ATTACHMENT 1: QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

This attachment summarizes the field quality assurance, laboratory quality assurance, data verification and data validation procedures utilized for the JPL groundwater monitoring program. Data validation was performed by an independent contractor, Laboratory Data Consultants, Inc. of Carlsbad, California. Data verification and validation indicated that the all volatile organic carbon (VOC), perchlorate, metal results obtained from the third quarter 2012 groundwater monitoring event were acceptable for their intended use of characterizing aquifer quality.

ATTACHMENT 1: QUALITY ASSURANCE/QUALITY CONTROL SUMMARY

Field and laboratory QC samples were collected and analyzed to fulfill quality requirements. Proper sample collection and handling procedures were utilized to ensure the integrity of the analytical results. A comprehensive quality assurance and quality control (QA/QC) plan for groundwater monitoring is described in the *Work Plan for Performing a Remedial Investigation/Feasibility Study* (Ebasco, 1993).

FIELD QUALITY ASSURANCE/QUALITY CONTROL

The field QA/QC samples collected for JPL groundwater monitoring included field duplicate samples, equipment rinsate blanks and trip blanks. The QC sample results were used for the qualitative evaluation of the data. Table 1-1 summarizes analytical results for the field quality control samples during the third quarter 2012 groundwater monitoring event.

Field Duplicate Samples. Duplicate samples were collected to evaluate the precision of the sample collection process. Duplicate samples for volatile organic compounds (VOCs), perchlorate, total chromium and hexavalent chromium [Cr(VI)] analyses were collected from monitoring wells MW-11 (Screen 3), MW-12 (Screen 1), MW-18 (Screen 3), MW-21 (Screen 3), MW-23 (Screen 2) and MW-24 (Screen 3) and MW-25 (Screen 3). The analytical results for the field duplicate samples were comparable to the results of the original groundwater samples for VOCs (Table 1) and Metals (Table 2).

Equipment Rinsate Blanks. Equipment rinsate blanks should have been collected each day that non-dedicated sampling equipment was used. Equipment rinsate blanks consist of distilled water run through the sampling equipment after decontamination, and analyzed for contaminants of concern to monitor for possible cross-contamination of the samples. During the third quarter 2012 groundwater monitoring event, trip blanks were inadvertently not collected. The field sampling team will ensure that trip blanks are collected during future monitoring events. VOC contaminants and/or TICs have been non-detect or detected at low concentrations in equipment rinsate blanks in recent monitoring events. For this reason, it is anticipated that the equipment decontamination process for the third quarter 2012 monitoring event was adequate and did not result in sample contamination.

Trip Blanks. Trip blanks, which consisted of reagent-grade water in vials transported with the sample bottles to and from the field, were submitted to the laboratory with each shipment of groundwater samples. Trip blanks were used to help identify cross-contamination of groundwater samples during transport and sample handling procedures. No VOC contaminants or TICs were detected in the trip blanks as shown in Table 1-1.

Source Blank. A source blank should have been collected once during the groundwater monitoring event. Source blanks consist of distilled water used by sampling personnel

for equipment decontamination and serve as a check for any contamination present in the source water. VOC contaminants and/or TICs have been non-detect or detected at low concentrations in the source blanks in recent monitoring events. For this reason, it is anticipated that the source water for equipment decontamination for the third quarter 2012 monitoring event was adequate and did not result in sample contamination.

LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

Laboratory QC samples included surrogate compounds (for VOC analyses), matrix spike samples, blank spike samples, and method blanks. The results of the laboratory QC samples were used by the laboratory to determine the accuracy and precision of the analytical techniques, and to identify anomalous results due to laboratory contamination or instrument malfunction.

DATA VERIFICATION AND VALIDATION

The purpose of data verification and validation is to assure that the data collected meet the data quality objectives (DQOs) outlined in the Quality Assurance Project Plan of the Groundwater Monitoring Plan (Ebasco, 1993).

Data Verification. Data verification is a review of the analytical data that includes confirming that the sample identification numbers on the laboratory reports match those on the chain-of-custody records. Data verification also includes a review of the analytical data reports to confirm that all samples were analyzed and all required analytes were quantified for each sample.

Data Validation. Data validation is a systematic review of the analytical data to determine the compliance with established method performance criteria. Validation of a data package included review of the technical holding time requirements, review of sample preparation, review of the initial and continuing calibration data, review and recalculation of the laboratory QC sample data, review of the equipment performance, reconciliation of the raw data with the reduced results, identification of data anomalies, and qualification of data to identify data usability limitations.

Data validation was performed by an independent contractor, Laboratory Data Consultants, Inc. (LDC) of Carlsbad, CA. All of the data provided by Alpha Analytical, Inc. and Columbia Analytical Services, Inc. (CAS) were validated. Ninety percent of the data were subjected to Level III validation and ten percent of the data were subjected to Level IV validation in accordance with the EPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic and Inorganic Data Review (U.S. EPA, 2008; 2010).

Data Validation Qualifiers. Analytical data were qualified based on data validation. Data qualifiers were assigned in accordance with EPA guidelines. All samples were analyzed within the analytical holding times. Data validation indicated that the all of the data from the third quarter 2012 groundwater monitoring event were acceptable for their intended use of characterizing aquifer quality.

The data validation reports are included in Attachment 2.

REFERENCES

- Ebasco. 1993. *Work Plan for Performing a Remedial Investigation/Feasibility Study*. National Aeronautics and Space Administration Jet Propulsion Laboratory, Pasadena, California. December.
- U.S. EPA. 2008. USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review. June.
- U.S. EPA. 2010. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review. January.

This attachment contains the data validation reports performed by an independent subcontractor, Laboratory Data Consultants, Inc. (LDC) of Carlsbad, California.



Laboratory Data Consultants, Inc.

7750 El Camino Real, Ste. 2L Carlsbad, CA 92009

Phone 760.634.0437 Web w

Web www.lab-data.com

Fax 760.634.0439

October 26, 2012

Battelle 505 King Avenue Room 10-1-170 Columbus, OH 43201 ATTN: Ms. Betsy Cutie

SUBJECT: NASA JPL, Data Validation

Dear Ms. Cutie,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on October 8, 2012. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 28534:

1216753 1216917	SDG #		Fraction
1216984 121/062	1216317 1216488	1216407 1216587	

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

- USEPA, Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, June 2008
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, January 2010
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; Update IV, February 2007

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

Sincerely,

Erlinda T. Rauto Operations Manager/Senior Chemist

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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
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Collection Date: August 27, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216140

Sample Identification

TB-1 MW-20-5 MW-20-4 MW-20-3 MW-20-2 MW-20-1 MW-20-1 MW-19-5 MW-20-4MS MW-20-4MSD

Introduction

This data review covers 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 30.0%.

The percent differences (%D) of the second source calibration standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
8/31/12	Acrolein	51.6	All samples in SDG 1216140	J (all detects) UJ (all non-detects)	А

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and RLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

XVII. Field Blanks

Sample TB-1 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1216140

SDG	Sample	Compound	Flag	A or P	Reason
1216140	TB-1 MW-20-5 MW-20-4 MW-20-3 MW-20-2 MW-20-1 MW-19-5	Acrolein	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1216140

No Sample Data Qualified in this SDG

NASA JPL Volatiles - Field Blank Data Qualification Summary - SDG 0000

No Sample Data Qualified in this SDG

LDC #:28534A1	VALIDATION COMPLETENESS WORKSHEET	Date: 10/13/12
SDG #:1216140	_ Level III	Page:_/_of/
Laboratory: BC Laboratories	, Inc.	Reviewer:
		2nd Reviewer:
METHOD: CC/MS Valatilas /	ERA Mathad 521 2)	

METHOD: GC/MS Volatiles (EPA Method 524.2)

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

<u> </u>			T
	Validation Area		Comments
1.	Technical holding times	Δ	Sampling dates: 3/27/12
11.	GC/MS Instrument performance check	Δ	
111.	Initial calibration	A	% PSD 520, 12
IV.	Continuing calibration/ICV	SIN	ICV / CCV = 3 U
V.	Blanks	$\overline{\nabla}$,
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	ics
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	Δ	
<u>XI.</u>	Target compound identification	N	
XII.	Compound quantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	ND	TB=1

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

Validated Samples:

1	TB-1		BVH2430	21	31	
2	MW-20-5	12		22	32	
3	MW-20-4	13		23	33	
4	MVV-20-3	14	·····	24	34	
5	MW-20-2	15		25	35	
6	MW-20-1	16		26	 36	
7	MW-19-5	17		27	 37	
8	#3M5	18		28	 38	
9	#3MSD	19		29	 39	
10	[20		30	40	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA Method 524.2)

A. Chloromethane	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF, Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene	BB. 1,1,2,2-Tetrachloroethane	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane	CC. Toluene	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene	XX. 1,2,3-Trichloropropane	RRR. m.p-Xylenes	LLLL. Ethyl ether
K. Chloroform	EE. Ethylbenzene	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN.
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	dddd
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	ରର୍ବର.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRR.
Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	บบบบ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	www.

LDC #: 78 5 34A

VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

Page: /of <u>/</u> N 2nd Reviewer: Reviewer:___

METHOD: GC/MS VOA (EPA Method 524.2) Plgase see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". W N/A. Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

	Qualifications	d/ [n/[
	Associated Samples	A //														
	Finding %D (Limit: <u>≤</u> 30.0%)	51.6														
2. %	Compound	A cro/cin														
Were all percent differences (%D) $\leq 30\%$?	Standard ID	1211277-10121														
Y N/N/A Were all per		21/12/3														
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Laboratory Data Consultants, Inc. Data Validation Report

- Project/Site Name: NASA JPL
- Collection Date: August 27, 2012
- LDC Report Date: October 18, 2012
- Matrix: Water
- Parameters: Chromium
- Validation Level: EPA Level III
- Laboratory: BC Laboratories, Inc.
- Sample Delivery Group (SDG): 1216140

Sample Identification

MW-20-5 MW-20-4 MW-20-3 MW-20-2 MW-20-1 MW-20-4MS MW-20-4MSD MW-20-4DUP

Introduction

This data review covers 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium was found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Chromium	0.739 ug/L	All samples in SDG 1216140

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-20-5	Chromium	0.92 ug/L	0.92U ug/L
MW-20-3	Chromium	0.59 ug/L	0.59U ug/L

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
MW-20-4DUP (All samples in SDG 1216140)	Chromium	-	3.35 ug/L (≤3.0)	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

Raw data were not reviewed for this SDG.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Chromium - Data Qualification Summary - SDG 1216140

SDG	Sample	Analyte	Flag	A or P	Reason
1216140	MW-20-5 MW-20-4 MW-20-3 MW-20-2 MW-20-1	Chromium	J (all detects) UJ (all non-detects)	A	Duplicate (difference)

NASA JPL Chromium - Laboratory Blank Data Qualification Summary - SDG 1216140

SDG	Sample	Analyte	Modified Final Concentration	A or P
1216140	MW-20-5	Chromium	0.92U ug/L	А
1216140	MW-20-3	Chromium	0.59U ug/L	A

Level III

Date: <u>10-16-12</u> Page: <u>1of 1</u> Reviewer: <u>M G</u> 2nd Reviewer: <u>1</u>

Laboratory: <u>BC Laboratories, Inc.</u> Chromium M.C.

METHOD: Metals (EPA Method 200.8)

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
<u> </u>	Technical holding times	A	Sampling dates: 8-97-12
11.	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks	รฟ	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	A	MS/MSO
VII.	Duplicate Sample Analysis	SW	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	not reviewed
<u>X.</u>	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not utilized not performed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
xv	Field Blanks	N	

Note:

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LDC #: 28534A4

SDG #: 1216140

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

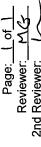
Validated Samples:

	all Note				 	
1	MW-20-5	11		21	31	
2	MW-20-4	12		22	32	
3	MW-20-3	13		23	 33	<u>1</u>
4	MW-20-2	14		24	 34	
5	MW-20-1	15		25	35	
6	#2MS	16		26	36	
7	#2 MSD	17		27	37	
8	#2 DUP	18		28	38	
9		19		29	39	
5 6 7 8 9 10		20	PBW	30	40	

Notes:

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Sample Concentration units, unless otherwise noted: ug/L SDG #: See Cover LDC #: 28534A4

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES Soil preparation factor applied: NA Associated Samples: all



2nd Reviewer:

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		69
	e n	0.5
	-	0.92
2-		
	it a	35
	Action Limit	3.695
	Maximum ICB/CCBª (ug/L)	
	m	6
	Maximum PB ^a (ug/L)	0.739
	Maximum PB ^a (mg/Kg)	
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	fe	
	Analyte	
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Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U". Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

28534A4 LDC #:

VALIDATION FINDINGS WORKSHEET Duplicate Analysis

して Page: 1 of Reviewer:__ 2nd Reviewer.

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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

N/N Was a duplicate sample analyzed for each matrix in this SDG?

Were all duplicate sample relative percent differences (RPD) < 20% for water samples and < 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L. for soil) was used for sample values that were <5X the R.L. including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY: Y N N/A Wer

Y(N/N/A

7

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

				 	_		_				-	 	l	_	_	_	_
Oualifications	JUJ/A																
Associated Samples																	
Difference (Limits)	3.35 49/1 (=3.0)																
RPD (Limits)																	
Analvte	C r																
Matrix	water																
Dunlicate ID	ထ																
Date																	
#		1	1		1	. 1	1	E I	1	 1		1	1	i	F	L	1

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Comments:

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
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Collection Date:	August 27,	2012

LDC Report Date: October 18, 2012

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216140

Sample Identification

MW-20-5 MW-20-4 MW-20-2 MW-20-1 MW-19-5 MW-20-4MS MW-20-4MSD MW-20-4DUP MW-20-5MS MW-20-5MSD MW-20-5DUP

Introduction

This data review covers 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 314.0 for Perchlorate and EPA SW 846 Method 7196 for Hexavalent Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
MW-20-5MS/MSD (MW-20-5 MW-20-4 MW-20-3 MW-20-2 MW-20-1)	Hexavalent chromium	65.8 (85-115)	64.8 (85-115)	-	J (all detects) UJ (all non-detects)	A

VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Sample Result Verification

Raw data were not reviewed for this SDG.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1216140

SDG	Sample	Analyte	Flag	A or P	Reason
1216140	MW-20-5 MW-20-4 MW-20-3 MW-20-2 MW-20-1	Hexavalent chromium	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1216140

No Sample Data Qualified in this SDG

LDC #: 28534A6 VALIDATION COMPLETENESS WORKSHEET	Date: <u>10 - 16</u> -
SDG #:1216140 Level III	Page: <u></u> of <u></u>
Laboratory: <u>BC Laboratories, Inc.</u>	Reviewer: MG

2nd Reviewer:

12

METHOD: Perchlorate (EPA Method 314.0), Hexavalent Chromium (EPA SW846 Method 7196)

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
Ι.	Technical holding times	A	Sampling dates: 8 - 27 - 12
II	Initial calibration	A	
III.	Calibration verification	A	
١٧	Blanks	A	
v	Matrix Spike/Matrix Spike Duplicates	SW	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
Х.	Field duplicates	N	
XI	Field blanks	N	

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

Validated Samples: "Water

r		1			1	<u>г т</u>	
1	MVV-20-5	11	# IMSD	21		31	
2	MW-20-4	12	# (DUP	22		32	
3	MW-20-3	13		23		33	
4	MW-20-2	14		24		34	
5	MW-20-1	15		25		35	
6	MW-19-5	16		26		36	
7	#2 MS	17		27		37	
8	#2 MSD	18		28		38	
9	#2 DUP	19		29		39	
10	HFI MS	20	PBW	30		40	

Notes:_

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: <u>l_of</u> Reviewer: <u>MG</u> 2nd reviewer: <u>____</u> KetXI, Po

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All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-75	W	ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR° CO ₄
6		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
ac 7-79		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ (O)
10712	ł	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC $(CR^{6+})CIO_4$
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		PH_TDS_CLF_NO ₃ _NO ₂ _SO ₄ _PO ₄ _ALK_CN ⁻ NH ₃ _TKN_TOC_CR ⁶⁺ _ClO ₄
		PH TDS CLE NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4

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VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1 Reviewer: MG 2nd Reviewer: 1

METHOD: Inorganics, EPA Method See cover

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

<u>N N/A</u> Was a matrix spike analyzed for each matrix in this SDG?

Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken. Y (N) N/A

Were all duplicate sample relative percent differences (RPD) $\leq 20\%$ for water samples and $\leq 35\%$ for soil samples? KN N/A

LEVEL IV ONLY:

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations. Y N N/A

#	UI USW/SW	Matrix	Analyte	MS MSD %Recoverv %Recoverv	MSD %Recoverv	RPD (Limits)	Associated Samples	Qualifications	
-	11/01	water	CrvI	65.8 (85-115)	64.8(85-115)		1-25	STUJA	1
									T T
									T.
									1
									1
									T
									T
									Î
									
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									<u></u>
									 1
- S	Comments:								1

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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
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Collection Date: August 28, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216226

Sample Identification

TB-1 MW-19-4** MW-19-3 MW-19-2 MW-19-1** MW-14-5 MW-14-5 MW-14-4 MW-14-3 MW-14-2 MW-14-1 MW-14-2 MW-14-2MS MW-14-2MSD MW-19-3MS MW-19-3MSD

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 14 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore gualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/1/12	Bromoform Bromomethane trans-1,4-Dichloro-2-butene Methyl lodide	31.6 62.0 31.6 45.3	All samples in SDG 1216226	J (all detects) UJ (all non-detects)	Ρ

The percent differences (%D) of the second source calibration standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
8/31/12	Acrolein	51.6	All samples in SDG 1216226	J (all detects) UJ (all non-detects)	Р

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XII. Compound Quantitation and RLs

All compound quantitation and RLs were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

All tentatively identified compounds were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIV. System Performance

The system performance was acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

XVII. Field Blanks

Sample TB-1 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1216226

SDG	Sample	Compound	Flag	A or P	Reason
1216226	TB-1 MW-19-4** MW-19-3 MW-19-2 MW-19-1** MW-14-5 MW-14-4 MW-14-3 MW-14-2 MW-14-1	Bromoform Bromomethane trans-1,4-Dichloro-2-butene Methyl Iodide	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1216226	TB-1 MW-19-4** MW-19-3 MW-19-2 MW-19-1** MW-14-5 MW-14-4 MW-14-3 MW-14-2 MW-14-1	Acrolein	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1216226

No Sample Data Qualified in this SDG

LDC #:	28534B1	VALIDATION COMPLETENESS WORKSHEET	Date: 10/17/12
SDG #:_	1216226	Level III/IV	Page:_/_of
Laborato	ory: <u>BC Laboratories</u> ,	Inc	Reviewer:
			2nd Reviewer: 'n

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METHOD: GC/MS Volatiles (EPA Method 524.2)

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
l.	Technical holding times	A	Sampling dates: S 28 12
II.	GC/MS Instrument performance check	Δ	
111.	Initial calibration	Α	$\frac{1}{6}$ psp $\leq 20, 1^{2}$
IV.	Continuing calibration/ICV	<u></u> ζW	$ w cw \leq 3D$
V.	Blanks	А	
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	Ą	1C>
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	Δ	
XI.	Target compound identification	Δ	Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	A	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	Δ	Not reviewed for Level III validation.
XIV.	System performance	Δ	Not reviewed for Level III validation.
XV.	Overall assessment of data	Δ	
XVI.	Field duplicates	N	
XVII.	Field blanks	ND	TB = 1

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

Validated Samples:** Indicates sample underwent Level IV validation

	1,2000 + 1						
1	TB-1	11	MW-14-2MS	21	BV/10013	31	
1 1 2	MW-19-4**	12	MW-14-2MSD	22 Z	BY I 6014	32	
3	MW-19-3	13	#3M5	23		33	
4	MW-19-2	14	#3MS17	24		34	
5-1	MW-19-1**	15		25		35	
6	MW-14-5	16		26		36	
7	MW-14-4	17		27		37	
81	MW-14-3	18		28		38	
9 2	MW-14-2	19		29		39	
10 7	MW-14-1	20		30	· · · · · · · · · · · · · · · · · · ·	40	

Method: Volatiles (EPA Method 524.2)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	\leq			
Cooler temperature criteria was met.	/			
II. GC/MS Instrument performance check.				
Were the BFB performance results reviewed and found to be within the specified criteria?	/	-		
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration	12			
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) < 20%?		enus di tanici	origent alteration (See	
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	/			
Were all percent differences (%D) < 30%?			erectoristic for	
V. Blanks				
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	<			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.			-	
<u>VI. Surrogate spikes</u>				
Were all surrogate %R within QC limits?	/			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?				
VII. Matrix spike/Matrix spike duplicates	-			
Was a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for this SDG?	-			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	/	-		
VIII Laboratory control samples				
Was an LCS analyzed for this SDG?				
Was an LCS analyzed per analytical batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		L		

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VALIDATION FINDINGS CHECKLIST

	Page:	_of
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Validation Area	Yes	No	NA	Findings/Comments
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?		[
X. Internal standards				
Were internal standard area counts within +/-40% from the associated calibration standard?	/	-		
Were retention times within - 30% of the last continuing calibration or +/- 50% of the initial calibration?				
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	/	r 		
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	\langle	-		
Were chromatogram peaks verified and accounted for?	$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 25 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	/	-	بر	6
Were relative intensities of the major ions within <u>+</u> 20% between the sample and the reference spectra?				
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?	/			
XIV. System performance				
System performance was found to be acceptable.	/			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
XVI. Field duplicates		2005. 1995 -		
Field duplicate pairs were identified in this SDG.	-	/	1	
Target compounds were detected in the field duplicates.				
XVII. Field blanks			~	
Field blanks were identified in this SDG.		-]		
Target compounds were detected in the field blanks.				

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA Method 524.2)

A. Chloromethane	U. 1,1,2-Trichloroethane	00. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride	W. trans-1,3-Dichloropropene	QQ. 1, 1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	llil. Isobutyl alcohol
H. 1,1-Dichloroethene	BB. 1,1,2,2-Tetrachioroethane	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane	CC. Toluene	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene	XX. 1,2,3-Trichloropropane	RRR. m.p-Xylenes	LLLL. Ethyl ether
K. Chlaroform	EE. Ethylbenzene	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN.
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	. dddd
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	<u>aaaa.</u>
P. Bromodichioromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRR.
Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	uuu.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	WW.

(8/76.382 :# DDI

VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

Page: Zof Reviewer: FT 2nd Reviewer:_

METHOD: GC/MS VOA (EPA SW 846 Method 8269) 52 4.2^{-2}

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

N N/A

Qualifications	d/ [n] [-		1						7							
Associated Samples	A1/			7						// 🛃							
Finding RRF (Limit: _0.05)															~		
Einding %D 344	315 5年5	62.0	31.6	45.3						51.6							
Compound	×	B	trans - 1, 4 - Dichlere - 2 - butene	Methyl Icalide						Acolein							
Standard ID Compound Clinctic of $S(0) > 0$ Finding F	1211334-001/		45ans - 1, 4- Di							1211277-1eur							
# Date	1.1									2//15/8	 						

LDC #: 28 534B #995S

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET



METHOD: GC/MS VOA (EPA Method 524.2)

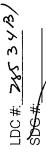
The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the follow calculations:

 $\label{eq:RF} RF = (A_x)(C_s)/(A_s)(C_x) \\ average RRF = sum of the RRFs/number of standards \\ \ensuremath{\%RSD} = 100 * (S/X) \\ \ensuremath{\%RSD}$

 $A_x =$ Area of compound, $C_x =$ Concentration of compound, S = Standard deviation of the RRFs X = Mean of the RRFs

 $A_{\rm is}$ = Area of associated internal standard $C_{\rm is}$ = Concentration of internal standard

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



VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compoun identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF RRF = (A_x)(C_s)'(A_s)(C_x)

 A_{is} = Area of associated internal standard C_{is} = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
		Calibration		Ачегала ВВЕ	u Q	ц Д Д	2	2
#	Standard ID	Date	Compound (Reference internal Standard)	(initial)	(00)	(CC)	C10/	U.97
-	1211334-001	21/10/6	Wethytene Chloride (1st Internal Standard)	0.8272395	0.7171007	1-2011717.0	5 . 3 /	13.3
			Trichloroethene (2nd Internal Standard)	6.3259183	0.2948632	0.2948622	6 - ک	9:5
			Chlere kenser (3rd Internal Standard)	3.719529	3.030293	3.030193	8.7	8:7
~			Methyl Acetate Ally Chloride Methylene Chloride (1st internal Standard)	1. 331689	1.210646	11.210646	ه . ۲	9.1
			Methyl metacvylatu <u>Trichloroethe</u> ne (2nd Internal Standard)	9-8116×10-2		2-01×L8P5-2	14. 2	14.4
					0.1339261	1 26251.0	ウ・1を	31.6
~			Mathulana Chlorida (1st Internal Standard)					
>								
			Bromoform (3rd Internal Standard)					
4			Methylene Chloride (1st Internal Standard)					
			Trichloroethene (2nd Internal Standard)					

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

METHOD: GC/MS VOA (EPA Method 524.2)

Surroyate Results Vernication

Percent

Difference

Percent

Recovery

Recalculated

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID: $\#\nu$			
	Surrogate Spiked	Surrogate Found	Percent Recovery
			Reported
Toluene-d8	10	10.140	101

Toluene-d8	10	10.140	10/	101	0
Bromofluorobenzene	10	9.580	95-8	95-8]
1,2-Dichlorobenzene-d4	ەر	10.540	105	105	
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

Sample ID:_____

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
		-	Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified belo using the following calculation:

% Recovery = 100 * (SSC - SC)/SA

Where:

RPD = I MSC - MSDC I * 2/(MSC + MSDC)

SSC = Spiked sample concentration SA = Spike added MSC = Matrix spike percent recovery

SC = Sample concentration

MSDC = Matrix spike duplicate percent recovery

MS/MSD sample: 12 11

	sp Sp	ike	Sample	Spiked Sample	ample	Matrix	Matrix Spike	Matrix Spike Duplicate	Duplicate	SM	USM/SD
Compound	ÞҰ)	Added (ver L)	Concentration (いんレ)	Concentration	iration	Percent F	Percent Recovery	Percent Recovery			RPD
	WS	MSD		WS	USM	Reported	Recalc	Reported	Recalc	Renorfed	Recalculater
1,1-Dichloroethene	z	ų	()~	01722 062 42	22.610	97.2 97.2	97.2	90.4	9.06	1.1)	1.1
Trichloroethene				23.750	0.29 0.29 0LE.EZ QS1.22	0.sp	95.0	93.5	واعبح	1.01	19.1
Benzene				21.800	2-28 0h3.12 ang.12	2-28	218	86.2	862	1.20	2.
Toluene				22.460 22.250 89-8 89.8	22.250	8-3-K	8-63	Q. 6%	89.0	P51.0 P5P.0	0.739
Chlorobenzene		->		22.380	22.380 23.120 89.5 89.5	ولع · ک	5-63	حامرر	٦٩.٢	3.27	3.25

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.C of the recalculated results.

53413/	
LDC #: 2	SDG#:

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculat for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

S + LCSD) LCS = Laboraotry control sample percent recovery

ł

LCSD = Laboratory control sample duplicate percent recovery

5	
GOO IVO	
LCS ID:	

Percent Recovery
Reported
1. tb
٩٩٠٩
46.2
<i>ڊ∙</i> %
ډ. کړ

LCSCLC.1S5

recalculated results.

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the second second

VALIDATION FINDINGS WORKSHEET **Sample Calculation Verification**

Page:_	of
Reviewer:	FT
2nd reviewer:	Q
_	/`

METHOD: GC/MS VOA (EPA Method 524.2)

Compound	results	for .
----------	---------	-------

and verified using the following equation:

_____reported with a positive detect were recalculated

una ioi		denig the following equation.
Concen	tratio	$n = \frac{(A_{\star})(I_{s})(DF)}{(A_{is})(RRF)(V_{o})(\%S)}$
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
l _s	=	Amount of internal standard added in nanograms (ng)
RRF	=	Relative response factor of the calibration standard.
V _o	=	Volume or weight of sample purged in milliliters (ml) or grams (g).
Df	=	Dilution factor.
%S	=	Percent solids, applicable to soils and solid matrices only.

Example:			
Sample I.D A.A.			
$Conc. = (\frac{8095}{529863}) (\frac{10}{5.305}) ($)(_))
= 0.50 ug/L			

#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Acceptable (Y/N)
					· · · ·
					·····
	: 				
					· · · · · · · · · · · · · · · · · · ·

Laboratory Data Consultants, Inc. Data Validation Report

BC Laboratories, Inc.

Project/Site Name:	NASA JPL
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Collection Date: August 28, 2012

LDC Report Date: October 18, 2012

Matrix: Water

Parameters: Chromium

Validation Level: EPA Level III

Laboratory:

Sample Delivery Group (SDG): 1216226

Sample Identification

MW-14-3 MW-14-2 MW-14-1 MW-14-2MS MW-14-2MSD MW-14-2DUP

Introduction

This data review covers 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium was found in the initial, continuing and preparation blanks.

V. ICP Interference Check Sample (ICS) Analysis

Instrument performance check is not required for by this method.

VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

Raw data were not reviewed for this SDG.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Chromium - Data Qualification Summary - SDG 1216226

No Sample Data Qualified in this SDG

NASA JPL Chromium - Laboratory Blank Data Qualification Summary - SDG 1216226

No Sample Data Qualified in this SDG

LDC #:_	28534B4	VAI
SDG #:	1216226	
Laborat	ory: BC Laboratories,	Inc.

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 10-16-12 Page: 1 of 1 Reviewer: MG 2nd Reviewer: 1/2

METHOD: Metals (EPA Method 200.8)

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
Ι.	Technical holding times	A	Sampling dates: 8-28-12
11.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	A	not required Ms/MsD
VII.	Duplicate Sample Analysis	А	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	not veriewed
Х.	Furnace Atomic Absorption QC	Z	not utilized
XI.	ICP Serial Dilution	2	not veriewed not utilized not performed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV	Field Blanks	2	

Note: A = Acceptable

r;

N = Not provided/applicable SW = See worksheet

ND = No compounds detected R = Rinsate FB = Field blank

D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples: 211

vanu	all Water				 	
1	MW-14-3	11		21	 31	
2	MW-14-2	12		22	 32	
3	MW-14-1	13		23	 33	
4	MW-14-2MS	14		24	 34	
5	MW-14-2MSD	15		25	 35	
6	MW-14-2DUP	16		26	 36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20	PBW	30	40	

Notes:

Laboratory Data Consultants, Inc. Data Validation Report

roject/Site Name:	NASA JPL
rojecusite name:	INAGA JE

Collection Date: August 28, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216226

Sample Identification

MW-19-4** MW-19-3 MW-19-2 MW-19-1** MW-14-5 MW-14-3 MW-14-3 MW-14-2 MW-14-2 MW-19-4MS MW-19-4MSD MW-19-4DUP MW-14-2MS MW-14-2MSD MW-14-2DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 15 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 314.0 for Perchlorate and EPA SW 846 Method 7196 for Hexavalent Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1216226

No Sample Data Qualified in this SDG

NASA JPL

Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1216226

No Sample Data Qualified in this SDG

LDC #: <u>28534B6</u>	VALIDATION COMPLETENESS WORKSHEET	Date:
SDG #: <u>1216226</u>	Level III/IV	Page:
Laboratory: BC Laboratories,	Inc.	Reviewer:

Date: <u>/0 - 16 - 12</u> Page: <u>(of [</u> Reviewer: <u>MG</u> 2nd Reviewer: <u>(</u>

METHOD: Perchlorate (EPA Method 314.0), Hexavalent Chromium (EPA SW846 Method 7196)

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
١.	Technical holding times	A	Sampling dates: 8 - 28 - 12
11	Initial calibration	A	
- 111.	Calibration verification	A	
IV	Blanks	A	
v	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	Not reviewed for Level III validation.
IX.	Overall assessment of data	A	
X .	Field duplicates	N	
L	Field blanks		

Note: A = Acceptable N = Not provided/applicable

SW = See worksheet

ND = No compounds detected R = Rinsate FB = Field blank D = Duplicate TB = Trip blan

TB = Trip blank EB = Equipment blank

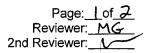
Validated Samples:** Indicates sample underwent Level IV validation

	all water						
1	MW-19-4**	11	4 MW-19-3MSD	21		31	
2	MW-19-3	12	u MW-19-3DUP	22		32	
3	MW-19-2	13	MW-14-2MS	23	·	33	
4	MW-19-1**	14	MW-14-2MSD	24		34	
5	MW-14-5	15	MW-14-2DUP	25		35	
6	MW-14-4	16		26		36	
7	MW-14-3	17		27		37	
8	MW-14-2	18		28		38	
9	MW-14-1	19		29	PBWI	39	
10	4 MW-19-3MS	20		30	PBW2	40	

Notes: 9MA

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VALIDATION FINDINGS CHECKLIST



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S. 1127 S.

Method: Inorganics (EPA Method See cover

Validation Area	Yes	No	NA	Findings/Comments		
I. Technical holding times		-				
All technical holding times were met.	1					
Cooler temperature criteria was met.	1					
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?	\checkmark					
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?	\checkmark					
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) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CRDL(\leq 2X CRDL for soil) was used for samples that were \leq 5X the CRDL, including when only one of the duplicate sample values were \leq 5X the CRDL.						
V. Laboratory control samples						
Was an LCS anaylzed for this SDG?	\checkmark					
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?	\checkmark					
VI. Regional Quality Assurance and Quality Control						
Were performance evaluation (PE) samples performed?		\checkmark				
Were the performance evaluation (PE) samples within the acceptance limits?			\checkmark			

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VALIDATION FINDINGS CHECKLIST

Page:	Zof	2
Reviewer:	M	6
2nd Reviewer:	C	~

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?	\checkmark			
Were detection limits < RL?	\checkmark			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	\checkmark			<u> </u>
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		1		
Target analytes were detected in the field duplicates.				
X. Field blanks				
Field blanks were identified in this SDG.		\checkmark		
Target analytes were detected in the field blanks.			\checkmark	

LDC #: 28534B6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	<u>l_of </u> [
Reviewer:	MG
2nd reviewer:	$\overline{1}$

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All circled methods are applicable to each sample.

Sample ID Matrix	Parameter
$ \rightarrow 6 $	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CO ₄
7-79 1	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC $CR^{69}CIO_4$
ec . 10→12	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ (CO_2)
13-715	ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC $(R^{e+}CO)$
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN- NH3 TKN TOC CR6+ CIO4
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	PH TDS CLE NO, NO, SO, PO, ALK CNº NH, TKN TOC CR ⁶⁺ CIO,

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METHODS.6

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LDC# <u>38534</u> 86	B6	VAL Initial and Col	VALIDATION F	VALIDATION FINDINGS WORKSHEET Continuing Calibration Calculation V	IDATION FINDINGS WORKSHEET ntinuing Calibration Calculation Verification		Page: Lof L Reviewer: ハG 2nd Reviewer: L
METHOD: Inorganics, Method		see cover					
The correlation coefficient (r) for the calibration of	icient (r) for the c	calibration of C	(0 4	was recalculated. Calibration date:	ate: 9-5-12		
An initial or continuing calibration verification percent recovery	g calibration veri	fication percent re		alculated for each typ	(%R) was recalculated for each type of analysis using the following formula:	le following formula:	
%R = <u>Found</u> x 100 True	Where, Found True	d = concentration of e = concentration of ea	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	ne analysis of the ICV or C X source	CV solution		
				Y	Recalculated	Reported	
Type of Analysis	Analyte	Standard ID	Coνc Found (units)	AVeco True (units)	r or %R	r or %R	Acceptable (Y/N)
Initial calibration		Blank	1	L			
		Standard 1	2 (mg/r)	0.0035			
		Standard 2	4 ()	0,0050			<u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>
	<u></u>	Standard 3	6 ()	0-0075			
	CIOH	Standard 4	() oi	0.0194	r 2=0.997663	V 2= 0.996435	>
		Standard 5	() ()	0.0352	•		_
		Standard 6	ŀ	١			
		Standard 7	1	ţ			
Calibration verification		1339		1			
	C104	ICV	9. 1875 (mg/) 10.00	(7) Br) 00.01	91.9	6.19	
Calibration verification)		1			1	l
Calibration verification)	1	l			I
Comments: Refer to recalculated results	Calibration Verifi	ication findings wo	orksheet for list of qual	ifications and associa	ited samples when rej	ported results do not a	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.
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LDC#: 28534 B6

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

ð Page: Reviewer: 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:

concentration of each analyte <u>measured</u> 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. Found = Where, %R = Found x 100 True

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

RPD = <u>[S-D]</u> x 100 Where, S = (S+D)/2 D =

Original sample concentration Duplicate sample concentration

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	%R / RPD	%R / RPD	Acceptable (Y/N)
الإلاح	Laboratory control sample					-	
1577		CIOH	10.306 (mg/1) 10.00 (mg/1)	10.00 (mg/r)	103	103	٢
اكفكا	Matrix spike sample		(SSR-SR)				
01		C104	1.195 (mg/L) 10.101 (mg/L)	10.101 (mg/L)	90.3	90.3	
1 1458 / 1512 Duplicate sample	Duplicate sample	C10.	(// gm) 2 2 2 0 (mg/)	2 700 (mg/.)	Ŭ (11.2	
1 9			3.603 \ 1 'L'	7. 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6.01		4

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

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LDC #	28534B6	VALIDATION FINDINGS Wo Sample Calculation Ver		Pa Review 2nd review	ge:lof ver:M_G ver:
METH	OD: Inorganics, Metho	d <u>sce cover</u>			
(∕у)м	<u>N/A</u> Have results N/A Are results w	w for all questions answered "N". Not app been reported and calculated correctly? ithin the calibrated range of the instrumen ion limits below the CRQL?		e identified as "N/.	Α".
Comp recalc	ound (analyte) results f ulated and verified using	or <u> </u>	repc	orted with a positiv	ve detect were
Concen	tration =	Recalculation:			
√ ≞	$y = m_{x+b}$ 0.005 = 0.001 (x) + 0				
	where 0.001	$5 = \times (\mu g / L)$			
#	Sample ID	Analyte	Reported Concentration (^{MG} /L)	Calculated Concentration (パタノレ)	Acceptable (Y/N)
	(CIOH	3.6	5	Ý
 					
┣					
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<u> </u>	L	ic using many signifi-	t finne	the number of the second	
Note:_	(60	is using more signific.	an igures	ran ii re	15 TOT 15

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Laboratory Data Consultants, Inc. Data Validation Report

- Project/Site Name: NASA JPL
- Collection Date: August 29, 2012
- LDC Report Date: October 22, 2012
- Matrix: Water
- Parameters: Volatiles
- Validation Level: EPA Level III
- Laboratory: BC Laboratories, Inc.
- Sample Delivery Group (SDG): 1216317

Sample Identification

TB-1 MW-18-5 MW-18-4 MW-18-3 DUP-1-3Q12 MW-18-2 MW-17-4 MW-17-3 MW-17-2

Introduction

This data review covers 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 30.0%.

The percent differences (%D) of the second source calibration standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
8/31/12	Acrolein	51.6	All samples in SDG 1216317	J (all detects) UJ (all non-detects)	Р

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and RLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

Samples MW-18-3 and DUP-1-3Q12 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)	
Compound	MW-18-3	DUP-1-3Q12	RPD
Carbon tetrachloride	7.4	5.4	31

	Concenti	ration (ug/L)	
Compound	MW-18-3	DUP-1-3Q12	RPD
Chloroform	1.6	1.4	13
Tetrachloroethene	0.15	0.13U	200
Trichloroethene	1.0	0.76	27

XVII. Field Blanks

Sample TB-1 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1216317

SDG	Sample	Compound	Flag	A or P	Reason
1216317	TB-1 MW-18-5 MW-18-4 MW-18-3 DUP-1-3Q12 MW-18-2 MW-17-4 MW-17-3 MW-17-2	Acrolein	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

NASA JPL

Volatiles - Laboratory Blank Data Qualification Summary - SDG 1216317

No Sample Data Qualified in this SDG

NASA JPL

Volatiles - Field Blank Data Qualification Summary - SDG 0000

No Sample Data Qualified in this SDG

LDC #:	VALIDATION COMPLETENESS WORKSHEET	Date: 10/17/12
SDG #: 1216317	Level III	Page:of
Laboratory: BC Laboratories,	Inc	Reviewer:
-		2nd Reviewer:/
METHOD: GC/MS Volatiles (E	EPA Method 524.2)	9

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
1.	Technical holding times	Ą	Sampling dates: 8 29 12
U.	GC/MS Instrument performance check	4	
III.	Initial calibration	A	°/0 RSD ≤ 20, 12
IV.	Continuing calibration/ICV	sto	$\frac{1}{1000} RSD \leq 20, T^{2}$ $\frac{1}{1000} CCV \leq 30$
V.	Blanks	Δ	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	MW-19-3NS/D MW-20-4MS/D
VIII.	Laboratory control samples	A	
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	\diamond	
XI.	Target compound identification	N	
XII.	Compound quantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
xı∨.	System performance	N	
XV.	Overall assessment of data	Δ.	
XVI.	Field duplicates	હ્પ	p = 4, 5
XVII.	Field blanks	NP	TB =)

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

Validated Samples:

1	TB-1	11	BV H243 U	21	31	
2	MW-18-5	12	-BVI0013-	22	32	
3	MVV-18-4	13		23	33	
4	MVV-18-3	14		24	 34	
5	DUP-1-3Q12 P	15		25	 35	
6	MVV-18-2	16		26	 36	
7	MW-17-4	17	· · · · · · · · · · · · · · · · · · ·	27	 37	
82	MW-17-3	18		28	38	
9 Z	MW-17-2	19		29	 39	
10		20		30	40	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B) 534.2

A Atlantationat	1 1 1 2-Trichlomethane	00. 2,2-Dichioropropane	til. n-Butytbenzene	CCCC.1-Chlorohexane
	V Bannana	PP. Bromochloromethane	J.U. 1,2-Dichtorobenzone	DDDD. Isopropyi alcohol
D, D.O.I.M.164 Marco	W trans.1 3. Dicklommmane	QQ. 1.1-Dichloropropene	KIGK 1,2,4-Trichlorobenzene	EEEE. Acetoritrite
Li. VINA CROFOR			LLL. Hexachlorobutadiene	FFFF. Acroisin
D. Chicroethane			und Nadhalana	GGGG. Acryonitrile
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-LACROPOPERE		
F. Arstrna	Z. 2-Hexanone	TT. 1,2-Dibromoethene	NNN. 1,2,3-Tricthorobenzene	HHHH. 1,4-Diceane
Codom destina	A. Tetrachioroethene	UU. 1,1,1,2-Tetrachtoroethane	000.1,3,5-Trichlorobenzene	UII. teobutyl alcohol
U. 4.4 Publicanotherma ⁴⁴	RB. 1.1.2.2-Tetrachioroethane*	VV. teopropytheitzene	PPP, trans-1,2-Dichloroethene	J.J.J. Methacylonitrile
	C. Tohanatt	WW. Bromobenzene	QQQ. cia-1,2-Dichioroethene	KKKK. Propionitrile
	UN Chimhanzanat	XX. 1,2,3-Trichloropropene	RRR. m.p-Xyleives	LLLL. Ethy other
J. 1,2-UKURQUOBURARQ	EE Ethuthanyanati		SSS. o-Xytene	MMMM. Benzyi chioride
			TTT, 1,1,2-Trichloro-1,2,2-triffuoroethane	NNNN
L. 1,2-Dichloroethane	Fr. Synane			
M. 2-Butanone	GG. Xylenes, totat	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichkorotetrafikuoroethane	0000
N 111-Trichtmethana	HH. Virvi ecetate	BBB. 4-Chiorotokiene	VVV. 4-Ethyttokuene	Pppp.
O Carbon tetnachloride	II. 2-Chloroethytvinyl ether	CCC, tert-Butyfbenzene	WWW. Ethenoi	aaaa.
0. Brundishformathane	JJ. Dichlorodifuoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRR.
 A 9 Pichlammanat⁴ 	KK. Trichloroftuoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	888S,
u: 1,2-ununununununununununununununununununun	11. Mathyl-tert-buthyl other	FFF. 1,3-Dichlorobenzene	222. tert-Butyl alcohol	тт.
s. Trichlinnethane	MM. 1,2-Dibromo-3-chloropropene	GGG. p-fsopropytioluente	AAAA. Ethyl tent-butyl ether	UUUU.
		HHH 1 4. Dichlombenzene	BBBB. tert-Amyi methyl ether	ww.

* = System performance check compounds (SPCC) for RRF ; ** = Calibration check compounds (CCC) for %RSD.

LDC # 28 5340/

VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

2nd Reviewer Page: Reviewer:__

METHOD: GC/MS VOA (EPA Method 524.2) Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". V N/N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

	Qualifications]/u/P							-							
	Associated Samples	A11														
	Finding %D (Limit: <u>≤</u> 30.0%)	51.6														
% ?	Compound	Acm/ein														
Were all percent differences (%D) < 30% ?	Standard ID	1211-1721161														
Y N/N/A Were all per		8/31/12														
Х	#															

LDC #:_ SDG #: <u>pre</u> our

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	
Reviewer:_	<u></u>
2nd reviewer:_	_ <u>k</u>

METHOD: GC/MS VOA (EPA Method 524.2)

Y N N/A Y/N N/A

Were field duplicate pairs identified in this SDG?

Were target compounds detected in the field duplicate pairs?

	Concentration	n(ug L)	
Compound	Ц	5	RPD
Ð	7.4	5.4	3]
K	1.6	1.4	13
ÁA	0.15	0.134	200
S	1.0	0.76	27
			,

	Concentration	()	
Compound			RPD

			Concentration	()	
		Compound			RPD
-	· · · · · · · · · · · · · · · · · · ·				
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Laboratory Data Consultants, Inc. Data Validation Report

- Project/Site Name: NASA JPL
- Collection Date: August 29, 2012
- LDC Report Date: October 22, 2012
- Matrix: Water
- Parameters: Chromium
- Validation Level: EPA Level III
- Laboratory: BC Laboratories, Inc.
- Sample Delivery Group (SDG): 1216317

Sample Identification

MW-18-4 MW-18-3 DUP-1-3Q12 MW-18-2 MW-17-4 MW-17-3 MW-17-2 MW-18-4MS MW-18-4MSD MW-18-4DUP

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium was found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Chromium	0.546 ug/L	All samples in SDG 1216317

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-18-3	Chromium	2.5 ug/L	2.5U ug/L
DUP-1-3Q12	Chromium	2.1 ug/L	2.1U ug/L
MW-17-4	Chromium	0.90 ug/L	0.90U ug/L
MW-17-3	Chromium	1.3 ug/L	1.3U ug/L

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required by the method.

VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

Raw data were not reviewed for this SDG.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples MW-18-3 and DUP-1-3Q12 were identified as field duplicates. No chromium was detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)	
Analyte	MW-18-3	DUP-1-3Q12	RPD
Zinc	2.5	2.1	17

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Chromium - Data Qualification Summary - SDG 1216317

No Sample Data Qualified in this SDG

NASA JPL Chromium - Laboratory Blank Data Qualification Summary - SDG 1216317

SDG	Sample	Analyte	Modified Final Concentration	A or P
1216317	MW-18-3	Chromium	2.5U ug/L	А
1216317	DUP-1-3Q12	Chromium	2.1U ug/L	А
1216317	MW-17-4	Chromium	0.90U ug/L	А
1216317	MW-17-3	Chromium	1.3U ug/L	A

LDC #: <u>28534C4</u>	VALIDATION COMPLETENESS WORKSHEET	Date: <u>10-17</u> -12
SDG #: <u>1216317</u>	Level III	Page: 1_of_1_
Laboratory: BC Laboratori	es, Inc	Reviewer: MG
Chromium		2nd Reviewer:

METHOD: Metals (EPA Method 200.8) 9n.K.

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
<u>l.</u>	Technical holding times	A	Sampling dates: 8-29-12
<u> </u>	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	Z	not required
VI.	Matrix Spike Analysis	А	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	2	not verieved
Х.	Furnace Atomic Absorption QC	2	not utilized
XI.	ICP Serial Dilution	Ν	not utilized Not performed
XII.	Sample Result Verification	N	,
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	sW	D=2+3
XV	Field Blanks	レ	

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

Validated Samples:

	all was	<u> </u>				
1 2 3 4 5 6 7 8 9	MW-18-4	11		21	31	
2	MW-18-3	12		22	 32	
3	DUP-1-3Q12	13		23	 33	
4	MW-18-2	14		24	 34	
5	MW-17-4	15		25	35	
6	MW-17-3	16		26	36	
7	MW-17-2	17		27	37	
8	MW-18-4MS	18		28	38	
9	MW-18-4MSD	19		29	39	
10	MW-18-4DUP	20	PBW	30	40	

Notes:__

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) SDG #: See Cover LDC #: 28534C4

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES Soil preparation factor applied: NA



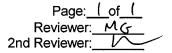
Associated Samples: all Sample Concentration units, unless otherwise noted: ug/L

Analyte	Maximum PB ^a (mg/Kg)	Maximum PB ^a 1 PB ^a 1 (ug/L)	Maximum ICB/CCB ^a (ug/L)	Action Limit	2	ъ	5	9			
c			0.546	2.730	2.5	2.1	0.00	1.3	-		

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U". Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC#: 28534C4

VALIDATION FINDINGS WORKSHEET Field Duplicates



METHOD: Metals (EPA Method 6010B/7000)

NNA Were field duplicate pairs identified in this SDG?

<u>NNA</u> Were target analytes detected in the field duplicate pairs?

	Concent	ration (ug/L)		
Analyte	2	3	RPD	
Chromium	2.5	2.1	17	

V:\FIELD DUPLICATES\FD_inorganic\28534C4.WPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL

Collection Date: August 29, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216317

Sample Identification

MW-18-5 MW-18-4 MW-18-3 DUP-1-3Q12 MW-18-2 MW-17-4 MW-17-3 MW-17-3 MW-17-2 MW-18-5MS MW-18-5MSD MW-18-5DUP MW-18-4MS MW-18-4MSD MW-18-4DUP

Introduction

This data review covers 14 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 314.0 for Perchlorate and EPA SW 846 Method 7196 for Hexavalent Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Sample Result Verification

Raw data were not reviewed for this SDG.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples MW-18-3 and DUP-1-3Q12 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce	entration	
Analyte	MW-18-3	DUP-1-3Q12	RPD
Hexavalent chromium	0.0018 mg/L	0.0017 mg/L	6
Perchlorate	93 ug/L	91 ug/L	2

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1216317

No Sample Data Qualified in this SDG

NASA JPL

Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1216317

No Sample Data Qualified in this SDG

LDC#<u>28534C6</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: <u>1 of 1</u> Reviewer: <u>MG</u> 2nd Reviewer: <u></u>

Inorganics: Method See Cover

	Concentra			
Analyte	3	4	RPD	
Hexavalent Chromium (mg/L)	0.0018	0.0017	6	
Perchlorate	93	91	2	

V:\FIELD DUPLICATES\FD_inorganic\28534C6.WPD

LDC #: 28534C6 VALIDA	ATION COMPLETENESS WORKSHEET	Date: 10-17-12
SDG #:1216317	Level III	Page:_ <u>I_</u> of_ <u>I_</u>
Laboratory: BC Laboratories, Inc.		Reviewer: MG
		2nd Reviewer:

METHOD: Perchlorate (EPA Method 314.0), Hexavalent Chromium (EPA SW846 Method 7196)

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
١.	Technical holding times	A	Sampling dates: 8 - 29 - 12
	Initial calibration	A	
111.	Calibration verification	A	
IV	Blanks	<u> </u>	
v	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
<u></u>	Sample result verification	N	
IX.	Overall assessment of data	<u> </u>	
Х.	Field duplicates	SW	D = 3+4
	Field blanks	N	

Note:

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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

Validated Samples: all Water

1	MW-18-5	11	MW-18-5DUP	21		31	
2	MW-18-4	12	MW-18-4MS	22	····	32	
3	MVV-18-3	13	MW-18-4MSD	23		33	
4	DUP-1-3Q12	14	MW-18-4DUP	24		34	
5	MW-18-2	15		25		35	
6	MW-17-4	16		26		36	÷ :
7	MW-17-3	17		27		37	
8	MW-17-2	18		28		38	
9	MW-18-5MS	19		29		39	
10	MW-18-5MSD	20		30	PBW	40	

Notes:

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	of
Reviewer:	MG
2nd reviewer:	\sim

and the second second

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All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
	\sim	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CO
2-18	1	ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (CR°) (CO_4)
UC 9-711		PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CO4
12-714	•	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (CR°) CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		PH_TDS_CI_F_NO ₃ _NO ₂ _SO ₄ _PO ₄ _ALK_CN ⁻ NH ₃ _TKN_TOC_CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		$_{\rm pH}$ TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH_3 TKN TOC CR^{6+} ClO ₄

Comments:_

Laboratory Data Consultants, Inc. Data Validation Report

- Project/Site Name: NASA JPL
- Collection Date: August 30, 2012
- LDC Report Date: October 22, 2012
- Matrix: Water
- Parameters: Volatiles
- Validation Level: EPA Level III & IV
- Laboratory: BC Laboratories, Inc.
- Sample Delivery Group (SDG): 1216407

Sample Identification

TB-1 MW-22-3 MW-22-2 MW-22-1 MW-26-2 MW-26-1 MW-25-5** MW-25-4 MW-25-3 DUPE-2-3Q12 MW-25-2 MW-25-1

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**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/1/12	Bromoform Bromomethane trans-1,4-Dichloro-2-butene Methyl lodide	31.6 62.0 31.6 45.3	TB-1 MW-22-3 MW-22-2 MW-22-1 MW-26-2 BVI0013	J (all detects) UJ (all non-detects)	Ρ
9/2/12	Bromoform Carbon tetrachloride Dibromochloromethane 1,2-Dibromo-3-chloropropane 2,2-Dichloropropane trans-1,3-Dichloropropene 1,1,1,2-Tetrachloroethane 1,1,1-Trichloroethane Acrolein trans-1,4-Dichloro-2-butene Pentachloroethane	56.9 51.0 39.6 47.8 65.5 37.0 39.0 35.8 47.9 63.8 93.6	MW-26-1 MW-25-5** MW-25-4 MW-25-3 MW-25-2 MW-25-1 DUPE-2-3Q12 1211334CCB2	J (all detects) UJ (all non-detects)	Ρ

The percent differences (%D) of the second source calibration standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
8/31/12	Acrolein	51.6	All samples in SDG 1216407	J (all detects) UJ (all non-detects)	Ρ

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XII. Compound Quantitation and RLs

All compound quantitation and RLs were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

All tentatively identified compounds were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIV. System Performance

The system performance was acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

Samples MW-25-3 and DUPE-2-3Q12 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/L)				
Compound	MW-25-3	DUPE-2-3Q12	RPD		
Chloroform	0.41	0.40	2		

XVII. Field Blanks

Sample TB-1 was identified as a trip blank. No volatile contaminants were found.

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NASA JPL Volatiles - Data Qualification Summary - SDG 1216407

SDG	Sample	Compound	Flag	A or P	Reason
1216407	TB-1 MW-22-3 MW-22-2 MW-22-1 MW-26-2	Bromoform Bromomethane trans-1,4-Dichloro-2-butene Methyl lodide	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1216407	MW-26-1 MW-25-5** MW-25-4 MW-25-3 MW-25-2 MW-25-1 DUPE-3Q12	Bromoform Carbon tetrachloride Dibromochloromethane 1,2-Dibromo-3-chloropropane 2,2-Dichloropropane trans-1,3-Dichloropropene 1,1,2-Tetrachloroethane 1,1,1-Trichloroethane Acrolein trans-1,4-Dichloro-2-butene Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1216407	TB-1 MW-22-3 MW-22-2 MW-22-1 MW-26-2 MW-26-1 MW-25-5** MW-25-4 MW-25-3 DUPE-2-3Q12 MW-25-2 MW-25-1	Acrolein	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1216407

No Sample Data Qualified in this SDG

LDC #:_	28534D1	VALIDATION COMPLETENESS WORKSHEET	Date: 19/17/12
SDG #:_	1216407	Level III/IV	Page: <u>/</u> of_ <u>/</u>
Laborato	ory: BC Laboratories,	Inc	Reviewer: <u>127</u>
			2nd Reviewer:

METHOD: GC/MS Volatiles (EPA Method 524.2)

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
Ι.	Technical holding times	\land	Sampling dates: 8 30 12
11.	GC/MS Instrument performance check	Δ	
111.	Initial calibration	, A	0/0 PSP 5 20, 12
IV.	Continuing calibration/ICV	K	$\frac{0}{0}$ psp ± 20 , 1^{2} $101/cot \pm 30$
V.	Blanks	Â	
VI.	Surrogate spikes	4	
VII.	Matrix spike/Matrix spike duplicates	A	MW-19-34510 HW-14-24510
VIII.	Laboratory control samples	1	
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	4	
XI.	Target compound identification	D	Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	Δ	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	Δ	Not reviewed for Level III validation.
XIV.	System performance	Ą	Not reviewed for Level III validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 9, 10
XVII.	Field blanks	ND	TB=1

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

Validated Samples:** Indicates sample underwent Level IV validation

r	(Date)						
11	TB-1	11 2	MW-25-2	21	BVI0013	31	
2	MW-22-3	12 V	MW-25-1	22	1211 334-CCB2	32	
3 1	MW-22-2	13		23		33	
4 1	MW-22-1	14		24		34	
5	MW-26-2	15		25		35	
6]	MW-26-1	16		26		36	
77	MW-25-5**	17		27		37	
87	MW-25-4	18		28		38	
9 Z	MW-25-3	19		29		39	
102	DUPE-2-3Q12 P	20		30		40	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA Method 524.2)

V. RenzenePP. Bromochloromethane $1.1.1.2.20$ EnhorobenzeneM. trans-1.3.DichloropropeneCQ. 1,1-DichloropropeneKrixt, 1.2,4-TrichlorobenzeneK. BromoformR. DibromomethaneLLL. HexachlorobutacieneX. BromoformS. 1,3-DichloropropeneMM. MaphthaleneY. 4-Methyl-Z-pentanoneS. 1,3-DichloropropaneMM. MaphthaleneY. 4-Methyl-Z-pentanoneS. 1,2-DichloropropaneMM. MaphthaleneY. 4-Methyl-Z-pentanoneS. 1,2-DichloropropaneMM. 1,2-TichlorobenzeneB. 1,1.2.2-TetrachloroethaneUU 1,1,1.2-TetrachloroethaneCOO. 1,3-FirtichlorobenzeneI.D. ChlorobenzeneW. BromobenzeneCOO. 1,3-FirtichlorobenzeneB. 1,1.2.2-TetrachloroethaneUU 1,1.2-TetrachloroethaneCOO. 1,3-FirtichlorobenzeneI.D. ChlorobenzeneW. BromobenzeneCOO. 1,3-FirtichlorobenzeneI.D. ChlorobenzeneW. BromobenzeneW. J. PicklorobenzeneI.D. ChlorobenzeneW. H. H. 1,2-TirtethybenzeneW. 4-EthylloueneI.J. DichlorodfluoromethaneD. 1,2-4-TirtethybenzeneW. 4-EthylloueneI.J. DichlorodfluoromethaneD. 1,2-4-TirtethybenzeneW. 4-EthylloueneI.J. DichlorodfluoromethaneD. 1,2-4-	A. Chloromethane	U. 1,1,2-Trichloroethane	00. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
W. trans. 1, 2-InchloropropeneQu. 1, 1-DichloropropeneKKK. 1, 2, 4-TrichlorobenzeneX. BronnoformR.R. DibronomethaneLLL. HexachlorobutacieneX. BronnoformR.R. DibronomethaneLLL. HexachlorobutacieneY. 4-Wettry!-2-pentanoneS. 1, 3-DichloropropaneMMM. NaphthaleneY. 4-Wettry!-2-pentanoneS. 1, 3-DichloropropaneMMM. 1, 2, 3-TrichlorobenzeneZ. 2-HexanoneU. U. 1, 1, 2-TetrachloroethaneNNN. 1, 2, 3-TrichlorobenzeneB. 1, 1, 2, 2-TetrachloroethaneU. U. 1, 1, 2-TichlorobenzenePPP. trans. 1, 2-DichloroethaneD. ChloubeneW.W. BromobenzeneOCO. 1, 3, 5-TrichlorobenzenePPP. trans. 1, 2-DichloroethaneI.D. ChloubeneW.V. IsopropyhanzeneOCO. 1, 3, 5-TrichlorobenzenePPP. trans. 1, 2-DichloroethaneI.D. ChloubenzaneW.V. IsopropyhanzeneOCO. 1, 3, 5-TrichlorobenzenePPP. trans. 1, 2-DichloroethaneI.D. ChloubenzaneW.V. IsopropyhanzeneDCO. 1, 3, 5-TrichlorobenzenePPP. trans. 1, 2-DichloroethaneI.D. ChloubenzaneW.V. IsopropyhanzeneDCO. 1, 3, 2-TrichlorobenzenePPP. trans. 1, 2-TrichlorobenzeneI.D. ChloubenzaneW.V. Istrans. NW. EthanoDCO. 1, 3, 2-TrichlorobenzenePPP. trans. 1, 2, 2-TrichlorobenzeneI.D. ChloubenzaneW.V. Istra.DCO. 1, 3, 2-TrichlorobenzenePPP. trans. 1, 2, 2-TrichlorobenzeneI.D. ChloubenzaneW.V. Istra.DCO. 1, 3, 2-TrichlorobenzenePPP. trans. 1, 1, 1, 2-TrichlorobenzeneI.D. ChloubenzeneZZ. 2-ChloubenzeneW.V. Istra.PPP	B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
X. Bromoform R.R. Dibromonethane LL. Hexachlorobutadiene Y. 4.Methyl-2-pentanone Ss. 1.3-Dichloropropane MMM. Naphthatene Z. 2-Hexianone Ss. 1.3-Dichloropropane MMM. Naphthatene Z. 2-Hexianone UV. 1.1.2-Tictrachloroethane MNN. 1.2, 3-Trichlorobenzane B. 1.1.2.2-Tetrachloroethane UV. 1.1.2-Tictrachloroethane MNN. 1.2, 3-Trichlorobenzane B. 1.1.2.2-Tetrachloroethane UV. 1.1.2-Tictrachloroethane MNN. 1.2, 3-Trichlorobenzane B. 1.1.2.2-Tetrachloroethane WN. Bromobenzane MNN. 1.2, 3-Trichlorobenzane B. 1.1.2.2-Tetrachloroethane WN. Bromobenzane MNN. 1.2, 2-Dichloroethane I. DD. Chlorobenzane WN. Bromobenzane MNN. 1.2, 2-Dichloroethane I. DD. Chlorobenzane WN. Bromobenzane MNN. Ethene I. DD. Chlorobenzane WN. Etheno MNN. Ethene I. DD. Chlorobenzane WN. Etheno MNN. Etheno I. D. Chlorobenzane WN. Etheno MNN. Etheno I. U. 1.2.4-Trimetrybenzane WNN. Etheno MNN. Etheno I. U. U. 1.2.Dichorobenzane WNN. Eth	C. Vinyl choride	W. trans-1,3-Dichloropropene		KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
Y.4-Metryl-2-pentanone SS.13-Dichoropogane MMM. Naphthalene Z.2-Hexanone TT. 1.2-Dibromeethane NNN. 1.2.3-Trichorobenzene M.A. Tetrachoroethane UU. 1.1.1.2-Tetrachoroethane NNN. 1.2.3-Trichorobenzene B.B. 1.1.2.2-Tetrachoroethane UU. 1.1.1.2-Tetrachoroethane OOO. 1.3,5-Trichorobenzene B.B. 1.1.2.2-Tetrachoroethane UV. Isopropylbenzene OOO. 1.3,5-Trichorobenzene D.D. Chlorobenzene WW. Biomobenzene OOO. 1.3,5-Trichorobenzene I. DD. Chlorobenzene ZZ-2-Chlorobelnzene WW. Biomobenzene <td>D. Chloroethane</td> <td>X. Bromoform</td> <td>RR. Dibromomethane</td> <td>LLL. Hexachlorobutadiene</td> <td>FFFF. Acrolein</td>	D. Chloroethane	X. Bromoform	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
Z 2-Hexiatone TT. 1.2-Dibromoethane NIN. 1.2,3-Trichlorobenzene A Tetrachloroethene UU 1,1,1,2-Tetrachloroethane OOO. 1,3,5-Trichlorobenzene B 1,1,2,2-Tetrachloroethane UU 1,1,1,2-Tetrachloroethane OOO. 1,3,5-Trichlorobenzene B 1,1,2,2-Tetrachloroethane WW. Biomobenzene OOO. 1,3,5-Trichlorobenzene B 1,1,2,2-Tetrachloroethane WW. Biomobenzene OOO. 1,3,5-Trichlorobenzene B D, Chlorobenzene WW. Biomobenzene COO. 1,3,5-Trichlorobenzene B D, Chlorobenzene WW. Biomobenzene RRR. m,p-Vylense B D, Chlorobenzene WY. Browne RRR. m,p-Vylense B D, Chlorobenzene WY. BRR. m, P-Vylenes UU 1, 1, 2-Dichloroethane H L, Vinyl acetal AA. 1, 3, 5-Trimethybenzene UUU 1, 1, 2-Dichloroethane H L, Vinyl acetale BB 4, Chlorobune WW. Ethanol H L, Vinyl acetale BB 4, Chlorobune WW. Ethanol J J. Dichloroffulture WW. Ethanol WW. Ethanol J J. Dichloroffulture MW. Ethanol WW. Ethanol J J. Dichloroffulture WW. Ethanol WW. Ethanol J J. Dichlorooffulture WW. Ethanol	E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
AA. Tetrachloroethene UU. 1,1,2-Tetrachloroethane OOO. 1,3,5-Trichlorobenzene BB. 1,1,2,2-Tetrachloroethane VV. isopropybenzene PPP. trans.1,2-Dichloroethene ID DD. Chlorobenzene VV. isopropybenzene RR. m,p-Xylenes II DD. Chlorobenzene VV. isopropybenzene QQ. cis-1,2-Dichloroethene II DD. Chlorobenzene VV. isopropybenzene QQ. cis-1,2-Dichloroethene II DD. Chlorobenzene XV. 1,2,3-Trichloroptane RR. m,p-Xylenes II DD. Chlorobenzene XV. 1,2,3-Trichloroptane RR. m,p-Xylenes II DD. Chlorobenzene XV. 1,2,3-Trichloroptane RR. m,p-Xylenes II DD. Chlorobenzene XY. 1,2,2-Trithethylenzene UUU. 1,2-Dichloroethane II. Activate BBB. 4-Chlorotoluene UUU. 1,2-Dichloroethane UUU. 1,2-Dichloroethane II. J. Chloroethylvil ether DD. 1,2,4-Trithethylbenzene UUU. 1,2-Dichloroethane UUU. 1,2-Dichloroethane II. J. Dichloroethane BBB. 4-Chloroethuene UUU. 1,2-Dichloroethane UUU. 1,2-Dichloroethane II. J. Dichloroethane DD. 1,2,4-Trithethylbenzene UUU. 1,2-Dichloroethane UU	F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
BB. 1.1.2.2-Tetrachloroethane W. Isopropylbenzene PPF. trans-1.2-Dichloroethene IC CC. Toluene WW. Bromobenzene QQQ. cis-1.2-Dichloroethene IC DD. Chlorobenzene XX. 1.2,3-Trichloroppane RRR. mp-Xylenes IC DD. Chlorobenzene XX. 1.2,3-Trichloroppane RRR. mp-Xylenes IC DD. Chlorobenzene XX. 1.2,3-Trichloroppane RRR. mp-Xylenes IE Ef. Hylbenzene WY. n-Propylbenzene SSS. o-Xylenes IC ZZ. 2-Chlorotuluene UUU. 1,2-Dichloro-1,2-trifluoroethane IN. Vinyl acetate BBB. 4-Chlorotuluene UUU. 1,2-Dichloro-1,2-trifluoroethane II. 2-Chlorotultylether DU. 1,2-Chlorotultene WWW. Ethanol II. 2-Chlorotultylether BBB. 4-Chlorotultene WWW. Ethanol II. 2-Chlorotultane DD. 1,2,4-Trimethylbenzene WWW. Ethanol II. 2-Chlorotultane DD. 1,2,4-Trimethylbenzene WWW. Ethanol MM. 1,2-Dibronorethane EEE. sec-Butylbenzene WWW. Ethanol MM. 1,2-Dibronorethane EEE. sec-Butylbenzene WWW. Ethanol MM. 1,2-Dibronorestene GG. p-Isopropylotuene ZZZ terf	G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
Image: C. Toluene WW. Bronobenzene QQQ. cis-1,2-Dichloroethene Image: D. Chlorobenzene XX. 1,2,3-Trichloropropane RRR. m,p-Xylenes Image: D. Chlorobenzene XX. 1,2,3-Trichloropropane RRR. m,p-Xylenes Image: E. Ethylbenzene YY. n-Propylbenzene SSs. o-xylene Image: F. Styrene ZZ. 2-Chlorobluene ITT. 1,1,2-Trichloro-1,2,2-triftuoroethane Image: F. Styrene ZZ. 2-Chlorobluene UUU. 1,2-Dichlorotettatluoroethane Image: F. Styrene ZZ. 2-Chlorobluene UUU. 1,2-Dichlorotettatluoroethane Image: F. Styrene ZZ. 2-Chlorobluene UUU. 1,2-Dichlorotettatluoroethane Image: F. Styrene DD. 1,2,4-Trimethylbenzene WW. Ethanol Image: F. Styrene DD. 1,2,4-Trimethylbenzene WW. Ethanol Image: F. Stylorobenzene DD. 1,2,4-Trimethylbenzene XY. Di-Isopropyl ether Image: F. Stylorobenzene EE. Sec-Butylbenzene XY. Fet-Butyl ether Image: F. Stylorobenzene EF. 1,3-Dichlorobenzene ZZZ. tert-Butyl ether Image: F. T. 2-Dibromo-3-chloropropane EF. 1,3-Dichlorobenzene ZZZ. tert-Butyl ether Image: F. Hithyl ethore MM. Hithyl Methone MAA	H. 1,1-Dichloroethene	BB. 1,1,2,2-Tetrachloroethane	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
II DD. Chlorobenzene XX. 1, 2,3-Trichloropropane RRR. m,p-Xylenes EE. Ethylbenzene YY. n-Propylbenzene SSS. o-Xylene SSS. o-Xylene EF. Ethylbenzene XY. n-Propylbenzene NY. n-Propylbenzene SSS. o-Xylene RF. Styrene Z.Z. 2-Chlorobluene UUU 1, 2-Trichloro-1, 2, 2-triftuoroethane GG. Xylenes, total AAA. 1, 3, 5-Trimethylbenzene UUU 1, 2-Dichloroethane HH. Vinyl acetate BBB. 4-Chlorotoluene WW. 4-Ethyltoluene II. 2-Chloroethylwinyl ether CCC. tert-Bulylbenzene WWW. Ethanol JJ. Dichlorodifluoromethane DDD. 1, 2, 4-Trimethylbenzene WWW. Ethanol M. Trichlorofutuoromethane EEE. sec-Bulylbenzene XYY. tert-Butal M. 1, 2-Dibrono-3-chloropropane GG. p-Isopropyltoluene ZZZ. tert-Butyl achoni M. 1, 2-Dibrono-3-chloropropane GG. p-Isopropyltoluene AAA. Ethyl tert-butyl ether N. Methyl ethyl ethole GG. p-Isopropyltoluene AAA. Ethyl tert-butyl ether	I. 1,1-Dichloroethane	CC. Toluene	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
Ef. EthylbenzeneYY. n-PropylbenzeneSSS. o-XyleneF. StyreneZ.Z. 2-ChlorotolueneTTT. 1,1,2-Trichloro-1,2,2-triftuoroethaneG.G. Xylenes, totalAAA. 1,3,5-TrimethylbenzeneUUU. 1,2-DichlorotetrafluoroethaneHH. Vinyl acetateBBB. 4-ChlorotolueneUUU. 1,2-DichlorotetrafluoroethaneHH. Vinyl acetateBBB. 4-ChlorotolueneWW. 4-EthyltolueneJ. DichlorodifluoromethaneBBB. 4-ChlorotolueneWW. 5thanolJ. DichlorodifluoromethaneBDD. 1,2,4-TrimethylbenzeneWWW. EthanolJ. DichlorodifluoromethaneEEE. sec-ButylbenzeneYYY. tert-ButyloueneM. 1,2-Dibromo-3-chloropropaneGG. p-IsopropyltolueneZZZ. tert-Butyl atooholNN. Methyl ethyl etholeGG. p-IsopropyltolueneAAA. Ethyl tert-butyl etherNN. Methyl ethyl etholeHH. 1,4-DichlorobenzeneBBBB. tert-Amyl methyl ether	J. 1,2-Dichloroethene, total	DD. Chlorobenzene	XX. 1,2,3-Trichloropropane	RRR. m.p-Xylenes	LLLL. Ethyl ether
FF. StyreneZZ. 2-ChlorotolueneTTT. 1, 1, 2-Trichloro-1, 2, 2-triftuoroethaneGG. Xylenes, totalAAA. 1, 3, 5-TrimethylbenzeneUUU. 1, 2-DichlorotetrafluoroethaneHH. Vinyl acetateBBB. 4-ChlorotolueneWW. 4-EthyltolueneII. 2-Chloroethylvinyl etherCCC. tert-ButylbenzeneWWW. EthanolJJ. DichlorodifluoromethaneDDD. 1, 2, 4-TrimethylbenzeneWWW. EthanolKK. TrichloroftuoromethaneDDD. 1, 2, 4-TrimethylbenzeneWYY. EthanolM. 1, 2-DichloroptioneEEE. sec-ButylbenzeneWYY. EthanolMM. 1, 2-Dibromo-3-chloropropaneGG. p-IsopropyltolueneZZZ. tert-Butyl alcoholNN. Methyl ethorMN. 1, 4-DichlorobenzeneMAA. Ethyl tert-butyl etherNN. Methyl ethoreHHI. 1, 4-DichlorobenzeneMAA. Ethyl tert-butyl ether	K. Chloroform		YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
GG. Xylenes, total AAA. 1,3,5-Trimethylbenzene UUU. 1,2-Dichlorotetrafluoroethane HH. Vinyl acetate BBB. 4-Chlorotoluene WW. 4-Ethyltoluene II. 2-Chloroethylvinyl ether CCC. tert-Butylbenzene WWW. Ethanol JJ. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene WWW. Ethanol KK. Trichlorofluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-isopropyl ether MM. 1,2-Dibrono-sthoromethane EEE. sec-Butylbenzene YYY. tert-Butanol MM. 1,2-Dibrono-3-chloropropane GGG. p-Isopropyltoluene ZZZ. tert-Butyl alcohol NN. Methyl ethyl ketone HHH. 1,4-Dichlorobenzene BBBB. tert-Am/ methyl ether	L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-triftuoroethane	NNNN.
HH. Vinyl acetate BBB. 4-Chlorotoluene WW. 4-Ethyltoluene II. 2-Chloroethylvinyl ether CCC. tert-Butylbenzene WWW. Ethanol JJ. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene WWW. Ethanol KK. Trichlorofluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-isopropyl ether MM. 1,2-Dibrono-sthloropropane EEE. sec-Butylbenzene XYY. tert-Butyl alcohol MM. 1,2-Dibrono-3-chloropropane GGG. p-Isopropyltoluene AAA. Ethyl tert-butyl ether NN. Methyl ketone HHH. 1,4-Dichlorobenzene BBBB. tert-Amyl methyl ether	M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.
II. 2-Chloroethylvinyl ether CCC. tert-Butylbenzene WWW. Ethanol JJ. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-isopropyl ether KK. Trichlorofluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-isopropyl ether MM. 1,2-Dibrono-sthorophane EEE. sec-Butylbenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibrono-3-chloropropane GGG. p-Isopropyltoluene AAAA. Ethyl tert-butyl ether NN. Methyl ethyl ketone HHH. 1,4-Dichlorobenzene BBBB. tert-AmM methyl ether	N. 1,1,1-Trichloroethane	HH. Vinyl acetate		VVV. 4-Ethyltoluene	. dddd
JJ. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-isopropyl ether KK. Trichlorofluoromethane EEE. sec-Butylbenzene YYY. tert-Butanol LL. Methyl-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropropane GGG. p-Isopropyltoluene AAAA. Ethyl tert-butyl ether NN. Methyl ethyl ketone HHH. 1,4-Dichlorobenzene BBBB. tert-Amyl methyl ether	O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	aaa.
KK. Trichlorofluoromethane EEE. sec-Butylbenzene YYY. tert-Butanol LL. Methyl-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropropane GGG. p-Isopropyltoluene AAAA. Ethyl tert-butyl ether NN. Methyl ethyl ketone HHH. 1,4-Dichlorobenzene BBBB. tert-Amvl methyl ether	P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRR.
b LL. Methyl-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropropane GGG. p-Isopropyltoluene AAAA. Ethyl tert-butyl ether NN. Methyl ethyl ketone HHH. 1,4-Dichlorobenzene BBBB. tert-Amvl methyl ether	Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane		YYY. tert-Butanol	SSSS.
MM. 1,2-Dibromo-3-chloropropane GGG. p-Isopropyltoluene AAAA. Ethyl tert-butyl ether NN. Methyl ethyl ketone HHH. 1,4-Dichlorobenzene BBBB. tert-Amyl methyl ether	R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTT.
NN. Methyl ethyl ketone HHH. 1,4-Dichlorobenzene BBBB. tert-Amyl methyl ether	S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane		AAAA. Ethyl tert-butyl ether	ບບບບ.
	T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	VVVV.

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Method: Volatiles (EPA Method 524.2)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	г	1 1	1 1	
All technical holding times were met.	\square			
Cooler temperature criteria was met.				
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?		crement of delivers	NATURAL STR	
III. Initial calibration	1		1 1	
Did the laboratory perform a 5 point calibration prior to sample analysis?	/			
Were all percent relative standard deviations (%RSD) < 20%?		ana na an a ban n	-	
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	/			
Were all percent differences (%D) < 30%?				
V. Blanks				
Was a method blank associated with every sample in this SDG?	/			
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	/			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.			- Millez Institu	
VI: Surrogate spikes				
Were all surrogate %R within QC limits?	/			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?				
VII. Matrix spike/Matrix spike duplicates				
Was a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for this SDG?	_			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	~			
VIII. Laboratory control samples	<u>~</u>			
Was an LCS analyzed for this SDG?	-			
Was an LCS analyzed per analytical batch?	/		 	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	/			

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VALIDATION FINDINGS CHECKLIST

Page:_	of
Reviewer:	= #T
nd Reviewer	~

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Validation Area	Yes	No	NA	Findings/Comments
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?	 		/	
Were the performance evaluation (PE) samples within the acceptance limits?				-
X. Internal standards				
Were internal standard area counts within +/-40% from the associated calibration standard?	/	-		
Were retention times within - 30% of the last continuing calibration or +/- 50% of the initial calibration?	/			
XI. Target compound identification		f		
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	\wedge		/	F
Did compound spectra meet specified EPA "Functional Guidelines" criteria?		[
Were chromatogram peaks verified and accounted for?				
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/	r		
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 25 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	/	r		
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?	/	-		
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?	/			
XIV. System performance				
System performance was found to be acceptable.			•	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/	-		
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.	/	-		
Target compounds were detected in the field duplicates.	/	-		
XVII. Field blanks				
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.				

(& # 282 34)

VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

Page: <u>/</u>of_ Reviewer: FT 2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8269) 534.2

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

<u>Ý N N/A</u>

Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ? Were all %D and RRFs within the validation criteria of <255%D and SBF-0

z ≻	A/A	Were all %u and rrrs	WITHIN THE VAIIDATION CITL				
+	Date	Sondard ID Compound (Limit: 525:0%) (Limit: 20.	Compound	<u>50</u> Finding %D っし (Limit: <u>225</u> .0%)	Finding RRF (Limit: <u>></u> 0.05)	Associated Samples	Qualifications`
	21/1/6	1211334-000/	×	316 245		AN BVIOUS	3, J/4J/P
			В	62.0		54-11	-
		trans-1,4-D,	trans-1,4-Dichlore-2-bulene	31-6			/
			Methyl Icalide	45.3		Ŷ	V
	1/17/6	1211334-0012	×	56.9	1121	211344062 6-012	
			ø	51.0			
			F	39.6			
			MM	47.8			
			9 <i>6</i>	65.5			
			~	37.0			
			MM	39.0			
L			N	35.8			
			FFFF	47.9			
		Trams - 1, 4 - 0)	Trans-1,4-0; chlero-2-bulen	63.8			
		Per	Perfactions chane	93.6			
	8/31/12	12/1277-702	Acrolein	51.6		A1/	d/cn/f
	, , ,						

LDC #:_ SDG #: <u>pre</u> ous

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	
Reviewer:	<u>P</u>
2nd reviewer:	_1
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METHOD: GC/MS VOA (EPA Method 524.2)

YN N/A YN N/A

Were field duplicate pairs identified in this SDG? Were target compounds detected in the field duplicate pairs?

	Concentration	(ug/L)	
Compound	9	ק	RPD
K	0.41	0.40	2

		Concentration	()	
Compound	·	· .		RPD
	•			
			· · ·	
	· · ·			· · · · · · · · · · · · · · · · · · ·

		Concentration	r ()	
	Compound			RPD
<u> </u>				
•				

LDC #: 28 5 34 B #995

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

∕ of K) Reviewer. 2nd Reviewer: Page:

METHOD: GC/MS VOA (EPA Method 524.2)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the follor calculations:

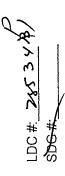
RRF = (A_)(C_s)/(A_s)(C_) average RRF = sum of the RRFs/number of standards %RSD = 100 * (S/X)

A_x = Area of compound, C_x = Concentration of compound, S = Standard deviation of the RRFs X = Mean of the RRFs

 A_{s} = Area of associated internal standard C_{s} = Concentration of internal standard

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	RRE/32	RRF/32 (25 ktd)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
-	1041	21/16/8	いいは、 Methytene Chloride (1st Internal Standard)	0.87653 1	59830	08272395	U. 8272	8.761454	8.76
	M5 YS	-	Trichloroethene (2nd Internal Standard)	6.303321	0.3033	0.3259183	0.3×9	81912.11	26.11
			chloro kun 3 eve- Ammenum (3rd Internal Standard)	2.106157	3.1062	665616.5	3.319	E:SXa8-11	18-11
5			A-IIよI Chloriolと (3ェ) Mothylone Chloride (1st Internal Standard)	1. 306942	1.3069	1. 331689	1-337	8-9 6-2844	76-8
			Nu Hry / No Facry / a に (30) Frichhordethene (2nd Internal Standard)	ax6076.6	0.0934	9.8163 X102	0.0982	10.82082	18.01
			F-14	198856 1.0	6.19533	2888391.0	68361.0	6 lot at.y	14.41
e			Methylene Chloride (1st Internal Standard)						
			Trichloroethene (2nd Internal Standard)						
			Bromoform (3rd Internal Standard)						
4			Chloride						
			Trichloroethene (2nd Internal Standard)						
			Bromoform (3rd Internal Standard)						

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



Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: ____oi 2nd Reviewer: Reviewer:

METHOD: GC/MS VOA (EPA Method 524.2)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compou identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF RRF = $(A_x)(C_x)/(A_y)(C_x)$

Where: ave. RRF = initial calibration average RRF RRF = continuing calibration RRF $A_x = Area of C_x = Area of C_x = Concentration of compound, <math>C_{is} = Concent$

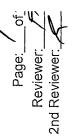
 $A_{\rm is}$ = Area of associated internal standard $C_{\rm is}$ = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	Δ%	%D
-	1211334-cev 9/01/12	21/10/6	Wethytene Chloride (1st Internal Standard)	0.8272395	C 00/L 1L 0	6.7171007	(3.3	13.3
			Trichloroethene (2nd Internal Standard)	6.3259183	0.2948632	0.2948632	9.5	٩٠٢
			Chloro traje~ (3rd Internal Standard)	3.719529	3.030293	3.030193	8.7	8.7
5			A c. H	1. 331689	1.210646	1.210646	۹.)	٩.
'			Methy w tacy atu Trichlorogthene (2nd Internal Standard)	9.8116×10-2	2. 3987 XIO	4-3987×10-2	14.4	14 -4
			t-1,4-diculoro-2-butere	0. M58235	1 22924 1.0	12621-0	3) · [E	31.6
ю			Methylene Chloride (1st Internal Standard)					
			Trichloroethene (2nd Internal Standard)					
			Bromoform (3rd Internal Standard)					
4			Methylene Chloride (1st Internal Standard)					
			Trichloroethene (2nd Internal Standard)					
			Bromoform (3rd Internal Standard)					

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

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VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified be using the following calculation:

% Recovery = 100 * (SSC - SC)/SA

Where:

RPD = I MSC - MSDC | * 2/(MSC + MSDC)

: SSC = Spiked sample concentration SA = Spike added MSC = Matrix spike percent recovery

SC = Sample concentration

MSDC = Matrix spike duplicate percent recovery

MW-19-3 MS/HSD THE STATE MS/MSD sample:

	Sp	ike	Sample	Spiked Sample	ample	Matrix Spike	Spike	Matrix Spike Duplicate	e Duplicate	SW .	MS/MSD
	Ad	Addpd	Concentration	Concentration	tration						
Compound	en)	<u>(</u>)	(14)	(m/r)	<u>٦</u>	Percent Recovery	ecovery	Percent Recovery	tecovery		RPD
	WS	MSD		WS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculati
1,1-Dichloroethene	25	x	() M	24.290	24.290 22410	97.2 97.2	9.7.6	90.4	90.4	1.1)	li-i
Trichloroethene		_	_	23.750	23.150 23.370 75.0 95.0	95.0	95.0	93.5	معلال	1.61	1.61
Benzene				21.800	21.8 2-28 ON 12 ON.12	2-28	2-1.8	2:98	86.2	02.1	1.20
Toluene				22.400	22.460 22.250 89.8 89.8	8-3-X	8-63	0.6%	89.0	9.739 0.739	0.739
Chlorobenzene				22.380	22.380 23.120 89.5 895	وعادر	۶÷۶	عدر	72.69	3.23	3.2

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10. of the recalculated results.

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DC #: 45 > 17 >/	JG#:

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalcult for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA VVhere: SSC = Spiked sample concentration SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS ID: BVI COOP LOS

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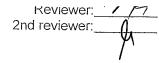
	S	pike	Spiked Sample	sample	J	cs	I CSD	SD.	I CS/I CSD	SD
Compound	۹ א א	Added (wy / L)	Concent (ug	tration し)	Percent Recovery	Recovery	Percent Recovery	tecovery	RPD	
		1 CSD		LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculate
1,1-Dichloroethene	ل.كد	ΨÅ	ol e.hc	₽.A	97 ·)	1-tb				
Trichloroethene		-	23.600	-	٩٩٠٩	94.4				
Benzene			21.540		86.2	86.2				
Toluene	-		060.12		ج، 8%	88.3				
Chlorobenzene		;	040.22		\$%.3	6.38	44			
				•						
Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of	ry Control S	ample finding	s worksheet for	r list of qualif	ications and a	issociated se	mples when re	sported result	s do not agree with	in 10.0% of

recalculated results.

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Surroyate Results vernication

METHOD: GC/MS VOA (EPA Method 524.2)



The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample	ID:	#7

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
: 			Reported	Recalculated	
Toluene-d8	10	10.020	100	100	0
Bromofluorobenzene	10	9.42	94.2	94.2	U
1,2-Dichlorobenzene-d4	10	10.140	10.140	101	D
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4				1	
Dibromofluoromethane		· · · · · · · · · · · · · · · · · · ·			

Sample ID:_____

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

Sample ID:_____

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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METHOD: GC/MS VOA (EPA Method 524.2)

		results for I using the following equation:	reported with a positive detect were recalculated
Conce	entratio	$n = \frac{(A_*)(I_*)(DF)}{(A_{ts})(RRF)(V_*)(\%S)}$	Example:
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D;:
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	
۱ _s	=	Amount of internal standard added in nanograms (ng)	Conc. = $() () () () ()$
RRF	=	Relative response factor of the calibration standard.	
V _o	=	Volume or weight of sample purged in milliliters (ml) or grams (g).	= hM
Df	=	Dilution factor.	
%S	=	Percent solids, applicable to soils and solid matrices only.	

#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Acceptable (Y/N)
·					
				······································	
					
				······································	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
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Collection Date: August 30, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Chromium

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216407

Sample Identification

MW-22-3 MW-22-2 MW-26-2 MW-26-2 MW-25-5** MW-25-4 MW-25-3 DUPE-2-3Q12 MW-25-2 MW-25-2 MW-25-1 MW-22-2MS MW-22-2MSD MW-22-2DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 14 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No metal contaminants were found in the initial, continuing and preparation blanks.

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required by the method.

VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples MW-25-3 and DUPE-2-3Q12 were identified as field duplicates. No chromium was detected in any of the samples with the following exceptions:

	Concent		
Analyte	MW-25-3	DUPE-2-3Q12	RPD
Chromium	3.2	3.2	0

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Metals - Data Qualification Summary - SDG 1216407

No Sample Data Qualified in this SDG

NASA JPL Metals - Laboratory Blank Data Qualification Summary - SDG 1216407

No Sample Data Qualified in this SDG

VALIDATION	COMPL	FTENESS	WORKS	SHEET

Level III/IV

Date: 10-17-12 Page: | of | Reviewer: M 2nd Reviewer:

Chronium METHOD: Metais (EPA Method 200.8) MA.

LDC #: 28534D4

SDG #: 1216407

Laboratory: BC Laboratories, Inc.

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 8-30-12 A Sampling dates: Technical holding times L A 11. ICP/MS Tune A 111. Calibration A IV. Blanks not required N ICP Interference Check Sample (ICS) Analysis V. A MS/MSD VI. Matrix Spike Analysis A DUP Duplicate Sample Analysis VII. A LCS VIII. Laboratory Control Samples (LCS) not reviewed for A level 111 IX. Internal Standard (ICP-MS) utilized not N Х. Furnace Atomic Absorption QC N NOT performed XI. **ICP Serial Dilution** A Sample Result Verification Not reviewed for Level III validation. XII. A XIII. Overall Assessment of Data SW D= 8+9 XIV. **Field Duplicates** Field Blanks N XV

Note:

A = Acceptable N = Not provided/applicable

SW = See worksheet

ND = No compounds detected R = Rinsate

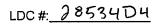
FB = Field blank

Validated Samples:** Indicates sample underwent Level IV validation all Water

	an					
1 l	MW-22-3	11	MW-25-1	21	31	
2	MW-22-2	12	MW-22-2MS	22	32	
3	MW-22-1	13	MW-22-2MSD	23	33	
4	MW-26-2	14	MW-22-2DUP	24	34	
5	MW-26-1	15		25	35	
6	MW-25-5**	16		26	36	
7	MW-25-4	17		27	37	
8	MW-25-3	18		28	38	
9	DUPE-2-3Q12	19		291 PBW1	39	
10	MW-25-2	20		307 PBW2	40	

Notes:

D = Duplicate TB = Trip blank EB = Equipment blank



No.

Method: Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	1			
Cooler temperature criteria was met.	1			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	\checkmark			
Were %RSD of isotopes in the tuning solution	\checkmark			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	\checkmark			
Were the proper number of standards used?	\checkmark			
Were all initial and continuing calibration verification %Rs within the 90-110% (80- 120% for mercury) QC limits?	1			
Were all initial calibration correlation coefficients > 0.995?	1			
IV. 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.		/		
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?		<i>✓</i>		
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
VI. Matrix spike/Matrix spike 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.	\checkmark			
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) $\leq 20\%$ for waters and $\leq 35\%$ for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were $\leq 5X$ the RL, including when only one of the duplicate sample values were $\leq 5X$ the RL.	⁄			
VII. Laboratory control samples				
Was an LCS anayized for this SDG?	\checkmark			
Was an LCS analyzed per extraction batch?	\checkmark			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?				

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LDC #: 28534 D4

VALIDATION FINDINGS CHECKLIST

Page:	2 of 2
Reviewer	MG
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Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			\checkmark	
Do all applicable analysies have duplicate injections? (Level IV only)			~	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			/	
Were analytical spike recoveries within the 85-115% QC limits?			~	
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		\checkmark		
Were all percent differences (%Ds) < 10%?			\checkmark	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			1	
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)			r	
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	1			
If the %Rs were outside the criteria, was a reanalysis performed?			/	
XI. Regional Quality Assurance and Quality Control			.	
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?		١		
XII. Sample Result Verification	·			
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	\checkmark			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	\checkmark			
Target analytes were detected in the field duplicates.	/			
XV. Field blanks				· · · · · · · · · · · · · · · · · · ·
Field blanks were identified in this SDG.			1	
Target analytes were detected in the field blanks.				

LDC#: 28534D4

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: <u>l</u> of <u>l</u> Reviewer: <u>MG</u> 2nd Reviewer: <u>V</u>

METHOD: Metals (EPA Method 6010B/7000)

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A Were field duplicate pairs identified in this SDG?
 A Were target analytes detected in the field duplicate pairs?

	Concentra	ition (ug/L)		
Analyte	8	9	RPD	
Chromium	3.2	3.2	0	

V:\FIELD DUPLICATES\FD_inorganic\28534D4.WPD

LDC # 08534D4

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: <u>1 of 1</u> Reviewer: <u>MG</u> 2nd Reviewer: <u>1</u>

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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

Where, Found = concentration (in ug/L) of each analyte $\underline{measured}$ in the analysis of the ICV or CCV solution True = concentration (in ug/L) of each analyte in the ICV or CCV source %R = Found x 100 True

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
1059 ICV	ICP/MS (Initial calibration)	Cr	51.282	50.00	103	103	\checkmark
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1987 CCV4	ICP/MS (Continuing calibration)	Cr	39.694	40.00	99. (99.1	
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

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.

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LDC # 28534 D4

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: 1 of 1 Reviewer: MG

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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

) Where, Found = Concentration of each analyte measured in the analysis of the sample. For the n	Pound = SSR (spiked sample result) - SR (sample result).	True = Concentration of each analyte in the source.
%R = Found x 100	True	

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

 RPD = [S-D]___ x 100
 Where, S = Original sample concentration

 (S+D)/2
 D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

 $%D = \frac{1-SDR}{1} \times 100$

Where, I = Initial Sample Result (mg/L) SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
1	ICP interference check	ι	١	1	ł	1	
L C S J	Laboratory control sample	Cr	43.863 (mg/r)	40.000 (mg/)	(10	011	Х
12 1	Matrix spike	Cr	(SSR-SR) 40.557 (mg/L) 40.000 (mg/L)	40.000 (mg/L)	101	101	
41 hEe1/18e1	Duplicate	Cr	1. 007 (mg/L)	1.007 (mg/r) 1.289 (mg/r) 24.6	34.6	34.6	
te	ICP serial dilution	١	~	1)	1)

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

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METH	IOD: Trac	e Metals (EPA	A SW 846	Metho	d 6010/60	20/70	00)					
	N/A N/A N/A	Are all detect	been repo ithin the ca ion limits b	rted ar alibrate elow t	nd calculated range of the CRDL'	ted co of the i ?	rrectly? nstrument			e identified as ear range of t		
Detect equati	ted analyt on:-	e results for _	level	(V	sample	. =	N.D.	₩	ere recalci	ulated and ver	ified usi	ng-the-following-
Concen	tration =	<u>(RD)(FV)(Dil)</u> (In. Vol.)				Reca	lculation:					
RD FV In. Vol. Dil	2 2 2	Raw data conce Final volume (m Initial volume (m Dilution factor	1)	G)								
#	Sa	mple ID			Analyte			Conc	ported entration タイレ)	Calculated Concentrati (Mg/L	on	Acceptable (Y/N)
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Note:____

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
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Collection Date: August 30, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216407

Sample Identification

MW-22-3 MW-22-2 MW-22-1 MW-26-2 MW-26-1 MW-25-5** MW-25-4 MW-25-3 DUPE-2-3Q12 MW-25-2 MW-25-1 **MW-22-3MS** MW-22-3MSD MW-22-3DUP MW-25-2MS MW-25-2MSD MW-25-2DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 17 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 314.0 for Perchlorate and EPA SW 846 Method 7196 for Hexavalent Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore gualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples MW-25-3 and DUPE-2-3Q12 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce	ntration	
Analyte	MW-25-3 DUPE-2-3Q12		RPD
Hexavalent chromium	0.0031 mg/L	0.0030 mg/L	3
Perchlorate	11 ug/L	11 ug/L	0

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1216407

No Sample Data Qualified in this SDG

NASA JPL

Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1216407

No Sample Data Qualified in this SDG

LDC #: <u>28534D6</u>	VALIDATION COMPLETENESS WORKSHEET	Date: 10-17-12
SDG #: <u>1216407</u>	Level III/IV	Page: 1_of_1_
Laboratory: BC Laboratories,	Inc	Reviewer: MG
-		2nd Reviewer:

METHOD: Perchlorate (EPA Method 314.0), Hexavalent Chromium (EPA SW846 Method 7196)

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
l.	Technical holding times	A	Sampling dates: 8-30-12
11	Initial calibration	A	
111.	Calibration verification	A	
١V	Blanks	A	
v	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	Not reviewed for Level III validation.
IX.	Overall assessment of data	A	
Х.	Field duplicates	SW	D= 8+9
	Field blanks	N	

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

Validated Samples:** Indicates sample underwent Level IV validation

	411 0476						
1	MW-22-3	11	MW-25-1	21		31	
2	MW-22-2	12	MW-22-3MS	22		32	
3	MW-22-1	13	MW-22-3MSD	23		33	
4	MW-26-2	14	MW-22-3DUP	24		34	
5	MW-26-1	15	MW-25-2MS	25		35	
6	MW-25-5**	16	MW-25-2MSD	26		36	
7	MW-25-4	17	MW-25-2DUP	27		37	
8	MW-25-3	18		28		38	
9	DUPE-2-3Q12	19		29	PBWI	39	
10	MW-25-2	20		30	PBW2	40	

Notes:

Method: Inorganics (EPA Method See cover

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	\checkmark			
Cooler temperature criteria was met.	\checkmark			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	/			
Were the proper number of standards used?	\checkmark			
Were all initial calibration correlation coefficients > 0.995?	/			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	\checkmark			
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) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CRDL(\leq 2X CRDL for soil) was used for samples that were \leq 5X the CRDL, including when only one of the duplicate sample values were \leq 5X the CRDL.	/			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	\checkmark			
Was an LCS analyzed per extraction batch?	\checkmark			
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?		\checkmark		
Were the performance evaluation (PE) samples within the acceptance limits?			/	

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: MG 2nd Reviewer: V

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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.	$\overline{}$			
Target analytes were detected in the field duplicates.	~			
X. Field blanks				
Field blanks were identified in this SDG.		\checkmark		
Target analytes were detected in the field blanks.			1	

LDC #: 28534D6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:	l_of l
Reviewer:	MG
2nd reviewer:	\sim

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All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
	W	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (CR^{6+}) (CIO_4)
QC 12-14		ph tds ci f NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC \mathbb{CR}^{69} \mathbb{CIO}
15-717	4	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (CR^{6}) ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO₄ PO₄ ALK CN ⁻ NH₃ TKN TOC CR ⁶⁺ CIO₄
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN ⁻ NH3 TKN TOC CR ⁶⁺ CIO4
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁵⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁵⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		_pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁵⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		PH TDS CLE NO, NO, SO, PO, ALK CN' NH, TKN TOC CR ⁶⁺ CIO,

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Comments:_

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LDC#<u>28534D6</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: <u>I</u> of <u>I</u> Reviewer: <u>MG</u> 2nd Reviewer: <u>V</u>

Inorganics: Method See Cover

	Concentra	ation (ug/L)		
Analyte	8	9	RPD	
Hexavalent Chromium (mg/L)	0.0031	0.0030	3	
Perchlorate	11	11	0	

V:\FIELD DUPLICATES\FD_inorganic\28534D6.WPD

LDC# 38534D6

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: 1 of 1 Reviewer: AG 2nd Reviewer: 1

METHOD: Inorganics, Method See CoVCV

6-99-12 was recalculated. Calibration date: The correlation coefficient (r) for the calibration of $\frac{Cv}{V}$ An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

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 %R = Found × 100 True

					Recalculated	Renorted	
			Conc	Arca			Acceptable
Type of Analysis	Analyte	Standard ID	Found (units)	True (units)	r or %R	r or %R	(ViN)
Initial calibration		Blank	0.000 (mg/L)	100.0			
		Standard 1	0.002 ()	0.003			
		Standard 2	0.005 ()	0.005		-	
		Standard 3	0.095 ()	0.022		r 2- 1 000070	
	Crvi	Standard 4	0.050 ()	640.0	29999992	0	~
		Standard 5	0.100 ()	630.0			
		Standard 6	1	•			
		Standard 7	1	1			
Calibration verification		2133		-			
	C104	CCV4	B. 784 (2/2)	8.784 (mg/L) 10.000 (mg/L)	81.8	87.8	
Calibration verification		Luco	0.04851				
	CrVI	CCV2	0.04913 (mg/L) 0.050 (mg/L)	0.050 (mg/L)	97.0	96.9	
Calibration verification			유씨				
	l	1)	l	l		

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recalculated results.

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

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VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: <u>lof l</u> Reviewer: <u>MG</u> 2nd Reviewer. <u>1</u>

METHOD: Inorganics, Method See cover

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

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. Found = Where, %R = Found x 100 True

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

Original sample concentration Duplicate sample concentration וו וו ס מ Where, RPD = <u>|S-D|</u> × 100 (S+D)/2

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	%R / RPD	%R / RPD	Acceptable (Y/N)
1000	Laboratory control sample						
1577		C~ ~1	0.04679 (mg/L) 0.050 (mg/L)	0.050 (mg/L)	93.6	93. L	\succ
6200	Matrix spike sample		(SSR-SR)				
4		0104	11.577 (mg/L)	11.577 (mg/L) 10.101 (mg/L)	<u>ار</u>	115	
lano/ 1000	Duplicate sample						
14		いこ	0.00177 (mg (2) 0.00183 (mg (2)	0.00183 (mg/L)	3.33	3.55	
Comments: Refer	Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.	or list of qualificat	ions and associated se	amples when reports	d results do not agree	∋ within 10.0% of the	recalculated result

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LDC #:2853	34D6 V		INGS WORKSHEE ation Verification	ET Page: 1 of 1 Reviewer: MG 2nd reviewer:
METHOD: Inorga	anics, Method <u>Sce</u>	Cover		
<u>() N N/A</u> H	lave results been rep	orted and calculated c alibrated range of the	orrectly?	tions are identified as "N/A".
Compound (anal	yte) results for <u>lev</u>	el IV sample	= N.D.	reported with a positive detect were

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recalculated and verified using the following equation:

Concentration =

Recalculation:

	Comple ID	Analyte	Reported Concentration ()	Calculated Concentration	Acceptable (Y/N)
#	Sample ID	Analyte	<u> </u>		,,
L					
		· · · · · · · · · · · · · · · · · · ·			
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Laboratory Data Consultants, Inc. Data Validation Report

- Project/Site Name: NASA JPL
- Collection Date: August 31, 2012
- LDC Report Date: October 22, 2012
- Matrix: Water
- Parameters: Volatiles
- Validation Level: EPA Level III
- Laboratory: BC Laboratories, Inc.
- Sample Delivery Group (SDG): 1216488

Sample Identification

TB-1 MW-11-4 MW-11-3 DUPE-3-3Q12 MW-11-2 MW-11-1 MW-11-4MS MW-11-4MSD

Introduction

This data review covers 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore gualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 30.0% with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/10/12	Bromomethane trans-1,4-Dichloro-2-Butene Methyl lodide Pentachloroethane	33 49.7 38.4 52.4	All samples in SDG 1216488	J (all detects) UJ (all non-detects)	Ρ

The percent differences (%D) of the second source calibration standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/8/12	Acrolein	50.3	All samples in SDG 1216488	J (all detects) UJ (all non-detects)	Р

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and RLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

Samples MW-11-3 and DUPE-3-3Q12 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentra		
Compound	MW-11-3	DUPE-3-3Q12	RPD
Styrene	0.15	0.17	13
Carbon disulfide	0.43	0.39	10

XVII. Field Blanks

Sample TB-1 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1216488

SDG	Sample	Compound	Flag	A or P	Reason
1216488	TB-1 MW-11-4 MW-11-3 DUPE-3-3Q12 MW-11-2 MW-11-1	Bromomethane trans-1,4-Dichloro-2-Butene Methyl Iodide Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1216488	TB-1 MW-11-4 MW-11-3 DUPE-3-3Q12 MW-11-2 MW-11-1	Acrolein	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1216488

No Sample Data Qualified in this SDG

NASA JPL Volatiles - Field Blank Data Qualification Summary - SDG 0000

No Sample Data Qualified in this SDG

		1-1.
LDC #: 28534E1	VALIDATION COMPLETENESS WORKSHEET	Date: 10/17/12
SDG #: <u>1216488</u>	Level III	Page: <u>/</u> of <u>/</u>
Laboratory: BC Laboratories,	Inc.	Reviewer: <u>F7</u>
		2nd Reviewer: <u>'</u>
METHOD: CC/MC Valatilaa /	DA Mathad 524 2)	/

METHOD: GC/MS Volatiles (EPA Method 524.2)

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
1.	Technical holding times	A	Sampling dates: 83112
١١.	GC/MS Instrument performance check	Д	
111.	Initial calibration	A	$\frac{\rho_{\rm SP}}{\rho_{\rm CV}} = \frac{1}{20}, r^2$
IV.	Continuing calibration/ICV	ربري	IN/CON = 30
V.	Blanks		
VI.	Surrogate spikes	4	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LUS
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	4	
XI.	Target compound identification	N	
XII.	Compound quantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	p = 3, 4
XVII.	Field blanks	ND	TB = 1

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

Validated Samples: water

	<u></u>						
1	TB-1		11	BVIOSUS	21	31	
2	MW-11-4		12		22	32	
3	MW-11-3	P	13		23	33	
4	DUPE-3-3Q12	P	14		24	34	
5	MW-11-2		15		25	35	
6	MW-11-1		16		26	36	
7	MW-11-4MS		17	·····	27	37	
8	MW-11-4MSD		18		28	38	
9			19		29	39	
10			20		30	40	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA Method 524.2)

A. Chloromethane	Q. 1,2-Dichloropropane	GG. Xylenes, total	WW. Bromobenzene	MMM. Naphthalene
B. Bromomethane	R. cia-1,3-Dichiloropropene	HH. Vinyl acetate	XX. 1,2,3-Trichloropropane	NNN. 1,2,3-Trichlorobenzene
C. Vinyl choride	S. Trichioroethene	II. 2-Chioroethyivinyi ether	YY. n-Propylbenzene	000. 1,3,5-Trichlerobenzene
D. Chloroethane	T. Dibromochloromethane	JJ. Dichlorodifluoromethane	ZZ. 2-Chlorotoluene	PPP. trans-1,2-Dichlorosthene
E. Methylene chloride	U. 1,1,2-Trichloroethane	KK. Trichiorofiuoromethane	AAA. 1,3,5-Trimethylbenzene	QQQ. cie-1,2-Dichloroethene
F. Acetone	V. Benzene	LL. MethyHtert-butyl ether	BBB. 4-Chiorotoluene	RRR. m.p-Xylenes
G. Carbon disulfide	W. trans-1,3-Dichloropropene	MM. 1,2-Dibrome-3-chioropropane	CCC. tert-Butylbenzene	SSS. o-Xylene
H. 1,1-Dichioroethene	X. Bromaform	NN. Diethyl ether	DDD. 1,2,4-Trimethylbenzene	777. 1,1,2-Trichloro-1,2,2-trifiuoroethane
I. 1,1-Dichloroethane	Y. 4-Methyl-2-pentanone	00. 2,2-Dichloropropane	EEE. sec-Butylbenzene	UUU. Benzyl chioride
J. 1,2-Dichiorcethene, total	Z. 2-Hexanone	PP. Bromochloromethane	FFF. 1,3-Dichlorobenzene	VVV. 4-Ethyltoluene
K. Chloraform	AA. Tetrachioroethene	QQ. 1,1-Dichloropropene	GGG. p-lsopropyltoluene	WWW. Ethanol
L. 1,2-Dichloroethane	BB. 1,1,2,2-Tetrachioroethane	RR. Dibromothane	HHH. 1, 4-Dichlorobenzene	xoo. Ethyl ether
M. 2-Butanone	CC. Toluene	SS. 1,3-Dichioropropane	lii. n-Butylbenzene	
N. 1,1,1-Trichioroethane	DD. Chlorobenzene	TT. 1,2-Dibromoethane	JJJ. 1,2-Dichlorobenzene	
O. Carbon tetrachloride	EE. Ethylbenzene	UU. 1,1,1,2-Tetrachioroethane	KKK. 1,2,4-Trichlorobenzene	
P. Bromodichloromethene	FF. Styrnene	VV. isopropylbenzene	LLL. Hexachiorobutadiene	

COMPNDL 1 S5

Notes:

LDC #. 24E

VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

/of / Reviewer:______2nd Reviewer:______ Page:

METHOD: GC/MS VOA (EPA Method 524.2) Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Vas a continuing calibration standard analyzed at least once every 12 hours for each instrument?

Qualifications	2/UJ/B			V			J/rn/r									
Associated Samples	A //	V		Ŋ			A1/									
Finding %D (Limit: <30.0%)		re 49.7		52-4			50,3									
Compound	B	1,4-Dichloro-2-Buffene	Muthy 1 Icolide	Pentachloroethand			Acrolein									
ate Standard ID	1211670-0cv/	Trams - 1, 4-1					1211678-JCNZ									
	~1/o1/b						21/8/6	/								
#																

LDC #: 285346/ SDG #: per cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	<u></u> of
Reviewer:	<u>F1</u>
2nd reviewer:	l.
	<u> </u>

METHOD: GC/MS VOA (EPA Method 524.2)

YN NA YN NA Were field duplicate pairs identified in this SDG? Were target compounds detected in the field duplicate pairs?

	Concentration	(ugl)	
Compound	3	<u> </u>	RPD
FF	0.15	0.17	13
6	0.43	0.39	10
	·	· · · · ·	

	Concentration	<u> </u>	
lı Compound			RPD
	·		
	· · · · · · · · · · · · · · · · · · ·		
	Concentration	()	
Compound			RPD
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

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	<u> </u>		

Laboratory Data Consultants, Inc. Data Validation Report

- Project/Site Name: NASA JPL
- Collection Date: August 31, 2012
- LDC Report Date: October 22, 2012
- Matrix: Water
- Parameters: Chromium
- Validation Level: EPA Level III
- Laboratory: BC Laboratories, Inc.
- Sample Delivery Group (SDG): 1216488

Sample Identification

MW-11-3 DUPE-3-3Q12 MW-11-2 MW-11-1 MW-11-3MS MW-11-3MSD MW-11-3DUP

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium was found in the initial, continuing and preparation blanks.

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required by the method.

VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

Raw data were not reviewed for this SDG.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples MW-11-3 and DUPE-3-3Q12 were identified as field duplicates. No chromium was detected in any of the samples.

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Chromium - Data Qualification Summary - SDG 1216488

No Sample Data Qualified in this SDG

NASA JPL

Chromium - Laboratory Blank Data Qualification Summary - SDG 1216488

No Sample Data Qualified in this SDG

LDC #: 28534E	VALIDATION COMPLETENESS WORKSHEET	Date: 10-17-12
SDG #: 12164	<u>B8</u> Level III	Page:_ <u>l_</u> of_ <u>l_</u>
Laboratory: BC L	aboratories, Inc.	Reviewer: MG
Chro	mium	2nd Reviewer:

Chromium METHOD: Metals (EPA Method 200.8) MK.

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
<u> </u>	Technical holding times	Ą	Sampling dates: 8 - 3 (- 1 2
11.	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	A	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	not reviewed
Х.	Furnace Atomic Absorption QC	N	not utilized
_ XI.	ICP Serial Dilution	2	not utilized Not performed
XII.	Sample Result Verification	N	•
<u></u>	Overall Assessment of Data	A	
XIV.	Field Duplicates	ND	D= (+2
XV	Field Blanks	2	

Note:

A = Acceptable N = Not provided/applicable SW = See worksheet

ND = No compounds detected R = Rinsate

FB = Field blank

Validated Samples:

	all Water					
1	MW-11-3	11		21	31	
2 3	DUPE-3-3Q12	12		22	 32	
3	MW-11-2	13		23	33	
4	MW-11-1	14		24	34	
5	MW-11-3MS	15		25	35	
6	MW-11-3MSD	16		26	 36	
7	MW-11-3DUP	17	<u>.</u>	27	37	
8		18		28	38	
9		19		29	39	
10		20	PBW	30	40	

D = Duplicate

TB = Trip blank

EB = Equipment blank

Notes:

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: N	NASA JPL
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Collection Date: August 31, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216488

Sample Identification

MW-11-4 MW-11-3 DUPE-3-3Q12 MW-11-2 MW-11-1 MW-11-3MSD MW-11-3MSD MW-11-3DUP MW-11-1MS MW-11-1MSD MW-11-1DUP

Introduction

This data review covers 11 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 300.0 for Chloride, Sulfate, and Nitrate as Nitrogen, EPA Method 353.2 for Nitrite as Nitrogen, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, and EPA Method 365.1 for Orthophosphate as Phosphorus.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Orthophosphate as phosphorus	0.0046060 mg/L	MW-11-1

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
MW-11-3MS/MSD (MW-11-3 DUPE-3-3Q12 MW-11-2 MW-11-1)	Hexavalent chromium	84.5 (85-115)	84.3 (85-115)	-	J (all detects) UJ (all non-detects)	А

VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Sample Result Verification

Raw data were not reviewed for this SDG.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples MW-11-3 and DUPE-3-3Q12 were identified as field duplicates. No contaminant concentrations were detected in any of the samples.

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1216488

SDG	Sample	Analyte	Flag	A or P	Reason
1216488	MW-11-3 DUPE-3-3Q12 MW-11-2 MW-11-1	Hexavalent chromium	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1216488

No Sample Data Qualified in this SDG

LDC #: V	ALIDATION C	OMPLETENESS WORKSHEET	Date: <u>/0-17-</u> 12
SDG #: <u>1216488</u>		Level III	Page: <u>_</u> _of_[
Laboratory: BC Laboratories, Inc.	_		Reviewer: MG
	9m.H.	Nitrite-N (EPA Method 353.2)	2nd Reviewer:

Nitrite-N (EPA Method 353.2) mg.

METHOD: Chloride, Sulfate, Nitrate-N, Nitrite-N, Orthophosphate-P(EPA Method 300.0), Perchlorate (EPA Method 314.0), Hexavalent Chromium (EPA SW846 Method 7196)

Orthophosphate - P (EPA Method 365.1)

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
Ι.	Technical holding times	A	Sampling dates: 8-31-12
11	Initial calibration	A	
Ш.	Calibration verification	A	
IV	Blanks	SW	
V	Matrix Spike/Matrix Spike Duplicates	SW	MS/MSD
VI.	Duplicates	A	קטק
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
Х.	Field duplicates	ND	$D = \partial + 3$
XI	Field blanks	N	

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

Validated Samples: all water

	All VIII		,				
1	MW-11-4	11 M	W-11-1DUP	21		31	
2	MW-11-3	12		22		32	
3	DUPE-3-3Q12	13		23		33	
4	MVV-11-2	14		24		34	
5	MW-11-1	15		25		35	
6	MW-11-3MS	16		26		36	
7	MW-11-3MSD	17		27		37	
8	MW-11-3DUP	18		28		38	
9	MW-11-1MS	19		29		39	
10	MW-11-1MSD	20		30	PBW	40	

Notes:

LDC #: 28534E6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: l of l Reviewer: MG 2nd reviewer: V 8.42.1

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All circled methods are applicable to each sample.

Matrix	Parameter
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ (CIO_4)
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶ CIO ₄
	pH TDS CI F (NO3 NO2 SO PO ALK CN NH3 TKN TOC CR ⁶⁹ CO
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (\mathbb{CR}^6) ClO ₄
	ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺ ClO ₄
•	
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	pH TDS CLE NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄

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Comments:___

METHODS.6

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LDC #: 28534E6

VALIDATION FINDINGS WORKSHEET Blanks

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METHOD:Inorganics, Method See Cover

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

<u>(V) N NA</u> Were blank analyses performed as required? If no, please see qualifications below.

Conc. units: mg/L	s: <u>mg/L</u>			Associated Samples: 5 (>5x)
Analyte	Blank ID	Blank ID Blank ID	Blank	
	ЪВ	ICB/CCB (mg/L)	Action Limit	No Qual
P04-P	PO4-P 0.0046060		0.023	

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:

All contaminants within five times the method blank concentration were qualified as not detected, "U".

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VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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METHOD: Inorganics, EPA Method See Cover

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

N N/A Was a matrix spike analyzed for each matrix in this SDG?

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Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken. Y (N) N/A

Were all duplicate sample relative percent differences (RPD) < 20% for water samples and <35% for soil samples? Q N N/A

LEVEL IV ONLY:

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations. <u>Υ Ν Ν/Α</u>

I									Γ
#	MS/MSD ID	Matrix	Analyte	MS Recovery	MSU %Recovery	RPD (I imits)	Associated Samples	Qualifications	
-	6/7	water	Cr 11	84.5 (85-115) 84.3 (85-115)	84.3 (85-115)		345	JUJ/A	
									1
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									Γ
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Laboratory Data Consultants, Inc. Data Validation Report

- Project/Site Name: NASA JPL
- Collection Date: September 4, 2012
- LDC Report Date: October 22, 2012
- Matrix: Water
- Parameters: Volatiles
- Validation Level: EPA Level III & IV
- Laboratory: BC Laboratories, Inc.
- Sample Delivery Group (SDG): 1216587

Sample Identification

TB-1 MW-23-3 MW-23-2 DUPE-4-3Q12 MW-23-1 MW-4-3 MW-4-2** MW-4-1

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/10/12	Bromomethane trans-1,4-Dichloro-2-Butene Methyl iodide Pentachloroethane	33 49.7 38.4 52.4	All samples in SDG 1216587	J (all detects) UJ (all non-detects)	Ρ

The percent differences (%D) of the second source calibration standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/8/12	Acrolein	50.3	All samples in SDG 1216587	J (all detects) UJ (all non-detects)	Р

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XII. Compound Quantitation and RLs

All compound quantitation and RLs were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

All tentatively identified compounds were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIV. System Performance

The system performance was acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

Samples MW-23-2 and DUPE-4-3Q12 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)	
Compound	MW-23-2	DUPE-4-3Q12	RPD
Chloroform	0.44	0.52	17
1,1-Dichloroethane	0.15	0.17	13
Tetrachloroethene	0.31	0.31	0
Trichloroethene	0.70	0.67	4

XVII. Field Blanks

Sample TB-1 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1216587

SDG	Sample	Compound	Flag	A or P	Reason
1216587	TB-1 MW-23-3 MW-23-2 DUPE-4-3Q12 MW-23-1 MW-4-3 MW-4-2** MW-4-2**	Bromomethane trans-1,4-Dichloro-2-Butene Methyl iodide Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1216587	TB-1 MW-23-3 MW-23-2 DUPE-4-3Q12 MW-23-1 MW-4-3 MW-4-2** MW-4-1	Acrolein	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1216587

No Sample Data Qualified in this SDG

LDC #:_	28534F1	VALIDATION COMPLETENESS WORKSHEET	Date: 10/17/12
SDG #:_	1216587	Level III/IV	Page: <u>/</u> of <u>/</u>
Laborato	ory: BC Laboratories,	Inc	Reviewer:
			2nd Reviewer:

METHOD: GC/MS Volatiles (EPA Method 524.2)

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
Ι.	Technical holding times	Δ	Sampling dates: 9/4/12
11.	GC/MS Instrument performance check	A	1.1.
III.	Initial calibration	A	% RSD = 20, 12
IV.	Continuing calibration/ICV	SA	$\frac{0}{10} RSP \leq 20, 12$ $\frac{1}{100} COV \leq 30$
V.	Blanks	Д	
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	\mathbf{A}	nw-11-4 ms 10
VIII.	Laboratory control samples	A	ics
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	A	
XI.	Target compound identification	A	Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	A	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	Σ	Not reviewed for Level III validation.
XIV.	System performance	A	Not reviewed for Level III validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	ىسى	D= 3,4
XVII.	Field blanks	ND	TB = 1

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

Validated Samples:** Indicates sample underwent Level IV validation nain

	when					a second and a second	
1-	TB-1		11	BVIOSHA	21	31	
2	MW-23-3		12	-	22	32	
3	MW-23-2	0	13		23	33	
4	DUPE-4-3Q12	p	14		24	34	
5	MW-23-1		15		25	35	
6	MW-4-3		16		26	36	
7	MW-4-2**		17		27	37	
8	MW-4-1		18		28	38	
9			19		29	39	
10			20		30	40	

Method: Volatiles (EPA Method 524.2)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	$\langle $			
Cooler temperature criteria was met.			i asijasi	
II. GC/MS Instrument performance check		1	000000 I	
Were the BFB performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration		r F	1	
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) < 20%?		Mersensu		
IV. Continuing calibration		1	r T	
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	-		 	
Were all percent differences (%D) < 30%?			t.	
V. Blanks	1 1	1 1	1	
Was a method blank associated with every sample in this SDG?		+ 		
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.			-	
VI Surrogate spikes	1	1	T T	
Were all surrogate %R within QC limits?	/ /	Γ		
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?		Success?		
VII. Matrix spike/Matrix spike duplicates		<u>لارم</u> ب	T	
Was a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for this SDG?	\vdash		 	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
VIII. Laboratory control samples			1898) T	
Was an LCS analyzed for this SDG?	-			
Was an LCS analyzed per analytical batch?	_			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the OC limits?	//	1		

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VALIDATION FINDINGS CHECKLIST

IDINGS CHECKLIST	Page: <u>2</u> of <u>2</u> Reviewer: <u>#</u>]
······································	2nd Reviewer:
Yes No NA	Findings/Comments

Validation Area	Yes	No	NA	Findings/Comments
IX. Regional Quality Assurance and Quality Control	, i i i i i			
Were performance evaluation (PE) samples performed?			/ /	-
Were the performance evaluation (PE) samples within the acceptance limits?			/ /	
X. Internal standards				
Were internal standard area counts within +/-40% from the associated calibration standard?	/	-		
Were retention times within - 30% of the last continuing calibration or +/- 50% of the initial calibration?	-	-		
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	_			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	<			
Were chromatogram peaks verified and accounted for?		and the second sec	All water to be	
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	/			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 25 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	/		-	
Were relative intensities of the major ions within <u>+</u> 20% between the sample and the reference spectra?	/			
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?	/			
XIV. System performance				
System performance was found to be acceptable.		F		
XV. Overall assessment of data	1		1	
Overall assessment of data was found to be acceptable.			<u> </u>	
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.	/			
Target compounds were detected in the field duplicates.		_		
XVII. Field blanks				
Field blanks were identified in this SDG.		-		
Target compounds were detected in the field blanks.				

IDC # She # DDI

VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

A Page: /of / Reviewer: /

METHOD: GC/MS VOA (EPA Method 524.2)

Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? Were all percent differences (%D) < 30% ? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". V N/N/A Were all percent differences (%D) < 30% ? V N/A Were all percent differences (%D) < 30% ?

Qualifications					A			d/ rn/r									
Associated Samples					Ś			1									
Finding %D (Limit: <30.0%)				38, 4				5.3									
Compound			1xc1-10-01010111-11-	Muthy 1 Icolide	Pen Fachloroe thang			Acrolein									
Were all percent differences (%U) 2 30 % f		1.2/0/0/7.1	Trans					1211628-1002	-								
# Defe all per	, u/ u/ u	A 1/ 01/L						21/8/6									
*																	

LDC #: 2853.4F SDG #: <u>her</u> 1000

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	<u></u>
Reviewer:	<u> </u>
2nd reviewer:	

METHOD: GC/MS VOA (EPA Method 524.2)

Y N N/A Y N N/A

Were field duplicate pairs identified in this SDG? Were target compounds detected in the field duplicate pairs?

	Concentration	n(ng l)	
Compound	3	4	RPD
K	0.44	0.52	17
Ī	0.15	0.17	13
AA	0.31	0.31	<u>0</u>
S	0.70	0.67	4
	· · · · · · · · · · · · · · · · · · ·		

	Concentration	()					
Compound			RPD				
	·						
		en e					
· · · · · · · · · · · · · · · · · · ·							

[Concentration	()	
	•••		Compound			RPD
	<u></u>					
· · .						
•		· . ·				
	· ·					
	• :					

LDC # 285 34P SDØ#

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Ъ L L Page: / Reviewer: 2nd Reviewer:_

METHOD: GC/MS VOA (EPA Method 524.2)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the followi calculations:

RRF = (A_x)(C_s)/(A_s)(C_x) average RRF = sum of the RRFs/number of standards %RSD = 100 * (S/X)

 $A_x =$ Area of compound, $C_x =$ Concentration of compound, S = Standard deviation of the RRFs X = Mean of the RRFs

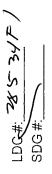
 $A_{\rm is}$ = Area of associated internal standard $C_{\rm is}$ = Concentration of internal standard

			ע הארפון ט וופ						
				Reported	Recalcutated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	RRF (25_std)	RRF (ZST std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
-	1621	21/8/6	いいかけ (1st Internal Standard)	0.522	0.522	0.5218497	0.522	6.73	6.24
	SN SW		Trichloroethene (2nd Internal Standard)	0.348	0.348	Sch6asz.0	0.35)	8.22	25
			Chlow benser (3rd internal Standard)	3.034	3.034	522201.8	3.107	3.18	3.18
5			A//4/ Methylene Chloride (1st Internal Standard)	o. syo	or sto	6.54,19KY	242.0	4.09	4.09
			me they in the cry to the Col	0.080	0.00	0,07696	0.077	163	5.91
			1-1,4- di chloro- 3- bull - (9)	0.117	0-117	0.1120184	0.112	11-94	1.94
n			Methylene Chloride (1st Internal Standard)						
			Trichloroethene (2nd Internal Standard)						
			Rromoform (3rd Internal Standard)						
4			Methylene Chloride (1st Internal Standard)						
			Trichloroethene (2nd Internal Standard)						

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

(3rd Internal Standard)

Bromoform



VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compoun identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF RRF = (A_x)(C_s)/(A_s)(C_x)

Where: ave. RRF = initial calibration average RRF RRF = continuing calibration RRF Δ = Δrea of commonied

 $A_x = Area of compound, <math>A_s = Area of C_x = Concentration of compound, <math>C_s = Concentration of compound, Area of C_s = Concentration of compound, C_s = Concentration of compound, C_s = Concentration of Conce$

A_{is} = Area of associated internal standard C_{is} = Concentration of internal standard

					Reported	Recalculated	Renorted	Recelentated
#	Standard ID	Calibration Date	Compoynd (Reference internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	%D	MD
	069/121	~1/01/b	いひは/ Methytene Chloride (1st Internal Standard)	0.52 18497 3.1072 25	18625525-0	0.52357	5.0 7-4	<i>o</i> .3
·	aev/		Trichloroethene (2nd Internal Standard)	& Lhbase.o	0. 350947 & O.3402642	0-34026	<u>ی. د</u>	3.0
			Homber New (3rd Internal Standard)	3.107rvc	3.141354	3.1413	/ -/	1./
2				o. 5419854	12152070	0.6035	11.4	1.4
			high not cry la u Trichtorethene (2nd Internal Standard)	7.696 × 10-2	7.696 ×10-2- 01.1 75/13 ×10-2	0.09175	19.2	19.2
			H- 1, 4-clichlero- 3 - 6 u Len -	0.1/20184	0.1677002	0.1677	49.7	4.9.7
¢			Motheridae (14 th Internet Chandred)					
n N								
			Trichloroethene (2nd Internal Standard)					
			Bromoform (3rd internal Standard)					
4			Methylene Chloride (1st Internal Standard)					
			Trichloroethene (2nd Internal Standard)					
			Bromoform (3rd Internal Standard)					
		Concernment of the second seco						

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of t recalculated results. SURVIJACE RESULTS VERTICATION

Keviewer: 2nd reviewer:

METHOD: GC/MS VOA (EPA Method 524.2)

47

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Sample ID:____

Where: SF = Surrogate Found SS = Surrogate Spiked

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8	10	9.830	98.3	98.3	Ο
Bromofluorobenzene	l l .	10.070	101	101	1
1,2-Dichlorobenzene-d4	10	10.770	108	. 108	
Dibromofluoromethane					

Sample ID:_____

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					· · · · · · · · · · · · · · · · · · ·
Dibromofluoromethane					

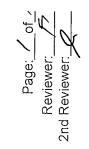
	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

Sample ID:_____

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

2853451	
LDC #:	

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified belt using the following calculation:

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration SA = Spike added

RPD = I MSC - MSDC I * 2/(MSC + MSDC)

MSC = Matrix spike percent recovery

MSDC = Matrix spike duplicate percent recovery

SC = Sample concentration

MS/MSD sample: WW - 11- 4 W 10

	Sp	ike	Sample	Spiked Sample	ample	Matrix Spike	Spike	Matrix Spike Duplicate	Duplicate	SW	USM/SM
	Adc	Addęd	Concentration	Concentration	ration						
Compound	¥)	x (L)	(2) (2)	() () ()	J	Percent Recovery	Recovery	Percent Recovery	ecovery	ц	RPD
	MS	MSD		D SM	USM	Reported	Recalc	Reported	Recalc.	Reported	Recalculater
1,1-Dichloroethene	2X.U	0.52	0M	OLT.X	701 046.52 OLT.22	107	107	hol	امل	3.15	3.15
Trichloroethene		_	_	いすってょ	24640 24730 98.6	98.6	6.26	98.9	78-7	0.365	0.365
Benzene				CRI.MC OCP.42		97.7	27.7	916.7	96.7	50.1	1.03
Toluene				24.590 24.780		१४,५	48.4	99.)	99.)	0.770	ort.o
Chlorobenzene		->	~	24.460	4.460 23.630 97.4 97.4	h-26	ף.רף	5.40	2-46	3.45 3.45	3.45

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of gualifications and associated samples when reported results do not agree within 10.0 of the recalculated results.

28534F/	
LDC #:	

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculat for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration SA = Spike added

RPD = 1 LCS - LCSD 1 * 2/(LCS + LCSD)

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS ID: BUTOSY3 Les

L

I CS/I CSD	RPD	Recalculated											
		Renorfed											
L CSD	Percent Recovery	Recalc											
	Percent	Reported					A V						
I CS	Percent Recovery	Recalc	60	201	98.4	3	41)		-				
	Percent	Reported	601	102	h.yr	001	76.7						
Sample	tration イ)	1 CSD	N A	-			6						
Spiked	Concentration $(\mathcal{A} \ \mathcal{A})$		27.340	२४.९५०	24.60	25.110	له ا . المر						
ike	Added (Ng L)) I CSD	¢ 2		-		0						
Sp	Ad W	1 CS	<i>5.0</i>				\	•		•			
	Compound		1,1-Dichloroethene	Trichloroethene	Benzene	Toluene	Chlorobenzene						

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the section of the se recalculated results.

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of
Reviewer:	FT
2nd reviewer:	0.

METHOD: GC/MS VOA (EPA Method 524.2)

	d results for d using the following equation:	reported with a positive detect were recalculated
Concentrat	ion = $\frac{(A_{i})(I_{s})(DF)}{(A_{is})(RRF)(V_{o})(\%S)}$	Example:
A _x =	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D, K:
A _{is} =	Area of the characteristic ion (EICP) for the specific internal standard	
! _s =	Amount of internal standard added in nanograms (ng)	Conc. = (35900) (10) (0.8/415) (0.
RRF =	Relative response factor of the calibration standard.	304065 0.8/41510
V _o =	Volume or weight of sample purged in milliliters (ml) or grams (g).	=
Df =	Dilution factor.	1.45 ng/L
%S =	Percent solids, applicable to soils and solid matrices only.	U /
	· · · · · · · · · · · · · · · · · · ·	

#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Acceptable (Y/N)
	·				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
i iojecuone name.	

Collection Date: September 4, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Chromium

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216587

Sample Identification

MW-23-4** MW-23-3 MW-23-2 DUPE-4-3Q12 MW-23-1 MW-4-3 MW-4-2** MW-4-2** MW-4-1 MW-23-4MS MW-23-4MSD MW-23-4DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 11 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No metal contaminants were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Chromium	1.9200 ug/L	MW-23-2 DUPE-4-3Q12 MW-23-1 MW-4-3 MW-4-2** MW-4-2

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-4-2**	Chromium	2.4 ug/L	2.4U ug/L

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required by the method.

VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples MW-23-2 and DUPE-4-3Q12 were identified as field duplicates. No chromium was detected in any of the samples.

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Metals - Data Qualification Summary - SDG 1216587

No Sample Data Qualified in this SDG

NASA JPL Metals - Laboratory Blank Data Qualification Summary - SDG 1216587

SDG	Sample	Analyte	Modified Final Concentration	A or P
1216587	MW-4-2**	Chromium	2.4U ug/L	A

LDC #: 28534F4

SDG #: 1216587 Laboratory: BC Laboratories, Inc.

Chromium METHOD: Metals (EPA Method 200.8)

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

Level III/IV

Validation Area Comments 9-4-12 A Technical holding times Sampling dates: T. A 11. **ICP/MS** Tune Α 111. Calibration รพ Blanks IV. required N ICP Interference Check Sample (ICS) Analysis not V. A MS NSD Matrix Spike Analysis VI. A DUP VII. **Duplicate Sample Analysis** Д LCS VIII. Laboratory Control Samples (LCS) Д NOt reviewed for level III IX. Internal Standard (ICP-MS) Utili N Not Х. Furnace Atomic Absorption QC N not performe XI. **ICP Serial Dilution** A Sample Result Verification Not reviewed for Level III validation. XII. Д XIII. **Overall Assessment of Data** ND D= 3+4 XIV. **Field Duplicates** r1 Field Blanks XV

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

Validated Samples:** Indicates sample underwent Level IV validation all Water

1	MW-23-4**	11	MW-23-4DUP	21	······································	31	
2	MW-23-3	12		22		32	
3	MW-23-2	13		23		33	
4	DUPE-4-3Q12	14		24		34	
5	MW-23-1	15		25	,	35	
6	MW-4-3	16		26		36	
7	MW-4-2**	17		27		37	
8	MW-4-1	18		28		38	
9	MW-23-4MS	19		29		39	
10	MW-23-4MSD	20		30	PBW	40	

Notes:

VALIDATION COMPLETENESS WORKSHEET Date: 10 - 17 - 12

Page: | of | Reviewer: MG 2nd Reviewer:_____

MA.

1. A. I.

Method:Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	1			
Cooler temperature criteria was met.	\checkmark			
II. ICP/MS Tune		· · · · ·	·	
Were all isotopes in the tuning solution mass resolution within 0.1 amu?				
Were %RSD of isotopes in the tuning solution ≤5%?	\checkmark		1	
III. Calibration		·	,	· · · · · · · · · · · · · · · · · · ·
Were all instruments calibrated daily, each set-up time?	\checkmark			
Were the proper number of standards used?	\checkmark			
Were all initial and continuing calibration verification %Rs within the 90-110% (80- 120% for mercury) QC limits?	\checkmark			
Were all initial calibration correlation coefficients <a> 0.995?	\checkmark			
IV. Blanks	·	r	T	
Was a method blank associated with every sample in this SDG?	\checkmark		[
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	\checkmark			
V. ICP Interference Check Sample	.	· · · · · ·		· · · · · · · · · · · · · · · · · · ·
Were ICP interference check samples performed daily?		\checkmark		
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
VI. Matrix spike/Matrix spike duplicates			r	
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.	\checkmark			
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.	1			
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.	⁄			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	\checkmark			
Was an LCS analyzed per extraction batch?	\checkmark			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	1			

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LDC #: 28534F4

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: MG 2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments					
VIII. Furnace Atomic Absorption QC									
If MSA was performed, was the correlation coefficients > 0.995?			\checkmark						
Do all applicable analysies have duplicate injections? (Level IV only)			\checkmark						
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)									
Were analytical spike recoveries within the 85-115% QC limits?		_	1						
IX. iCP Serial Dilution									
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		/							
Were all percent differences (%Ds) < 10%?			\checkmark						
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			/						
X. internal Standards (EPA SW 846 Method 6020/EPA 200.8)									
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	/								
If the %Rs were outside the criteria, was a reanalysis performed?			/						
XI. Regional Quality Assurance and Quality Control									
Were performance evaluation (PE) samples performed?									
Were the performance evaluation (PE) samples within the acceptance limits?		۰	/						
XII. Sample Result Verification									
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/								
XIII. Overall assessment of data									
Overall assessment of data was found to be acceptable.	/		ĺ						
XIV. Field duplicates									
Field duplicate pairs were identified in this SDG.	1								
Target analytes were detected in the field duplicates.		1							
XV. Field blanks									
Field blanks were identified in this SDG.		1							
Target analytes were detected in the field blanks.				1					

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Sample Concentration units, unless otherwise noted: ug/L LDC #: <u>28534F4</u> SDG #: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES Soil preparation factor applied: NA Associated Samples: 3-8



2.4 ~ Action Limit 9.60 Maximum ICB/CCB^a (ug/L) 1.9200 Maximum PBª (ug/L) Maximum PB^ª (mg/Kg) Analyte Շ

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U". Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC # <u>88534 F4</u>

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: 1 of 1 Reviewer: MG 2nd Reviewer: 1

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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

Where, Found = concentration (in ug/L) of each analyte <u>measured</u> in the analysis of the ICV or CCV solution True = concentration (in ug/L) of each analyte in the ICV or CCV source %R = <u>Found</u> x 100 True

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
1059 I C V	ICP/MS (Initial calibration)	S C	51. 282	50.000	103	103	7
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1556 CCV9	ICP/MS (Continuing calibration)	C C	39.672	40.000	99.2	L.99	->
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

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.

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VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

ð Reviewer: 2nd Reviewer: Page:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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

 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.
 %R = Found x 100 True

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

S = Original sample concentration D = Duplicate sample concentration Where, $RPD = \underline{[S-D]} \times 100$ (S+D)/2 An ICP serial dilution percent difference (%D) was recalculated using the following formula:

Where, 1 = Initial Sample Result (mg/L) SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5) %D = I-SDRI x 100

Sample IDType of AnalysisElementFound / S / ITrue / D / SDR (units) $\%R / RPD / \%D$ $\%R / RPD / \%D$ -ICP interference check1 E11L C S ILaboratory control sampleCr 40.393 $//4g/L$ 40.000 $//mg/L$ 101 101 1 b / 1L C S IL C S IL C S I 40.393 $//mg/L$ 40.000 $//mg/L$ 101 101 1 c S 1L C S IMatrix spikeCr 40.165 $//mg/L$ 40.000 $//mg/L$ 100 100 1 u 17 / 16.00DuplicateCr 3.338 $//mg/L$ 3.162 $//mg/L$ 3.45 3.45 -IIDuplicateCr 3.338 $//mg/L$ 3.162 $//mg/L$ 3.45 -IIDuplicateCr 3.338 $//mg/L$ 3.162 $//mg/L$ 3.45 -IIDuplicateCr 3.338 $//mg/L$ 3.162 $//mg/L$ 3.45 -IIIIIIIIII-IIIIIIIIII-IIIIIIIIIII1 bitIIIIIIIIIIIIIIIIIIIIIIIIII<	and the first of the					Recalculated	Reported	
ICP interference checkLaboratory control sample Cr 40.0343 $(\mu g/L)$ 40.000 $(\mu g/L)$ 101 Matrix spike Cr 40.165 $(\mu g/L)$ 40.000 $(\mu g/L)$ 100 Duplicate Cr 9.038 $(\mu g/L)$ 3.162 $(\mu g/L)$ 3.45 ICP serial dilution	Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
Laboratory control sample Cr 40.043 (μ_0/L) 101 101 Matrix spike Cr 40.165 (μ_0/L) 40.000 (μ_0/L) 100 Duplicate Cr 40.165 (μ_0/L) 40.000 (μ_0/L) 100 Duplicate Cr 3.338 (μ_0/L) 3.162 (μ_0/L) 3.45 ICP serial dilution $ -$		ICP interference check	l		١	١	-	l
Matrix spike(SSR-SR)(Mg/L)HO .000Mg/L)100Duplicate Cr 3.338 (Mg/L) 3.162 (Mg/L) 3.45 ICP serial dilution $ -$	L C S 1	Laboratory control sample	CC	40.993 (mg/r)	40.000 (mg/)	101	101	$\mathbf{\mathbf{Y}}$
Duplicate Cv 3.38 (wg/L) 3.162 (wg/L) 3.45 ICP serial dilution $ -$	الوياد م	Matrix spike					001	
ICP serial dilution	1617/1620 11	Duplicate	Cr		2.162 (mg/L)	3.45	3.45	
	1	ICP serial dilution	})	1	J	Ì	l

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

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LDC #:	28534F4	VALIDATION FINDINGS Sample Calculation V		Re 2nd re	Page:of viewer:G viewer:
METH	OD: Trace Metals (EPA	SW 846 Method 6010/6020/7000)			
QN I QN I QN I	V/A Have results N/A Are results with a second se	w for all questions answered "N". Not applete reported and calculated correctly? ithin the calibrated range of the instrument ion limits below the CRDL?			
Detect equation	ed analyte results for on:	#1, Cr	were recalcu	lated and verified	using the following
Concent	ration = <u>(RD)(FV)(Dil)</u> (In. Vol.)	Recalculation:			
RD FV In. Vol. Dil	= Raw data concer = Final volume (ml = Initial volume (m = Dilution factor)(0.050L) 050L	= 2.238	μg /ι
#	Sample ID	Analyte	Reported Concentration (^{Mg} / L)	Calculated Concentration (パターレ)	Acceptable (Y/N)
1	I	Cr	2.2	2.2	Ý
 					
 		· · · · · · · · · · · · · · · · · · ·	_		· ·
	· · · · · · · · · · · · · · · · · · ·				

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Laboratory Data Consultants, Inc. Data Validation Report

Collection Date: September 4, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216587

Sample Identification

MW-23-4** MW-23-3 MW-23-2 DUPE-4-3Q12 MW-23-1 MW-4-3 MW-4-2** MW-4-1 MW-23-4MS MW-23-4MSD MW-23-4MSD MW-23-4DUP MW-23-3MS MW-23-3MSD MW-23-3DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 14 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 314.0 for Perchlorate and EPA SW 846 Method 7196 for Hexavalent Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
LCS	Hexavalent chromium	82.7 (85-115)	All samples in SDG 1216587	J (all detects) UJ (all non-detects)	Р

VIII. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples MW-23-2 and DUPE-4-3Q12 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce	ntration	
Analyte	MW-23-2	DUPE-4-3Q12	RPD
Hexavalent chromium	0.00070U mg/L	0.0015 mg/L	200
Perchlorate	5.7 ug/L	4.6 ug/L	21

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1216587

SDG	Sample	Analyte	Flag	A or P	Reason
1216587	MW-23-4** MW-23-3 DUPE-4-3Q12 MW-23-1 MW-4-3 MW-4-2** MW-4-1	Hexavalent chromium	J (all detects) UJ (all non-detects)	Ρ	Laboratory control samples (%R)

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1216587

No Sample Data Qualified in this SDG

LDC #: <u>28534F6</u>	VALIDATION COMPLETENESS WORKSHEET	Date:
SDG #: <u>1216587</u>	Level III/IV	Page:_
Laboratory: BC Laboratories,	Inc.	Reviewer:

2nd Reviewer

METHOD: Perchlorate (EPA Method 314.0), Hexavalent Chromium (EPA SW846 Method 7196)

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.	Technical holding times	A	Sampling dates: 9-4-12
Ш	Initial calibration	A	
	Calibration verification	A	
IV	Blanks	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	Ą	DUP
VII.	Laboratory control samples	SW	LCS
VIII.	Sample result verification	A	Not reviewed for Level III validation.
IX.	Overall assessment of data	A	
Х.	Field duplicates	รฟ	D = 3 + 4
XL	Field blanks	N	

Note: A = Acceptable N = Not provided/applicable ND = No compounds detected R = Rinsate

FB = Field blank

D = Duplicate TB = Trip blank

EB = Equipment blank

Validated Samples:** Indicates sample underwent Level IV validation all whater

SW = See worksheet

	all water						
1	MW-23-4**	11	MW-23-4DUP	21		31	
2	MW-23-3	12	MW-23-3MS	22		32	
3	MW-23-2	13	MW-23-3MSD	23		33	
4	DUPE-4-3Q12	14	MW-23-3DUP	24		34	
5	MW-23-1	15		25		35	
6	MW-4-3	16		26		36	
7	MW-4-2**	17		27		37	
8	MW-4-1	18		28		38	
9	MW-23-4MS	19		29		39	
10	MW-23-4MSD	20		30	PBW	40	

Notes:_

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Method: Inorganics (EPA Method See cover

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	1			
Cooler temperature criteria was met.	/			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	1			
Were the proper number of standards used?	\checkmark			
Were all initial calibration correlation coefficients <a> 0.995?	\checkmark			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	/			
Were titrant checks performed as required? (Level IV only)			\checkmark	
Were balance checks performed as required? (Level IV only)				
III. Blanks				
Was a method blank associated with every sample in this SDG?	\checkmark			
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) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CRDL(\leq 2X CRDL for soil) was used for samples that were \leq 5X the CRDL, including when only one of the duplicate sample values were \leq 5X the CRDL.	/			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	\checkmark			
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?		\checkmark		
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		\checkmark		
Were the performance evaluation (PE) samples within the acceptance limits?				

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: MG 2nd Reviewer: √

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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?	\checkmark			
Were detection limits < RL?	\checkmark			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	\checkmark			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	\checkmark			
Target analytes were detected in the field duplicates.	\checkmark			
X. Field blanks				
Field blanks were identified in this SDG.		\checkmark		
Target analytes were detected in the field blanks.			\checkmark	

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: <u>l_of l</u> Reviewer: <u>MG</u> 2nd reviewer: <u>V</u> Research 11

All circled methods are applicable to each sample.

Comple ID	Matrix	Parameter
Sample ID		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (R^{Θ}) CIO ₄
2-78	1	ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC (\mathbb{R}^6) (\mathbb{O}_2)
QC 9-711		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (CR^6) CIO ₄
12-714		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ \bigcirc
• 10 - 11		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN [•] NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		PH TOS CLE NO, NO, SO, PO, ALK CN. NH, TKN TOC CR6+ CIO,

Comments:_

METHODS.6

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LDC #: 28534 F6 l SDG #:_

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: Lot L Reviewer: /

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See cover METHOD: Inorganics, Method_

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". V N N/A Was a laboratory control sample (LCS) analyzed for each matrix in this SDG? V N N/A Were all LCS percent recoveries (%R) within the control limits of 80-120% (85-115% for Method 300.0)? LEVEL IV ONLY:

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations. Y N N/A

Qualifications	T/UT/P																				
Associated Samples	a11																				
%R (limits)	82.7 (85-115)																				
Analvte	Cr <u>V</u>																				
Matrix																					
<u> </u>		1 (1)																			
-	- -	╉	+	╎	╈	╋	╈	+	╟	╎	╎	\uparrow	1	\uparrow	+	╢─	+-	\uparrow	1	\uparrow	

Comments:

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LCS.6

LDC#<u>28534F6</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:__l_of_l_ Reviewer:__MG____ 2nd Reviewer:___/___

Inorganics: Method See Cover

	Concentra	ation (ug/L)		
Analyte	3	4	RPD	
Hexavalent Chromium (mg/L)	0.00070U	0.0015	200	
Perchlorate	5.7	4.6	21	

V:\FIELD DUPLICATES\FD_inorganic\28534F6.WPD

LDC# 28534 F6

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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> COVER see METHOD: Inorganics, Method _

61-01-6 _was recalculated. Calibration date:_ 2104 The correlation coefficient (r) for the calibration of $_{-}$ An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

Where, Found = concentration of each analyte <u>measured</u> in the analysis of the ICV or CCV solution True = concentration of each analyte in the ICV or CCV source %R = <u>Found</u> x 100 True

			(Recalculated [Reported	
Type of Analysis A	Anaiyte	Standard ID	しのい C Found (units)	ハッピス True (units)	r or %R	r or %R	Acceptable (Y/N)
		Blank		2			
		Standard 1	2 (mg/r)	0.0020			
		Standard 2	ч ()	7 400.0			
	Ç	Standard 3	6 ()	0.0060	¢	rg. Agenes	>
<u>،</u>	0.04	Standard 4	10 ()	0.0095	1 = 0.994735		-
		Standard 5	00 (J)	0160.0			
		Standard 6	I	1			
		Standard 7	-	1			
Calibration verification		ные					
	Cr VI	ce V 1	0.05141 (mg/L) 0.050 (mg/L)	0.050 (3/1)	103	103	
Calibration verification		0037					
	CIJy	CCV5	10.5365 (mg/r)	10,000 (mg/L)	105	105	~
Calibration verification				1		ł	1
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	ation Verific	ation findings wor	ksheet for list of quali	I Ifications and associa	ted samples when rep	orted results do not a	gree within 10.0% of th

CALCLC.6

recalculated results.

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VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: <u>ا of ا</u> Reviewer: <u>الح</u> 2nd Reviewer: <u>م</u>

METHOD: Inorganics, Method See cover

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

Found = concentration of each analyte <u>measured</u> 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. Where, %R = Found x 100 True

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

	Recalculated	
ation tration		True / D
Original sample concentration Duplicate sample concentration		Found / S
Orig Dupl		j
= = 0 ==		 -
Where,		
RPD = <u> S-D </u> × 100 (S+D)/2		

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	%R / RPD	%R / RPD	Acceptable (Y/N)
hhee	Laboratory control sample						
rc5		Cr V	0.04137 (mg/L) 0.050 (mg/L)	0.050 (mg/L)	89.7	80.7	\succ
Isec	Matrix spike sample		(SSR-SR)				
د ا		CIOH	11. 905 (mg / L)	11. 905 (mg/L) 10.101 (mg/L)	118	118	
hhee / hhee	Duplicate sample						
11		Cr VI	0.00383 (mg /L) 0.00288 (mg/L)	o.ooæ8(mg/L)	5.44	5.41	

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

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LDC #: 28534F6 VALIDATION FINDINGS WORKSHEET Page:l of _l Sample Calculation Verification Reviewer: Reviewer: 2nd reviewer:								
METH	OD: Inorganics, Method	sce cover						
	N/A Have results to N/A Are results with N/A Are all detection N/A Are all detection Dund (analyte) results for	w for all questions answered "N". Not app been reported and calculated correctly? thin the calibrated range of the instrument on limits below the CRQL? or \pm 1, Cr V1	ts?	e identified as "N/A rted with a positiv				
recalci	ulated and ventied using	g the following equation.						
Concentration = Recalculation:								
Rias	Factor = 1.243 Rias = 0.001 Cr VI $mg/L = 1.243 (0.004 - 0.001) = 0.00373 mg/L$ dil=1x							
#	Sample ID	Analyte	Reported Concentration (⁴ 9 / –)	Calculated Concentration (パタ(レ)	Acceptable (Y/N)			
	7	CIQU	720	240	Ý			
	l	Crvl	0.0098 (mg/L)	0.0037 (mg/L)				
		L		<u>l</u>	<u></u>			

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Note:

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
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Collection Date: September 5, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216753

Sample Identification

TB-1 MW-12-5 MW-12-4 MW-12-3 MW-12-2 MW-12-1 DUPE-5-3Q12 MW-24-3 DUPE-6-3Q12 MW-24-2 MW-24-1 MW-12-3MS MW-12-3MSD

Introduction

This data review covers 13 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore gualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 30.0% with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/10/12	Bromomethane trans-1,4-Dichloro-2-Butene Methyl Iodide Pentachloroethane	33 49.7 38.4 52.4	TB-1 MW-12-5 MW-12-4 MW-12-3 MW-12-2 MW-12-3MS MW-12-3MSD BVI0543	J (all detects) UJ (all non-detects)	Ρ
9/10/12	Bromomethane trans-1,4-Dichloro-2-Butene Methyl lodide	55.6 33.0 48.9	MW-12-1 DUPE-5-3Q12 MW-24-3 DUPE-6-3Q12 MW-24-2 BV10544	J (all detects) UJ (all non-detects)	Ρ

Date	Compound	%D	Associated Samples	Flag	A or P
9/11/12	Bromomethane Acrolein trans-1,4-Dichloro-2-Butene Methyl Iodide Pentachloroethane	46.1 72.4 32.2 31.6 63.2	MW-24-1 1211778-CCB1	J (all detects) UJ (all non-detects)	Ρ

The percent differences (%D) of the second source calibration standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/8/12	Acrolein	50.3	All samples in SDG 1216753	J (all detects) UJ (all non-detects)	Ρ

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and RLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

Samples MW-12-1 and DUPE-5-3Q12 and samples MW-24-3 and DUPE-6-3Q12 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)	
Compound	MW-24-3	DUPE-6-3Q12	RPD
1,1-Dichloroethane	0.13	0.11U	200

XVII. Field Blanks

Sample TB-1 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1216753

SDG	Sample	Compound	Flag	A or P	Reason
1216753	TB-1 MW-12-5 MW-12-4 MW-12-3 MW-12-2	Bromomethane trans-1,4-Dichloro-2-Butene Methyl lodide Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1216753	MW-12-1 DUPE-5-3Q12 MW-24-3 DUPE-6-3Q12 MW-24-2	Bromomethane trans-1,4-Dichloro-2-Butene Methyl lodide	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1216753	MW-24-1	Bromomethane Acrolein trans-1,4-Dichloro-2-Butene Methyl lodide Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1216753	TB-1 MW-12-5 MW-12-4 MW-12-3 MW-12-2 MW-12-1 DUPE-5-3Q12 MW-24-3 DUPE-6-3Q12 MW-24-2 MW-24-1	Acrolein	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1216753

No Sample Data Qualified in this SDG

NASA JPL Volatiles - Field Blank Data Qualification Summary - SDG 0000

No Sample Data Qualified in this SDG

LDC #:28534G1	VALIDATION COMPLETENESS WORKSHEET	Date: 10/17/12
SDG #: <u>1216753</u>	_ Level III	Page: / of /
Laboratory: BC Laboratories	s <u>, Inc.</u>	Reviewer: 77
METHOD: GC/MS Volatiles (EPA Method 524.2)	2nd Reviewer:

METHOD: GC/MS Volatiles (EPA Method 524.2)

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
· .	Technical holding times	Δ	Sampling dates: 9/5/12
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	Ą	$0/0 PSP = 20, 1^{2}$
IV.	Continuing calibration/ICV	SIA	1cv/cw = 3U
V.	Blanks	4	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	R	NW-11-4 MS/MSD
VIII.	Laboratory control samples	A	LC>
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	Δ	
XI.	Target compound identification	N	
XII.	Compound quantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	¥
XVI.	Field duplicates	sW	D = 4, 7 8, 9
XVII.	Field blanks	NP	TB = /

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

Validated Samples: naen

1 1		113	MW-24-1	21 	BVIOSYS	31	
21	MW-12-5	12	MW-12-3MS	22	BVI 0544	32	
₃ 1	MW-12-4	13)	MW-12-3MSD	23 Z	BVIOSYV	33	
4	MW-12-3	14		24 7	1211778- CEB	34	
5	MW-12-2	15		25		35	
6 L	MW-12-1	16		26		36	
72	DUPE-5-3Q12	17		27		37	
8シ	мүү-24-3 Р,	18		28		38	
92	DUPE-6-3Q12 D	19		29		39	
107	MW-24-2	20		30		40	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA Method 524.2)

B. BromonetheneR. d. ei d. j. J. OblichtorprepieH. V. M. ei de de deM. M. 1. 2. ArtichtorobenzeneC. Myl daroffe8. Trichtoroethene1. 2. Oblicorethene0.0. 1. 3. 5. TrichtorobenzeneC. Myl daroffe7. Dibremonthanie1. 1. 2. Oblicorethene0.0. 1. 3. 5. TrichtorobenzeneD. Chtoroethene1. U. 1. 2. Trichtoroethene2. 2. Chtorobenzene0.0. 1. 3. 5. TrichtorobenzeneD. Chtoroethene1. U. 1. 2. Trichtoroethene2. 2. Chtorobenzene0.0. 1. 3. 5. TrichtoroetheneD. Chtoroethene1. U. 1. 2. Trichtoroethane2. 2. Chtorobenzene0.0. 1. 3. 5. TrichtoroetheneD. Chtoroethene1. U. 1. 2. Trichtoroethane2. 2. Chtorobenzene0.0. 1. 3. 5. TrichtoroetheneD. Chtoroethene1. U. 1. 2. TrichtoroethaneM. 1. 2. OblicoropteneBB. 4. Chtorobenzene0.0. 1. 3. 5. TrichtoroetheneD. ChtoroetheneW. V. taner 1. 2. OblicoropteneM. 1. 2. OblicoropteneBB. 4. Chtorobenzene0.0. 1. 3. 5. TrichtoroetheneD. L. 1. OblicorotteneW. V. taner 1. 2. OblicoropteneM. 1. 2. OblicoropteneBB. 4. Chtorobenzene0.0. 1. 3. 5. TrichtoroetheneU. 1. 1. OblicorotteneW. Laner 1. 2. OblicoropteneM. 1. 2. OblicoropteneM. 1. 2. Oblicoroptene0.0. 1. 3. 5. TrichtoroetheneU. 1. 2. OblicorotteneW. Lanet 1. 2. OblicoropteneM. 1. 2. OblicoropteneM. 1. 2. OblicoropteneM. 1. 2. 2. ChtoroetheneU. 1. 2. OblicorotteneM. 1. 2. OblicoropteneM. 1. 2. OblicoropteneM. 1. 2. OblicoropteneM. 1. 2. OblicoropteneU. 1. 2. OblicorotteneBE. 1. 1. 2. Oblicoroptene <t< th=""><th>A. Chloromethane</th><th>Q. 1,2-Dichloropropane</th><th>GG. Xylenes, total</th><th>WW. Bromobenzene</th><th>MMM. Naphthalene</th></t<>	A. Chloromethane	Q. 1,2-Dichloropropane	GG. Xylenes, total	WW. Bromobenzene	MMM. Naphthalene
S. TrichloroetheneII. 2-Chloroethylvlnyl etherYr. n-PropylbenzeneT. DibromechloromethanieJJ. DichlorodifluoromethaneZZ. 2-ChlorotolueneU. 1,1,2-TrichloroethaneJJ. DichlorodifluoromethaneAA. 1,3,5-TrimethylbenzeneU. 1,1,2-TrichloroethaneKK. TrichloroethaneAA. 1,3,5-TrimethylbenzeneU. 1,1,2-TrichloroethaneKK. TrichloroethaneAA. 1,3,5-TrimethylbenzeneU. 1,1,2-TrichloroethaneLL. Methyl-tart-bulyl etherBBB. 4-ChlorobuleneW. trans-1,3-DichloroptropeneCC. tert-BulylbenzeneW. trans-1,3-DichloroptropeneDD. 1,2-4-TrimethylbenzeneM. trans-1,3-DichloroptropeneCC. tert-BulylbenzeneM. trans-1,3-DichloroptropeneDD. 1,2-4-TrimethylbenzeneM. trans-1,3-DichloroptropeneCC. tert-BulylbenzeneM. tans-1,3-DichloroptropeneDD. 1,2-4-TrimethylbenzeneM. TattachloroetheneO. 2,2-DichloroptropeneEE. ese-BulylbenzeneM. TattachloroetheneO. 2,2-DichloroptropeneBB. 1,1,2-TehtenchonoethaneM. TattachloroetheneA. TettachloroethaneBB. 1,1,2-TettachlorobenzeneB. 1,1,22-TettachloroethaneS3. 1,3-DichloroptropeneJJJJ. 1,2-DichlorobenzeneD. ChlorobenzeneS3. 1,3-DichloroptropeneJJJJ. 1,2-DichlorobenzeneB. E. EthylbenzeneDD. ChlorobenzeneUU. 1,1,1,2-TettachloroethaneD. ChlorobenzeneUU. 1,1,1,2-TettachloroethaneKKK. 1,2-TrichlorobenzeneE. EthylbenzeneUU. 1,1,1,2-TettachloroethaneKKK. 1,2-TrichlorobenzeneE. EthylbenzeneUU. 1,1,1,2-TettachloroethaneKKK. 1,2-Trichlorobenze	B. Bromomethane	R. cie-1,3-Dichioropropene	HH. Vinyl acetate	XX. 1,2,3-Trichloropropane	NNN. 1,2,3-Trichlorobenzene
T. DibromochleroeuthanieJJ. DichlorodiffuoromethanieZZ -ChlorotolueneU. 1,1,2-TrichloroethaneKK, TrichloromethaneAAA. 1,3,5-TrimethylbenzeneU. 1,1,2-TrichloroethaneKK, TrichloromethaneAAA. 1,3,6-TrimethylbenzeneV. BenzeneLL. Methyl-terbuhyl etherBBB. 4-ChlorobulueneW. trans-1,3-DichloropropeneMM. 1,2-Dibromo-3-chloropropaneCCC. terbutylbenzeneK. BromotormNN. Diethyl etherDDD. 1,2,4-TrimethylbenzeneY. 4.Methyl-2-pentainoneOO. 2,3-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HexanoneOO. 2,3-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HexanoneOO. 2,3-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HexanoneOO. 2,3-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HexanoneOO. 2,3-DichloropropaneBG. 1,3-DichlorobenzeneIZ. 2-HexanoneRR. DibromoethaneRF. 1,3-DichlorobenzeneID. ChlorobenzeneS8. 1,3-DichloropropaneJJJJ. 1,2-DichlorobenzeneIDD. ChlorobenzeneUU. 1,1,3-TetrachlorobaneJJJJ. 1,2-DichlorobenzeneEE. EthylbenzeneUU. 1,1,3-TetrachloroethaneLL. HexachlorobenzeneEE. EthylbenzeneUU. 1,1,1,2-TetrachloroethaneLL. HexachlorobenzeneFF. StyreneUU. 1,1,1,2-TetrachloroethaneLL. Hexachlorobenzene	C. Vinyl choride	S. Trichloroethene	li. 2-Chloroethylvinyl ether	YY. n-Propylbenzene	000. 1,3,5-Trichlorobenzene
U. 1,1,2-TrichileroethaineKK. TrichileroethaineAA. 1,3,5-TrimethylbenzeneU. 8enzeneLL. Methyl-terbulyl etherBBB. 4-ChiloroblueneW. trame-1,3-DichloropropeneCCC. terbulylbenzeneW. trame-1,3-DichloropropeneCCC. terbulylbenzeneW. trame-1,3-DichloropropeneDDD. 1,2,4-TrimethylbenzeneY. 4-Methyl-z-pentianoneOO. 2,2-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HexanoneOO. 2,2-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HoxanoneOO. 1,1-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HoxanoneOO. 1,1-DichloropropaneIII. n.ButylbenzeneIZ. 2-HoxanoneSS. 1,3-DichloropropaneJJJJ. 1,2-DichlorobenzeneIDD. ChlorobenzeneTI. 1,2-TetrachloroethaneM. 1,1,1,2-TetrachloroethaneIEE. EthylbenzeneUU. 1,1,1,2-TetrachloroethaneKKK. 1,2-TrichlorobenzeneIFF. StyreneV. isopropylbenzeneIILL. Hexachlorobutatione	D. Chloroethane	T. Dibromachleromethane	JJ. Dichlorodifiuoromethane	ZZ. 2-Chiorotoluene	PPP. trane-1,2-Dichloroethene
V. BenzeneLL. Methyl-tart-butyl etherBBB. 4-ChlorotolueneW. trans-1,3-DlohloropropeneMM. 1,2-Dlibromo-3-chloropropeneCCC. tart-ButylbenzeneX. BromoformMM. 1,2-Dlibromo-3-chloropropeneCCC. tart-ButylbenzeneX. BromoformNN. Dlethyl etherDDD. 1,2,4-TrimethylbenzeneY. 4-Methyl-2-pentanoneOO. 2,2-DlohloropropeneDDD. 1,2,4-TrimethylbenzeneIZ. 2-HexanoneOO. 2,2-DlohloropropeneEEE. sec-ButylbenzeneIZ. 2-HexanoneOO. 2,2-DlohloropropeneGGG. pleopropytolueneIZ. 2-HexanoneRR. DlohonopropeneGGG. pleopropytolueneBB. 1,1,2,2-TetrachloroethaneRR. DlohonopropeneMH. 1,4-DichlorobenzeneCC. TolueneSS. 1,3-DlchloropropeneMJ. 1,2-DlchlorobenzeneDD. ChlorobenzeneDD. ChlorobenzeneMJ. 1,2-DlchlorobenzeneEE. EthylbenzeneUU. 1,1,1,2-TetrachloroethaneKKK. 1,24-ThchlorobenzeneFF. StyreneVV. iaopropylenzeneLL. Hexachlorobenzene	E. Methylene chloride	U. 1,1,2-Trichloroethane	KK. Trichlorofluoromethane	AAA. 1,3,5-Trimethylbenzene	QQQ. cis-1,2-Dichloroethene
W. trans-1,3-DichloropropeneMM. 1,2-Dibromo-3-chloropropeneCCC. tert-ButylbenzeneX. BromotormNN. Diethyl etherDDD. 1,2,4-TrimethylbenzeneY. 4-Methyl-2-pentanoneOO. 2,2-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HexanoneOO. 2,2-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HexanoneQO. 1,1-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HexanoneQO. 1,1-DichloropropaneEEE. sec-ButylbenzeneIZ. 2-HexanoneQO. 1,1-DichloropropaneBB. 1,1,2,2-TetrachloroefthaneBB. 1,1,2,2-TetrachloroefthaneRR. DibromonethaneIII. n-ButylbenzeneCC. TolueneS8. 1,3-DichloropropaneIII. n-ButylbenzeneDD. ChlorobenzeneUU. 1,1,2-TetrachlorobanzeneUU. 1,1,1,2-TetrachlorobanzeneFE. EthylbenzeneUU. 1,1,1,2-TetrachloroefthaneKKK. 1,2-TichlorobenzeneFE. StyreneUU. 1,1,1,2-TetrachloroefthaneKKK. 1,2-TichlorobenzeneFF. StyreneUU. 1,1,1,2-TetrachloroefthaneLLL. Hexachlorobutadlene	F. Acetone	V. Benzene	LL. Methyl-tert-butyl ether	BBB. 4-Chlorotoluene	RRR. m,p-Xylenes
X. BromoformNN. Diethyl etherDDD. 1,2,4-TrimethylbenzeneY. 4-Methyl-2-pentanoneOO. 2,2-DiohloropropaneEEE. esc-ButylbenzeneIZ. 2-HexanonePP. BromochloromethaneFF. 1,3-DichlorobenzeneA. TetrachloroethanePP. BromochloromethaneGGG. PisopropyltolueneBB. 1,1,2,2-TetrachloroethaneRR. DibromomethaneHHH. 1,4-DichlorobenzeneDD. chiorobenzeneSS. 1,3-DichloropropaneIII. n-ButylbenzeneDD. chiorobenzeneUU. 1,1,2-TetrachloroethaneJJJJ. 1,2-DichlorobenzeneFE. EthylbenzeneUU. 1,1,1,2-TetrachloroethaneKKK. 1,2-HrichlorobenzeneFF. StyreneV. IsopropylbenzeneLLL. Hexachlorobenzene	G. Carbon disuffide	W. trans-1,3-Dichloropropene	MM. 1,2-Dibromo-3-chloropropane	CCC. tert-Butylbenzene	SSS. c-Xylene
Y. 4-Methyl-2-pentanoneOO. 2,2-DlohloropropaneEEE. eec-ButylbenzeneIZ. 2-HexanonePP. BromochloromethaneFFF. 1,3-DichlorobenzeneA. TetrachloroethaneQQ. 1,1-DlchloropropaneGGQ. p-lsopropytholueneBB. 1,1,2,2-TetrachloroethaneRR. DibromonethaneHHH. 1,4-DichlorobenzeneCC. TolueneSS. 1,3-DichloropropaneIII. n-ButylbenzeneDD. ChlorobenzeneUU. 1,1,2-TetrachloroethaneJJJJ. 1,2-DichlorobenzeneEE. EthylbenzeneUU. 1,1,1,2-TetrachloroethaneKKK. 1,2-ATrichlorobenzeneFF. StyreneVV. lsopropylbenzeneLLL. Hexachlorobenzene	H. 1,1-Dichloroethene	X. Bromoform	NN. Diethyl ether	DDD. 1,2,4-Trimethylbenzene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane
IZ. 2-HexanonePP. BromochloromethaneFFF. 1,3-DichlorobenzeneAa. TetrachloroetheneQQ. 1,1-DichloropropeneGQQ. P-isopropytolueneBB. 1,1,2,2-TetrachloroethaneRR. DibromoethaneHHH. 1,4-DichlorobenzeneBD. ChloneethaneSS. 1,3-DichloropropaneIII. n-ButylbenzeneDD. ChlorobenzeneTT. 1,2-DichloropropaneJJJJ. 1,2-DichlorobenzeneEE. EthylbenzeneUU. 1,1,1,2-TetrachloroethaneKKK. 1,2-ATrichlorobenzeneFF. StyreneW. isopropylbenzeneLLL. Hexachlorobenzene	1. 1,1-Dichloroethane	Y. 4-Methyl-2-pentanone	00. 2,2-Diohloropropane	EEE. sec-Butylbenzene	UUU. Benzyi chloride
Ad. TetrachloroetheneQQ. 1,1-DichloropropeneQQG. p-isopropytolueneBB. 1,1,2,2-TetrachloroethaneRR. DibromonethaneHHH. 1,4-DichlorobenzeneCC. TolueneSS. 1,3-DichloropropaneIII. n-ButylbenzeneDD. ChlorobenzeneTT. 1,2-DichloropropaneJJJ. 1,2-DichlorobenzeneEE. EthylbenzeneUU. 1,1,1,2-TetrachloroethaneKKK. 1,2,4-TrichlorobenzeneFF. StyreneW. isopropylbenzeneLLL. Hexachlorobutadiene	J. 1,2-Dichloroethene, total	Z. 2-Hexanone	PP. Bromochloromethane	FFF. 1,3-Dichlorobenzene	VVV. 4-Ethyltoluene
BB. 1,1,2,2-Tetrachloroethane RR. Dibromonethane HHH. 1,4-Dichlorobenzene CC. Toluene SS. 1,3-Dichloropropane III. n-Butylbenzene DD. Chlorobenzene TT. 1,2-Dichloropropane JJJ. 1,2-Dichlorobenzene EE. Ethylbenzene UU. 1,1,1,2-Tetrachloroethane KKK. 1,2,4-Trichlorobenzene FF. Styrene W. iaopropylbenzene LLL. Hexachlorobutadiene	K. Chloroform	AA. Tetrachioroethene	QQ. 1,1-Dichloropropene	GGG. p-lsopropyltoluene	WWW. Ethanol
CC. Toluene SS. 1,3-Dichloropropane DD. Chlorobenzene TT. 1,2-Dibromoethane EE. Ethylbenzene UU. 1,1,1,2-Tetrachloroethane FF. Styrene W. laopropylbenzene	L. 1,2-Dichloroethane	BB. 1,1,2,2-Tetrachloroethane	RR. Dibromoethane	HHH. 1,4-Dichlorobenzene	XXX. Ethyl ether
DD. Chlorobenzene TT. 1,2-Dibromoethane EE. Ethylbenzene UU. 1,1,1,2-Tetrachloroethane FF. Styrene VV. leopropylbenzene	M. 2-Butanone	CC. Toluene	SS. 1,3-Dichloropropane	ili. n-Butyibenzene	
EE. Ethylbenzene UU. 1,1,1,2-Tetrachloroethane FF. Styrene VV. laopropylbenzene	N. 1,1,1-Trichloroethane	DD. Chlorobenzene	TT. 1,2-Dibromoethane	JJJ. 1,2-Dichiorobenzene	
FF. Styrene VV. Isopropylbenzene	O. Carbon tetrachloride	EE. Ethylbenzene	UU. 1,1,1,2-Tetrachloroethane	KKK. 1,2,4-Trichlorobenzene	
	P. Bromodichioromethane	FF. Styrene	W. isopropyibenzene	LLL. Hexachlorobutadiene	

Notes:

COMPNDL.155

LDC #: 28534 4 /

VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

Page: <u>/ of /</u> 2nd Reviewer: Reviewer:

METHOD: GC/MS VOA (EPA Method 524.2) Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". V N N/A V M N/A

Date			:		
	Standard ID	Compound	Finding %D (Limit: ≤30.0%)	Associated Samples	Qualifications
	1211690-001	в		BVI0543,	d/m/r
	Trans-	1, 4-		1-05,12,13	
		methy / Icdide	32.4		
		Pentachloroethan		♪	-7
Ţ					
	12/1690-0002	B	55.6	BVI0544	9/ m/r
	-h'l-smeet	D; C		0 4 9	
		4 3 6			7
	1211778-ewl	B	46.1	1211718-ceB1,	_
		Acrolein	4.22		
	Tran	Franks- 1, 4- Dichloro -2 - Bulu			
		-	31.6		
		Pentachloro ethane	しょひ	7	Y
21/2	1211678-1ev2	Acrolein	ج ,	Ē	J/uJ/p
:					

LDC #: 255 SDG #: <u>pre cove</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	<u></u>	<u> </u>
Reviewer:	P	
2nd reviewer:		

METHOD: GC/MS VOA (EPA Method 524.2)

Y N N/A Y N N/A

Were field duplicate pairs identified in this SDG? Were target compounds detected in the field duplicate pairs?

	Concentration	n(ng L)	
Compound	8	9	RPD
Ţ	0.13	0.111	200
	· · · ·		
	·· .		

	Concentration	(
lı Compound		·· .	RPD
	· ·		
	Concentration	()	
Compound			RPD
			4

Laboratory Data Consultants, Inc. Data Validation Report

BC Laboratories, Inc.

Project/Site	Name:	NASA JPL

Collection Date: September 5, 2012

LDC Report Date: October 23, 2012

Matrix: Water

Parameters: Chromium

Validation Level: EPA Level III

Laboratory:

Sample Delivery Group (SDG): 1216753

Sample Identification

MW-12-3 MW-12-2 MW-12-1 DUPE-5-3Q12 MW-24-4 MW-24-3 DUPE-6-3Q12 MW-24-2 MW-24-2 MW-24-1 MW-12-3MSD MW-12-3MSD MW-12-3DUP

Introduction

This data review covers 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium was found in the initial, continuing and preparation blanks.

V. ICP Interference Check Sample (ICS) Analysis

Instrument performance check is not required by this method.

VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

Raw data were not reviewed for this SDG.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples MW-12-1 and DUPE-5-3Q12 and samples MW-24-3 and DUPE-6-3Q12 were identified as field duplicates. No chromium was detected in any of the samples.

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Chromium - Data Qualification Summary - SDG 1216753

No Sample Data Qualified in this SDG

NASA JPL Chromium - Laboratory Blank Data Qualification Summary - SDG 1216753

No Sample Data Qualified in this SDG

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20034G4VV.W	Ju.

LDC #:_	28534G4	١
SDG #:	1216753	
Loborot	oru: PC Laboratoriaa	Inc

VALIDATION COMPLETENESS WORKSHEET Level III

Laboratory: <u>BC Laboratories, Inc.</u> Chronium 91.4.

METHOD: Metals (EPA Method 200.8)

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
1.	Technical holding times	A	Sampling dates: 9-5-12
١١.	ICP/MS Tune	A	
ш.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	A	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	2	not reviewed
Х.	Furnace Atomic Absorption QC	2	not utilized
XI.	ICP Serial Dilution	ン	not reviewed not utilized not performed
XII.	Sample Result Verification	N	v
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	ND	D = 3 + 4, $D = 6 + 7$
xv	Field Blanks	N	

Note: A

A = Acceptable N = Not provided/applicable SW = See worksheet ND = No compounds detected R = Rinsate

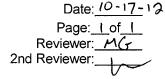
FB = Field blank

D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples:

	all water					
1	MW-12-3	11	MW-12-3MSD	21		31
2	MW-12-2	12	MW-12-3DUP	22		32
3	MW-12-1	13		23		33
4	DUPE-5-3Q12	14		24		34
5	MW-24-4	15		25		35
6	MW-24-3	16		26		36
7	DUPE-6-3Q12	17		27		37
8	MW-24-2	18		28		38
9	MW-24-1	19		29		39
10	MW-12-3MS	20		30 P	BW	40

Notes:_



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NAS/

Collection Date: September 5, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216753

Sample Identification

MW-12-5 MW-12-4 MW-12-3 MW-12-2 MW-12-1 DUPE-5-3Q12 MW-24-4 MW-24-3 DUPE-6-3Q12 MW-24-2 MW-24-1 MW-24-1 MW-12-3MS MW-12-3MSD MW-12-3DUP

Introduction

This data review covers 14 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 300.0 for Chloride, Sulfate, and Nitrate as Nitrogen, EPA Method 353.2 for Nitrite as Nitrogen, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, and EPA Method 365.1 for Orthophosphate as Phosphorus.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Sample Result Verification

Raw data were not reviewed for this SDG.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples MW-12-1 and DUPE-5-3Q12 and samples MW-24-3 and DUPE-6-3Q12 were identified as field duplicates. No contaminant concentrations were detected in any of the samples.

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1216753

No Sample Data Qualified in this SDG

NASA JPL

Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1216753

No Sample Data Qualified in this SDG

LDC #: 28534G6	\	ALIDATION COI	MPLETEN	IESS WO	ORKSHEE	ET	Date: 10-17-12
SDG #: 1216753			Level III				Page:of
Laboratory: BC Lab	oratories, Inc.	_					Reviewer: <u>MG</u>
	q. A.	N' in N	IF DA M	S books	53.2)	2n	d Reviewer:

	MZQ	· Nitri	te = N	(EFA MERION			
FTHOD: Chloride	Sulfate	Nitrate-N -Nitr	te-N-Orthe	onhosnhate-P(FP/	Method 300 0)	Perchlorate (FPA Method

METHOD: Chloride, Sulfate, Nitrate-N, Nitrite-N, Ortho	phosphate-P(EPA Metho	od 300.0), Perc	hlorate (EF	PA Method 31	4.0),
Hexavalent Chromium (EPA SW846 Method 7196)						

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
١.	Technical holding times	A	Sampling dates: 9-5-12
11	Initial calibration	A	
111.	Calibration verification	A	
١v	Blanks	A	
v	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	טטר
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
Х.	Field duplicates	ND	D=5+6 D=8+9
XI	Field blanks	N	

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

Validated Samples:

1	MW-12-5	11	MVV-24-1	21		31	
2	MW-12-4	12	MW-12-3MS	22		32	
3	MW-12-3	13	MW-12-3MSD	23		33	
4	MW-12-2	14	MW-12-3DUP	24		34	
5	MW-12-1	15		25		35	
6	DUPE-5-3Q12	16		26		36	
7	MW-24-4	17		27		37	
8	MW-24-3	18		28		38	
9	DUPE-6-3Q12	19		29		39	
10	MW-24-2	20		30	PBW	40	

Notes:

LDC #: 2853466

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: _ _ of _ _ Reviewer: _ _ MG____ 2nd reviewer: _ _ _

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1,2	·W	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR ⁶⁺ CO2
3-76 8-710	(pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{\oplus} CO_4
7		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC (CR^6) CIO ₄
11		pH TDS CI)F (NO, (NO, SO, PO,)ALK CN. NH3 TKN TOC (CR. CIO)
QC12+14	1	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (CR°) (Clo)
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ^{\cdot} NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO₄ PO₄ ALK CN ⁻ NH₃ TKN TOC CR ⁶⁺ ClO₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
6		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO₄ PO₄ ALK CN ⁻ NH₃ TKN TOC CR ⁵⁺ CIO₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁵⁺ CIO₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁵⁺ CIO ₄
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN- NH3 TKN TOC CR ⁶⁺ CIO4
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CLE NO, NO, SO, PO, ALK CN NH, TKN TOC CR6+ CIO,

Comments:___

METHODS.6

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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NASA JPL	Project/Site	Name:	NASA JPL
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Collection Date: September 6, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216917

Sample Identification

TB-1 MW-3-4 MW-3-3 MW-3-2 MW-21-5** MW-21-4 MW-21-3 DUPE-7-3Q12 MW-21-2 MW-21-1

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore gualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/10/12	Bromomethane trans-1,4-Dichloro-2-Butene Methyl Iodide	55.6 33.0 48.9	All samples in SDG 1216917	J (all detects) UJ (all non-detects)	Ρ

The percent differences (%D) of the second source calibration standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/8/12	Acrolein	50.3	All samples in SDG 1216917	J (all detects) UJ (all non-detects)	Ρ

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XII. Compound Quantitation and RLs

All compound quantitation and RLs were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

All tentatively identified compounds were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIV. System Performance

The system performance was acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

Samples MW-21-3 and DUPE-7-3Q12 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concent	ration (ug/L)	
Compound	MW-21-3	DUPE-7-3Q12	RPD
Chloroform	4.2	3.4	21
1,1-Dichloroethane	0.11	0.11	0
cis-1,2-Dichloroethene	0.73	0.52	34
Methyl-tert-butyl ether	0.18	0.20	11
Tetrachloroethene	3.8	2.6	37
Trichloroethene	0.66	0.50	28

XVII. Field Blanks

Sample TB-1 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1216917

SDG	Sample	Compound	Flag	A or P	Reason
1216917	TB-1 MW-3-4 MW-3-3 MW-3-2 MW-21-5** MW-21-5** MW-21-3 DUPE-7-3Q12 MW-21-2 MW-21-1	Bromomethane trans-1,4-Dichloro-2-Butene Methyl Iodide	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1216917	TB-1 MW-3-4 MW-3-3 MW-3-2 MW-21-5** MW-21-4 MW-21-3 DUPE-7-3Q12 MW-21-2 MW-21-1	Acrolein	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1216917

No Sample Data Qualified in this SDG

LDC #: 28534H1	VALIDATION COMPLETENESS WORKSHEET	Date: 10/11/12
SDG #: 1216917	Level III/IV	Page: <u>/</u> of <u>/</u>
Laboratory: BC Laborat	ories, Inc.	Reviewer: 12
		2nd Reviewer:'
METHOD: CC/MS Valat	ilos (ERA Mothod 524.2)	

METHOD: GC/MS Volatiles (EPA Method 524.2)

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
<u>l.</u>	Technical holding times	A	Sampling dates: 9 6/12
П.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	0/0 psD ≤ 20, 12
IV.	Continuing calibration/ICV	SAV	$\frac{0}{0} p_{SD} = 20, 1^{2}$ $\frac{1 c_{V} c_{CV} \leq 30}{2}$
V.	Blanks	Δ	
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	A	MW-12-4 MS/D
VIII.	Laboratory control samples	5	
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	A	
XI.	Target compound identification	Δ	Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	A	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	Δ	Not reviewed for Level III validation.
XIV.	System performance	4	Not reviewed for Level III validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	p=7.8
XVII.	Field blanks	ND	$\Gamma B = 1$

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

Validated Samples:** Indicates sample underwent Level IV validation

·	ualy				-	
1	TB-1	11	BVI0544	21	31	
2	MW-3-4	12		22	 32	
3	MW-3-3	13		23	 33	
4	MVV-3-2	14		24	 34	
5	MW-21-5**	15		25	 35	
6	MW-21-4	16		26	 36	
7	MW-21-3	17		27	 37	
8	DUPE-7-3Q12	18		28	 38	
9	MW-21-2	19		29	 39	
10	MVV-21-1	20		30	 40	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA Method 524.2)

A. Chloromethane	U. 1, 1, 2-Trichloroethane	00. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene	BB. 1,1,2,2-Tetrachloroethane	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane	CC. Toluene	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform	EE. Ethylbenzene	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyi chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN.
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafiuoroethane	0000.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	
0. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	0000.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRR.
Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	
S. Trichloroethene	M.M. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	บบบบ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	VVVV.

•••

Method: Volatiles (EPA Method 524.2)

Validation Area	Yes	No	NA	Findings/Comments
1. Technical holding times				
All technical holding times were met.	\leq			
Cooler temperature criteria was met.				
II. GC/MS Instrument performance check	1			
Were the BFB performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?			Alexandra an	
III. Initial calibration	1	L States		
Did the laboratory perform a 5 point calibration prior to sample analysis?		·		
Were all percent relative standard deviations (%RSD) < 20%?	W	anteri Comin	Dobaiecteris	
IV. Continuing calibration			1	
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	/			
Were all percent differences (%D) < 30%?	M	\vee		
V. Blanks				
Was a method blank associated with every sample in this SDG?	/	<u> </u>		
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	_			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.			F	
VI. Surrogate spikes				
Were all surrogate %R within QC limits?				
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?	21.33.52.14°			
VII. Matrix spike/Matrix spike duplicates			lini in the second s	
Was a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for this SDG?	\square	r		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		the contract of the spectrum of the		
VIII. Laboratory control samples	·		2 1	
Was an LCS analyzed for this SDG?	/			
Was an LCS analyzed per analytical batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				

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VALIDATION FINDINGS CHECKLIST

	Page:	20	f <u></u>
	Reviewer:]	<u>F)</u>
2nd	Reviewer:	(
		- /	

Validation Area	Yes	No	NA	Findings/Comments
IX. Regional Quality Assurance and Quality Control		1		
Were performance evaluation (PE) samples performed?			<u> </u>	
Were the performance evaluation (PE) samples within the acceptance limits?				
X. Internal standards				
Were internal standard area counts within +/-40% from the associated calibration standard?	/	-		
Were retention times within - 30% of the last continuing calibration or +/- 50% of the initial calibration?	/			
XI. Target compound identification		r		
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	/			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	\leq			
Were chromatogram peaks verified and accounted for?	\angle	22.05.000.000.000	20000000000000	
XII. Compound quantitation/CRQLs		1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1	1 1	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	/	-		
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?		-		
XIII, Tentatively identified compounds (TICs)				
Were the major ions (> 25 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	/			
Were relative intensities of the major ions within <u>+</u> 20% between the sample and the reference spectra?		-		
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?	/	1		
XIV, System performance				
System performance was found to be acceptable.				
XV. Overall assessment of data	•			
Overall assessment of data was found to be acceptable.	/	_		
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.	/			
Target compounds were detected in the field duplicates.		-		
XVII. Field blanks				
Field blanks were identified in this SDG.		-		
Target compounds were detected in the field blanks.				

LDC #: 785 34H /

VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

Page: _of_ Reviewer: _/__ 2nd Reviewer: _____

METHOD: GC/MS VOA (EPA Method 524.2) Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". V N. M.A. Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

Y/N/N/A		Were all percent differences (%U) 2 30% ?	<u>/o {</u>			
#		Standard ID		Finding %D (Limit: <u><</u> 30.0%)	Associated Samples	Qualifications
	alin line	12 11-91- 0012	B	22.4	au	J/m/r
		10 To	4-61-5-010/11-64-1-54		1	./
			nitry I Todide		\checkmark	P
			D			
\square						
	21/X/L	1211678-10N2	Acrolum	sv. 3	91/	Z
			-			

LDC #: 28 SDG #: <u>pre 10 veg</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	<u></u> of
Reviewer:	<u> </u>
2nd reviewer:	_

METHOD: GC/MS VOA (EPA Method 524.2)

Y N N/A Y N N/A Were field duplicate pairs identified in this SDG? Were target compounds detected in the field duplicate pairs?

	Concentration	(ug/L)	
Compound	7	8	RPĎ
k	4.2	3.4	21
<u> </u>	0.//	0.11	0
QQ Q	0.73	0.52	34
LL	0.18	0.20	11
AA	3.8	2.6	37
Ś	0.66	0.50	VS

li Compound		RPD

	· · ·		•••		Con	centration	()	
		Compound						RPD
				27 - 14 - 14 27 - 14 - 14 27 - 14				
	· · ·	 <u> </u>	. •.			·• • • • •		
		 · · ·	· · ·					
	· · · · ·		· .					
-		 				·. ·.		

#165 82 1 +46 5 m LDC #._ ₩øgs

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

لر اح U Page: / Reviewer: 2nd Reviewer.

METHOD: GC/MS VOA (EPA Method 524.2)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the follow calculations:

 $\label{eq:RFF} RFF = (A_{*})(C_{*})/(A_{*})(C_{*})$ average RRF = sum of the RRFs/number of standards %RSD = 100 * (S/X)

 $A_x = Area$ of compound, $C_x = Concentration of compound,$ S = Standard deviation of the RRFs<math>X = Mean of the RRFs

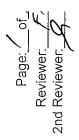
 $A_{hs} = Area$ of associated internal standard $C_{hs} = Concentration of internal standard$

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	RRF (25 std)	RRF (Z ^{std)}	Average RRF (initial)	Average RRF (initial)	"RSD	USA%
-	1091	11/8/6	いいいとして、 Methytene Chloride (1st Internal Standard)	0.522	0.522	79431230	0.522	6.75	6. 23
	SNSW		Trichloroethene (2nd Internal Standard)	0.348	0.348	8ch6asz.0	0.357	8:22	77:38
			Chlow benzere (3rd Internal Standard)	3.034	3.034	3.107255	3.107	3.1.6	9.18
2			A/I4/ Methylene Chloride (1st Internal Standard)	o. s40	01.5-0	6.54142.0	245.0	4.09	4.09
			The Huy / not fac (2nd Internal Standard)	0.080	0.0%	0.07696	0.077	16:5	16-5
			H-1, 4- di Wlord- 3 - bu le - 60	0.117	6-117	0.1120184	0.112	11-94	H611
6			Methylene Chloride (1st Internal Standard)						
			Trichloroethene (2nd Internal Standard)						
			Bromoform (3rd Internal Standard)						
4			Methylene Chloride (1st Internal Standard)						
			Trichloroethene (2nd Internal Standard)						
			Bromoform (3rd Internal Standard)						

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

LDC #. 285 34H SPO#

VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compoun identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF RRF = (A_x)(C_s)/(A_{1s})(C_x)

Where: ave. RRF = initial calibration average RRF RRF = continuing calibration RRF

 $A_x = Area of compound, C_x = Concentration of compound,$

 $A_{is} = Area$ of associated internal standard $C_{is} = Concentration of internal standard$

#Standard ID bateCalibration DateCalibration DateReported (initial)Reported (initial)1 $/2/lb30^{-}$ $3/lo/lv$ $Vu'ny'/vAverage RRF(initial)RRF(initial)RRF(initial)RRF(initial)1/2/lb30^{-}3/lo/lvVu'ny'/v0.52l Way'/v0.49'/w0.4'/w2Vu'ny'/vVu'ny'/v0.52l Way'/v0.78'/v0.78'/v0.78'/v2Vu'ny'/vVu'ny'/v0.74'/v0.78'/v0.78'/v0.78'/v0.78'/v2Vu'ny'/vVu'ny'/v0.74'/v0.74'/v0.78'/v0.78'/v0.78'/v0.78'/v2Vu'ny'/vVu'n'n'/v0.74'/v0.76'/v0.74'/v0.76'/v$									
Calibration Calibration Compound (Reference internal Standard) Average RRF (initial) RRF (cc) 12.1/670- 7/0/1 Wihyd/ Methydana Chloride (1st Internal Standard) 0.521 & W7 0.477 & W7 12.1/670- 7/0/1 Methydana Chloride (1st Internal Standard) 0.521 & W7 0.477 & W7 12.1/670- 7/0/1 Trichloroethene (2nd Internal Standard) 0.521 & W7 0.477 & W7 12.1/670- 7/0/1 Methydena Chloride (1st Internal Standard) 0.577 & 2.657						Reported	Recalculated	Reported	Recalculated
Standard ID Calibration Compound (Reference internal Standard) Average RRF RRF RRF 12.1/L90- 9/p/L Winnyton Chon location 0.521 k977 0.497 k974 (cc) 12.1/L90- 9/p/L Multivenschinder (1st Internal Standard) 0.521 k977 0.497 k974 (cc) CeV L Trichloroethene (2nd Internal Standard) 0.521 k977 0.478 k97 0.355 057 k97 0.488 57 0.557 k97 0.488 57 0.557 k97 0.483 57 0.557 k97 0.557 k97 0.551 k97 0.557 k97 0.578 57 0.565 57									
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	%D	۵%
$evl 2$ Trichloroethene (2nd Internal Standard) $D. 350747d$ $D. 350778^{2}$ $Trichloroethene (2nd Internal Standard)D. 350747d2.56575^{2}RindrytomA.ldg(3rd Internal Standard)2.571764^{2}3.05257^{2}A.ldgA.ldgD.hathylone Chloride (1st Internal Standard)0.571764^{2}3.05737^{2}P.ldgP.ldgD.hathylone Chloride (1st Internal Standard)0.57176^{2}3.05737^{2}P.ldgP.ldgD.hatholene (2nd Internal Standard)0.071676^{2}0.058309^{2}P.ldgP.ldgD.hatholene (2nd Internal Standard)0.071676^{2}0.058309^{2}P.ldgP.ldgD.hatholene (2nd Internal Standard)0.071876^{2}0.058309^{2}P.ldgP.ldgD.ldgD.ldg0.071876^{2}0.058309^{2}P.ldgD.ldgD.ldgD.ldgD.ldgD.ldgP.ldgD.ldgD.ldgD.ldgD.ldgD.ldgP.ldgD.ldgD.ldgD.ldgD.ldgD.ldgP.ldgD.ldgD.ldgD.ldgD.ldgD.ldgP.ldgD.ldgD.ldgD.ldgD.ldgD.ldgP.ldgD.ldgD.ldgD.ldgD.ldgP.ldgD.ldgD.ldgD.ldgD.ldgP.ldgD.ldgD.ldgD.ldgD.ldgP.ldgD.ldgD.ldgD.ldgD.ldgP.ldg$	-	-0691121	11/0/6	いっけり/ Methylene-Chloride (1st Internal Standard)	0.5218497	0.4998474	0. 499 WW	4.2	4.2
Chore et al.S. 1 c 72 X $3 \cdot 1 c 72 X$ $3 \cdot c 5 3' 5' 7$ A.Mat Much Methylene Chloride (1st Internal Standard) $0 \cdot 5' 1' 7 3' 7' 8' 7'$ $2 \cdot 5' 1' 8' 3' 7' 8' 7'$ A.Mat Much Methylene Chloride (1st Internal Standard) $0 \cdot 5' 1' 7 3' 7' 8' 7'$ $0 \cdot 5' 3' 7 3' 7' 8' 7'$ A.Mat Much Methylene Chloride (1st Internal Standard) $0 \cdot 5' 1' 7 3' 7' 8' 7'$ $0 \cdot 5' 3' 7 3' 7' 8' 7'$ Methylene Chloride (1st Internal Standard) $0 \cdot 5' 1' 7 3' 7' 8' 7'$ $0 \cdot 5' 3' 7' 8' 7' 7' 8' 7' 8' 7' 7' 8' 7' 7' 8' 7' 7' 7' 7' 7' 7' 7' 7' 7' 7' 7' 7' 7'$		cov 2		Trichloroethene (2nd Internal Standard)	Prhbass a	0. 25 105782	0.2505782	0 . /	0./
A^{1}/lg^{1} A^{1}/lg^{1} A^{2}/lg^{1} A^{2}/lg^{1} A^{2}/lg^{1} A^{2}/lg^{2} a_{2}/lg^{1} $a_{2}/lg^{2}/lg^{2}$ $a_{2}/lg^{$				Chlore Bens (3rd Internal Standard)	3.16725	7.05857	3.0587	イト	1.6
$ \left \begin{array}{c c c c c c c c c c c c c c c c c c c $	7			A.// J Methylene Chloride (1st Internal Standard)	0. 541 9254	0-5814832	0-5214832	5 · Z	7.3
T-1,4-U:Vhore-A-Lution C-1120/W C-1120/W C-149 cp/1 Remarktion (3xd internal Standard) C-1120/W C-1120/W C-149 cp/1 Methylene Chloride (1st Internal Standard) Trichloroethene (2nd Internal Standard) C-1120/W C-1120/W C-149 cp/1 Richnoform (3rd Internal Standard) Methylene Chloride (1st Internal Standard) C-1120/W C-1120/W C-149 cp/1 Richnoform (3rd Internal Standard) Methylene Chloride (1st Internal Standard) C-1120/W C-1120/W C-149 cp/1 Trichloroethene (1st Internal Standard) Trichloroethene (2nd Internal Standard) C-1120/W C-1120/W C-1120/W				Trichloreathene (2nd Internal Standard)	0.07696	405850.0	0.018304	6.71	14.7
				T - 1, 4 - 0, 5, 5, 000 - 3 - 5, 4, - 1000 - 3, - 10	h810c11-0	1/00/6/1-0	0.149001)	33.0	33.0
Methylene Chloride Trichloroethene Bromoform Methylene Chloride Trichloroethene									
Trichloroethene Bromoform Romoform Methylene Chloride Trichloroethene 1	б			Methylene Chloride (1st Internal Standard)					
Bromoform Methylene Chloride Trichloroethene									
Methylene Chloride Trichloroethene									
	4			Methylene Chloride (1st Internal Standard)					
Bromoform (3rd Internal Standard)									

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

SURVYALE RESULTS VERTICATION

Percent Difference

U

METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID: #5				
	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery
			Reported	Recalculated
Toluene-d8	Ю	9.8200	98.2	-7 98.2
Bromofluorobenzene		9.84	98.4	3 98.4
1,2-Dichlorobenzene-d4	1U	10.870	109	1,09

Sample ID:

Dibromofluoromethane

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

Sample ID:_

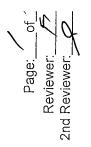
	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

Sample ID:_

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toiuene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

LDC #: 2853XH	SDG#:
LDC #:	SDG#

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified beli using the following calculation:

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration SA = Spike added

RPD = I MSC - MSDC I * 2/(MSC + MSDC)

MSC = Matrix spike percent recovery

MSDC = Matrix spike duplicate percent recovery

SC = Sample concentration

MS/MSD sample: MW-12-4

	Spike	ke	Sample	Spiked Sample	ample	Matrix Spike	Spike	Matrix Spike Duplicate	Duplicate	SIM	US/MSD
	Add	ed	Concentration	Concentration	ration						
Compound	gn)	<u>د</u>	(m) U	<u>ک</u> ر	4 2	Percent Recovery	ecovery	Percent Recovery	ecovery		RPD
	MS	MSD	P -	SM	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	х.0	مر .0	νD	26.20	201 NO 101/10 102 102	501	107	+11	114	PL-7 PL-7	PT-79
Trichloroethene	-		_	24.680	24.680 24.40	98.7 98.7	L'X1	101	901	61.1	6.73
Benzene				ass.m	226 2.36 OLT. 2 Crain	2.36	94.2	107	107	8.65	8.65
Toluene				U64.42	T.FP Urrun Urt.M	1.tP	97.7	105	50)	6h-L	64-7
Chlorobenzene	->		->	an.m	0.79 U.79 92.10 94.10	97-0	0.46	701	901	81.8	8-75

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of gualifications and associated samples when reported results do not agree within 10.C of the recalculated results.

+	
25 34K	
LDC #: 2	SDG#

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculat for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: S

Where: SSC = Spiked sample concentration SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCSID: BUTO 544 - 1321

LCS/LCSD	RPD	Recalculated										
1CS/		Reported										
csn.	Percent Recovery	Recalc										
	Percent	Reported	-				Al N					
cs	Recovery	Recalc	101	hol	98.2	Xib	2.15	- \				
J T	Percent Recovery	Reported	101	10Y	98.2	3.7.R	2.96					
sample	tration	I CSD	AN				ر					
Spiked 3	Concentration	l CS	ass.m	76.69 U	24.550	24.450	CHO42					
oike	Added	1 CSD	42	_			9					-
Ś	A 7 8 7	1 CS	0-52				>					-
	Compound		1,1-Dichloroethene	Trichloroethene	Benzene	Toluene	Chiorobenzene					

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of t recalculated results.

LDC #:<u>183 24 /7</u>/ SDG #:_____

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Example:

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Page:_	
Reviewer:	FT
2nd reviewer:	<u> </u>
	-y
	/

METHOD: GC/MS VOA (EPA Method 524.2)

-		results for using the following equation:
Concer	ntratio	$n = \frac{(A_{v})(I_{o})(DF)}{(A_{is})(RRF)(V_{o})(\%S)}$
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured
A _{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
ls	=	Amount of internal standard added in nanograms (ng)
RRF	11	Relative response factor of the calibration standard.
V°	=	Volume or weight of sample purged in milliliters (ml) or grams (g).
Df	=	Dilution factor.
%S	=	Percent solids, applicable to soils and solid matrices only.

____reported with a positive detect were recalculated

Sample I.D. <u>#5</u>, <u>K</u>:

Conc. = (151756) (10) ()303279 (0.8141746) () ()

6.20 6.15 mg/L

#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Acceptable (Y/N)
		······································			
		······			

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
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Collection Date: September 6, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Chromium

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216917

Sample Identification

MW-3-4 MW-3-3 MW-21-5** MW-21-4 MW-21-3 DUPE-7-3Q12 MW-21-2 MW-21-1 MW-3-4MS MW-3-4MSD MW-3-4DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No metal contaminants were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Chromium	1.0210 ug/L	All samples in SDG 1216917

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-3-4	Chromium	0.77 ug/L	0.77U ug/L
MW-21-5**	Chromium	0.75 ug/L	0.75U ug/L
MW-21-4	Chromium	0.73 ug/L	0.73U ug/L
MW-21-3	Chromium	0.62 ug/L	0.62U ug/L
MW-21-1	Chromium	1.4 ug/L	1.4U ug/L

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required for this SDG.

VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples MW-21-3 and DUPE-7-3Q12 were identified as field duplicates. No chromium was detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)		
Analyte	MW-21-3	DUPE-7-3Q12	RPD	
Chromium	0.62	0.50U	200	

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Metals - Data Qualification Summary - SDG 1216917

No Sample Data Qualified in this SDG

NASA JPL Metals - Laboratory Blank Data Qualification Summary - SDG 1216917

SDG	Sample	Analyte	Modified Final Concentration	A or P
1216917	MW-3-4	Chromium	0.77U ug/L	A
1216917	MW-21-5**	Chromium	0.75U ug/L	A
1216917	MW-21-4	Chromium	0.73U ug/L	A
1216917	MW-21-3	Chromium	0.62U ug/L	A
1216917	MW-21-1	Chromium	1.4U ug/L	A

_ VALIDATION COMPLETENESS WORKSHEE	T
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Level III/IV

Laboratory: <u>BC Laboratories, Inc.</u> *Chromium* METHOD: Metals (EPA Method 200.8)

LDC #: 28534H4

SDG #: 1216917

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
١.	Technical holding times	A	Sampling dates: 9-6-12
١١.	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	Α	not required MS/MSD
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	not reviewed for level 111
X.	Furnace Atomic Absorption QC	N	not reviewed for level 111 not performed utilized
XI.	ICP Serial Dilution	N	not performed
XII.	Sample Result Verification	Α	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	D = 6 + 7
xv	Field Blanks	N	

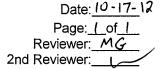
Note: A = Acceptable

N = Not provided/applicable SW = See worksheet ND = No compounds detected R = Rinsate FB = Field blank D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples:** Indicates sample underwent Level IV validation $O(1) \rightarrow O(2 + \ell)$

	an water					
1	MVV-3-4	11	MW-3-4MSD	21		31
2	MW-3-3	12	MW-3-4DUP	22		32
3	MW-3-2	13		23		33
4	MW-21-5**	14		24		34
5	MW-21-4	15		25		35
6	MW-21-3	16		26		36
3 4 5 7 8 9	DUPE-7-3Q12	17		27		37
8	MW-21-2	18		28		38
9	MW-21-1	19		29		39
10	MW-3-4MS	20		30	PBW	40

Notes:_



Method:Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	1			
Cooler temperature criteria was met.	\checkmark			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	1			
Were %RSD of isotopes in the tuning solution ≤5%?	\checkmark			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	1			
Were the proper number of standards used?	1			
Were all initial and continuing calibration verification %Rs within the 90-110% (80- 120% for mercury) QC limits?	/			
Were all initial calibration correlation coefficients > 0.995?	~			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	\checkmark			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	/			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?		1		
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			/	
VI. Matrix spike/Matrix spike 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) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.	\checkmark			
VII. Laboratory control samples	·			
Was an LCS anaylzed for this SDG?	\checkmark			
Was an LCS analyzed per extraction batch?	\checkmark			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	\checkmark			

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VALIDATION FINDINGS CHECKLIST

Page: 2	of 2
Reviewer:	MG
2nd Reviewer:	\sim

Validation Area	Yes	No	NA	Findings/Comments		
VIII. Furnace Atomic Absorption QC						
If MSA was performed, was the correlation coefficients > 0.995?			/			
Do all applicable analysies have duplicate injections? (Level IV only)			\checkmark			
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			V			
Were analytical spike recoveries within the 85-115% QC limits?						
IX. iCP Serial Dilution						
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		\checkmark	ļ,	· · · · · · · · · · · · · · · · · · ·		
Were all percent differences (%Ds) < 10%?			\checkmark			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.						
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)						
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	/					
If the %Rs were outside the criteria, was a reanalysis performed?			/			
XI. Regional Quality Assurance and Quality Control						
Were performance evaluation (PE) samples performed?		/	1			
Were the performance evaluation (PE) samples within the acceptance limits?		`	/			
XII. Sample Result Verification						
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/					
XIII. Overall assessment of data						
Overall assessment of data was found to be acceptable.	1		·			
XIV. Field duplicates						
Field duplicate pairs were identified in this SDG.	/					
Target analytes were detected in the field duplicates.						
XV. Field blanks			a			
Field blanks were identified in this SDG.		/		·		
Target analytes were detected in the field blanks.			1	[

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Sample Concentration units, unless otherwise noted: ug/L SDG #: See Cover LDC #: 28534H4

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES Soil preparation factor applied: NA Associated Samples: all

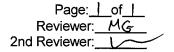


<u>4</u>. თ 0.62 ശ 0.73 ഹ 0.75 4 0.77 . 5.105 Action Limit Maximum ICB/CCB^a (ug/L) 1.0210 Maximum PB^a (ug/L) Maximum PB^a (mg/Kg) Analyte ວັ

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U". Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC#: 28534H4

VALIDATION FINDINGS WORKSHEET Field Duplicates



METHOD: Metals (EPA Method 6010B/7000)

<u>WNNA</u> Were field duplicate pairs identified in this SDG?

YNNA Were target analytes detected in the field duplicate pairs?

	Concentra	tion (ug/L)		
Analyte	6	7	RPD	
Chromium	0.62	0.50U	200	

V:\FIELD DUPLICATES\FD_inorganic\28534H4.WPD

LDC # 08534 H4

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

0 Page: L Reviewer: 2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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

Where, Found = concentration (in ug/L) of each analyte <u>measured</u> in the analysis of the ICV or CCV solution True = concentration (in ug/L) of each analyte in the ICV or CCV source %R = <u>Found</u> x 100 True

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
0959 ICV	ICP/MS (Initial calibration)	Cr	51.602	50.000	103	103	>
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1634 CCVA	ICP/MS (Continuing calibration)	Cr	40.813	40.000	102	102	
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

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.

CALCLC.4SW

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VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: 1 of 1 Reviewer: MG

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formuta:

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

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

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

%D = <u>|i-SDR|</u> x 100 Where, I = Initial Sample Result (mg/L) I SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
1	ICP interference check	l	١	1	}	l	-
۲ د S	Laboratory control sample	S	48.443 (mg/r)	40.000 (mg/)	106	901	٢
1691	Matrix spike	C r	Cr (ssr-sr) Cr (41.107 (mg/L)	02 (mg/r) 40.000 (mg/r)	103	103	
1613 × 1615 (2	Duplicate	Cr	0.767 (mg/L)	(mg/r) 0.862 (mg/r)	1.11	11.7	
1	ICP serial dilution	1	l	-	١	J	J

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

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LDC #:	2853444	
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VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	of
Reviewer:	MG
2nd reviewer:	

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

	N/A Are results N/A Are all dete	ts been reported an within the calibrate action limits below t	id calculated o d range of the he CRDL?	correctly?			
Detect equation	ed analyte results for on:	#4, C			were recalcu	lated and verified	using the following
Concent	ration = <u>(RD)(FV)(Dil</u> (In. Vol.)			alculation:			
RD FV In. Vol. Dil	 Raw data cor Final volume Initial volume Dilution factor 	centration (ml) (ml) or weight (G)	(0.752	Mg/L 0.5)(0.050L) D50L	_ = 0.75.	2 ^{Mg} /L
#	Sample ID		Analyte		Reported Concentration (パタ (し)	Calculated Concentration (パスノム)	Acceptable (Y/N)
1	Ц		Cr		0.75	0.75	Ý
					······································		
			<u></u>				
						<u> </u>	

Note:

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NASA JPL

Collection Date: September 6, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc..

Sample Delivery Group (SDG): 1216917

Sample Identification

MW-3-4 MW-3-3 MW-3-2 MW-21-5** MW-21-4 MW-21-3 DUPE-7-3Q12 MW-21-2 MW-21-1 MW-3-4MS MW-3-4MSD MW-3-4DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 314.0 for Perchlorate and EPA SW 846 Method 7196 for Hexavalent Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples MW-21-3 and DUPE-7-3Q12 were identified as field duplicates. No contaminant concentrations were detected in any of the samples.

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1216917

No Sample Data Qualified in this SDG

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1216917

No Sample Data Qualified in this SDG

LDC #: <u>28534H6</u>	VALIDATION COMPLETENESS WORKSHEET	
SDG #: <u>1216917</u>	Level III/IV	
Laboratory: BC Laboratories,	<u>Inc.</u>	Re

Date: 10-18-12 Page: 1 of 1 eviewer: MC 2nd Reviewer:

METHOD: Perchlorate (EPA Method 314.0), Hexavalent Chromium (EPA SW846 Method 7196)

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.	Technical holding times	A	Sampling dates: 9-6-12
Ш	Initial calibration	A	
- 111.	Calibration verification	A	
IV	Blanks	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	Not reviewed for Level III validation.
IX.	Overall assessment of data	A	
Χ.	Field duplicates	ND	D=6+7
XI	Field blanks	N	

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

Validated Samples:** Indicates sample underwent Level IV validation

	all wate			· · · · · · · · · · · · · · · · · · ·			
1	MW-3-4	11	MW-3-4MSD	21		31	
2	MW-3-3	12	MW-3-4DUP	22		32	
3	MW-3-2	13		23		33	
4	MW-21-5**	14		24		34	
5	MW-21-4	15		25		35	
6	MW-21-3	16		26		36	
7	DUPE-7-3Q12	17		27		37	
8	MW-21-2	18		28		38	
9	MW-21-1	19		29		39	
10	MW-3-4MS	20		30	PBW	40	

Notes:

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Method: Inorganics (EPA Method See cover

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	1			
Cooler temperature criteria was met.	\checkmark			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	~			
Were the proper number of standards used?	\checkmark			
Were all initial calibration correlation coefficients <a> 0.995?			L	
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	\checkmark			
Were titrant checks performed as required? (Level IV only)			\checkmark	
Were balance checks performed as required? (Level IV only)			1	
III. Blanks				
Was a method blank associated with every sample in this SDG?	\checkmark			
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) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CRDL(\leq 2X CRDL for soil) was used for samples that were \leq 5X the CRDL, including when only one of the duplicate sample values were \leq 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	\checkmark			
Was an LCS analyzed per extraction batch?	\checkmark			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	\checkmark			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		\checkmark		
Were the performance evaluation (PE) samples within the acceptance limits?	[

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: MG 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?	\checkmark			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	\checkmark			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	\checkmark			
Target analytes were detected in the field duplicates.		\checkmark		
X. Field blanks				
Field blanks were identified in this SDG.		\checkmark		
Target analytes were detected in the field blanks.			\checkmark	

LDC #: 28534H6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: 1 of 1 Reviewer: MG 2nd reviewer: _____ PANAT -

All circled methods are applicable to each sample.

Samula ID	Matrix	Parameter
Sample ID		
OC 10-12		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (CR^{6+}) (CIO_{2})
10-3(2	¥	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC(CR^{6+}) CIO ₄)
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ^{\cdot} NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁵⁺ CIO ₄
		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁵⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO₄ PO₄ ALK CN ⁻ NH₃ TKN TOC CR ⁶⁺ CIO₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CLF NO, NO, SO, PO, ALK CN NH, TKN TOC CR ⁶⁺ CIO,

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Comments:_

METHODS.6

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LDC# 28534H6

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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> COVER see METHOD: Inorganics, Method

8-22-12 was recalculated. Calibration date: Cr S The correlation coefficient (r) for the calibration of $_$

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

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 %R = Found × 100 True

гог жя 92 ^{V д} =0.999978 108 97.6				(Y	Recalculated	Renorted	
Blank 0.000 (mg/L) 0.001 Number Nu	Type of Analysis	Analyte	Standard ID	Found (units)	True (units)	T 01 %D	Q /0 - 2 - 2	Acceptable
Standard 1 0.002 (1) 0.003 Standard 2 0.005 (1) 0.005 Standard 3 0.035 (1) 0.005 Standard 4 0.035 (1) 0.022 Standard 5 0.100 (1) 0.023 Standard 6 $ -$ Standard 6 $ -$ Standard 7 $ -$ Standard 7 $ -$ Standard 7 $ -$ Standard 7 $ -$ OLO4 $CCV2$ 10.7583 ($\mu g/L$) 10.000 ($\mu g/L$) CIO4 $CCV2$ 10.7583 ($\mu g/L$) 0.050 ($m g/L$) 7.6	Initial calibration		Blank	0.000 (mg/r)	0.001			(hu)
Standard 2 0.005 0.005 0.005 Standard 3 0.035 0.0022 $1^2 = 0.99892$ Cr VI Standard 5 0.006 0.042 $1^2 = 0.99892$ Standard 5 0.100 0.023 $1^2 = 0.99892$ Standard 6 $ -$ Standard 7 $ -$ Standard 7 $ -$ Standard 7 $ -$ O104 0.7593 10.7593 10.000 $10 $ 108 Cr VI $CcVI$ 0.04878 0.050 9.10 97.6			Standard 1	0.002(1)	0.003			
Cr VI Standard 3 0.035 (1) 0.022 7^2 7^2 9^2 7^2 9^2 10^2 9^2 10^2 10^2 9^2 10^2			Standard 2		0,005			
Cr VI Standard 4 0.050 (1) 0.043 $0'=0.9993$ Standard 5 0.100 (1) 0.083 0.093 Standard 6 $ -$ Standard 7 $ 0.518$ 0.0753 $//g/L$ 10.000 0.753 0.7533 $//g/L$ 10.000 0.753 0.04878 $//g/L$ 0.050 $ 0.04878$ $//g/L$ 0.050 $ 0.00000000000000000000000000000000000$			Standard 3	0.095 ()	220.0	•	r 8- 00000	
Standard 5 0.100 (J) 0.083 Standard 6 - - Standard 7 - - 0.318 - - 0.318 0.010 - 0.318 10.7583 (μ_g/L) 10.000 (μ_g/L) 0.753 10.7583 (μ_g/L) 10.000 (μ_g/L) 0.753 0.04878 (m_g/L) 0.050 (m_g/L) $-$ - -	·	Crvi	Standard 4	0.050 ()	640.0	6120.9999892	= 0. 4444 /8	≻
Standard 5 - - - Standard 7 - - - Standard 7 - - - o^{518} - - - o^{518} - - - o^{518} - - - o^{518} 10.7583 (u_q/L) 10.000 (u_q/l) 108 o^{753} 0.7583 (u_q/L) 10.000 (u_q/l) 108 o^{753} 0.04878 (m_q/L) 0.050 (m_q/l) 97.6 $-$ - - - -			Standard 5	•	630.0			_
Standard 7 - - 0318 0318 - - 0104 CCV2 10.7583 (mg/L) 10.000 (mg/L) 108 0153 0.753 0.04878 (mg/L) 0.050 (mg/L) 97.6			Standard 6	1	J			
CIUH CCV2 10.7583 (mg/L) 10.000 (mg/L) 108 CrV1 CCV1 0.04878 (mg/L) 0.050 (mg/L) 97.6			Standard 7	ł	1			
CIU4 CCV2 10.7583 (mg/L) 10.000 (mg/L) 108 0753 0.04878 (mg/L) 0.050 (mg/L) 97.6	Calibration verification		0318					
CrVI CCVI 0.04878 (mg/L) 0.050 (mg/L) 97.6		C104	CCVJ	10.7583 (mg/L)	(1/bn) 000.01		108	
CrVI CCVI 0.04878 (mg/L) 0.050 (mg/L) 97.6	Calibration verification		0753			×.		
Calibration verification		Cr VI	Ccvl	0.04878 (mg/L)	0.050 (mg/1)		97.6	;
	Calibration verification							
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recalculated results.

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VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: <u>of 1</u> Reviewer: <u>MG</u> 2nd Reviewer: <u>1</u>

METHOD: Inorganics, Method See cover

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

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. Found = Where, %R = <u>Found</u> x 100 True

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

RPD = <u>IS-DI</u> × 100 Where, S = (S+D)/2 D =

Original sample concentration Duplicate sample concentration

Sample ID Type of Analysis 0.95 I Laboratory control sample L C	is Element ple C1Ομ	t Found / S (units)	True / D (units)			
				%R / RPD	%R / RPD	Acceptable (Y/N)
	CIOH					
Matrix enika samuta			11.3625 (mg/L) 10.000 (mg/L)	114	114	\succ
		(SSR-SR)				
01	Cr VI		0.04302 (mg/L) 0.050 (mg/L)	86.0	86.0	
0305 / 0344 Duplicate sample						
د)	CIOH		ND (mg/r) ND (mg/r) O	0	١	

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

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LDC #	2853446	VALIDATION FINDINGS V Sample Calculation Ve		Pag Review 2nd review	ge: <u>lof</u> ver: <u>MG</u> ver:			
METH	OD: Inorganics, Method	sce cover						
(Y)N I (Y)N I (Y)N I (Y)N I Composition recalcu	V/A Have results V/A Are results with V/A Are results with V/A Are all detects ound (analyte) results for all detects Indetects	w for all questions answered "N". Not appeen reported and calculated correctly? thin the calibrated range of the instrume ion limits below the CRQL? or $\underline{\#4}, Crvi$ g the following equation:	ents?	e identified as "N/. rted with a positiv				
Concent		Recalculation:						
	r = 1.243 = 0.001	Cr VI = 1.243 × (0.00)	(-0.001) = 0	.00194				
	= (x							
#	Sample ID	Analyte	Reported Concentration (۳%/L)	Calculated Concentration (Acceptable (Y/N)			
	4	Cr	0.0012 0.0012 Y					
		. <u> </u>						
 								
 		· · · · · · · · · · · · · · · · · · ·						
		-						
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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
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Collection Date: September 7, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216984

Sample Identification

TB-1 MW-13 MW-10 MW-6 MW-5 MW-13MS MW-13MSD

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 30.0% with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/11/12	Bromomethane Acrolein trans-1,2-Dichloro-2-Butene Methyl Iodide Pentachloroethane	46.1 72.4 32.2 31.6 63.2	All samples in SDG 1216984	J (all detects) UJ (all non-detects)	Ρ

The percent differences (%D) of the second source calibration standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/8/12	Acrolein	50.3	All samples in SDG 1216984	J (all detects) UJ (all non-detects)	Ρ

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and RLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

XVII. Field Blanks

Sample TB-1 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1216984

SDG	Sample	Compound	Flag	A or P	Reason
1216984	TB-1 MW-13 MW-10 MW-6 MW-5	Bromomethane Acrolein trans-1,2-Dichloro-2-Butene Methyl lodide Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1216984	TB-1 MW-13 MW-10 MW-6 MW-5	Acrolein	J (all detects) UJ (all non-detects)	Р	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1216984

No Sample Data Qualified in this SDG

NASA JPL Volatiles - Field Blank Data Qualification Summary - SDG 0000

No Sample Data Qualified in this SDG

LDC #:	2853411	VALIDATION COMPLETENESS WORKSHEET	Date: 10/17/12
SDG #:_	1216984	Level III	Page: <u>/</u> of
Laborato	ory: BC Laboratories,	Inc.	Reviewer:
			2nd Reviewer:

METHOD: GC/MS Volatiles (EPA Method 524.2)

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.	Technical holding times	A	Sampling dates: 9/1/12
11.	GC/MS Instrument performance check	A	., , , ,
111.	Initial calibration	A	% psp < 20, 12
IV.	Continuing calibration/ICV	SW	$1 col con \neq 3 U$
V.	Blanks	$\underline{\wedge}$	· -
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	\square	
VIII.	Laboratory control samples	<u> </u>	
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	\wedge	
XI.	Target compound identification	N	
XII.	Compound quantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	M	TB=1

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

/

Validated Samples:

vanu	water				
1	TB-1	11	BVI0656	21	31
2	MW-13	12		22	32
3	MW-10	13		23	33
4	MW-6	14		24	34
5	MVV-5	15		25	35
6	MW-13MS	16		26	36
7	MW-13MSD	17		27	37
8		18		28	38
9		19		29	39
10		20		30	40

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METHOD: VOA (EPA Method 524.2)

A. Chloremethane	Q. 1,2-Dichloropropene	GG. Xylenea, total	WW. Bromobenzene	MMM. Naphthalene
B. Bromomethane	R. cia-1,3-Dichloropropene	HH. Vinyi acetate	XX. 1,2,3-Trichloropropane	NNN. 1,2,3-Trichlorobenzene
C. Vinyl choride	. S. Trichioroethene	il. 2-Chioroethyivinyi ether	YY. n-Propylbenzene	000. 1,3,5-Trichlorobenzene
D. Chioroethane	T. Dibromochloromethene	JJ. Dichlorodiffuoromethane	ZZ. 2-Chlorotoluene	PPP. trans-1,2-Dichloroethene
E. Methylene chloride	U. 1,1,2-Trichleroethane	KK. Triohioroftuoromethane	AAA. 1,3,5-Trimethylbenzene	QQQ. cia-1,2-Dichloroethene
F. Acetone	V. Benzene	LL. Methy-tert-butyf ether	BBB. 4-Chiorotoluene	RRR. m.p-Xylenes
G. Carbon disuilide	W. trans-1,3-Dichloropropene	MM. 1,2-Dibromo-3-chloropropane	CCC. tert-Butylbenzene	SSS. o-Xylene
H. 1,1-Dichloroethene	X. Bromoform	NN. Diethyl ether	DDD. 1,2,4-Trimethylbenzene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane
I. 1,1-Dichloroethane	Y. 4-Methyl-2-pentanone	00. 2,2-Dichioropropane	EEE. sec-Butylbenzene	UUU. Benzyl chloride
J. 1,2-Dichleroethene, total	Z. 2-Hexanone	PP. Bromochloromethane	FFF. 1,3-Dichlorobenzene	VW. 4-Ethyltoitene
K. Chioroform	AA. Tatrachiereethene	aa. 1,1-Dichloropropene	GGG. p-leopropyttoluene	WWW. Ethanol
L. 1,2-Dichloroethane	BB. 1,1,2,2-Tetrachloroethane	RR. Dibromothane	HHH. 1,4-Dichlorobenzene	XXX. Ethyl ether
M. 2-Butanone	CC. Toluene	SS. 1,3-Dichloropropane	III. n-Butylbenzene	
N. 1,1,1-Trichioroethane	DD. Chlorobenzene	TT. 1,2-Dibromcethane	JJJ. 1,2-Dichlorobenzene	
O. Carbon tetrachloride	EE. Ethylbenzene	UU. 1,1,1,2-Tetrachioroethane	KKK. 1,2,4-Trichlorobenzene	
P. Bromodichioromethane	FF. Styrene	VV. isopropylbenzene	LLL. Hexachiorobutadiene	

Notes:

COMPNDL_185

LDC # 28 534 I)

VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

Page: <u>/</u>of <u>́</u> Reviewer:

METHOD: GC/MS VOA (EPA Method 524.2)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>V</u>N N/A VAS a continuing calibration standard analyzed at least once every 12 hours for each instrument?

б Qualifications 5 3 **Associated Samples** = ∢ Finding %D (Limit: ≤30.0%) 63.2 32.4 γ 77.4 46.1 g mmg-c- analizid -Pen Fachloroetheure Methy] Indide A crolein Compound Acrolein В Were all percent differences (%D) $\leq 30\%$? -smert 12/11678-1ev 2 V20-81112 Standard ID 1112 Date 21/8/6 Y N N/A #

Laboratory Data Consultants, Inc. Data Validation Report

October 22, 2012

Project/Site Name: NASA JPL

Collection Date: September 7, 2012

LDC Report Date:

Matrix:

Parameters:

Water

Chromium

.

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1216984

Sample Identification

MW-13 MW-10 MW-6 MW-5 MW-13MS MW-13MSD MW-13DUP

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
9/13/12	CCV (17:41)	Chromium	113 (90-110)	MW-10 MW-6 MW-5	J (all detects)	Ρ

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No chromium was found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Chromium	1.9200 ug/L	All samples in SDG 1216984

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-6	Chromium	2.3 ug/L	2.3U ug/L

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required by the method.

VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

Raw data were not reviewed for this SDG.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Chromium - Data Qualification Summary - SDG 1216984

SDG	Sample	Analyte	Flag	A or P	Reason
1216984	MW-10 MW-6 MW-5	Chromium	J (all detects)	Ρ	Calibration (%R)

NASA JPL Chromium - Laboratory Blank Data Qualification Summary - SDG 1216984

SDG	Sample	Analyte	Modified Final Concentration	A or P
1216984	MW-6	Chromium	2.3U ug/L	A

LDC #:_	2853414	VALIDATION COMPLETENESS WORKSHEET	Date: <u>10-18-</u> 12
SDG #:_	1216984	Level III	Page:_/_of_ (
Laborato	ory: <u>BC Laborato</u> Chromium	ies, Inc. m.M.	Reviewer: MG 2nd Reviewer:
METHO	D: Metals (EPA I	· · · · · · · · · · · · · · · · · · ·	
The com	plac listed below	ware reviewed for each of the following validation cross. Validation f	indings are noted in attached

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
1.	Technical holding times	A	Sampling dates: 9-7-12
п.	ICP/MS Tune	A	
111.	Calibration	SW	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	N	not required
VI.	Matrix Spike Analysis	Α	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	not reviewed
Х.	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not verieved not utilized not performed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV	Field Blanks	N	

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

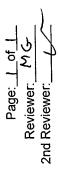
Validated Samples:

	all water				
1	MW-13	11	21	31	
2	MW-10	12	22	32	
3	MW-6	13	23	33	
4	MW-5	14	24	34	
5	MW-13MS	15	25	35	
6	MW-13MSD	16	26	36	
7	MW-13DUP	17	27	37	
8		18	28	38	
9		19	29	39	
10		20 PE	30 30	40	

Notes:

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VALIDATION FINDINGS WORKSHEET Calibration



METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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

Were all instruments calibrated daily, each set-up time, and were the proper number of standards used? (V) N N/A

Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% for all analytes except mercury (80-120%) and cyanide (85-115%)? Y N N/A

LEVEL IV ONLY:

Y N N/A

Was a midrange cyanide standard distilled? <u>Y N N/A</u> Y N N/A

Are all correlation coefficients 20.995?

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recalculation Worksheet for recalculations.

#	Date	Calibration ID	Analvte	%R	Associated Samples	Qualification of Data
4 -	0		5 U	113 (90-110)	J → 4	Jdets /P
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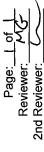
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METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Sample Concentration units, unless otherwise noted: ug/L SDG #: See Cover LDC #: 2853414

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES Soil preparation factor applied: NA Associated Samples: all



246); 2 ⁻¹⁰		
<u>.</u>		
-	n	2.3
	Action Limit	9.60
	Maximum ICB/CCB ^a (ug/L)	1.9200
	laximum PBª (ug/L)	
	(Mau Mau	
	laximum PBª (mg/Kg)	
	Maximum Maximum PB ^a PB ^a (mg/Kg) (ug/L)	
	Analyte	
	An	ວັ

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U". Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

Laboratory Data Consultants, Inc. Data Validation Report

- Project/Site Name: NASA JPL
- Collection Date: September 7, 2012
- LDC Report Date: October 22, 2012
- Matrix: Water
- Parameters: Wet Chemistry
- Validation Level: EPA Level III
- Laboratory: BC Laboratories, Inc.
- Sample Delivery Group (SDG): 1216984

Sample Identification

MW-13 MW-10 MW-5 MW-13MS MW-13MSD MW-13DUP MW-10MS MW-10MSD MW-10DUP

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 300.0 for Chloride, Sulfate, and Nitrate as Nitrogen, EPA Method 353.2 for Nitrite as Nitrogen, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, and EPA Method 365.1 for Orthophosphate as Phosphorus.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Chloride	0.195 mg/L	MW-13

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Sample Result Verification

Raw data were not reviewed for this SDG.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1216984

No Sample Data Qualified in this SDG

NASA JPL

Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1216984

No Sample Data Qualified in this SDG

LDC #:2853416	VALIDATION COMPLETENESS WORKSHEET	Date: 10-18-12
SDG #: <u>1216984</u>	Level III	Page:of
Laboratory: BC Laboratories	, Inc.	Reviewer: MG

oratory: BC Laboratories, Inc.

MA.

Nitrite-N (EPA R Method 353.2)

METHOD: Chloride, Sulfate, Nitrate-N, Nitrite-N, Orthophosphate-P(EPA Method 300.0), Perchlorate (EPA Method 314.0), Hexavalent Chromium (EPA SW846 Method 7196)

Orthophosphate-P (EPA Method 365.1)

2nd Reviewer: 1~

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
Ι.	Technical holding times	A	Sampling dates: 9-7-12
II	Initial calibration	A	
111.	Calibration verification	A	
IV	Blanks	SW	
v	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
Х.	Field duplicates	N	
Lxi	Field blanks	N	

Note:

A = Acceptable N = Not provided/applicable SW = See worksheet

Water

ND = No compounds detected R = Rinsate FB = Field blank

D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples: all

1	MW-13	11		21	31	
2	MW-10	12		22	32	
3	MW-6	13	<u></u>	23	33	
4	MVV-5	14		24	34	
5	MW-13MS	15		25	35	
6	MW-13MSD	16		26	36	
7	MW-13DUP	17		27	37	
8	MW-10MS	18		28	38	
9	MW-10MSD	19		29	39	
10	MW-10DUP	20	PBW	30	40	

Notes:

LDC #: 28534I6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: <u>lof</u> Reviewer: <u>MG</u> 2nd reviewer: <u>V</u>

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
	W	pH TDS CI)F NO, NO, SO PO ALK CN- NH3 TKN TOC (CR) CIO
Ә→५	[ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (CR^{\oplus}) CIO ₂
°C 5→7		pH TDS CI F NO NO SO PO ALK CN NH3 TKN TOC CR CIO4
8-10		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} (CIO ₄)
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
-		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
**************************************		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
	····	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
:		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		PH TDS CLE NO, NO, SO, PO, ALK CN- NH, TKN TOC CR6+ CIO,

Comments:

METHODS.6

LDC #: 2853416

VALIDATION FINDINGS WORKSHEET <u>Blanks</u>

ζ д Z Page: 0f 2nd Reviewer:__ Reviewer:

METHOD:Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>V N N/A</u> Were blank analyses performed as required? If no, please see qualifications below. <u>V N N/A</u> Were any activities in the blanks greater than the minimum detectable activity? If yes, please see qualifications below.

Conc. units: mg/L	s: mg/L			Associated Samples: 1 (>5x)
Analyte	Blank ID	Blank ID	Blank	
	PB	ICB/CCB (mg/L)	Action Limit	No Quai's.
ច		0.195	0.975	

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:

All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC Report# 28534J1

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
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Collection Date: September 10, 2012

LDC Report Date: October 23, 2012

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1217062

Sample Identification

TB-1 MW-16 MW-8** MW-7 MW-16MS MW-16MSD

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/11/12	Bromomethane Acrolein trans-1,4-dichloro-2-Butene Methyl Iodide Pentachloroethane	46.1 72.4 32.2 31.6 63.2	All samples in SDG 1217062	J (all detects) UJ (all non-detects)	Ρ

The percent differences (%D) of the second source calibration standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/8/12	Acrolein	50.3	All samples in SDG 1217062	J (all detects) UJ (all non-detects)	Р

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XII. Compound Quantitation and RLs

All compound quantitation and RLs were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

All tentatively identified compounds were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIV. System Performance

The system performance was acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

XVII. Field Blanks

Sample TB-1 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1217062

SDG	Sample	Compound	Flag	A or P	Reason
1217062	TB-1 MW-16 MW-8** MW-7	Bromomethane Acrolein trans-1,4-dichloro-2-Butene Methyl lodide Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
1217062	TB-1 MW-16 MW-8** MW-7	Acrolein	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1217062

No Sample Data Qualified in this SDG

LDC #:28534J1	VALIDATION COMPLETENESS WORKSHEET	Date:
SDG #: 1217062	Level III/IV	Page: /of /
Laboratory: BC Laboratories,	Inc.	Reviewer: 17
METHOD: GC/MS Volatiles (F	PA Method 524 2)	2nd Reviewer:

METHOD: GC/MS Volatiles (EPA Method 524.2)

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
Ι.	Technical holding times	Δ	Sampling dates: 9/0/12
II.	GC/MS Instrument performance check	Δ	
Ш.	Initial calibration	A	% PSD = 20, 12
IV.	Continuing calibration/ICV	SW	$1001cw \pm 30$
V.	Blanks	Δ	
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	▲	
VIII.	Laboratory control samples	A	10>
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	Δ	
XI.	Target compound identification	Δ	Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	A	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	Δ	Not reviewed for Level III validation.
XIV.	System performance	$\overline{\nabla}$	Not reviewed for Level III validation.
XV.	Overall assessment of data	4	
XVI.	Field duplicates	N	
XVII.	Field blanks	M	TB = 1

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

Validated Samples:** Indicates sample underwent Level IV validation

	water	· · · · · · · · · · · · · · · · · · ·			 3 1	
1	TB-1	11	BVI0657	21	 31	
2	MW-16	12		22	 32	
3	MW-8**	13		23	33	
4	MW-7 .	14		24	 34	
5	MW-16MS	15		25	 35	
6	MW-16MSD	16		26	36	
7		17		27	 37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA Method 524.2)

A. Chloromethane	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene	BB. 1,1,2,2-Tetrachloroethane	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane	CC. Toluene	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1, 2-Dichloroethene, total	DD. Chlorobenzene	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform	EE. Ethylbenzene	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chiorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN.
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafiuoroethane	0000.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	. dddd
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRR.
Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	ບບບບ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	vwv.

Method: Volatiles (EPA Method 524.2)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	1	1		
All technical holding times were met.	\leq			
Cooler temperature criteria was met.		F		
II. GC/MS Instrument performance check	,		r	
Were the BFB performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?		2011521 (100 UNIS)	SIREADO	
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	_			
Were all percent relative standard deviations (%RSD) < 20%?		stars i dinisi adi	nimusias	
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	<			
Were all percent differences (%D) < 30%?	8000 - 2000 - 0			
V. Blanks				
Was a method blank associated with every sample in this SDG?		-		
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	/	^		
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	- A			
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	_			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?		ana dan 1922 kilo		
VII. Matrix spike/Matrix spike duplicates				
Was a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for this SDG?				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	/	-		a mina ao amina no bao amina dia dia mandritra dia mandritra dia mandritra dia mandritra dia mandritra dia mand
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	_			
Was an LCS analyzed per analytical batch?	\leq			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	/			

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VALIDATION FINDINGS CHECKLIST

Page: 7f2 Reviewer: #/ 2nd Reviewer:
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Validation Area	Yes	No	NA	Findings/Comments
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			2	
Were the performance evaluation (PE) samples within the acceptance limits?				
X. Internal standards				
Were internal standard area counts within +/-40% from the associated calibration standard?	/			
Were retention times within - 30% of the last continuing calibration or +/- 50% of the initial calibration?				
XI. Target compound identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	1	4	_	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	T		_	-
Were chromatogram peaks verified and accounted for?				
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?			/	-
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/	-		
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 25 percent relative intensity) in the reference spectrum evaluated in sample spectrum?		-		
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?	/			
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?	/	-		
XIV. System performance				
System performance was found to be acceptable.	/			
XV: Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.		_	-	
Target compounds were detected in the field duplicates.			_	
XVII. Field blanks				
Field blanks were identified in this SDG.		-		
Target compounds were detected in the field blanks.				

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VALIDATION FINDINGS WORKSHEET **Continuing Calibration**



METHOD: GC/MS VOA (EPA Method 524.2) Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>Y N N/A</u> Were all percent differences (%D) < 30% ?

Qualifications	9/cn//				P			L J									
Associated Samples	411				4			1									
Finding %D (Limit: <30.0%)	46.	μ.«L						50.3									
Compound	Å	Acrolein	traches - 1, 4-Dichlore - 3-B	pethy I Tudide	Penty chloro thank			Acrolein									
	1 m 1178-eev 1		heat					1211678-1CUZ									
Date	9/11/12							11/8/6									
#																	

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Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET



METHOD: GC/MS VOA (EPA Method 524.2)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the follow calculations:

 $\label{eq:RFF} RFF = (A_w)(C_w)/(A_w)(C_w)$ average RRF = sum of the RRFs/number of standards %RSD = 100 * (S/X)

 $A_x = Area \ of \ compound,$ $C_x = Concentration \ of \ compound,$ $S = Standard \ deviation \ of the \ RRFs$ $X = Mean \ of the \ RRFs$

 A_{is} = Area of associated internal standard C_{is} = Concentration of internal standard

			Reported	Recalculated	Reported	Recalculated	Renorfed	Recalculated
# Standard ID	Calibration Date	Compound (Reference Internal Standard)	RRF (Zr_std)	RRF (Za std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
1 1091	21/8/2	い'ハリ/ Methykene Chloride (1st Internal Standard)	0.522	0.522	0.5218497	0.522	6.75	6. 24
SNSW	·	Trichloroethene (2nd Internal Standard)	0.345	0.348	8(h6asz.a	0.351	22%	2:3
		Chlor blazer (3rd Internal Standard)	3.034	3.034	3-10725	3.107	81.6	\$1.6
2		Aバリノ Methylene Chloride (1st Internal Standard)	o. s40	01.5-0	D. 54/424	242.0	4.09	4.09
		We Hay / Not pa Cry fa th Trichlordethene (2nd Internal Standard)	0.080	0.0%	0,07696	0.077	16:5	16-5
		+-1,4-dibloro-3-bull-1,000	0.117	0-117	0.1120184	0.112	11.94	1611
ю		Methylene Chloride (1st Internal Standard)						
		Trichloroethene (2nd Internal Standard)						
		Bromoform (3rd Internal Standard)						
4		Methylene Chloride (1st Internal Standard)						
		Trichloroethene (2nd Internal Standard)						
		Bromoform (3rd Internal Standard)						

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



VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification

Page: __of_. Reviewer: _____ 2nd Reviewer: _____

METHOD: GC/MS VOA (EPA Method 524.2)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compoun identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF RRF = (A_x)(C_s)/(A_s)(C_x)

Where: ave. RRF = initial calibration average RRF RRF = continuing calibration RRF Δ = Area of commond

 $A_x = Area of compound,$ $<math>C_x = Concentration of compound,$

A_{is} = Area of associated internal standard C_{is} = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
#	, Standarg ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	О%	۵%
-	tallet	cilotte-	<i>Wi N</i> / Methylene Chloride (1st Internal Standard)	1948152.0	19820250	pors.0	¢ Ç	0.3
	aev /	~1/11/b	Trichloroethene (2nd Internal Standard)	0.3509478	0. 347455	4745 -0	10	0.1
			Chleve lenge (3rd Internal Standard)	3.1071 ×	2Leboie	3.1093	0.07	0.07
7			A//y/ Methylene Chloride (1st Internal Standard)	0. 54/ 925A	6-01119.0	0.6117	6-01	6-el
			he that we ta cry for	96920.0	1-286244)	0.01626	(-e)	12-/
			7-1,4-0; chiere - 2 - Bule	1/20184	5250841.0	0-14807	32-2	32.2
3			Methylene Chloride (1st Internal Standard)					
			Trichloroethene (2nd Internal Standard)					
			Bromoform (3rd Internal Standard)					
4			Methylene Chloride (1st Internal Standard)					
			Trichloroethene (2nd Internal Standard)					
			Bromoform (3rd Internal Standard).					

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

Surroyate Results vernication

METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID):	H 3	

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
		<u> </u>	Reported	Recalculated	
Toluene-d8	10	9.83	98.3	98.3	υ
Bromofluorobenzene] .	9.64	96.4	96.4	
1,2-Dichlorobenzene-d4	J.	10.810	108	108	J
Dibromofluoromethane					

Sample ID:_____

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

Sample ID:_____

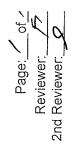
	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
wanu			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

28534J	
3854	
	SDG#

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified bely using the following calculation:

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration SA = Spike added

RPD = I MSC - MSDC I * 2/(MSC + MSDC)

MSC = Matrix spike percent recovery

MSDC = Matrix spike duplicate percent recovery

SC = Sample concentration

MS/MSD sample: 5 + C

	S.	Spike	Sample	Spiked Sample	ample	Matrix Spike	Spike.	Matrix Spike Duplicate	Duplicate	SIM	MS/MSD
Compound	Adde (123)	aed 3 /L)	Concentration (ν_{3}/L)	Concentration	incentration	Percent Recovery	kecovery	Percent Recovery	ecovery		RPD
	WS	MSD.	·····	NS NS	MSD	Reported	Recalc	Reported	Recalc	Renorted	Recalculater
1,1-Dichloroethene	25-0	0.Sc	νD	26.80		601 601 asm	601	7a1 9a1	9a1	1.24	/x/
Trichloroethene	-			24.690	24.690 24.570 98B	8.8	B-86	5.76	88.3	0.427	0.48)
Benzene				24.840	24.840 24.60	4.4	49.4	4.26	98-3	0.97/	16:0
Toluene				C153./m	24.52 25. Jus	99.4	<i>666</i>	101	101	1-40	1.40
Chlorobenzene		1	1	ma.m	24.020 ×1.850 96.1 96.1	36.1	96./	99.4	79.4	3.40	3.40 3.40

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.C of the recalculated results.

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VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification



METHOD: GC/MS VOA (EPA Method 524.2)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculat for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration SA = Spike added

KPD = I LCS - LCSD I * 2/(LCS + LCSD)

SD) LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCSID: BVJO657 LC>

LCS/LCSD	RPD	Bocalculatod										
1 CS/I	RF	Renorted										
sn	Recovery	Recalr										
I CSD	Percent Recovery	Reported					م کھر					
CS	Percent Recovery	Recalc	104	loy	964	97.K	1.49					
	Percent	Reported	[0 c]	hal	96.4	97.X	1. t6	-				
Sample	tration レ)	1 CSD	A A	-			>					
Spiked	Concentration $(u_{A} L)$	D SUL	Dro.NO	76.00	060.12	25t- hz	olcha					
ike	Added VX L)	1 CSD	Н Ф	-								
Ś	₽ <u></u> 	1 CS	25.0					>				
	Compound		1,1-Dichloroethene	Trichloroethene	Benzene	Toluene	Chlorobenzene					

Comments: Refer to Laboratory Control Sample findings worksheet for list of gualifications and associated samples when reported results do not agree within 10.0% of t recalculated results.

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	<u>o</u>	f
Reviewer:	F	Τ
2nd reviewer:		1

METHOD: GC/MS VOA (EPA Method 524.2)

		results for I using the following equation:	reported with a positive detect were recalculated
Conce	ntratio	$n = \frac{(A_{*})(I_{*})(DF)}{(A_{is})(RRF)(V_{*})(\%S)}$	Example:
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D;:
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	
l _s	=	Amount of internal standard added in nanograms (ng)	Conc. = $() () () () $
RRF	=	Relative response factor of the calibration standard.	
V,	=	Volume or weight of sample purged in milliliters (ml) or grams (g).	=
Df	=	Dilution factor.	
%S	=	Percent solids, applicable to soils and solid matrices only.	
[

#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Acceptable (Y/N)
			· · · · · · · · · · · · · · · · · · ·		

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site	Name:	NASA JPL

Collection Date: September 10, 2012

LDC Report Date: October 22, 2012

Matrix: Water

Parameters: Chromium

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1217062

Sample Identification

MW-16 MW-15 MW-8** MW-7 MW-16MS MW-16MSD MW-16DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Chromium.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No metal contaminants were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Chromium	0.72500 ug/L	MW-15

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

V. ICP Interference Check Sample (ICS) Analysis

ICP interference check sample (ICS) analysis was not required for this SDG.

VI. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Metals - Data Qualification Summary - SDG 1217062

No Sample Data Qualified in this SDG

NASA JPL Metals - Laboratory Blank Data Qualification Summary - SDG 1217062

No Sample Data Qualified in this SDG

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

Laboratory: BC Laboratories, Inc. MA. Chromium

LDC #: 28534J4

SDG #: 1217062

METHOD: Metals (EPA Method 200.8)

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
Ι.	Technical holding times	A	Sampling dates: 9-10-12
11.	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks 9m 🗄	ASW	/
V.	ICP Interference Check Sample (ICS) Analysis	N	not required
VI.	Matrix Spike Analysis	A	MS/MSD
VII.	Duplicate Sample Analysis	A	DVP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	Α	Not reviewed for level 111
X .	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not utilized not performed
XII.	Sample Result Verification	Ą	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	2	
XV	Field Blanks	N	

Note:

A = Acceptable N = Not provided/applicable SW = See worksheet

ND = No compounds detected R = Rinsate

FB = Field blank

Validated Samples:** Indicates sample underwent Level IV validation

·····	all water				 	· · · · · · · · · · · · · · · · · · ·
1	MVV-16	11		21	31	
2	MW-15	12		22	32	
3	MW-8**	13		23	33	
4	MW-7	14		24	34	
1 2 3 4 5	MW-16MS	15		25	35	
6	MW-16MSD	16		26	36	
7	MW-16DUP	17		27	37	
7 8		18		28	38	
9		19		29	39	
10		20	PBW	30	40	

D = Duplicate

TB = Trip blank

EB = Equipment blank

Notes:_

Page: _ l of _ l Reviewer: MG, 2nd Reviewer:

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Method:Metals (EPA SW 846 Method 6010B/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	\checkmark			
Cooler temperature criteria was met.	\checkmark			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	1			
Were %RSD of isotopes in the tuning solution	1			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	1			
Were the proper number of standards used?	1			
Were all initial and continuing calibration verification %Rs within the 90-110% (80- 120% for mercury) QC limits?	1			
Were all initial calibration correlation coefficients > 0.995?		L		
IV. Blanks				
Was a method blank associated with every sample in this SDG?	\checkmark			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	~			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?		\checkmark		
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
VI. Matrix spike/Matrix spike 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.	\checkmark			
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.	⁄			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	\checkmark			
Was an LCS analyzed per extraction batch?				; ; ;
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	/			

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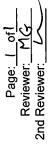
LDC #:_ 28534 J4

VALIDATION FINDINGS CHECKLIST

Page: 2	of 2
Reviewer:	MG
2nd Reviewer:	\sim

Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?				
Do all applicable analysies have duplicate injections? (Level IV only)		_	/	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)				
Were analytical spike recoveries within the 85-115% QC limits?				
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		\checkmark		
Were all percent differences (%Ds) < 10%?				
Was there evidence of negative interference? If yes, professional judgement will be used to gualify the data.				
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	/			
If the %Rs were outside the criteria, was a reanalysis performed?				
XI. Regional Quality Assurance and Quality Control		,,		• · · · · · · · · · · · · · · · · · · ·
Were performance evaluation (PE) samples performed?		\checkmark		
Were the performance evaluation (PE) samples within the acceptance limits?		·		<u> </u>
XII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	1			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/		[
XIV. Field duplicates				· · · · · · · · · · · · · · · · · · ·
Field duplicate pairs were identified in this SDG.			1	
Target analytes were detected in the field duplicates.				1
XV. Field blanks				•
Field blanks were identified in this SDG.		1		
Target analytes were detected in the field blanks.				1

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES Soil preparation factor applied: <u>NA</u> Associated Samples: <u>2 (ND)</u> Associated Samples:



No Qual. Action Limit 3.625 Maximum ICB/CCB^a (ug/L) 0.72500 Maximum PB^ª (ug/L) Maximum PB^a (mg/Kg) Analyte ັວ

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U". Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC # 08534 J4

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: <u>1 of 1</u> Reviewer: <u>MG</u> 2nd Reviewer: <u>1</u>

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution True = concentration (in ug/L) of each analyte in the ICV or CCV source %R = Found x 100 True

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
120 1CV	ICP/MS (Initial calibration)	Cr	49.468	50.000	98.9	98.9	>
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1359 CCV3	ICP/MS (Continuing calibration)	Cr	38.817	40.000	97.0	97.0	
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

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.

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LDC # 38534 J4

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Page: l of 2nd Reviewer: Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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

 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.
 %R = Found x 100 True

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

Where, S = Original sample concentration D = Duplicate sample concentration $RPD = \underline{|S-D|} \times 100$ (S+D)/2

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

Where, I = Initial Sample Result (mg/L) SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5) %D = ||-SDR| × 100

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
l	ICP interference check	l		1	1	1	ł
L C S	Laboratory control sample	CC	1/bm) 000.04 (ng/r) 40.000 (ng/r)	()/br) 000.0h	101	101	$\mathbf{\mathbf{Y}}$
1346 5	Matrix spike	٢	(SSR-SR) 31.654	(mg/l) 40.000 (mg/l)	79.1	79.1	
0 h E I / 13 H O	Duplicate	Cr	(7/ bn) 101.84	((mg / r) 82,023 (mg / r)	L.G1	12.21	
ł	ICP serial dilution	1	l	1	1	١	t

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

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VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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Reviewer:	MG
2nd reviewer:	v

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METHOD: Trace Metais (EPA SW 846 Method 6010/6020/7000)

	N/A N/A N/A	Have results Are results wi Are all detect	been reported ithin the calib ion limits belo	d and calcula rated range o w the CRDL	ted correctly? of the instruments	cable questions are s and within the line		
Detect equati	ed analy on:	te results for _	<u># 3,</u>	Cr		were recalcu	lated and verified	using the following
Concen	tration =	<u>(RD)(FV)(Dil)</u> (In. Vol.)			Recalculation:			
RD FV In. Vol. Dil	2 2 2	Raw data concer Final volume (ml Initial volume (m Dilution factor	l)	(3.660	мg/∟)(с 0.050 г		3.660	мд / <u>г</u>
#	Sa	ample ID		Analyte		Reported Concentration (パタノレ)	Calculated Concentration (Mg/L)	Acceptable (Y/N)
		p 3		Cr		3.7	3.7	Ý
								
			<u></u>					
				·				

Note:___

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
Collection Date:	September 10, 2012
LDC Report Date:	October 19, 2012
Matrix:	Water
Parameters:	Wet Chemistry
Validation Level:	EPA Level III & IV

Laboratory:Alpha Analytical, Inc.

Sample Delivery Group (SDG): 1217062

Sample Identification

MW-16 MW-15 MW-8** MW-7 MW-16MS MW-16MSD MW-16DUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 300.0 for Chloride, Sulfate, and Nitrate as Nitrogen, EPA Method 353.2 for Nitrite as Nitrogen, EPA Method 314.0 for Perchlorate, and EPA SW 846 Method 7196 for Hexavalent Chromium, and EPA Method 365.1 for Orthophosphate as Phosphorus.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (January 2010).

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 or advisory nature.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Chloride Orthophosphate as phosphorus	0.14300 mg/L 0.01292 mg/L	MW-16 MW-8** MW-7

The absolute value of the contaminant concentrations found in the initial, continuing and preparation blanks were less than the RL with the following exceptions:

Method Blank ID	Analyte	Concentration	RL	Associated Samples	Flag	A or P
CCB6	Hexavalent chromium	-0.015172 mg/L	0.00200 mg/L	MW-15	J (all detects) UJ (all non-detects)	A

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
MVV-8**	Orthophosphate as phosphorus	0.0083 mg/L	0.0083U mg/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-7	Orthophosphate as phosphorus	0.018 mg/L	0.018U mg/L

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

IX. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1217062

SDG	Sample	Analyte	Flag	A or P	Reason
1217062	MW-15	Hexavalent chromium	J (all detects) UJ (all non-detects)	A	Method blanks (negative concentration)

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1217062

SDG	Sample	Analyte	Modified Final Concentration	A or P
1217062	MW-8**	Orthophosphate as phosphorus	0.0083U mg/L	A
1217062	MW-7	Orthophosphate as phosphorus	0.018U mg/L	А

J 9M.H.		
LDC #: 285341/6 VALI	DATION COMPLETENESS WORKSHEET	Date: 10-18-12
SDG #: <u>1216917 1</u> 217062	Level III/IV	Page:_(_of_(_
Laboratory: <u>BC Laboratories, Inc.</u>		Reviewer: MG
	9MA Nitrite - N (EPA Method 353	. 2) 2nd Reviewer:

METHOD: Chloride, Sulfate, Nitrate-N, Nitrite-N, Orthophosphate-P(EPA Method 300.0), Perchlorate (EPA Method 314.0), Hexavalent Chromium (EPA SW846 Method 7196)

Orthophosphate-P (EPA Method 365.1)

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
١.	Technical holding times	A	Sampling dates: 9-10-12
11	Initial calibration	A	
- 111.	Calibration verification	A	
IV	Blanks	SW	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	Not reviewed for Level III validation.
IX.	Overall assessment of data	A	
Х.	Field duplicates	N	
	Field blanks		

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

Validated Samples:** Indicates sample underwent Level IV validation

	an water					
1	MW-16	11		21	31	
2	MW-15	12		22	 32	
3	MW-8**	13		23	33	
4	MW-7	14		24	34	
5	MW-16MS	15		25	 35	
6	MW-16MSD	16		26	36	
7	MW-16DUP	17		27	 37	
8		18		28	 38	
9		19		29	39	
10		20	PBW	30	40	

Notes:

Method:Inorganics	(FPA Method	see	cover
Method Inorganics			

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.	\checkmark			
II. Calibration			·	
Were all instruments calibrated daily, each set-up time?	\checkmark			
Were the proper number of standards used?	\checkmark			
Were all initial calibration correlation coefficients	\checkmark			
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?	\checkmark			
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.	\checkmark			
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.	\checkmark			
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CRDL(\leq 2X CRDL for soil) was used for samples that were \leq 5X the CRDL, including when only one of the duplicate sample values were \leq 5X the CRDL.				
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	\checkmark			
Was an LCS analyzed per extraction batch?	\checkmark			
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?		\checkmark		/
Were the performance evaluation (PE) samples within the acceptance limits?			$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: MG 2nd Reviewer: V :

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Validation Area	Yes	No	NA	Findings/Comments			
VII. Sample Result Verification			<u>,</u>				
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.							

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LDC #: 28534 J6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: 1 of 1 Reviewer: MG 2nd reviewer: V 2482, T-

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All circled methods are applicable to each sample.

Semale ID	Matrix	Parameter
Sample ID		pH TDS (CI)F NO NO SO PO ALK CN NH3 TKN TOC (CR) (CO)
2		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (\mathbb{R}^6) CIO ₄
QC 5-7		ph TDS (CI)F (NO, NO, SO, PO, ALK CN NH, TKN TOC (\mathbb{CR}^6) (\mathbb{O}_2)
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
	·····	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN [•] NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ^{\cdot} NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ^{\cdot} NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ^{\cdot} NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{6+} ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR^{5+} CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ ClO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR ⁶⁺ CIO4
	. 4	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR ⁶⁺ CIO4
	<u></u>	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
 		ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁸⁺ ClO ₄
		DH TDS CLF NO, NO, SO, PO, ALK CN NH, TKN TOC CR6+ CIO,

Comments:

.......

LDC #: 28534J6

VALIDATION FINDINGS WORKSHEET <u>Blanks</u>

5 Page: _____of___ 2nd Reviewer:___ Reviewer:_

METHOD:Inorganics, Method See Cover

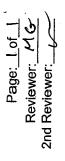
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>V N NA</u> Were blank analyses performed as required? If no, please see qualifications below. <u>V N NA</u> Were any activities in the blanks greater than the minimum detectable activity? If yes, please see qualifications below.

Conc. units: mg/L	s: mg/L			Ä	Associated Samples: 1,3,4	amples:	1,3,4					
Analyte		Blank ID Blank ID										
	ΡB	ICB/CCB (mg/L)	Action Limit	e	4							
Ū	0.14300	0.12900	0.715									 ;
PO4-P	0.01292		0.0646	0.0083	0.018							
CIRCLED	RESULTS V	VERE NOT	CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS I	ALL RESU	ILTS NOT C	IRCLED W	FRE QUAL	IFIED BY TI	HE FOLLO	VOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT	ENT:	

All contaminants within five times the method blank concentration were qualified as not detected, "U".

SDG #:

VALIDATION FINDINGS WORKSHEET Blanks



METHOD: Inorganics, Method See cover

# Date	Blank ID	Analvfa	blank cone. Report limit		
-	1000	8		Associated Samples	Qualifications
-	1	2	-0.01217 71 (0.00200)	٦	J/UJ/A
		-			
			/ The absolute value of the		
			negative blank is greater		
			Athan the reporting limit /		
				2	
-					
Commonte.					

Comments:

BLANKS.4C4

LDC #. 2853476

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: 1 of 1 Reviewer: 2nd Reviewer: 1

METHOD: Inorganics, Method See CoVEV

8-22-12 _ was recalculated. Calibration date: The correlation coefficient (r) for the calibration of $\frac{NO_3 - N}{NO_3 - N}$ An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

Where, Found = concentration of each analyte <u>measured</u> in the analysis of the ICV or CCV solution True = concentration of each analyte in the ICV or CCV source %R = <u>Found</u> x 100 True

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			<	``<	Recalculated	Reported	
Tvne of Analveic	Analuta	Standard ID	CONC Found (mite)	H b S -	0,9	0	Acceptable
Initial calibration		Blank	0.00 (mg/L)	0.011			
		Standard 1	0.02 ()	0.022			
		Standard 2	0.05 ()	0.037			
		Standard 3	0.10 ()	0.065		6.5	
	N-CON	Standard 4	0.50 ()	776.0	r 2= 0.999385	CCH666.0= 1	\succ
	5	Standard 5	()) ()	0.573			
		Standard 6	1	-			
		Standard 7	,	3			
Calibration verification	-	0352					
	N03- N	CCV3	5.090 (mg/y)	5.090 (mg/l) 5.00 (mg/L)	601	201	
Calibration ventication		6016					
	C104	TCV	10.3590 (mg/L)	1.3590 (mg/L) 10.000 (mg/L)	ТОЧ	104	
Calibration verification		0756					
	PO4 - P	CCV3	0.18378 (mg/L) 0. 200 (mg/L)	0.200 (mg/r)	91.9	6.16	

CALCLC.6

recalculated results.

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

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VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: Lof L Reviewer: <u>MG</u> 2nd Reviewer: <u>1</u>

METHOD: Inorganics, Method See cover

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

Found = concentration of each analyte <u>measured</u> 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. Where, %R = Found x 100 True

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

Origir Dupli	
S = D =	
Where,	
RPD = <u>IS-DI</u> x 100 (S+D)/2	

nal sample concentration icate sample concentration

Acceptable (Y/N) > 95.8 92.1 0.430 %R / RPD Reported 95.8 0.430 92.1 Recalculated %R/RPD 0.04791 (mg/L) 0.050 (mg/L) OL 4845 (mg /L) 0.52632 (mg/L) 40.167(mg/L) 40.340 (mg/L) True / D (units) Found / S (units) (SSR-SR) N-eON C ¢ <I 504 Element Laboratory control sample **Type of Analysis** Matrix spike sample **Duplicate sample** 0541 / 0743 Sample ID 2832 LCS 9180 7 15

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

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LDC #:	28534J6		VALIDATION FINDINGS WORKSHEET Sample Calculation Verification		Page: 1 of 1 Reviewer: MG 2nd reviewer:	
METHOD: Inorganics, Method <u>Sce Cover</u>						
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". W N/A Have results been reported and calculated correctly? Are results within the calibrated range of the instruments? Are all detection limits below the CRQL? Compound (analyte) results for $\frac{\# 3, C}{\# 3, C}$ reported with a positive detect were recalculated and verified using the following equation: Concentration = $\frac{2}{\sqrt{4 \times (0.0003)(1.496+0.0159) + (0.1666)^{3}} - 0.1666}{2(0.0003))} = 8.9775 \frac{mg}{L}$						
#	Sample ID	Analyte	Reported Concentration (^{Mg} /ட)	Calculated Concentration	Acceptable (Y/N)	
	3	СІ	9.0	9.0	Ý	
		N03-N	0.17	0.16		
	<u></u>	SOu	21	21		
		PU4-P	0.0083	0.0086		
<u> </u>						
				· · · · · · · · · · · · · · · · · · ·		
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