07/27/18)	8073136-11	Air	07/27/18
9	PWAM-2 (07/27/18)	8073136-12	Air	07/27/18
10	PWAM-3 (07/27/18)	8073136-13	Air	07/27/18
11	PWAM-FB (07/27/18)	8073136-14	Air	07/27/18
12	PWAM-TB (07/27/18)	8073136-15	Air	07/27/18
13	PWAM-3 (07/28/18)DUP	8073136-08DUP	Air	07/28/18
14				
15				
16				

Notes:

LDC #: 42353B6

VALIDATION FINDINGS CHECKLIST

Reviewer: JB
2nd Reviewer:

Method: Inorganics (EPA Method See Cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 42853B4

VALIDATION FINDINGS CHECKLIST

Reviewer: JB
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 42853B6

Validation Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: JS
2nd Reviewer: CL

Method: Inorganics, Method See Cover

The correlation coefficient (r) for the calibration of Cr6+ was recalculated. Calibration date: 8/2/16

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (ug/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	Cr6+	s1	0.05	0.0441243	*99.989%*	*99.988%*	Y
		s2	0.1	0.0837117			
		s3	0.2	0.1706414			
		s4	0.5	0.414064			
		s5	1	0.8202524			
		s6	2	1.6870669			
Calibration verification	Cr6+	ICV	FOUND: 0.5048 ng/mL	TRUE: 0.500 ng/mL	101%	101%	Y
Calibration verification	Cr6+	CCV	FOUND: 0.5078 ng/mL	TRUE: 0.500 ng/mL	102%	102%	Y
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 42853B4

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: JB
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See Cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = Found / True x 100 Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

RPD = |S-D| / (S+D)/2 x 100 Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Cr6+	0.4700 ng/m3	0.463 ng/m3	102%	102%	Y
	Matrix spike sample		(SSR-SR)				
DUP	Duplicate sample	Cr6+	0.004786 ng/m3	SR= 0.00520 ng/m3	8.29 RPD	8.45 RPD	Y

Comments: _____

LDC #: 42853B4

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: JB
2nd reviewer:

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y	N	N/A	Have results been reported and calculated correctly?
Y	N	N/A	Are results within the calibrated range of the instruments?
Y	N	N/A	Are all detection limits below the CRQL?

Compound (analyte) results for Cr6+ #8 reported with a positive detect were recalculated and verified using the following equation:

Concentration = Recalculation:

Cr6+ #8 =
$Y = mx + b$
$y = 0.346954$
$m = 0.8338275$
$b = 0.0014$

$$Cr6+ = \frac{0.41418\ ng/mL \times 10\ mL}{21.6\ m^3} = 0.19175\ ng/m^3$$

#	Sample ID	Analyte	Reported Concentration (ng/m^3)	Calculated Concentration (ng/m^3)	Acceptable (Y/N)
	3	Cr6+	0.0334	0.0334	Y
	4	Cr6+	0.0140	0.0140	Y
	5	Cr6+	0.00520	0.00520	Y
	8	Cr6+	0.192	0.192	Y
	9	Cr6+	0.151	0.151	Y
	10	Cr6+	0.407	0.407	Y

Note: