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, and metal results obtained from the first quarter 2013 groundwater monitoring event were acceptable for their intended use of characterizing the 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 first quarter 2013 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) and perchlorate were collected from monitoring wells MW-4 (Screen 3), MW-7, MW-8, MW-13, MW-19 (Screen 1), and MW-25 (Screen 4). Duplicate samples for total chromium and hexavalent chromium [Cr (VI)] analyses were collected from monitoring wells MW-4 (Screen 3), MW-7, MW-8, MW-13, MW-23 (Screen 4) and MW-25 (Screen 4). 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 were collected each day that non-dedicated sampling equipment was used. The equipment rinsate blanks, consisting of distilled water run through the sampling equipment after decontamination, were analyzed for all contaminants of concern to monitor possible cross-contamination of the samples due to inadequate decontamination. VOCs (acetone, methylene chloride and toluene) and total chromium were detected in a few of the equipment blanks as shown in Table 1-1. The methylene chloride and toluene detected concentrations were at or below the reporting limits. The acetone detected concentrations were above the reporting limit. Acetone, methylene chloride and toluene are common laboratory chemicals and may have been introduced into the blank samples during sample processing. The source of the blank contamination could not be determined. Detected concentrations in the equipment blanks were compared to the detected concentrations in the monitoring wells during the data validation process described below to determine if data validation qualifiers were necessary. No other VOC contaminants or TICs were detected in the equipment blanks as shown in Table 1-1.

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 which consisted of distilled water used by sampling personnel for equipment decontamination was collected during this sampling event. This QC sample serves as a check for any contamination present in the source water. VOCs (acetone, methylene chloride and toluene) were detected in the source blank as shown in Table 1-1. The methylene chloride and toluene detected concentrations were at or below the reporting limits. The acetone detected concentrations were above the reporting limit. Acetone, methylene chloride and toluene are common laboratory chemicals and may have been introduced into the blank sample during sample processing. The source of the contamination could not be determined. Detected concentrations in the source blank were compared to the detected concentrations in the monitoring wells during the data validation process described below to determine if data validation qualifiers were necessary.. No other VOC contaminants or TICs were detected in the source blank as shown in Table 1-1.

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 BC Laboratories, Inc., of Bakersfield, California 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 National Functional Guidelines for Organic and Inorganic Data Review (U.S. EPA, 2008; 2010).

Data Validation Qualifiers. Analytical data were qualified based on the 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 first quarter 2013 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.

TABLE 1-1 SUMMARY OF CONTAMINANTS DETECTED IN QUALITY CONTROL SAMPLES

COLLECTED DURING THE JAN/FEB 2013 SAMPLING EVENT

(All concentrations reported in µg/L.)

Blank Type	Sample ID Number	Sampling Location(s)	Total Chromium	Methylene Chloride	1,2,3- Trichloropropane	2-Butanone	Other Organic Compounds		TICs	
EQUIPMENT BLANK	EB-1-1/28/13	MW-19, MW-20	2 J	0.53	1 U	10 U	Toluene	0.13 J		
2001111211112211111	25 1 1/26/10	15, 25		0.00	. •		Acetone	7.5 J		
EQUIPMENT BLANK	EB-2-1/29/13	MW-14, MW-25	1.1 J	0.5 U	1 U	10 U	Acetone	8.6 J		
EQUIPMENT BLANK	EB-3-1/30/13	MW-3, MW-17, MW-18	3 U	0.48 J	1 U	10 U	Toluene	0.19 J		
EQUIPMENT BLANK	EB-4-1/31/13	MW-22, MW-24	3 U	0.5 U	1 U	10 U				
EQUIPMENT BLANK	EB-5-2/1/13	MW-23, MW-26	3 U	0.5 U	1 U	10 U				
EQUIPMENT BLANK	EB-6-2/4/13	MW-4, MW-12	0.58 J	0.5 U	1 U	10 U				
EQUIPMENT BLANK	EB-7-2/5/13	MW-11, MW-21	3 U	0.5 U	1 U	10 U				
SOURCE BLANK	SB-1-1/28/13		3 U	0.49 J	1 U	10 U	Toluene	0.12 J		
OCCINCE BEHIN	GB 1 1/20/10		0.0	0.40 0	10	10 0	Acetone	7.3 J		
SOURCE BLANK	SB-2-1/31/13		3 U	0.5 U	1 U	10 U				
TRIP BLANK	TB-1-1/28/13	MW-19, MW-20	NA	0.5 U	1 U	10 U				
TRIP BLANK	TB-2-1/29/13	MW-14, MW-25	NA	0.5 U	1 U	10 U				
TRIP BLANK	TB-3-1/30/13	MW-3, MW-17, MW-18	NA	0.5 U	1 U	10 U				
TRIP BLANK	TB-4-1/31/13	MW-22, MW-24	NA	0.5 U	1 U	10 U				
TRIP BLANK	TB-5-2/1/13	MW-23, MW-26	NA	0.5 U	1 U	10 U				
TRIP BLANK	TB-6-2/4/13	MW-4, MW-12	NA	0.5 U	1 U	10 U				
TRIP BLANK	TB-7-2/5/13	MW-11, MW-21	NA	0.5 U	1 U	10 U				
TRIP BLANK	TB-8-2/6/13	MW-5, MW-6, MW-13, MW-15	NA	0.5 U	1 U	10 U				
TRIP BLANK	TB-9-2/7/13	MW-7, MW-8, MW-10, MW-16	NA	0.5 U	1 U	10 U				

Notes

NA Not Analyzed

J Analyte concentration is an estimated value

U Analyte was analyzed for but not detected at or above the stated limit

ATTACHMENT 2: DATA VALIDATION REPORTS

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 www.lab-data.com

Fax 760.634.0439

March 25, 2013

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 March 13, 2013. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 29353:

SDG # Fraction 1301880, 1301977 Volatiles, Chromium, Wet Chemistry 1302075, 1302177

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

Collection Date:

January 28, 2013

LDC Report Date:

March 25, 2013

Matrix:

Water

Parameters:

Volatiles

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1301880

Sample Identification

TB-1-1/28/13

SB-1-1/28/13

EB-1-1/28/13

MW-20-5

MW-20-4

MW-20-3

MW-20-2

MW-20-1

MW-19-5

MW-19-4

MW-19-3

MW-19-2

MW-19-1

DUP-1-1Q13

MW-19-4MS

MW-19-4MSD

Introduction

This data review covers 16 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.

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-19-1 and DUP-1-1Q13 were identified as field duplicates. No volatiles were detected in any of the samples,

XVII. Field Blanks

Sample TB-1-1/28/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-1-1/28/13 was identified as an equipment blank. No volatile contaminants were found with the following exceptions:

Blank ID	Compound	Concentration (ug/L)
EB-1-1/28/13	Methylene chloride Toluene Acetone	0.53 0.13 7.5

Sample SB-1-1/28/13 was identified as a source blank. No volatile contaminants were found with the following exceptions:

Blank ID	Compound	Concentration (ug/L)
SB-1-1/28/13	Methylene chloride Toluene Acetone	0.49 0.12 7.3

NASA JPL Volatiles - Data Qualification Summary - SDG 13-01880

No Sample Data Qualified in this SDG

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-01880

No Sample Data Qualified in this SDG

VALIDATION COMPLETENESS WORKSHEET LDC #:_ 29353A1 1301880 SDG #:_

Level III

Reviewer: 2nd Reviewer:

Laboratory: 'BC Laboratories, Inc.

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: 1/28 13
II.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	RSD = 20? r=
IV.	Continuing calibration/ICV	A	RSD=209, r2 1CV1 CCV=309
V.	Blanks	d	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	ANGK	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
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	Ð	
XVI.	Field duplicates	ND	F10= 13 + 14
XVII.	Field blanks	SUJ	*TB= 1 SB= 2 EB= 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

1	TB-1-1/28/13	打	MW-19-3	21	31	BWA2108-MB
11 12 13 14 15 16 17 18 10 10	SB-1-1/28/13	12	MVV-19-2	22	32	
3	EB-1-1/28/13	13	MVV-19-1 ()	23	33	
1	MW-20-5	14	DUP-1-1Q13 b	24	 34	
1 5	MW-20-4	15	MVV-19-4MS	25	35	
→	MW-20-3	16	MW-19-4MSD	26	 36	
7	MW-20-2	17		27	37	
₽	MW-20-1	18		28	38	
¥ 9	MW-19-5	19		29	39	
10	MW-19-4	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. Pentachloraethan
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000 Methyl is tile
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	2000.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
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	דדדד.
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	www.

LDC#: <u>29353A1</u> SDG#: <u>See corre</u>

VALIDATION FINDINGS WORKSHEET Field Blanks

N N/A N N/A		lanks identified in this SDG? compounds detected in the field blanks?	
ample:		Field Blank / Trip Blank / Rinsate (circle c	one) Source Blank
		Compound	Concentration Units (Myla)
	E		0.49
	CC		0.12
	F		7.3
ample:	3	Field Blank / Trip Blank / Rinsate (circle c	DRE) Equipment Blank
			Concentration
	E	Compound	Units (144) <
	CC		0.13
			7.5
			
Sample:	F	Field Blank / Trip Blank / Rinsate (circle o	one)
Sample:	F	Field Blank / Trip Blank / Rinsate (circle o	Concentration Units (
Sample:	F		Concentration

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

January 28, 2013

LDC Report Date:

March 20, 2013

Matrix:

Water

Parameters:

Chromium

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1301880

Sample Identification

SB-1-1/28/13

EB-1-1/28/13

MW-20-5

MW-20-4

MW-20-3

MW-20-2

MW-20-1

SB-1-1/28/13MS

SB-1-1/28/13MSD

SB-1-1/28/13DUP

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

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria 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

No field duplicates were identified in this SDG.

XV. Field Blanks

Sample EB-1-1/28/13 was identified as an equipment blank. No chromium was found with the following exceptions:

Blank ID	Analyte	Concentration (ug/L)
EB-1-1/28/13	Chromium	2.0

Sample SB-1-1/28/13 was identified as a source blank. No chromium was found.

NASA JPL Chromium - Data Qualification Summary - SDG 1301880

No Sample Data Qualified in this SDG

NASA JPL

Chromium - Laboratory Blank Data Qualification Summary - SDG 1301880

No Sample Data Qualified in this SDG

LDC #: 29353A4

VALIDATION COMPLETENESS WORKSHEET

Level III

Reviewer: M 2nd Reviewer:_

Laboratory: BC Laboratories, Inc.

SDG #: 1301880

Chromium
METHOD: Metals (EPA Method 200.8)

9M.H -

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	Α	Sampling dates: 1 - 28 - 13
11.	ICP/MS Tune	Ą	
111.	Calibration	_A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	N	not required MS/MSD
VI.	Matrix Spike Analysis	Α	MS/MSD
VII.	Duplicate Sample Analysis	Α	DUP
VIII.	Laboratory Control Samples (LCS)	Α	LCS
IX.	Internal Standard (ICP-MS)	2	not reviewed
X.	Furnace Atomic Absorption QC	2	not utilized
XI.	ICP Serial Dilution	7	not utilized not performed
XII.	Sample Result Verification	N	•
XIII.	Overall Assessment of Data	Α	
XIV.	Field Duplicates	7	
χV	Field Blanks	SW	5B=1* EB=2

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

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

Notes:			

LDC#: 29353A4

VALIDATION FINDINGS WORKSHEET <u>Field Blanks</u>

Page:	of
Reviewer:_	MG
2nd reviewer:	$\overline{}$

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

\otimes N	N/A
(Y) N	

Were field blanks identified in this SDG?

Were target analytes detected in the field blanks?

Sample:	2	Field Blank / Trip Blank / Rinsate Other	EB (circle one)

Analyte	Concentration (Mg /L)
Cr	2.0
	10.

Sample:	Field Blank /	Trip Blank	/ Rinsate /	Other	(circle one)
---------	---------------	------------	-------------	-------	--------------

Analyte	Concentration Units ()
	and the same of th

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

January 28, 2013

LDC Report Date:

March 20, 2013

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1301880

Sample Identification

SB-1-1/28/13

MW-19-2MSD

EB-1-1/28/13

MW-19-2DUP

MW-20-5

MW-20-4

MW-20-3

MW-20-2

MW-20-1

MW-19-5

MW-19-4

MW-19-3

MW-19-2

MW-19-1

DUP-1-1Q13

SB-1-1/28/13MS

SB-1-1/28/13MSD

SB-1-1/28/13DUP

MW-19-4MS

MW-19-4MSD

MW-19-4DUP

MW-19-2MS

Introduction

This data review covers 22 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-19-1 and DUP-1-1Q13 were identified as field duplicates. No contaminant concentrations were detected in any of the samples.

XI. Field Blanks

Sample EB-1-1/28/13 was identified as an equipment blank. No contaminant concentrations were found.

Sample SB-1-1/28/13 was identified as a source blank. No contaminant concentrations were found.

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 1301880

No Sample Data Qualified in this SDG

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1301880

No Sample Data Qualified in this SDG

LDC #: 29353A6

SDG #: 1301880

VALIDATION COMPLETENESS WORKSHEET

Level III

Page: [of] Reviewer: MG 2nd Reviewer:

Laboratory: BC Laboratories, Inc.

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 m.A.
1.	Technical holding times	A	Sampling dates: 1-28-13 + + + + + + + + + + + + + + + + + + +
- 11	Initial calibration	Α	U
111.	Calibration verification	Α	
IV	Blanks	l A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	Α	DUP
VII.	Laboratory control samples	Α	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	ND	D = 13+14
ΧI	Field blanks	ND	SB=1 EB=2

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:

9n/s

vanac	all water		9n/f				- 11 - 12 - 12 - 12 - 12 - 12 - 12 - 12
1	SB-1-1/28/13	11	MW-19-3	21	MW-19-2MS	31	
2	EB-1-1/28/13	12	MW-19-2	22	MW-19-2MSD	32	
3	MW-20-5	13_	MW-19-1	23	MW-19-2DUP	33	
4	MW-20-4	14	DUP-1-1Q13	24		34	
5	MW-20-3	15	SB-1-1/28/13MS	25		35	
6	MW-20-2	16	SB-1-1/28/13MSD	26		36	
7	MW-20-1	17	SB-1-1/28/13DUP	27		37	
8	MVV-19-5	18	MW-19-4MS	28		38	
9	MVV-19-4	19	MW-19-4MSD	29		39	PBWI
10	MVV-19-3	20	MW-19-4DUP	30	41111	40	PBW 2

Notes:		 	

LDC#: <u>8935</u>3A6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	Lof_L
Reviewer:_	MG
2nd reviewer:_	1/

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter O
1-77	W	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR6) CIO4)
8→14		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CO4
ac 15->17		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR ClO4
18723	•	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 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+ ClO4
		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⁺ 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⁺ 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 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 CR6+ ClO.

Comments:			

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

January 29, 2013

LDC Report Date:

March 25, 2013

Matrix:

Water

Parameters:

Volatiles

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1301977

Sample Identification

TB-2-1/29/13

EB-2-1/29/13

MW-14-5

MW-14-4

MW-14-3

MW-14-2

MW-14-1**

MW-25-5

MW-25-4

DUP-2-1Q13

MW-25-3

MW-25-2**

MW-25-1

^{**}Indicates sample underwent EPA Level IV review

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.

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
2/1/13	Bromomethane Methyl iodide Pentachloroethane	52.6 36.2 51.9	MW-14-1** MW-25-5 MW-25-4 DUP-2-1Q13 MW-25-3 MW-25-2** MW-25-1 BWB0007-BLK1	J (all detects) UJ (all non-detects)	Р

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

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

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

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-25-4 and DUP-2-1Q13 were identified as field duplicates. No volatiles were detected in any of the samples.

XVII. Field Blanks

Sample TB-2-1/29/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-2-1/29/13 was identified as an equipment blank. No volatile contaminants were found with the following exceptions:

Blank ID	Compound	Concentration (ug/L)
EB-2-1/29/13	Acetone	8.6

NASA JPL Volatiles - Data Qualification Summary - SDG 13-01977

SDG	Sample	Compound	Flag	A or P	Reason
13-01977	MW-14-1** MW-25-5 MW-25-4 DUP-2-1Q13 MW-25-3 MW-25-2** MW-25-1	Bromomethane Methyl iodide Pentachloroethane	J (all detects) UJ (all non-detects)	Р	Continuing calibration (%D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-01977

No Sample Data Qualified in this SDG

VALIDATION COMPLETENESS WORKSHEET LDC #: 29353B1 SDG #:_ 1301977

Level III/IV

Date: <u>3</u> 2.	13
Page: _(of_	
Reviewer: <u></u>	
2nd Reviewer: 📉	_

Laboratory: <u>BC Laboratories, Inc.</u>

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: 1 29 13
II.	GC/MS Instrument performance check	F	
III.	Initial calibration	<u> </u>	RSD=20%, 12 10V1 CCV=307
IV.	Continuing calibration/ICV	SW	10V1 CCV=30?
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec.
VIII.	Laboratory control samples	A	Client spec.
IX.	Regional Quality Assurance and Quality Control	N	
X.	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)	A	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	M	FD= 9+ 10
XVII.	Field blanks	SW	*T6=1 E6=2

Note:

A = Acceptable N = Not provided/applicable

*ND = No compounds detected

R = Rinsate

SW = See worksheet FB = Field blank D = Duplicate TB = Trip blank

EB = Equipment blank

Validated Samples:** Indicates sample underwent Level IV validation

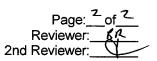
<u> </u>	ter	OII	
1 TB-2-1/29/13 2 EB-2-1/29/13	11 2 MW-25-3	21	31, BN A 2108-MB
2 EB-2-1/29/13	† 2 MW-25-2**	22	32 2 BW B 0 007 - MB
- 1	13 2 MW-25-1	23	33
3 MW-14-5 4 MW-14-4 5 MW-14-3 6 MW-14-2 7 2 MW-14-1**	14	24	34
5 1 MW-14-3	15	25	35
∮ 6	16	26	36
7 2 MW-14-1**	17	27	37
8 2 MW-25-5	18	28	38
9 2 MW-25-4 P	19	29	39
10 2 DUP-2-1Q13 D	20	30	40

Page: 1 of 2
Reviewer: 50
2nd Reviewer: 1

Method: Volatiles (EPA Method 524.2)

Validation Area	Yes	No	NA	Findings/Comments
J. Technical holding times				
All technical holding times were met.	_			
Cooler temperature criteria was met.				A ANNUAL TO THE TOTAL THE
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				
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) ≤ 20%?				
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.			12	
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?	X		~	
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?				

VALIDATION FINDINGS CHECKLIST



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		I	·	And the second s
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?				
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.	/			

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	OOO. 1,3,5-Trichlorobenzene	IIII. 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. 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. Pentachloraetham
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000. Methyl ighile
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	ବରରର.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
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	uuuu.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB, tert-Amyl methyl ether	www.

吹起

LDC#. 293538)

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: _of_ 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".

Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

Y(N N/A Were all percent differences (%D) < 30%?

							_	<u></u>									
Qualifications	Jusip		4														
Associated Samples	7-13 +	8WB0007-BLK1															
Finding %D (Limit: <30.0%)	52.6	36.2	51.9														
Compound			ル														
Standard ID	BECON CEV-DIFER DZ																
Date																	
#																	

LDC #: 2935381 SDG #: see conv

VALIDATION FINDINGS WORKSHEET Field Blanks

Page:_	<u></u>
Reviewer:	BR
nd reviewer.	5

VIETHOD : G	C/MS VOA (E	EPA Method 524.2)	
N N/A N N/A		d blanks identified in this SDG? let compounds detected in the field blanks?	
Sample:		Field Blank / Trip Blank / Rinsate (circle one)	quipment Blank
		Compound	Concentration Units (µy)
	F		8.6
Sample:		Field Blank / Trip Blank / Rinsate (circle one)	
		Compound	Concentration Units ()
Sample:		Field Blank / Trip Blank / Rinsate (circle one)	
		Compound	Concentration Units (
		Стирини	

29353B1 LDC#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

1 of + 80 Page: 2nd Reviewer: 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 following calculations:

A_x ≈ Area of Compound

A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards $RRF = (A_x)(C_{is})/(A_{is})(C_x)$

 C_x = Concentration of compound,

C_{is} = Concentration of internal standard

%RSD = 100 * (S/X)

S= Standard deviation of the RRFs,

X = Mean of the RRFs

Recalculated

Reported %RSD

Average RRF Recalculated

Average RRF

(Initial)

(RRF 10 std) 0.777386

(RRF 10 std) 0.777386 0.358727 0.621034

RRF

Reported

Recalculated

Reported RRF 0.735267 0.3478301

%RSD

4.359162

10.678231 9.696123

4.359179

0.5931176 0.3478301 0.735267 (Initial)

0.5931176

0.358727 0.621034

9.696118 10.678231

				11
1	ICAL	1/28/2013	11,1-Dichloroethene (IS1	
	MS-V5		Trichloroethene (1S2)	
			1,1,2,2-Tetrachloethane	

Calibration

	•			
	1,1,2,2-Tetrachloet	0.6113063	0.5971845	0.6210336
	l	0.3713256	0.3988806	0.3587269
	Sonc 1,1-Dichloroethene Trichloroethene	0.7827933	0.8125329	0.7773857
_	Conc	0.5	_	10

Trichloroethene	0.3713256	0.3988806	0.3587269	0.3436288	0.3195173	0.2949011	0.347830	0.0371
1,1-Dichloroethene	0.7827933	0.8125329	0.7773857	0.7266194	0.6936307	0.6186399	0.735267	0.0713
Conc	0.5	-	10	25	50	100	×	S

351323 89438

287960 Ais

> 223856 126029 55544

10/10 10/10 10/10

¥

Cis/Cx

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 recalculated results.

0.0259

0.593118

0.5808763 0.5482052

0.6000997

29353∱1 LDC#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

2 of 2 Page: 2nd Reviewer: 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 following calculations:

 $RRF = (A_x)(C_{is})/(A_{is})(C_x)$

average RRF = sum of the RRFs/number of standards

 A_x = Area of Compound

 $C_x = Concentration of compound,$

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

%RSD = 100 * (S/X)

S= Standard deviation of the RRFs,

X = Mean of the RRFs

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (IS)	(RRF 32/80 std)	(RRF 32/80 std)	(Initial)	(Initial)		
1	ICAL	1/28/2013	Allyl chloride (IS1)	0.703648	0.703647	0.7066773	0.7066773	7.559528	7.559522
	MS-V5		Methyl methacrylate (IS)	0.093356	0.093356	0.0935328	0.0935328	7.803155	7.803165
			t-1,4-dichloro-2-butene (0.182570	0.182570	0.1720950	0.1720950	7.927922	7.927924

Ais	291272	368391	95466	
Ax	655849	275131	139434	
Cis/Cx	10/32	10/80	10/80	

Conc	Conc Allyl chloride (Methyl methacrylatet-1,4-dichloro-2-but	t-1,4-dichloro-2-but
1.6/4	0.7900931	0.1047586	0.1539661
6.4/16	0.7229656	0.0923109	0.1560499
16/40	0.7209230	0.0981355	0.1818048
32/80	0.7036475	0.0933556	0.1825702
48/120	0.6696828	0.0889169	0.1744647
80/200	0.6327515	0.0837192	0.1837142
×	0.7066773	0.0935328	0.1720950
S	0.0534	0.0073	0.0136
•			

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 recalculated results.

LDC#: 29353B1

VALIDATION FINDINGS WORKSHEET Continuing Calibration Calculation Verification

Page: 6 of 1
Reviewer: BR

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

Where:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

RRF = (Ax)(Cis)/(Ais)(Cx)

Ax = Area of compound,

Cx = Concentration of compound,
Ais = Area of associated internal standard

Cis = Concentration of internal standard

Recalculated 5.3 1.2 2.4 4. 4.7 Reported □ % 11.8 5.3 4. 1.2 2.4 4.7 Recalculated 0.09461411 0.7526536 0.3429434 0.6212125 0.1517514 0.669422 RRF 9 0.09461411 0.6212125 0.1517514 0.7526536 0.3429434 0.669422 Reported RRF 9 Average RRF 0.347830 0.593118 0.093533 0.172095 0.735267 0.706677 (Initial) 1,1,2,2-Tetrachloethane (181) Methyl methacrylate (IS2 1,1-Dichloroethene (IS1 Trichloroethene (IS2) t-1,4-dichloro-2-butene Compound (IS) Allyl chloride Calibration 2/1/2013 2/1/2013 Date Standard ID 01FEB03 01FEB02 # 2

	Ais	257025	315245	79010
CCV2	Ax	550586	238613	95919
	Ais	257025	315245	79010
CCV1	Ax	483627	270278	122705
	Cis/Cx	10/25/32	10/25/80	10/25/80

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

LDC #: 29353B1 SDG#: See cover

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

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

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

Sam	ple	ID:	-

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8	10.00	10.08	101	101	٥
Bromofluorobenzene	1	9.80	98.0	98.0	9
1,2-Dichlorobenzene-d4	J J	10.60	106	106-0 m	δ
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
		į.	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					<u> </u>

LDC # 293538) SDG # See entil

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: 1818
2nd Reviewer: 0

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 recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where

Where: SSC = Spiked sample concentration SA = Spike added

RPD = ILCS - LCSD I * 2/(LCS + LCSD)

BWB 60 07 - LCS

LCS ID:

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

	Spi	ķe.	Spiked S	ample	108	Ş	I CSD	D.	I CS/I	I CS/I CSD
Added (My/L)	<u>8</u> 🖰	7.	Concentration $(\mathcal{A} \cap \mathcal{A})$	tration	Percent Recovery	tecovery	Percent Recovery	ecovery	Ŗ	RPD
108		I CSD	1 CS	I CSD	Reported	Recalc	Renorted	Recalc	Reported	Recalculated
28.60		1	24.820		79.3	89.3				
			22.720		90.9					
			24.190		8.36					
			23.310		93.2					
<i>→</i>		→	22.870	\	5.16	_	7		7	1
		,								
										

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 recalculated results.

LDC #:_	KX S	2935381
SDG #:	_	•

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of
Reviewer:	BK
2nd reviewer:	

METHOD: GC/MS VOA (EPA Method 524	24.2)
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matrices only.

Compou	ind results for	<u> </u>	reported with a positive d	etect were recalculate
and verif	fied using the followin	g equation:		c
Concentr	ration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%)}$	is)	Example:	S= 1.7 mg
A _x	 Area of the character compound to be mea 	ristic ion (EICP) for the sured	Sample I.D;:	
A_{is}	 Area of the character specific internal stand 	istic ion (EICP) for the dard		
l _s	 Amount of internal statement (ng) 	andard added in nanograms	conc. = (1934) (10) ((32072k) 0.347890) ()
RRF	 Relative response factorial standard. 	ctor of the calibration		
V _o	 Volume or weight of s (ml) or grams (g). 	sample purged in milliliters	= 1.73416 mg/c	
Df	 Dilution factor. 	•		
%S	 Percent solids, applic 	able to soils and solid		

#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Acceptable (Y/N)
					,,,,
	<u></u>				
					·
					<u> </u>
····					
	<u> </u>				

Laboratory Data Consultants, Inc. **Data Validation Report**

Project/Site Name:

NASA JPL

Collection Date:

January 29, 2013

LDC Report Date:

March 20, 2013

Matrix:

Water

Parameters:

Chromium

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1301977

Sample Identification

EB-2-1/29/13

MW-14-3

MW-14-2

MW-14-1**

MW-25-5

MW-25-4

DUP-2-1Q13

MW-25-3

MW-25-2**

MW-25-1

^{**}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 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

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria 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

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

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-25-4 and DUP-2-1Q13 were identified as field duplicates. No chromium was detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)	
Analyte	MW-25-4	DUP-2-1Q13	RPD
Chromium	2.0	1.8	11

XV. Field Blanks

Sample EB-2-1/29/13 was identified as an equipment blank. No chromium was found with the following exceptions:

Blank ID	Analyte	Concentration (ug/L)
EB-2-1/29/13	Chromium	1.1

NASA JPL

Chromium - Data Qualification Summary - SDG 1301977

No Sample Data Qualified in this SDG

NASA JPL

Chromium - Laboratory Blank Data Qualification Summary - SDG 1301977

No Sample Data Qualified in this SDG

LDC #:__ 29353B4

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

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

Reviewer: MG	

Date: 3-18-13

SDG #: 1301977 Laboratory: BC Laboratories, Inc.

validation findings worksheets.

Chromium

METHOD: Metals (EPA Method 200.8)

2nd Reviewer:

	Validation Area		Comments
Į.	Technical holding times	Α	Sampling dates: 1-29-13
II.	ICP/MS Tune	A	
III.	Calibration	Α	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	Α	
VI.	Matrix Spike Analysis	2	client specified
VII.	Duplicate Sample Analysis	2	10 (1
VIII.	Laboratory Control Samples (LCS)	Α	LCS
IX.	Internal Standard (ICP-MS)	Α	not reviewed for level 111
Χ.	Furnace Atomic Absorption QC	7	not reviewed for level 111 not utilized
XI.	ICP Serial Dilution	7	not performed
XII.	Sample Result Verification	Α	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	Α	
XIV.	Field Duplicates	SW	D=6+7
ΧV	Field Blanks	SW	EB=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

	all water			
1	EB-2-1/29/13	11	21	31
2	MW-14-3	12	22	32
3	MVV-14-2	13	23	33
4	MW-14-1**	14	24	34
5	MVV-25-5	15	25	35
6	MW-25-4	16	26	36
7	DUP-2-1Q13	17	27	37
8	MW-25-3	18	28	38
9	MW-25-2**	19	291 PBW1	39
102	MW-25-1	20	302 PBW2	40

Notes:		

LDC#:_____

VALIDATION FINDINGS CHECKLIST

Page: Lof 2
Reviewer: MG
2nd Reviewer: V

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.	/				
Cooler temperature criteria was met.	/				
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%?	/				
III. Calibration					
Were all instruments calibrated daily, each set-up time?					
Were the proper number of standards used?	✓				
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?	/				
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?	$\sqrt{}$				
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) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.			✓		
VII. Laboratory control samples					
Was an LCS anaylzed for this SDG?	/				
Was an LCS analyzed per extraction batch?	/				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	/				

LDC#: 29353B4

VALIDATION FINDINGS CHECKLIST

Page: 2of 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?			/	, , , , , , , , , , , , , , , , , , ,			
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)?		/					
Were all percent differences (%Ds) < 10%?			<u> </u>	·			
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?	<u> </u>						
If the %Rs were outside the criteria, was a reanalysis performed?			<u> </u>				
XI. Regional Quality Assurance and Quality Control							
Were performance evaluation (PE) samples performed?		/	Ĺ.,				
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?	/						
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.	/						
Target analytes were detected in the field duplicates.	/						
XV. Field blanks							
Field blanks were identified in this SDG.							
Target analytes were detected in the field blanks.	/						

LDC#: 29353B4

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:_	Lof I
Reviewer:_	MG
2nd Reviewer:	

METHOD: Metals (EPA Method 6010B/7000)

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

	Concentra			
Analyte	6	7	RPD	
Chromium	2.0	1.8	11	

V:\FIELD DUPLICATES\FD_inorganic\29353B4.WPD

A RIGHT CONTRACTOR CONTRACTOR CONTRACTOR IN CONTRACTOR IN CONTRACTOR CONTRACT

LDC #: 2935 3 B 4 VALIDATION FINDINGS WORKSHEET Field Blanks

Page:_	ofl
Reviewer:_	MG
2nd reviewer	1/-

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000) WN N/A Were field blanks identified in this SDG? Were target analytes detected in the field blanks? N N/A EB Sample: _____ Field Blank / Trip Blank / Rinsate Other _(circle one) Concentration MQ Analyte. Sample: _____ Field Blank / Trip Blank / Rinsate / Other____ (circle one) Concentration Analyte

29353B4 LDC #:

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: Lof L 2nd Reviewer: 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:

 $%R = Found \times 100$ True

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

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
1938 ICV	ICP/MS (Initial calibration)	C	50.936	50.000	102	102	>
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
3138 CCVE	ICP/MS (Continuing calibration)	Cr	41.574	40.000	HO1	hQ/	->
	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. T_i

LDC#_ 3935384

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Page: 1 of 1 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:

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

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

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

%D = [I-SDR] × 100

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

	Acceptable (Y/N)			
	%R/RPD/%D	%R/RPD/%D	%R/RPD/%D ———————————————————————————————————	%R/RPD/%D
%R/RPD/%D		- (
True / D / SDR (units)	l	- (7bm) c00.04	10000 (mg/)	- (ng/)
Found / S / I (units)	l	43.639 (mg/L) 40.000 (mg/L)	43.639 (mg/L)	43.629 (mg/L) (SSR-SR)
Element		Č	 	
Type of Analysis		Laboratory control sample	Laboratory control sample Matrix spike	Laboratory control sample Matrix spike Duplicate
Sample ID				

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.

3.75 :

LDC#: 29353B4

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of
Reviewer:	MG
2nd reviewer:	

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

Please VN VN VN	e see qualifications be N/A Have resul N/A Are results N/A Are all dete	elow for all questions answer ts been reported and calcula within the calibrated range c ection limits below the CRDL	red "N". Not appl ted correctly? of the instrument ?	icable questions are	e identified as "N// ear range of the IC	A". :P?
Detect equation	ed analyte results for on:	# 4, Cr		were recalcu	llated and verified	using the following
Concen	tration = $\frac{(RD)(FV)(Dil)}{(In. Vol.)}$		Recalculation:	`		
RD FV In. Vol. Dil	= Raw data con = Final volume = Initial volume = Dilution factor	centration (1. 266 (ml) or weight (G)	мg/L)(0.050	0.0501)	- 1.266	Mg/L
#	Sample ID	Analyte		Reported Concentration (^M g/L)	Calculated Concentration (Mg/L)	Acceptable (Y/N)
	4	Cr		1.3	1.3	Y
		·				
Note:_						

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NASA JPL

Collection Date: January 29, 2013

LDC Report Date: March 20, 2013

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1301977

Sample Identification

EB-2-1/29/13

MW-14-5

MW-14-4

MW-14-3

MW-14-2

MW-14-1**

MW-25-5

MW-25-4

DUP-2-1Q13

MW-25-3

MW-25-2**

MW-25-1

MW-14-1MS

MW-14-1MSD

MW-14-1DUP

MW-25-2MS

MW-25-2MSD

MW-25-2DUP

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 18 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. 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

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-25-4 and DUP-2-1Q13 were identified as field duplicates. No contaminants were detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)	
Analyte	MW-25-4	DUP-2-1Q13	RPD
Perchlorate	19	9.9	63

XI. Field Blanks

Sample EB-2-1/29/13 was identified as an equipment blank. No contaminant concentrations were found.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1301977

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1301977

No Sample Data Qualified in this SDG

LDC #: 29353B6

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

SDG #:_	1301977	
Laborato	rv: BC Laboratorie	es. 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
1.	Technical holding times	Α	Sampling dates: 1- 29- 13
li	Initial calibration	Α	
111.	Calibration verification	A	
IV	Blanks	A	
V	Matrix Spike/Matrix Spike Duplicates	A	M5/M5D
VI.	Duplicates	A	DUP OK by difference
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	SW	D=8+9
ΧI	Field blanks	ND	EB=1

Note:

A = Acceptable

SW = See worksheet

N = Not provided/applicable

R = Rinsate

ND = No compounds detected

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:** Indicates sample underwent Level IV validation

	all water	•			
1	EB-2-1/29/13	11 2 _{MW-25-2**}	21	31	
2	MW-14-5	12 MW-25-1	22	32	
3	MW-14-4	13 MW-14-1MS	23	33	
4	MW-14-3	14 MW-14-1MSD	24	34	
5	MW-14-2	15 MW-14-1DUP	25	35	
6	MW-14-1**	16 2 MW-25-2MS	26	36	
7	MW-25-5	17 ² MW-25-2MSD	27	37	
8	MW-25-4	18 2 MW-25-2DUP	28 .	38	
9	DUP-2-1Q13	19	29 PBWI	39	
10	MW-25-3	20	302 PBW 2	40	

Notes:		

VALIDATION FINDINGS CHECKLIST

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

Method: Inorganics (EPA Method see cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	/			
Cooler temperature criteria was met.		Ĺ′		
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?	<u> </u>	<u> </u>		
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	/			
Were titrant checks performed as required? (Level IV only)		<u> </u>	/	
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?	/	<u> </u>	<u> </u>	
Was an LCS analyzed per extraction batch?	/	<u></u> '	<u> </u>	
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?		/	<u> </u>	
Were the performance evaluation (PE) samples within the acceptance limits?	1	1 1	1./	

LDC#: 29353B6

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?				
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.				
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	/			
Target analytes were detected in the field duplicates.				
X. Field blanks				
Field blanks were identified in this SDG.				
Target analytes were detected in the field blanks.				

LDC#: 29353B6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

F		
Sample ID	Matrix	Parameter
2.3	٤	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
1,4->12		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC(CR ⁶⁺)CIO ₄)
QC 13 -> 18	1	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR CO)
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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
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 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 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 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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLE NO3 NO3 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4

Comments:		 	

LDC#<u>29353B6</u>

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:_	of
Reviewer:	MG
d Reviewer.	1/

Inorganics: Method_See Cover_

		ation (ug/L)		- ,
Analyte	8	9	RPD	
Perchlorate	19	9.9	63	

V:\FIELD DUPLICATES\FD_inorganic\29353B6.WPD

LDC# 39353B6

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: 1 & C

METHOD: Inorganics, Method See cover

was recalculated. Calibration date: [- 34-13 The correlation coefficient (r) for the calibration of $\frac{C \sqrt{V}}{V}$

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

%R = <u>Found</u> x 100 True

Where, Found = concentration of each analyte $\underline{\text{measured}}$ in the analysis of the ICV or CCV solution True = concentration of each analyte in the ICV or CCV source

Acceptable r3=0.999991 102 98.8 Reported r or %R 1 3= 0,999 B64 **18.8** Recalculated 601 r or %R l 0.04939 (mg/L) 0.0500 (mg/L) 7/8m) 000.01 True (units) Arca 0.003 0.003 0.000 0.077 0.021 l 0.039 10.334 (mg/L) Found (units) CONC 0.050 0.000 0.003 0.005 260.0 0.100 Standard ID ICV 1777 218 1316 Standard 2 Standard 3 Standard 4 Standard 5 Standard 6 Standard 7 Standard 1 Blank Analyte C104 ر د ک C < [1 Calibration verification Calibration verification Calibration verification Type of Analysis Initial calibration

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

LDC#: 39353 B6

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Page: / of 2nd Reviewer: Reviewer:

> see cover METHOD: Inorganics, Method

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

Where, %R = Found x 100

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

| S | 0

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

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)
8118	Laboratory control sample						
507		Cr v	0.05037 (mg/L) 0.0500 (mg/L)	0.0500 (mg/L)	101	101	<u>}</u>
9171	Matrix spike sample		(SSR-SR)				
[3		Clou	10-113 (49/2)	10-113 (49/2) 10.101 (49/2)	001	001	
8116/8116	Duplicate sample						
13/14		C- <-	0.0507 (mg/L) 0.0506 (mg/L)	0.0506 (m3/1)	0.197	0.216	→

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.

LDC #: 29353B6

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: / of / Reviewer:_ 2nd reviewer:

l	METH	IOD: Inorganics, Method	d_see cover			
	Y N Y N	N/A Have results N/A Are results w	ow 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/	A ".
(Comp ecalc	ound (analyte) results foulted and verified using	or # 6, CIO4 g the following equation:	repo	orted with a positiv	e detect were
		tration =	Recalculation:			
		x + b	0.004 = 0.001 (x)	+0.000		
	h =	0.000	4.00 mg/L =	×		
Į;	<u>۔ ۔ ا</u>	1×		Reported	Calculated	
	#	Sample ID	Analyte	Concentration (Mg/L)	Concentration (Mg /L)	Acceptable (Y/N)
	<u>"</u>	Gample 1D	ClOy	3.9	4.0	Y

Note:	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

January 30, 2013

LDC Report Date:

March 25, 2013

Matrix:

Water

Parameters:

Volatiles

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302075

Sample Identification

TB-3-1/30/13

EB-3-1/30/13

MW-17-4**

MW-17-3

MW-17-2

MW-18-5

MW-18-4

MW-18-3

MW-3-4

MW-3-3

MW-3-2

MW-18-2

MW-18-3MS

MW-18-3MSD

MW-3-4MS

MW-3-4MSD

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 16 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 (r²) 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
2/1/13	Bromomethane Methyl iodide Pentachloroethane	52.6 36.2 51.9	TB-3-1/30/13 EB-3-1/30/13 MW-17-4** MW-17-3 MW-17-2 MW-18-5 MW-18-3 MW-3-4 MW-3-3 MW-3-4 MW-3-3 MW-18-3MSD MW-3-4MSD BWB0007-MB BWB0008-MB	J (all detects) UJ (all non-detects)	Р
2/1/13	Pentachloroethane	35.8	MW-3-2 MW-18-2 1301370-CCB2	J (all detects) UJ (all non-detects)	Р

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

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-3-1/30/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-3-1/30/13 was identified as an equipment blank. No volatile contaminants were found with the following exceptions:

Blank ID	Compound	Concentration (ug/L)
EB-3-1/30/13	Methylene chloride Toluene	0.48 0.19

NASA JPL Volatiles - Data Qualification Summary - SDG 13-02075

SDG	Sample	Compound	Flag	A or P	Reason
13-02075	TB-3-1/30/13 EB-3-1/30/13 MW-17-4** MW-17-3 MW-17-2 MW-18-5 MW-18-4 MW-18-3 MW-3-4 MW-3-3	Bromomethane Methyl iodide Pentachloroethane	J (all detects) UJ (all non-detects)	Р	Continuing calibration (%D)
13-02075	MW-3-2 MW-18-2	Pentachloroethane	J (all detects) UJ (all non-detects)	Р	Continuing calibration (%D)

NASA JPL

Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-02075

No Sample Data Qualified in this SDG

VALIDATION COMPLETENESS WORKSHEET LDC #: 29353C1 SDG #: 1302075

Level III/IV

Date:	<u> 3/21/13</u>
Page:_	lof/
Reviewer:	<u> </u>
2nd Reviewer:	1

Laboratory: "BC Laboratories, Inc.

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: 1/30 /13
11.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	RSD = 202, r2
IV.	Continuing calibration/ICV	SW	1CV(CcV=309)
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	x A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	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)	A	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	7	
XVII.	Field blanks	รม	*1B=1 EB=2

Note:

A = Acceptable

SW = See worksheet

N = Not provided/applicable

*ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

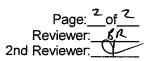
Validated Samples:** Indicates sample underwent Level IV validation

validated Sa	imples. Indicates sample unde	erwent Level IV validation		
	-1/30/13 1 13	MW-3-2	21	31 BWB0007-MB 32 2 BWB008-MB
1 EB-3	-1/30/13 12.3	MW-18-2	22	32 2 BWB008-MB
	17-4** 13 \	MW-18-3MS	23	333 1301370-CCBZ
4 1 MW- 5 1 MW-	17-3 14 /	MW-18-3MSD	24	34
5 1 MW-	17-2 15 2	# 9MS	25	35
6 MW-	18-5 16 2	# 9 MSD	26	36
7 MW-	18-4 17		27	37
8 1 MW-	18-3 18		28	38
9 2 MW-	3-4 19		29	39
10 (MW-:	3-3 20		30	40

Method: Volatiles (EPA Method 524.2)

Validation Area	Yes	No	NA	Findings/Comments
t. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.				
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?				
III. Initial calibration		Į.	Γ	
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) ≤ 20%? , ✓				
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) < 30%?			Ĺ	
V. Blanks		_	ı	
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.				No. of the control of
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?	7			
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?				
Will. Laboratory control samples		-		
Was an LCS analyzed for this SDG?				
Was an LCS analyzed per analytical batch?		<u></u>		
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				

VALIDATION FINDINGS CHECKLIST



Validation Area	Yes	No	NA	Findings/Comments
IX. Regional Quality Assurance and Quality Control			ı	
Were performance evaluation (PE) samples performed?		_	<u></u>	
Were the performance evaluation (PE) samples within the acceptance limits?				+
X Internal standards 1111	l		l	
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?				
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.				The state of the s
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.		<u> </u>		

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-Tetrachioroethane	OOO. 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. Pentach longethan
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000 methy todile
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	РРРР.
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	RRRR.
Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane	EEE. sec-Bufylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TITT.
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	ww.

LDC#: 29353C)

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: / of / Reviewer: FR 2nd Reviewer:

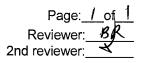
METHOD: GC/MS VOA (EPA Method 524.2)

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

Standard Compound Finding %0 Associated Samples CCV - O1 FE'56.2 Finding %0 S.2.		T 1
Finding %D Finding %D Finding %D Finding %D Finding %D F. C F. C	Qualifications Just 18	
- 01下E1602 & B	Associated Samples 1-10 13-16 + BNB6007-MB 11-12 + 1301330-CCB2	
- 01 FEB35	Finding %D (Limit: <30.0%)	
Standard ID	Compound B ODOD NANA	
	Standard ID CCV - OIFEB35 CCV - OIFEB35	
# Date 2113		

LDC #: 29353C1 SDG #: See cover

VALIDATION FINDINGS WORKSHEET Field Blanks



METHOD:	GC/MS VOA (EPA Method 524.2)	
N N/A N N/A	Were field blanks identified in this SDG? Were target compounds detected in the field blanks?	
Sample: _	Field Blank / Trip Blank / Rinsate (circle one)	ipment Blank
	Compound	Concentration Units (Mg/L)
	E	0.48
	CC	0.19
	·	
Sample: _	Field Blank / Trip Blank / Rinsate (circle one)	
	Compound	Concentration Units ()
Sample: _	Field Blank / Trip Blank / Rinsate (circle one)	
	Compound	Concentration Units ()
		<u> </u>

29353C1 LDC#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

1 of 2 Page: 2nd Reviewer: 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 following calculations:

 $RRF = (A_x)(C_{is})/(A_{is})(C_x)$

 $A_x = Area of Compound$

A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards

 $C_x = Concentration of compound,$

C_{is} = Concentration of internal standard X = Mean of the RRFs

%RSD = 100 * (S/X)

S= Standard deviation of the RRFs,

Calibratio	1/28/201:
Standard ID	ICAL MS-V5
#	1

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (IS)	(RRF 10 std)	(RRF 10 std)	(Initial)	(Initial)		
1	ICAL	1/28/2013	1,1-Dichloroethene (IS1)	0.777386	0.777386	0.735267	0.735267	9.696123	9.696118
	MS-V5		Trichloroethene (IS2)	0.358727	0.358727	0.3478301	0.3478301	10.678231	10.678231
			1,1,2,2-Tetrachloethane	0.621034	0.621034	0.5931176	0.5931176	4.359179	4.359162

351323 89438	126029 55544	10/10
287960	223856	10/10
Ais	Ax	Cis/Cx

Sono	Sonc 1,1-Dichloroethene Trichloroethene	Trichloroethene	1,1,2,2-Tetrachloet
0.5	0.7827933	0.3713256	0.6113063
_	0.8125329	0.3988806	0.5971845
10	0.7773857	0.3587269	0.6210336
25	0.7266194	0.3436288	2660009:0
20	0.6936307	0.3195173	0.58087
100	0.6186399	0.2949011	0.5482052
×	0.735267	0.347830	0.593118
S	0.0713	0.0371	0.0259
_			

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 recalculated results.

29353C1 LDC#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

2 0 6 BR Page: 2nd Reviewer: 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 following calculations:

 $RRF = (A_x)(C_{is})/(A_{is})(C_x)$

 $A_x = Area of Compound$

A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards

 C_x = Concentration of compound,

C_{is} = Concentration of internal standard X = Mean of the RRFs

%RSD = 100 * (S/X)

S= Standard deviation of the RRFs,

Recalculated

Reported

%RSD

Average RRF Recalculated

(Initial)

%RSD

7.559522

7.559528

0.7066773 0.0935328

7.803155 7.927922

0.1720950

7.803165 7.927924

0.1720950	0.182570	0.182570	t-1,4-dichloro-2-butene (
0.0935328	0.093356	0.093356	Methyl methacrylate (IS)		MS-V5	
0.7066773	0.703647	0.703648	Allyl chloride (IS1)	1/28/2013	ICAL	-
(Initial)	(RRF 32/80 std) (RRF 32/80 std)	(RRF 32/80 std)	Compound (IS)	Date	Standard ID	#
Average RRF	RRF	RRF		Calibration		
Reported	Recalculated	Reported				

	0.1539661	0.1560499	0.1818048	0.1825702	0.1744647	0.1837142	0.1720950	0.0136	
					0.1				
	0.1047586	0.0923109	0.0981355	0.0933556	0.0889169	0.0837192	0.0935328	6200.0	
	0.7900931	0.7229656	0.7209230	0.7036475	0.6696828	0.6327515	0.7066773	0.0534	
_	1.6/4	3.4/16	16/40	32/80	8/120	002/0	= ×	S =	

291272

655849 275131 139434

10/32

Ais

¥

Cis/Cx

368391

10/80 10/80

95466

0% of the recalculated results.
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LDC#: 29353C1

VALIDATION FINDINGS WORKSHEET Continuing Calibration Calculation Verification

Page: of Reviewer: BR

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

Where:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF Ax = Area of compound,

RRF = (Ax)(Cis)/(Ais)(Cx)

Cx = Concentration of compound, Ais = Area of associated internal standard

Cis = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
		Calibration		Average RRF	RRF	RRF	Q %	Q%
#	Standard ID	Date	Compound (IS)	(Initial)	(CC)	(CC)		
-	01FEB02	2/1/2013	1,1-Dichloroethene (IS1	0.735267	0.7526536	0.7526536	2.4	2.4
			Trichloroethene (IS2)	0.347830	0.3429434	0.3429434	1.4	1.4
			1,1,2,2-Tetrachloethane	0.593118	0.6212125	0.6212125	4.7	4.7
2	01FEB03	2/1/2013	Allyl chloride (IS1)	0.706677	0.669422	0.669422	5.3	5.3
			Methyl methacrylate (IS:	0.093533	0.09461411	0.09461411	1.2	1.2
			t-1,4-dichloro-2-butene (0.172095	0.1517514	0.1517514	11.8	11.8

1	_			
	Ais	257025	315245	79010
CCV2	Ax	550586	238613	95919
	Ais	257025	315245	79010
CCV1	Ax	483627	270278	122705
)	Cis/Cx	10/25/32	10/25/80	10/25/80

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

LDC #: 29353C1 SDG#: see core

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	
Reviewer:	BR
2nd reviewer:	4

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: 3

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8	10.00	9.8900	98-9	98.9	б
Bromofluorobenzene	1	9.7900	97.9	97.9	Ö
1,2-Dichlorobenzene-d4		11.010	110	110	ď
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					

SDG # See Cory LDC #: 293536]

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET



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 below

using the following calculation:

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

SSC = Spiked sample concentration SA = Spike added Where:

SC = Sample concentration

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

MSC = Matrix spike percent recovery

MSDC = Matrix spike duplicate percent recovery

MS/MSD sample:

	Sp	ke	Sample	Spiked Sample	Imple	Matrix Spike	inike	Matrix Spike Duplicate	Dunlicate	MS	MS/MSD
	Adc	Added	Concentration	Concentration	ation						
Compound	[]*\/ ()**()	(L)	() <i>[</i> 27/	25	7	Percent Recovery	ecovery	Percent Recovery	ecovery	ш.	RPD
	MS	MSD	0	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	25.00	25.00 25.00	0	25.800	24.310	25.800 24.390 103 103	103	2.76	77.6	97.6 77.6 5.62 5.62	5.62
Trichloroethene			0.71650	24. 210 23.230 94.0 94.0	23.230	94.0	94.0	1.06	90.1	4.13 4.13	4.13
Benzene			P	25.000 23.870	23.870	001 001	100	35.5	95.5	95.5 95.5 4.70 4.70	4.70
Toluene			0	24.330	23.200	97.3	97.3	24.330 23.200 97.3 97.3 92.8 92.8	92.8	4.35	4.75 4.75
Chlorobenzene	->-	Y	8	23.730 22.550 74.9 94.9	22.550	14.9	94.9	90.2 90.2 5.10	90.2	2.19	5.10

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

LDC# 29353C1 SDG# See enver

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Page: Lof L Reviewer: KR 2nd Reviewer:

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 recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: Si

Where: SSC = Spiked sample concentration SA = Spike added

RPD = ILCS - LCSD I* 2/(LCS + LCSD)

BNB 0667-LCS

LCS ID:

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

	<i>\overline{\sigma}</i>	Spike	Spiked S	ample	SDI	S	usot	J.	I CS/I CSD	CSD
Compound	ه در کر)	Added $(\mathcal{A}/\mathcal{A})$	Concentration (LX/L)	ration つ	Percent Recovery	ecovery	Percent Recovery	Recovery	RPD	0
	o soi	LCSD) 	I CSD	Renorted	Recalc	Reported	Recalc	Renorted	Recalculated
1,1-Dichloroethene	25.00	(-	24.820	\ -	99.3	99.3				
Trichloroethene	1		22.720		98.9	6.01				
Benzene			24.190		96.8	8.36				
Toluene			23.310		93.2 93.2	93.2				
Chlorobenzene	7	7	22.870	3	2.16 2.16	91.5	1		1	1
		·								
							,			

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 recalculated results.

LDC #:_	293 <u>5</u>	<u>3C1</u>
SDG #:	CIP	enw

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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

METHOD: GC/MS VOA (EPA Method 524.2)

matrices only.

		results for	reported with a positive detect we	ere recalculated
Conce	entratio	$on = \frac{(A_{\bullet})(I_{\circ})(DF)}{(A_{i_{\theta}})(RRF)(V_{\circ})(\%S)}$	Example: 3	S= 0.76 Mg
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. <u>\$259</u> , <u>S</u> :	1
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard		
l _s	=	Amount of internal standard added in nanograms (ng)	Conc. = (8259) (10)(311317) (0.347830)()
RRF	=	Relative response factor of the calibration standard.		
V _o	=	Volume or weight of sample purged in milliliters (ml) or grams (g).	= 0.762708 mg	
Df	=	Dilution factor.		
%S	=	Percent solids, applicable to soils and solid		

#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Acceptable (Y/N)
	-				
				<u> </u>	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

January 30, 2013

LDC Report Date:

March 20, 2013

Matrix:

Water

Parameters:

Chromium

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302075

Sample Identification

EB-3-1/30/13

MW-17-4**

MW-17-3

MW-17-2

MW-18-4

MW-18-3

MW-3-4

MW-3-3

MW-3-2

MW-18-2

MW-18-3MS

MW-18-3MSD

MW-18-3DUP

^{**}Indicates sample underwent EPA Level IV review

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 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

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria 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)

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

Sample EB-3-1/30/13 was identified as an equipment blank. No chromium was found.

NASA JPL Chromium - Data Qualification Summary - SDG 1302075

No Sample Data Qualified in this SDG

NASA JPL

Chromium - Laboratory Blank Data Qualification Summary - SDG 1302075

No Sample Data Qualified in this SDG

LDC #: 29353C4

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

Date: 3~18-1 Page: 1 of 1

mb.

SDG #: 1302075
Laboratory: BC Laboratories, Inc.

Chromium

METHOD: Metals (EPA Method 200.8)

Page: 1 of 1
Reviewer: ^C
2nd Reviewer:

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	Α	Sampling dates: 1-30-13
fl.	ICP/MS Tune	A	
111.	Calibration	Α	
IV.	Blanks	Α	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	Α	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	Α	LCS
IX.	Internal Standard (ICP-MS)	A	not reviewed for level 111
X.	Furnace Atomic Absorption QC	7	not utilized not performed
XI.	ICP Serial Dilution	7	not performed
XII.	Sample Result Verification	A	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	2	
ΧV	Field Blanks	ND	EB = 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

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

Notes:				
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VALIDATION FINDINGS CHECKLIST

Page: Lof 2
Reviewer: MG
2nd Reviewer: V

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.	_/			
Cooler temperature criteria was met.	✓			
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%?	V			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	/			
Were the proper number of standards used?	/			
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?	V			
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?		/		
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.	/			
VII. Laboratory control samples	· · · · · · ·		r	
Was an LCS anayized for this SDG?	✓ <u> </u>			
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?	V			

VALIDATION FINDINGS CHECKLIST

Page: 2of 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?				
Do all applicable analysies have duplicate injections? (Level IV only)		_	<i></i>	
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)?		/		
Were all percent differences (%Ds) < 10%?			V	· · · · · · · · · · · · · · · · · · ·
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			V	
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?		/	ļ,	
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	į			
Overall assessment of data was found to be acceptable.	/			
XIV. Field duplicates			T	,
Field duplicate pairs were identified in this SDG.		1		
Target analytes were detected in the field duplicates.			<u> </u>	
XV. Fleld blanks				
Field blanks were identified in this SDG.	1	ļ,		
Target analytes were detected in the field blanks.		<u> </u>	<u>L.</u>	

LDC# 2935364

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: Lof L Reviewer: MG 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:

%R = Found x 100 True

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

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
1055 ICV	ICP/MS (Initial calibration)	Cr	59.833	50.000	901	901	4
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1933 CCVC	ICP/MS (Continuing calibration)	Cr	40.814	40.000	201	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.

LDC#_ 39353C4

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Page: 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:

%R = Found x 100 True

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.

RPD = <u>IS-DL</u> x 100 (S+D)/2

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

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

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

%D = [I-SDR] x 100

Where, I = Initial Sample Result (mg/L) SDR = Serial Dilution Result (mg/L) (Instrument Reading \times 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)	
	ICP interference check	1	1	-				·
2071	Laboratory control sample	Š	(7/ Bm) 222 17	(7/ Bm) 000 Oh	104	101	>	T
176 <i>5</i> 11	Matrix spike	Ş	(SSR-SR) 42.665 (Mg/L)	(1/8m) 000.04	107	101		-
1746 / 1749 13	Duplicate	Cr	J.104 (Mg/L)	2.514 (mg/L)	17.8	17.8		
ł	ICP serial dilution	,				ļ	H	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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LDC#: 09353C4

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	1_of
Reviewer:	MG
2nd reviewer:	

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

Please Y) N Y) N Y) N	e see qualifications belonder M/A Have results W/A Are results work M/A Are all detections.	ow for all questions answered "N' been reported and calculated co vithin the calibrated range of the i tion limits below the CRDL?	". Not applicable questions ar prrectly? nstruments and within the line	e identified as "N/	A". CP?
Detect equation	ed analyte results for _ on:	#2, Cr	were recalcu	ulated and verified	using the following
Concen	tration = $\frac{(RD)(FV)(Dil)}{(ln. Vol.)}$		lculation:		
RD TV n. Vol. Dil	= Raw data conce = Final volume (m = Initial volume (n = Dilution factor	entration (1.765) nl) or weight (G)	Mg/L)(0.050 L) = 1	765 Mg/L
#	Sample ID	Analyte	Reported Concentration ("g/L)	Calculated Concentration	Acceptable (Y/N)
,	2	Cr	1.8	1.8	Y
	<i>σ</i>			","	
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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NASA JPL

Collection Date: January 30, 2013

LDC Report Date: March 20, 2013

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302075

Sample Identification

EB-3-1/30/13

MW-17-4**

MW-17-3

MW-17-2

MW-18-5

MW-18-4

MW-18-3

MW-3-4

MW-3-3

MW-3-2

MW-18-2

MW-17-4MS

MW-17-4MSD

MW-17-4DUP

MW-18-3MS

MW-18-3MSD

MW-18-3DUP

MW-3-4MS

MW-3-4MSD

MW-3-4DUP

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 20 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. 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

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

Sample EB-3-1/30/13 was identified as an equipment blank. No contaminant concentrations were found.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1302075

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1302075

No Sample Data Qualified in this SDG

LDC #: 29353C6

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

SDG #: 1302075	Level
Laboratory: BC Laboratories, Inc.	

Date: 3 - 18 - 13	•
Page:_Lof_L	
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
<u>l.</u>	Technical holding times	A	Sampling dates: 1-30-13
11	Initial calibration	A	
111.	Calibration verification	Α	
IV	Blanks	A	
V	Matrix Spike/Matrix Spike Duplicates	l A	MS/MSD
VI.	Duplicates	A	PUP
VII.	Laboratory control samples	Α	LCS
VIII.	Sample result verification	Α	Not reviewed for Level III validation.
IX.	Overall assessment of data	Α	
Χ.	Field duplicates	N	
XI	Field blanks	ND	EB=1

Note: A = Acceptable

N = Not provided/applicable

ND = No compounds detected

D = Duplicate TB = Trip blank

SW = See worksheet

R = Rinsate FB = Field blank

EB = Equipment blank

Validated Samples:** Indicates sample underwent Level IV validation

water all 21 EB-3-1/30/13 11 MW-18-2 31 22 32 2 MW-17-4** 12 MW-17-4MS 3 MW-17-3 13 MW-17-4MSD 23 33 MW-17-4DUP 24 MW-17-2 14 34 25 5 MW-18-5 15 MW-18-3MS 35 26 36 6 MW-18-4 16 MW-18-3MSD 37 17 27 MW-18-3 MW-18-3DUP 1₃₈ l PBWI MW-3-4 18 MW-3-4MS 28 8 1<u>39</u> 3 PBW2 29 9 MW-3-3 19 MW-3-4MSD 40 40 PBW3 10 MW-3-2 20 MW-3-4DUP 30

Notes:				

VALIDATION FINDINGS CHECKLIST

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

Method: Inorganics (EPA Method See cover)

1	 -	T	
Yes	No	NA	Findings/Comments
т			
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LDC#: 29353C6

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: ^C
2nd Reviewer: \(\sqrt{C} \)

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

LDC#: 29353C6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: of Reviewer: MG 2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	<u>Matrix</u>	Parameter Parameter
1→4, 6→11	W	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR8+) CIO4)
5		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR CO4
oc 12→20	J	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CRE+)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 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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 CR8+ 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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+ CIO4
		ph TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+ ClO4
		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 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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR84 ClO4
		ph tds ci f No3 No2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 CR6+ CIO4
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+ 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 CR6+ CIO.

Comments:			
		 the second of	**
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LDC#: 39353C6

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: 1 of 1 Reviewer: 166 2nd Reviewer: 166

METHOD: Inorganics, Method See cover

2-5-13 _ was recalculated. Calibration date: The correlation coefficient (r) for the calibration of $C10 \, \mu$ An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found × 100 Where, True

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

			, , ,	Area	Recalculated	Renorted	
Type of Analysis	Analyte	Standard ID	Found (units)	True (units)	r or %R	ror%R	Acceptable (Y/N)
Initial calibration		Blank	ı				
i		Standard 1	(20 (mg/L)	0.0034			
	-	Standard 2	ا ۲۰۰ (۱	hh00.0			
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Standard 3	6.0 ()	0.0065	•		
	20,2	Standard 4	() 0.01	8010.0	5 = 0.999502 5=0.999584	r 3=0.999584	>
		Standard 5	20.0 (↓)	0.0932			-
		Standard 6	1	•			
		Standard 7	١	,			
Calibration verification		вые		•			
	Cr V1	Cevi	0.04974 (mg/L) 0.0500 (mg/L)	0.0500 (mg/L)	99.5	99.5	
Calibration venification	C104	lisa ICV	(7/6m) H69.01	(0.694) 10.000 (mg/L)	201	201	
Calibration verification	1)		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 recalculated results.

LDC#: 39353C6

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Page: Reviewer. 2nd Reviewer:_

> cover See METHOD: Inorganics, Method

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

Where, %R = Found x 100

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.

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

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

" " "

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)
90h)	Laboratory control sample						
1827		C104	10.709 (2/2) 10.000 (2/3/2)	10.000 (49/2)	101	201	>
	Matrix spike sample		(SSR-SR)				
12		Cr <1.	(7/8m) 90:00:00 (7/8m) 85:50.0	0.0526 (mg/L)	102	701	
E181 / 6581	Duplicate sample						
<u>3</u>		Cloy	9.964 (mg/L) 18.634 (mg/L)	8.634 (mg/L)	14:3	14.3	>

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.

LDC#: 29353C6

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page	/ of (
Reviewer:	MG
2nd reviewer:	

METHOD: Inorgani	ics, Method <u>see cover</u>	
YN N/A Ha	ations below for all questions answered "N". Not applicable question we results been reported and calculated correctly? The results within the calibrated range of the instruments? The all detection limits below the CRQL?	ns are identified as "N/A".
Compound (analyte recalculated and ve	e) results for # 2, CIO 4 erified using the following equation:	reported with a positive detect were
Concentration =	Recalculation:	
Y= Mx + b where	0.011 = 0.001(x)+0.000	
= 0.001	11 mg/L = X	

#	Sample ID	Analyte	Reported Concentration (パタノレ)	Calculated Concentration (パタイム)	Acceptable (Y/N)
(2	C104	10	Ĭl	Y
				:	
		,			
ļ				<u> </u>	. 94
			ž ž		£ + cot y

Note:			i
	:		
		!	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

January 31, 2013

LDC Report Date:

March 25, 2013

Matrix:

Water

Parameters:

Volatiles

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302177

Sample Identification

TB-4-1/31/13

SB-2-1/31/13

EB-4-1/31/13

MW-22-3

MW-22-2**

MW-22-1

MW-24-3

MW-24-2

MW-24-1

MW-24-1MS

MW-24-1MSD

^{**}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 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 (r²) 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
2/1/13	Pentachloroethane	35.8	All samples in SDG 13-02177	J (all detects) UJ (all non-detects)	Р

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

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-4-1/31/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-4-1/31/13 was identified as an equipment blank. No volatile contaminants were found.

Sample SB-2-1/31/13 was identified as a source blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 13-02177

SDG	Sample	Compound	Flag	A or P	Reason
13-02177	TB-4-1/31/13 SB-2-1/31/13 EB-4-1/31/13 MW-22-3 MW-22-2** MW-22-1 MW-24-3 MW-24-2 MW-24-1	Pentachloroethane .	J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)

NASA JPL

Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-02177

No Sample Data Qualified in this SDG

VALIDATION COMPLETENESS WORKSHEET LDC #: SDG #:

Level III/IV

	Date:	3/21	13
	Page:_	<u>l</u> of	1
F	Reviewer:	BK	
2nd F	Reviewer:	9	_

Laboratory: "BC Laboratories, Inc.

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: 1 31 13
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	RSD 620? 12
IV.	Continuing calibration/ICV	SW	100/ CCV=30)
V.	Blanks	A	
VI.	Surrogate spikes	A	-
VII.	Matrix spike/Matrix spike duplicates	AW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	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)	K	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	2	
XVII.	Field blanks	מא	TB=1 SB=2 EB=3

Note:

A = Acceptable

N = Not provided/applicable

ND = No compounds detected

D = Duplicate TB = Trip blank

SW = See worksheet

R = Rinsate FB = Field blank

EB = Equipment blank

Validated Samples:** Indicates sample underwent Level IV validation

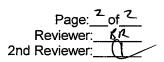
- unac	wate	•				
1	TB-4-1/31/13	11	MW-24-1MSD	21	31	BN/B0058-MB
2	SB-2-1/31/13	12		22	32	
3	EB-4-1/31/13	13		23	33	
4	MW-22-3	14		24	34	
15	MW-22-2**	15		25	35	
ŧ	MW-22-1	16		26	36	
7	MW-24-3	17		27	37	
\$	MW-24-2	18		28	38	
2 3 4 +5 +6 +7 +8 +9	MW-24-1	19		29	39	
10	MW-24-1MS	20		30	40	

Page: 1 of 2
Reviewer: 67
2nd Reviewer: 1

Method: Volatiles (EPA Method 524.2)

Wethod: Volatiles (EPA Method 524.2)	V			Findings(Comments
Validation Area	Yes	No	NA_	Findings/Comments
I, Technical holding times			Γ	
All technical holding times were met.				
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				
Did the laboratory perform a 5 point calibration prior to sample analysis?	1			
Were all percent relative standard deviations (%RSD) ≤ 20%? ,				
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.				
VI. Surrogate spikes	ı	ı	ı	
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		· · · · · ·	ı	
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	· · · ·	г	ı —	
Was an LCS analyzed for this SDG?		<u> </u>		
Was an LCS analyzed per analytical batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	/			

VALIDATION FINDINGS CHECKLIST



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	ı	1,000	ı	
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 \pm 0.06 RRT units of the standard?				
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?	/			
XIII. Tentatively identified compounds (TICs)			- 4	
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	l	l.		
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.			/	
XVII. Field blanks				The second se
Field blanks were identified in this SDG.		<u> </u>		
Target compounds were detected in the field blanks.	<u> </u>		<u> </u>	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA Method 524.2)

A Ch	11 4 A O Trichle confidence		1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	
A. Cilioloffiettialle	o. i, i,z-riidiloloeniaile	oo. z,z-Dichloloproparie	III. II-butyibenzene	CCC. 1-Cnloronexane
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. Aoetonitrile
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-Tetrachioroethane	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. Pentachla acthan
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000. methyl isdide
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	aaaa.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
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	uuuu.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

LDC# 293530)

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: L of L Reviewer: B K 2nd Reviewer:

METHOD: GC/MS VOA (EPA Method 524.2)

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

Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? (Y N) N/A

Y N/A Were all percent differences (%D) < 30% ?

*	Date	Standard ID	Compound	Finding %D (Limit: <30.0%)	Associated Samples	Qualifications
	2/1/18	CW-01PEB35	ルククグ	35.8	HII	JIMJIP

29353D1 LDC#:

Initial Calibration Calculation Verification **VALIDATION FINDINGS WORKSHEET**

1 of 2 Page: 2nd Reviewer: 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 following calculations:

 $RRF = (A_x)(C_{is})/(A_{is})(C_x)$

A_x = Area of Compound

A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards

C_x = Concentration of compound,

C_{is} = Concentration of internal standard X = Mean of the RRFs

S= Standard deviation of the RRFs,

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (IS)	(RRF 10 std)	(RRF 10 std)	(Initial)	(Initial)		!
-	ICAL	1/28/2013	1,1-Dichloroethene (IS1	0.777386	0.777386	0.735267	0.735267	9.696123	9.696118
	MS-V5		Trichloroethene (IS2)	0.358727	0.358727	0.3478301	0.3478301	10.678231	10.678231
			1,1,2,2-Tetrachloethane	0.621034	0.621034	0.5931176	0.5931176	4 359179	4 359162

Ais	287960	351323	89438	
Ax	223856	126029	55544	
Cis/Cx	10/10	10/10	10/10	

0.3988806 0.5971845 0.3687269 0.6210336 0.3436288 0.6000997 0.3195173 0.5808763 0.2949011 0.5482052 0.347830 0.593118
0 0 0
0

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 recalculated results.

LDC #: 29353D1

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: 2 of 2 Reviewer: BR 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 following calculations:

 $RRF = (A_x)(C_{is})/(A_{is})(C_x)$

 $A_x = Area of Compound$

 C_x = Concentration of compound,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

X = Mean of the RRFs

e RRF = sum of the RRFs/number of standards	= 100 * (S/X)
average RRF =	%RSD = 100 *

S= Standard deviation of the RRFs,

	-, 12-1			Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (IS)	(RRF 32/80 std)	(RRF 32/80 std)	(Initial)	(Initial)		
-	ICAL	1/28/2013	Allyl chloride (IS1)	0.703648	0.703647	0.7066773	0.7066773	7.559528	7.559522
	MS-V5		Methyl methacrylate (IS;	0.093356	0.093356	0.0935328	0.0935328	7.803155	7.803165
			t-1,4-dichloro-2-butene (0.182570	0.182570	0.1720950	0.1720950	7.927922	7.927924

Ais	291272	368391	95466	
Ax	655849	275131	139434	
Cis/Cx	10/32	10/80	10/80	

Conc	Conc Allyl chloride (Methyl methacrylat∮t-1,4-dichloro-2-but	t-1,4-dichloro-2-but
1.6/4	0.7900931	0.1047586	0.1539661
6.4/16	0.7229656	0.0923109	0.1560499
16/40	0.7209230	0.0981355	0.1818048
32/80	0.7036475	0.0933556	0.1825702
48/120	0.6696828	0.0889169	0.1744647
80/200	0.6327515	0.0837192	0.1837142
×	0.7066773	0.0935328	0.1720950
S	0.0534	0.0073	0.0136

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 recalculated results.

LDC#: 29353D1

VALIDATION FINDINGS WORKSHEET Continuing Calibration Calculation Verification

Page: of / Reviewer: BR

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

Where:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF

RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF RRF = continuing calibration RRF

ארר = continuing calibration ארר Ax = Area of compound,

Cis = Concentration of internal standard

Ais = Area of associated internal standard

Cx = Concentration of compound,

Recalculated 2.4 3.3 0. 4. 5.7 1.7 Reported □ % 2.4 3.3 5.7 4.0 1.7 Recalculated 0.09507967 0.7528716 0.3593725 0.5955784 0.6666824 RRF 000 0.09507967 0.7528716 0.3593725 0.5955784 0.6666824 Reported RRF (00) Average RRF 0.593118 (Initial) 0.347830 0.093533 0.735267 0.706677 (182) 1,1,2,2-Tetrachloethane (181) Methyl methacrylate (IS 1,1-Dichloroethene (IS1 Compound (IS) Trichloroethene Allyl chloride Calibration 2/1/2013 2/1/2013 Date Standard ID 01FEB35 01FEB34 # N

7.6

7.6

0.1589831

0.1589831

0.172095

t-1,4-dichloro-2-butene (

S	543	288	21
A	257	3082	19021
Ax	549438	235256	100504
Ais	257543	309288	19021
Ax	484742	277874	117658
Cis/Cx	10/25/32	10/25/80	10/25/80
	Ax	Ax Ais Ax 484742 257543 549438 26	Ax Ais Ax 484742 257543 549438 277874 309288 235256

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

LDC #: 29353D SDG #: <u>sec en</u>ver

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	of /
Reviewer:	BR
 2nd reviewer:	- W

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	Percent Difference
			Reported	Recalculated	
Toluene-d8	10.50	9.9500	99.5	99.5	9
Bromofluorobenzene		10.000	100	100	0
1,2-Dichlorobenzene-d4		11. 130	111	11.1	9

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:

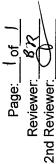
	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8					
Bromofluorobenzene					
1,2-Dichlorobenzene-d4					
Dibromofluoromethane					

Sample ID:

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

Sec cort LDC #: 29353D) SDG #:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET



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 below

using the following calculation:

Where:

SC = Sample concentration

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

SSC = Spiked sample concentration SA = Spike added

MSDC = Matrix spike duplicate percent recovery

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

MSC = Matrix spike percent recovery

0 MS/MSD sample:

	Sp	ike	Sample	Spiked Sample	Matrix Spike	Spike	Matrix Spike Duplicate	Duplicate	MS	MS/MSD
Compound	Ag 3	Added	Concentration (レット)	Concentration	Percent Recovery	ecovery	Percent Recovery	Scovery	~	RPD
) SM	MSD		MS MSD	Renorted Recalc	Recalc	Reported	Recalc	Reported	Reported Recalculated
1,1-Dichloroethene	25.00	25.00 25.00	Q	25.230 24.760	101 0) Q!	0.66	99.0	99.0 1.88	1.88
Trichloroethene	_		0	23.280 25.210 93.1 93.1	0 93.1	93.1	8 - 25	92.8	92.8 92.8 0.30) 6.301	6.307
Benzene			O. 13000	24.113 23.93 95.9 95.9	8 95.9	95.9	95.2	95.2	95.2 95.2 0.749 0.749	0.7 79
Toluene			0	24.060 23.800 96.2 96.2 95.2	2.96.2	96.2	2.56	2.56	1.09	1.09
Chlorobenzene	÷	ે	Q	23.460 23.040 93.8 93.8	10 93.8	93.8	92.2	92.2	92.2 92.2 1.8)	18-1

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

MSDCLCE.1S5

LDC# 29353D1 SDG#: Scc Com

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Page: l of l Reviewer: \(\lambda R \rangle \)

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 recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: \$

Where: SSC = Spiked sample concentration SA = Spike added

RPD = ILCS - LCSD I * 2/(LCS + LCSD)

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS ID: 0MB 0058-LCS

r cs/i csp	RPD	Recalculated									
/SD 1	N. N.	Reported					7				
ď	ecovery	Recalc				/					
I CSD	Percent Recovery	Reported									
S	Recovery	Recalc	001	101	97.2	4.7	42.4				
SDI	Percent Recovery	Reported	90 l	l et	2.46	t.46	92.4	,			
ample	ration (し	I CSD	1	1			\rightarrow				
Spiked S	Concentration (人の/し)	O	25.630	25.360	24.360	23. 688	01.82			:	
ike	Added (Lon)	l CSD	1				Ť				
ds	Ad (LS)	0 801	25.000				\(\frac{1}{2}\)				
	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 recalculated results. LDC #: 29353D1 SDG #: SCE CAVE

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	[of]
Reviewer:	BR/
2nd reviewer:	4

METHOD: GC/MS VOA	(EPA Method 524.	2)
-------------------	------------------	----

matrices only.

Compo	nund	results for	reported with a positive detect were recalculated
		d using the following equation:	
Conce	ntratic	$pn = \frac{(A_s)(I_s)(DF)}{(A_{ls})(RRF)(V_s)(\%S)}$	Example: $S = 0.19 \text{ sg}$
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. 5
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	
l _s	=	Amount of internal standard added in nanograms (ng)	Conc. = $(1945)(10)($
RRF	=	Relative response factor of the calibration standard.	
V _o	=	Volume or weight of sample purged in milliliters (ml) or grams (g).	= 0.185235 pg
Df	=	Dilution factor.	$^ \mathcal L$
%S	=	Percent solids, applicable to soils and solid	

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

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

January 31, 2013

LDC Report Date:

March 20, 2013

Matrix:

Water

Parameters:

Chromium

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302177

Sample Identification

SB-2-1/31/13

EB-4-1/31/13

MW-22-3

MW-22-2**

MW-22-1

MW-24-4**

MW-24-3

MW-24-2

MW-24-1

MW-24-1MS

MW-24-1MSD

MW-24-1DUP

^{**}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

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria 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)

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

Sample EB-4-1/31/13 was identified as an equipment blank. No chromium was found.

Sample SB-2-1/31/13 was identified as a source blank. No chromium was found.

NASA JPL Chromium - Data Qualification Summary - SDG 1302177

No Sample Data Qualified in this SDG

NASA JPL Chromium - Laboratory Blank Data Qualification Summary - SDG 1302177

No Sample Data Qualified in this SDG

LDC #: 29353D4

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

Date:	<u>3-18-</u> 13
Page: <u>(</u>	_of
Poviowor:	MC

SDG #: 1302177

Laboratory: BC Laboratories, Inc.

Chromium

METHOD: Metals (EPA Method 200.8)

Page: ___ of __ Reviewer: __ MG_ 2nd Reviewer: ____

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	Α	Sampling dates: 1-31-13
II.	ICP/MS Tune	Α	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	7	not required
VI.	Matrix Spike Analysis	Α	MS/MSD
VII.	Duplicate Sample Analysis	Α	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	not reviewed for level 111
X.	Furnace Atomic Absorption QC	2	not utilized
XI.	ICP Serial Dilution	7	not utilized not performed
XII.	Sample Result Verification	A	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	Α	
XIV.	Field Duplicates	7	
XV	Field Blanks	ND	SB=1 EB=2

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

Notes	

VALIDATION FINDINGS CHECKLIST

Page: Lof 2
Reviewer: MG
2nd Reviewer: L

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

Wettiod. Wetals (EFA 3VV 640 Wethod 00 10B/1000/0020)				
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	······			
All technical holding times were met.	✓			
Cooler temperature criteria was met.	/			
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%?	/		<u> </u>	
III. Calibration	,		,	
Were all instruments calibrated daily, each set-up time?	/			
Were the proper number of standards used?	/			
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?	/			
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?		/		
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?		<u> </u>		
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.	/			
VII. Laboratory control samples	ļ			
Was an LCS anaylzed for this SDG?	V		ļ	
Was an LCS analyzed per extraction batch?	/		ļ	
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?	/			·

LDC#: 29353DL

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?				
Do all applicable analysies have duplicate injections? (Level IV only)			<u> </u>	
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)?		/		
Were all percent differences (%Ds) < 10%?			1	
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?	<u> </u>			
If the %Rs were outside the criteria, was a reanalysis performed?			V	
XI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		1	Ļ.,	
Were the performance evaluation (PE) samples within the acceptance limits?	<u> </u>	<u> </u>		
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.	<u> </u>	/		
Target analytes were detected in the field duplicates.			<u> </u>	
XV. Fleid blanks				
Field blanks were identified in this SDG.	/			
Target analytes were detected in the field blanks.		/		

LDC# 39353 D4

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of 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:

%R = Found x 100 True

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

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
105¢	ICP/MS (Initial calibration)	Cr	53.833	50.000	901	901	>
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1047 CCV8	ICP/MS (Continuing calibration)	Cr	39.973	40.000	9.99	99.9	>
	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.

LDC# 39353D4

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

2nd Reviewer.__ Page: 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:

%R = Found x 100

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

Concentration of each analyte in the source. True ≖

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

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

Where,

S = Original sample concentration D = Duplicate sample concentration

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

%D = [I-SDR] x 100

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

					Recalculated	Renorted		
Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R/RPD/%D	%R/RPD/%D	Acceptable (Y/N)	
	ICP interference check	1		1		-	(1
1618 1618	Laboratory control sample	Š	43.640 (mg/L)	(7/ Bm) 000.04 (601	601	>	1 1
	Matrix spike	Ç	185R-SR) (Mg/L)	38.055 (mg/L) 40.000 (mg/L)	95.1	95.1		
1624/1637 12	Duplicate	Cr	19.222 (mg/L)	1 M. 457 (mg/L)	1.32	1.33	>	<u>.</u>
	ICP serial dilution	١	1	1	1	-	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.

*

LDC#:	293	53	D4

RECALC.4SW

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of
Reviewer:	MG
2nd reviewer:	

METH	IOD: Trace Metals (EP/	A SW 846 Method 6010/6020/7000)			
Please VN VN VN	e see qualifications below the N/A Have results work and N/A Are all detections.	ow for all questions answered "N". Not app been reported and calculated correctly? ithin the calibrated range of the instrumen tion limits below the CRDL?			
etect quati	ted analyte results for _ ion:	# 4, Cr	were recalcu	lated and verified	using the following
oncen	tration = (RD)(FV)(Dil)	Recalculation:			
D V n. Vol. vil	(In. Vol.) = Raw data conce = Final volume (m = Initial volume (m = Dilution factor	() (0.050 L)	= 2.020	, mg/L
#	Sample ID	Analyte	Reported Concentration	Calculated Concentration	Acceptable (Y/N)
1	4	Cr	2.0	2.0	Y

#	Sample ID	Analyte	Reported Concentration (Mg/L)	Calculated Concentration (Mg/L)	Acceptable (Y/N)
	4	Cr	2.0	2.0	Y
					·
				4 1 1 4 A	
					7V4
					·

Note:		:	
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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

January 31, 2013

LDC Report Date:

March 20, 2013

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302177

Sample Identification

SB-2-1/31/13

EB-4-1/31/13

MW-22-3

MW-22-2**

MW-22-1

MW-24-4**

MW-24-3

MW-24-2

MW-24-1

MW-22-2MS

MW-22-2MSD

MW-22-2DUP

MW-24-1MS

MW-24-1MSD

MW-24-1DUP

^{**}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 300.0 for Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, and EPA Method 365.1 for Orthophosphate as Phosphorus, EPA Method 314.0 for Perchlorate, and EPA SW 846 Method 7196 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 with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Chloride	0.161 mg/L	MW-24-1

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

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

Sample EB-4-1/31/13 was identified as an equipment blank. No contaminant concentrations were found.

Sample SB-2-1/31/13 was identified as a source blank. No contaminant concentrations were found.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1302177

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1302177

No Sample Data Qualified in this SDG

LDC #: 29353D6

VALIDATION COMPLETENESS WORKSHEET

Date: 3-18-13

SDG #: 1302177 Laboratory: BC Laboratories, Inc.

Level III/IV 9114.

Reviewer:

Nitrate as N

Nitrite as N

2nd Reviewer:

METHOD: Chloride Sulfate (EPA Method 300.0). Nitrate as N. Nitrate as NO₂(EPA Method 353.2), ortho-Phosphate as P (EPA Method 365.1), 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: 1- 31- 13
11	Initial calibration	A	
111.	Calibration verification	Α	
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	Α	
Х.	Field duplicates	7	
ΧL	Field blanks	ND	SB=1 EB=2

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

	11 Water	o campio ana	CIWCITE EGVOTTV Validation				
1	SB-2-1/31/13	11	MW-22-2MSD	21		31	
2	EB-4-1/31/13	12	MW-22-2DUP	22	· · · · · · · · · · · · · · · · · · ·	32	
3	MVV-22-3	13	MVV-24-1MS	23		33	
4	MVV-22-2**	14	MW-24-1MSD	24		34	
5	MW-22-1	15	MW-24-1DUP	25		35	
6	MW-24-4**	16		26		36	·
7	MW-24-3	17		27		37	
8	MW-24-2	18		28	PBWI	38	
9	MVV-24-1	19		29	PBW2	39	
10	MW-22-2MS	20		30	PBW3	40	

Notes:	 	 	
		 	 —

VALIDATION FINDINGS CHECKLIST

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

Method: Inorganics (EPA Method "see cover)

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

LDC#: 29353D6

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

LDC#: 29353D6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: of Reviewer: MG
2nd reviewer:

All circled methods are applicable to each sample.

01- ID		Parameter and the first of the same of the
Sample ID	<u>Matrix</u>	Falametel
7.8	W	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR CO)
6		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC (CR ⁶⁺) CIO ₄
9		pH TDS (C) F (NO) (NO) (SO) (PO) ALK CN' NH3 TKN TOC (CR) (CIO)
OC 10712		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄)
13→15	J	PH TDS CI F NO3 (NO) SO4 (PO) ALK CN' NH3 TKN TOC (CRE) (IO4)
		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 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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 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+ ClO4
		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⁺ 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 CLF NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺ ClO ₄
<u> </u>		PH TDS CLE NO, NO, SO, PO, ALK CN' NH, TKN TOC CR6+ CIO.

Comments:	

LDC #: 29353D6

VALIDATION FINDINGS WORKSHEET Blanks

Page: Lof (

Reviewer: MG 2nd Reviewer:

METHOD:Inorganics, Method See Cover

mg/L Conc. units:

Associated Samples: 9 (>5x)

	· · · · · · · · · · · · · · · · · · ·		
	No Qual's.		
Blank	Action Limit	0.805	
Blank ID Blank ID	ICB/CCB (mg/L)	0.149	
Bíank ID	PB	0.161	
Analyte		IJ	

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".

100# 39353D6

Initial and Continuing Calibration Calculation Verification **VALIDATION FINDINGS WORKSHEET**

Reviewer: MG Page: | of_ 2nd Reviewer.

> see cover METHOD: Inorganics, Method

1-24-13 _ was recalculated. Calibration date:_ The correlation coefficient (r) for the calibration of $\frac{C \cdot V}{V}$ An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found x 100 True

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

				8	Recalculated	Reported	
			CONG	30,1			Acceptable
Type of Analysis	Analyte	Standard ID	Found (units)	True (units)	ror%R	r or %R	(Y/N)
Initial calibration		Blank	(1/8m) 000.0	٠ (
		Standard 1	0.002 (,)	0.003			
	1	Standard 2	0.005 ()	9.00.0			
		Standard 3	0.035 ()	160.0		CI.	
	こっさ	Standard 4	0.050 ()	0.039	1 9=0,999 B64 1 = 0. 49991	v=0. 499991	>
		Standard 5	0.100 (1)	710.0		ang mag	_
		Standard 6	l	ł			
		Standard 7	L	ı			
Calibration verification		C80)		•			
	C104	ICV	10.387 (mg/L)	(7/by) 000.00 (mg/L) 10.000 (mg/L)	h0/	万0 /	
Calibration ventication		Внес					
	C- V(CCVS	0.05072 (mg/L) 0.0500 (mg/L)	0.0500 (mg/L)	10)	10	>
Calibration verification							

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

LDC#_ 39353D6

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

2nd Reviewer: Page: 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:

Where, %R = Found x 100

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.

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

S= 0 Where, RPD = $\frac{|S-D|}{(S+D)/2} \times 100$

Original sample concentration Duplicate sample concentration

Acceptable (Y/N) 91.2 90/ %R / RPD 3.71 91.3 3.71 Recalculated 201 %R/RPD 3,240 (mg/L) 3.122 (mg/L) 0.0480 (mg/L) 0.0536 (mg/L) 10.581 (Mg/L) 10.000 (Mg/L) True / D (units) Found / S (units) (SSR-SR) C104 C104 Element C < < Laboratory control sample Type of Analysis Matrix spike sample Duplicate sample 1305/0848 1 cs 1 1950 Sample ID 1600 5 3

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.

1.1

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LDC#: 29353D6

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	
Reviewer:	
2nd reviewer:	

METHOD: Inc	rganics, Method <u>see cover</u>	
Please see qu YN N/A YN N/A N N/A	alifications below for all questions answered "N". Not applicable of Have results been reported and calculated correctly? Are results within the calibrated range of the instruments? Are all detection limits below the CRQL?	questions are identified as "N/A".
Compound (ar	nalyte) results for#	reported with a positive detect were
Concentration =	Recalculation:	
y = mx + b where $m = 0.001$	0.004 = 0.001(x) + 0.000	
m= 0.001 b= 0.000 d:(= 1x	4.0 mg/L = X	

#	Sample ID	Analyte	Reported Concentration (パタ(上)	Calculated Concentration (パタ/レ)	Acceptable (Y/N)
1	Ч	C104	3.2	4.0	Y
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				CLIDE W	
				1 1	(*1)

Note:		1	<u> </u>
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RECALC.6



Laboratory Data Consultants, Inc.

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

Phone 760.634.0437

Web www.lab-data.com

Fax 760.634.0439

March 25, 2013

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 March 15, 2013. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 29373:

SDG#	<u>Fraction</u>
1302259, 1302331 1302480, 1302612 1302723	Volatiles, Chromium, Wet Chemistry

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

29373ST.wpd

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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

February 1, 2013

LDC Report Date:

March 25, 2013

Matrix:

Water

Parameters:

Volatiles

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302259

Sample Identification

TB-5-2/1/13

EB-5-2/1/13

MW-23-3**

MW-23-2

MW-23-1

MW-26-2

MW-26-1

^{**}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 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
2/1/13	Pentachloroethane	35.8	BWB0058-BLK	J (all detects) UJ (all non-detects)	Р
2/4/13	Bromomethane Methyl iodide Pentachloroethane	38.4 39.9 49.7	All samples in SDG 1302259	J (all detects) UJ (all non-detects)	Р

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

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

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

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-5-2/1/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-5-2/1/13 was identified as an equipment blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1302259

SDG	Sample	Compound	Flag	A or P	Reason
1302259	TB-5-2/1/13 EB-5-2/1/13 MW-23-3** MW-23-2 MW-23-1 MW-26-2 MW-26-1	Bromomethane Methyl iodide Pentachloroethane	J (all detects) UJ (all non-detects)	Р	Continuing calibration (%D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1302259

No Sample Data Qualified in this SDG

LDC #:

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

1302259 SDG #: Laboratory: BC Laboratories, Inc.

METHOD: GC/MS Volatiles (EPA Method 524.2)

Reviewer: 2nd Reviewer:

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>I.</u>	Technical holding times	A-	Sampling dates: 2)1/13
II.	GC/MS Instrument performance check	A-	2, '
III.	Initial calibration	Δ	RSD = 20%, 12
IV.	Continuing calibration/ICV	SW	RSD = 207, r2 1CV (Cov = 307
V.	Blanks	Δ	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec.
VIII.	Laboratory control samples	A	Client Spec.
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	ORA 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)	55th	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	2	
XVII.	Field blanks	NO	N3=1 EB= 2

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

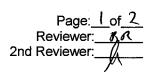
R = Rinsate FB = Field blank D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:** Indicates sample underwent Level IV validation

	WX	ter			
1	TB-5-2/1/13	11	21	31 BN	180 058-MB
2	EB-5-2/1/13	12	22	32 130	180058-MB 01431-ccb)
2	MVV-23-3**	13	23	33	
4	MVV-23-2	14	24	34	
3	MVV-23-1	15	25	35	
6	MW-26-2	16	26	36	
7	MVV-26-1	17	27	37	
8		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	. 53			
All technical holding times were met.				
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?				Market State Committee Com
III. Initial calibration			1	
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) ≤ 20%? , γ ²				
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				MATERIAL AND THE STREET
Were all percent differences (%D) ≤ 30%?				
Ƴ. 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.				
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				
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?				

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 67
2nd Reviewer: 1

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	ı	I	I	Property of the state of the st
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		l		
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?				
XII. Compound quantitation/CRQLs		l	ı	
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)		100		
Were the major ions (> 25 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	. /		7	8x .
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?	\		7	1 <u>L</u>
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?	/	<i>-</i>	16n	
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.				

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	OOO. 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. Pentach loraethan.
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000 nethy is tide
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	уррр.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	2000.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
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	ТТТ
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	uuuu.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

LDC#: 2933391

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: Lof Reviewer: KK 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". Was a continuing calibration standard analyzed at least once every $\frac{2}{3}$ hours for each instrumen $\frac{2}{3}$ Were all percent differences (%D) \leq 30%?

Was a continuing calibration standard analyzed at least once every $4\mathbb{Z}$ hours for each instrument? Were all percent differences (%D) \leq 30%?

38.4 All Samples That I	O bachacks	chacta	9	Compound	Finding %D	Accociated Samples	Qualifications
38.4 A11 Samples 39.9 49.7	CON- OIFERS	OIFER35	√ \	ر ارز	35.8	BW80658- BUK)	J/4318
38.4 All Samples 7/47 39.9 49.7							
38.4 All Samples 7/45 39.9 49.7 49.7							
38.4 All samples 7147 39.9 44.7							
38.4 All samples 7/47 49.7 49.7 Lange of the control of the cont							
38.4 All Samples 7147 49.7 L							
38.4 All Samples 7147 49.7							
39.4 All Samples 3/47 49.7 49.7 L L L L L L L L L L L L L					- 70	- 11	+
	2/4/13 CV- 07 FEBOZ B	07FE802	T		38.4		J 25 / F
	700	700	700	8	39.9		
	NA	VV	NA	JWN)	49.7		7

29373A1 LDC#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

10 to 1 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 following calculations:

 $RRF = (A_\chi)(C_{is})/(A_{is})(C_\chi)$

 $A_x = Area of Compound$

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

average RRF = sum of the RRFs/number of standards

 C_x = Concentration of compound,

X = Mean of the RRFs

Recalculated

Reported

%RSD

Average RRF Recalculated

Average RRF

0.735267 (Initial)

0.777386

0.777386

1,1-Dichloroethene (IS1

1/28/2013

ICAL

Calibration

Date

Standard ID

#

Compound (IS)

Reported

Recalculated

Reported

RRF

(RRF 10 std)

(RRF 10 std)

RRF

%RSD

9.696118

9.696123 10.678231 4.359179

4.359162 10.678231

0.5931176 0.3478301 0.735267 (Initial)

> 0.5931176 0.3478301

> 0.621034 0.358727

> 0.621034 0.358727

> > 1,1,2,2-Tetrachloethane

(182)

Trichloroethene

MS-V5

S= Standard deviation of the RRFs,

%RSD = 100 * (S/X)

_	
	Ais
	Ax
	Cis/Cx

287960 351323 89438

126029

10/10

55544

10/10

223856

10/10

Conc	Conc 1,1-Dichloroethene Trichloroethene	Trichloroethene	1,1,2,2-Tetrachloet
0.5	0.7827933	0.3713256	0.6113063
_	0.8125329	0.3988806	0.5971845
10	0.7773857	0.3587269	0.6210336
25	0.7266194	0.3436288	2660009:0
20	0.6936307	0.3195173	0.5808763
100	0.6186399	0.2949011	0.5482052
×	0.735267	0.347830	0.593118
S	0.0713	0.0371	0.0259

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 recalculated results.

29373A1 LDC#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

BR Page: 2nd Reviewer: Reviewer:

7

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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 following calculations:

 $RRF = (A_x)(C_{is})/(A_{is})(C_x)$

 $A_x = Area of Compound$

A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards

 C_x = Concentration of compound,

C_{is} = Concentration of internal standard

S= Standard deviation of the RRFs,

X = Mean of the RRFs

%RSD = 100 * (S/X)

Standard ID

MS-V5 ICAL

		Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
Date	Compound (IS)	(RRF 32/80 std)	(RRF 32/80 std)	(Initial)	(Initial)		3
1/28/2013	1/28/2013 Allyl chloride (IS1)	0.703648	0.703647	0.7066773	0.7066773	7.559528	7.559522
	Methyl methacrylate (IS	ate (IS; 0.093356	0.093356	0.0935328	0.0935328	7.803155	7.803165
	t-1,4-dichloro-2-butene (0.182570	0.182570	0.1720950	0.1720950	7.927922	7.927924

Ais	291272	368391	95466
Ax	655849	275131	139434
Cis/Cx	10/32	10/80	10/80

Conc	Conc Allyl chloride (Methyl methacrylat∮t-1,4-dichloro-2-but	t-1,4-dichloro-2-but
1.6/4	0.7900931	0.1047586	0.1539661
6.4/16	0.7229656	0.0923109	0.1560499
16/40	0.7209230	0.0981355	0.1818048
32/80	0.7036475	0.0933556	0.1825702
48/120	0.6696828	0.0889169	0.1744647
80/200	0.6327515	0.0837192	0.1837142
×	0.7066773	0.0935328	0.1720950
S	0.0534	0.0073	0.0136

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 recalculated results.

LDC#: 29373A1

VALIDATION FINDINGS WORKSHEET Continuing Calibration Calculation Verification

Page: (of / Reviewer: BR 2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

Where:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF

RRF = (Ax)(Cis)/(Ais)(Cx)

RF)/ave. RRF ave. RRF = initial calibration average RRF RRF = continuing calibration RRF

ibration RRF Ais = A

Ax = Area of compound,

Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

	,				Reported	Recalculated	Reported	Recalculated
		Calibration		Average RRF	RRF	RRF	Q %	Q%
#	Standard ID	Date	Compound (IS)	(Initial)	(CC)	(CC)		
1	04FEB02	2/4/2013	1,1-Dichloroethene (IS1)	0.73526698	0.7530315	0.7530315	2.4	2.4
			Trichloroethene (IS2)	0.34783005	0.3361331	0.3361331	3.4	3.4
			1,1,2,2-Tetrachloethane	0.59311760	0.6310034	0.6310034	6.4	6.4
2	04FEB03	2/4/2013	Allyl chloride (IS1)	0.7066773	0.666307	0.666307	5.7	5.7
			Methyl methacrylate (IS)	0.09353278	0.0903525	0.0903525	3.4	3.4
			t-1,4-dichloro-2-butene (0.17209498	0.1741519	0.1741519	1.2	1.2

l	Ais	257892	316170	80475
	<i>'</i>	25.	31	98
CCV2	Ax	549873	228534	112119
	Ais	257892	316170	80475
		25	31	8
,				
	Ax	485502	265688	126950
CCV1				
	Cis/Cx	10/25/32	10/25/80	0/25/80
	Cis	10/2	10/2	10/2

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

LDC #: 29373A1 SDG #: See em

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	_/_of/_
Reviewer:	BR
2nd reviewer:	
	/

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

Dibromofluoromethane

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID:

Odinpio IBI					
	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8	10.000	9. 8860	98.8	98.8	0
Bromofluorobenzene		9.7100	97.1	97.1	0
1,2-Dichlorobenzene-d4		10.460	105	105	0

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					

LDC#. 29373A1 SDG#.__SCC_CAMEN

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Page: l of l
Reviewer: RR

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 recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: S

Where: SSC = Spiked sample concentration SA = Spike added

RPD = ILCS - LCSD I * 2/(LCS + LCSD)

B W80058-851

LCS ID:

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

		В									
CS/I CSD	RPD	Recalculated					1				
1 CS/	8	Reported					<i>]</i>				
SD	tecovery	Recalc									
I CSD	Percent Recovery	Reported									
S	Recovery	Recalc	Qø1	101	2-26	4.76	42.4				
SOI	Percent Recovery	Reported	100	101	2.46	44.7	92.9				
ample	ration [C]	I CSD	L				<i>\rightarrow</i>				
Spiked S	Concentration (人みん)) SDI	25.030	25.360	24.300	23.690	23.110				
ike	Added ルダ (ウ	I CSD					→				
ďs	₽ <u>↓</u>	SOI	25.m	_			7	:			
	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 recalculated results. LDC #: 2 9373 A1 SDG #: <u>See un</u>

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	of	1
Reviewer:	BR	
2nd reviewer:	-	
	/	

METHOD: GC/MS VOA (EPA Method 524.2)

matrices only.

		results for <u>キロ ルカ</u> I using the following equation:	reported with a positive detect were recalculated
Concen	tratic	$n = \frac{(A_{\bullet})(I_{\bullet})(DF)}{(A_{is})(RRF)(V_{\bullet})(\%S)}$	Example:
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. 3 , <u>A-I1 N.D</u>
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	, , 9.0
l _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).	=
Df	=	Dilution factor.	
%S	=	Percent solids, applicable to soils and solid	

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

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

February 1, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Chromium

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302259

Sample Identification

EB-5-2/1/13

MW-23-4

DUP-3-1Q13

MW-23-3**

MW-23-2

MW-23-1

MW-26-2

MW-26-1

EB-5-2/1/13MS

EB-5-2/1/13MSD

EB-5-2/1/13DUP

^{**}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

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria 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)

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-23-4 and DUP-3-1Q13 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

	Concenti	ration (ug/L)	
Analyte	MW-23-4	DUP-3-1Q13	RPD
Chromium	3.0	3.1	3

XV. Field Blanks

Sample EB-5-2/1/13 was identified as an equipment blank. No chromium was found.

NASA JPL Chromium - Data Qualification Summary - SDG 1302259

No Sample Data Qualified in this SDG

NASA JPL

Chromium - Laboratory Blank Data Qualification Summary - SDG 1302259

No Sample Data Qualified in this SDG

LDC #: 29373A4

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

Date:	J- 00
Page:_	of
Paviawar.	MC

Laboratory: BC Laboratories, Inc.

ank). Chromium

SDG #: 1302259

METHOD: - Metals (EPA Method 200.8)

2nd Reviewer:

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	Α	Sampling dates: 2-1-13
II.	ICP/MS Tune	Α	
111.	Calibration	Α	
IV.	Blanks	Α	
V.	ICP Interference Check Sample (ICS) Analysis	7	not required
VI.	Matrix Spike Analysis	Α	MS/MSD
VII.	Duplicate Sample Analysis	Α	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	Α	not reviewed for level III
X.	Furnace Atomic Absorption QC	7	not utilized
XI.	ICP Serial Dilution	2	not utilized Not performed
XII.	Sample Result Verification	A	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	D=2+3
XV	Field Blanks	ND	EB=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

	all water	<u>'</u>					N30"."".
1	EB-5-2/1/13	11	EB-5-2/1/13DUP	21		31	
2	MW-23-4	12		22		32	
3	DUP-3-1Q13	13		23		33	
4	MW-23-3**	14		24		34	
5	MW-23-2	15		25		35	
6	MW-23-1	16		26		36	
7	MW-26-2	17		27		37	
8	MW-26-1	18		28		38	
9	EB-5-2/1/13MS	19		29		39	
10	EB-5-2/1/13MSD	20		30	PBW	40	

Notes:			
	 	···	

VALIDATION FINDINGS CHECKLIST

Page: Lof 2
Reviewer: MG
2nd Reviewer: ______

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

Inection inicials (El A 644 646 inicialed 66 febries 6525)	T			
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	,			
All technical holding times were met.	✓			
Cooler temperature criteria was met.	/			
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%?	/			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	/			
Were the proper number of standards used?	/			
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?	/			
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?				
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.	/			
VII. Laboratory control samples			i	
Was an LCS anayized for this SDG?	✓			
Was an LCS analyzed per extraction batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	/			

VALIDATION FINDINGS CHECKLIST

Page: 2	of 2
Reviewer:_	
2nd Reviewer:	

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)			/			
Were analytical spike recoveries within the 85-115% QC limits?		L	<u> </u>			
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%?			V			
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?	/		<u> </u>			
If the %Rs were outside the criteria, was a reanalysis performed?			<u> </u>			
XI. Regional Quality Assurance and Quality Control		·	T			
Were performance evaluation (PE) samples performed?		/	ļ	A		
Were the performance evaluation (PE) samples within the acceptance limits?	<u> </u>		<u></u>			
XII. Sample Result Verification		I - "				
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.	/					
X/V. Field duplicates	_		:			
Field duplicate pairs were identified in this SDG.	/					
Target analytes were detected in the field duplicates.	/					
XV. Field blanks	•	,	•	.		
Field blanks were identified in this SDG.	/					
Target analytes were detected in the field blanks.		/	<u> </u>			

LDC#: 29373A4

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:_	<u> </u> of_
Reviewer:	MG
2nd Reviewer:	

METHOD: Metals (EPA Method 6010B/7000)

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

	Concentra			
Analyte	2	3	RPD	
Chromium	3.0	3.1	3	

V:\FIELD DUPLICATES\FD_inorganic\29373A4.WPD

LDC # 39373 A4

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: Lof L Reviewer: MG 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:

%R = Found × 100

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

True

Acceptable (Y/N) Reported 901 101 % R Recalculated 100 0 50.000 40.000 True (ug/L) 58.833 40.35 Found (ug/L) Element S Š ICP/MS (Continuing calibration) CVAA (Continuing calibration) GFAA (Continuing calibation) ICP (Continuing calibration) ICP/MS (Initial calibration) Type of Analysis CVAA (Initial calibration) GFAA (Initial calibration) ICP (Initial calibration) CONF Standard ID エロン 1050

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC# 39373A4

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Reviewer. 16 Page: / of 2nd 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:

%R = Found x 100

Where, 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.

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

RPD = [S-D]_ x 100 (S+D)/2

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

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 = [I-SDR] x 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)
1	ICP interference check	ı	ì	1			
9059 LCS	Laboratory control sample	Ç	40.693 (Mg/L)	() 40.000 (mg/L)	102	601	>
4116	Matrix spike	ڼ	(SSR-SR) (Mg/L)	(mg/L)	101	101	
0516/7616	Duplicate	Cr	(mg/r) ON	(1) ND (49/L)	0	١	
	ICP serial dilution	J	l	ı		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.

.

LDC #: 29373A4

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	1 of 1
Reviewer	MG
2nd reviewer	

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

Y)N Y)N Y)N	N/A Have results work in the control of the control	been reported and calculated correctly? ithin the calibrated range of the instrume tion limits below the CRDL?	ents and within the line	ear range of the IC	P?
Detect equati	ted analyte results for _ on:	#4, Cr	were recalcu	lated and verified	using the following
Concen	tration = $\frac{(RD)(FV)(Dil)}{(In. Vol.)}$	Recalculation:	\		
RD V n. Vol. Jil	= Raw data conce = Final volume (m = Initial volume (m = Dilution factor	ni) (,))(0.050L) 050 L	= 3.2	03 Mg/L
#	Sample ID	Analyte	Reported Concentration	Calculated Concentration	Acceptable (Y/N)
	ч	Cr	3.2	3. 2	Y
					· · · · · · · · · · · · · · · · · · ·
				1 1	
					·
ote:_					1
			: 		

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

January 31, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302259

Sample Identification

EB-5-2/1/13

MW-23-4

DUP-3-1Q13

MW-23-3**

MW-23-2

MW-23-1

MW-26-2

MW-26-1

MW-23-3MS

MW-23-3MSD

MW-23-3DUP

^{**}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 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. 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

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-23-4 and DUP-3-1Q13 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concent		
Analyte	MW-23-4	DUP-3-1Q13	RPD
Hexavalent chromium	0.0016	0.0017	6

XI. Field Blanks

Sample EB-5-2/1/13 was identified as an equipment blank. No contaminant concentrations were found.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1302259

No Sample Data Qualified in this SDG

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1302259

No Sample Data Qualified in this SDG

LDC #: 29373A6

SDG #: 1302259

VALIDATION COMPLETENESS WORKSHEET

Date: 3 - 20 -	13
Page:of	
Reviewer: MG	
2nd Reviewer:	

Laboratory: BC Laboratories, Inc.

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	Α	Sampling dates: 2-1-13
- 11	Initial calibration	A	
111.	Calibration verification	A	
lV	Blanks	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	Α	LCS
VIII.	Sample result verification	Α	Not reviewed for Level III validation.
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	D= 2+3
ΧI	Field blanks	ND	EB=1

Note:

A = Acceptable

SW = See worksheet

N = Not provided/applicable

R = Rinsate

ND = No compounds detected

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:** Indicates sample underwent Level IV validation

	all water					
1	EB-5-2/1/13	11 M	W-23-3DUP	21		31
2	MW-23-4	12		22		32
3	DUP-3-1Q13	13		23		33
4	MW-23-3**	14		24		34
5	MW-23-2	15		25		35
6	MVV-23-1	16		26	3	36
7	MW-26-2	17		27	3	37
8	MVV-26-1	18		28		38
9	MW-23-3MS	19		29	3	39
10	MVV-23-3MSD	20		30 P	BW /	40

Notes:_			

VALIDATION FINDINGS CHECKLIST

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

Method:Inorganics (EPA Method See cover)

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

LDC#: 29373A6

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

LDC#: 29373A6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: ___of __ Reviewer: __ M G 2nd reviewer: __ _

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1,4→8	W	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR CO
2,3		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR CO) CIO4
QC9>11	<u> </u>	PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR CO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
	·	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 CR8+ 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 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 NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		ph TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		ph tds ci f no3 no2 so4 po4 alk cn nh3 tkn tóc cr6+ cio4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN- NH3 TKN TOC CR6+ ClO4
		pH TDS CLE NO, NO, SO, PO, ALK CN NH, TKN TOC CR6+ CIO,

Comments:		
COLUMN TO THE PROPERTY OF THE		

LDC#<u>29373A6</u>

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:_	of_[_
Reviewer:	MG
2nd Reviewer:	

Inorganics: Method_See Cover_

	Concentra	tion (mg/L)		
Analyte	2	3	RPD	
Hexavalent Chromium	0.0016	0.0017	6	

V:\FIELD DUPLICATES\FD_inorganic\29373A6.WPD

LDC# 39373A6

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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

METHOD: Inorganics, Method

See cover

was recalculated. Calibration date: The correlation coefficient (r) for the calibration of $C10 \, \mu$

2-5-13

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

%R = Found x 100

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

			Gre	Area	Recalculated	Reported	
Type of Analysis	Analyte	Standard ID	Found (units)	True (units)	ror%R	ror%R	Acceptable (Y/N)
Initial calibration		Blank	l	1			
ŗ	. :	Standard 1	3.0 (Mg/L)	0.0034			
		Standard 2	4.0 (,)	0.004y			
		Standard 3	() 0.9	0.0065			``
	20,7	Standard 4	() 0.01	0.0108	5 = 0.999502 10=0.999584	1 3=0.999584	> -
		Standard 5	(↑) 0.00	20.0			
		Standard 6	1	ļ			
	-	Standard 7	١	1			
Calibration verification		2187					
	 	CCVI	0.0487 (mg/L)	0.0487 (mg/L) 0.050 (mg/L)	47.4	97.4	
Calibration verification		1351	•				
	C104	CCVZ	10.169 (Mg/L)	169 (mg/L) 10.000 (mg/L)	40	201	>
Calibration verification							

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

LDC# 39373A6

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

2nd Reviewer: Page: Lof Reviewer:__

> see cover METHOD: Inorganics, Method_

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

%R = Found x 100

Where,

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.

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

8 " Q

Original sample concentration

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

Duplicate sample concentration

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	%R/RPD	%R/RPD	Acceptable (Y/N)
1234	Laboratory control sample						
rcs		C104	11.049 (49/2)	11.049 (48/L) 10.000 (48/L)	011	011	>
7516	Matrix spike sample		(SSR-SR)				
9	Sag. M	ころう	0.0511 (mg/L) 0.0526 (mg/L)	0.0576 (mg/L)	97.1	97.0	
Lhe1/ 8591	Duplicate sample	The second secon					
(1)		h010	3.609 (4g/) 3.745 (mg/L)	9.745 (mg/L)	2.08	5.07	

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.

LDC#: 29373A6

dil= 1x

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	Lof_L
Reviewer:_	MG
2nd reviewer:_	1~

METHOD: Inorganics, Metho	d see cover	
WN N/A Have results WN N/A Are results w	ow for all questions answered "N". Not applical been reported and calculated correctly? ithin the calibrated range of the instruments? ion limits below the CRQL?	ble questions are identified as "N/A".
Compound (analyte) results f recalculated and verified using	or	reported with a positive detect were
Concentration =	Recalculation:	
Factor = 1.337 Bias = 0.002	(0.003-0.002) x 1.3	337 = 0.00134 mg/L
Bias = 0.002		

#	Sample ID	Analyte	Reported Concentration (声) (上)	Calculated Concentration (M分/上)	Acceptable (Y/N)
(Ч	. C104	2.6	3. ()	Y
		Cr VI	0.0018 (mg/L)	0.0013 (mg/2)	\downarrow
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Note:			i i	
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RECALC.6

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

February 4, 2013

LDC Report Date:

March 25, 2013

Matrix:

Water

Parameters:

Volatiles

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302331

Sample Identification

TB-6-2/4/13

EB-6-2/4/13

MW-4-3

DUP-4-1Q13

MW-4-2

MW-4-1

MW-12-5

MW-12-4

MW-12-3

MW-12-2

MW-12-1

MW-12-4MS

MW-12-4MSD

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 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
2/5/13	Pentachloroethane	41.7	All samples in SDG 1302331	J (all detects) UJ (all non-detects)	Р

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

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-4-3 and DUP-4-1Q13 were identified as field duplicates. No volatiles were detected in any of the samples.

XVII. Field Blanks

Sample TB-6-2/4/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-6-2/4/13 were found.	was identified	as an	equipment	blank.	No volat	tile contaminan	ts
•							

NASA JPL Volatiles - Data Qualification Summary - SDG 1302331

SDG	Sample	Compound	Flag	A or P	Reason
1302331	TB-6-2/4/13 EB-6-2/4/13 MW-4-3 DUP-4-1Q13 MW-4-2 MW-4-1 MW-12-5 MW-12-4 MW-12-3 MW-12-2 MW-12-1	Pentachloroethane	J (all detects) UJ (all non-detects)	Р	Continuing calibration (%D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1302331

No Sample Data Qualified in this SDG

VALIDATION COMPLETENESS WORKSHEET LDC #: 29373B1

SDG #: 1302331 Laboratory: BC Laboratories, Inc. Level III

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
	Technical holding times	A	Sampling dates: 2/4/13
П.	GC/MS Instrument performance check	A	, , , , , , , , , , , , , , , , , , ,
III.	Initial calibration	A	1 CV (CCV = 30 ?
IV.	Continuing calibration/ICV	SW	1 CV (CCV = 30)
V.	Blanks	A	,
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	AW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X	Internal standards	A	
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	ND	FO= 3+4
XVII.	Field blanks	ND	TB=1 EB=2 .

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

1	TB-6-2/4/13	11	MW-12-1	21		31	BWB0215-MB
2	EB-6-2/4/13	12	MW-12-4MS	22		32	
3	MW-4-3 D	13	MW-12-4MSD	23		33	
4	DUP-4-1Q13 D	14	MW-12-4DUP	24		34	
f 5	MW-4-2	15		25	_	35	
6	MW-4-1	16		26		36	
+ 7	MW-12-5	17		27		37	
¥	MW-12-4	18		28		38	
1 9	MW-12-3	19		29		39	
10	MW-12-2	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	OOO. 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. Pentachloroetham
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000 Method lodide
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	- С
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	9999.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
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	חחתח.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	www.

LDC#. 293381

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: 1 of 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". Y N N/A

Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? Were all percent differences (%D) \leq 30%?

Qualifications	7/42/P														
Associated Samples	ΨII														
Finding %D (Limit: <30.0%)	41.7														
Compound	NNNN														
Standard ID	CUV - 054EB 03														
Date	2 513														
#															

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

February 4, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Chromium

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302331

Sample Identification

EB-6-2/4/13

MW-4-3

DUP-4-1Q13

MW-4-2

MW-4-1

MW-12-3

MW-12-2

MW-12-1

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

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria 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

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

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-4-3 and DUP-4-1Q13 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

	Concentr		
Analyte	MW-4-3	DUP-4-1Q13	RPD
Chromium	3.5	3.4	3

XV. Field Blanks

Sample EB-6-2/4/13 was identified as an equipment blank. No chromium was found with the following exceptions:

Blank ID	Analyte	Concentration (ug/L)
EB-6-2/4/13	Chromium	0.58

NASA JPL

Chromium - Data Qualification Summary - SDG 1302331

No Sample Data Qualified in this SDG

NASA JPL

Chromium - Laboratory Blank Data Qualification Summary - SDG 1302331

No Sample Data Qualified in this SDG

LDC #: 29373B4

SDG #: 1302331

VALIDATION COMPLETENESS WORKSHEET

Level III

Reviewer: 2nd Reviewer:

Laboratory: BC Laboratories, Inc.

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	Α	Sampling dates: $\partial - 4 - 13$
II.	ICP/MS Tune	Α	
111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	7	not required client specified
VII.	Duplicate Sample Analysis	2	it.
VIII.	Laboratory Control Samples (LCS)	Α	LCS
IX.	Internal Standard (ICP-MS)	2	not reviewed
X.	Furnace Atomic Absorption QC	2	not utilized
XI.	ICP Serial Dilution	7	not reviewed not utilized not performed
XII.	Sample Result Verification	N	·
XIII.	Overall Assessment of Data	Α	
XIV.	Field Duplicates	SW	D=2+3
ΧV	Field Blanks	sw	EB=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:

	all water				 	
1	EB-6-2/4/13	11		21	31	
2	MW-4-3	12		22	32	
3	DUP-4-1Q13	13		23	33_	
4	MW-4-2	14		24	 34	
5	MVV-4-1	15		25	35	
6	MW-12-3	16		26	36	
7	MW-12-2	17		27	37	
8	MW-12-1	18		28	38	
9		19		29	39	
10		20	PBW	30	 40	

Notes:		 	 	

LDC#: 29373B4

VALIDATION FINDINGS WORKSHEET

Field Duplicates

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

METHOD: Metals (EPA Method 6010B/7000)

ØN NA ØN NA

Were field duplicate pairs identified in this SDG?

Were target analytes detected in the field duplicate pairs?

	Concentration (ug/L)			
Analyte	2	3	RPD	
Chromium	3.5	3.4	3	

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LDC#: 29373B4

VALIDATION FINDINGS WORKSHEET Field Blanks

Page:	l_of
Reviewer:	MG
2nd reviewer:_	-/-

METHOD: Tr	race Metals (EPA SW 846 Method 6010/6020/7000)	
YN N/A YN N/A	Were field blanks identified in this SDG? Were target analytes detected in the field blanks?	
Sample:	Field Blank / Trip Blank / Rinsate Other EB (circle	•
	Analyte	Concentration Mg/L
	Cr	0.58
L		
Sample:	Field Blank / Trip Blank / Rinsate / Other(circ	:le one)
	Analyte	Concentration
	Апация	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

February 4, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302331

Sample Identification

EB-6-2/4/13

MW-4-3

DUP-4-1Q13

MW-4-2

MW-4-1

MW-12-5

MW-12-4

MW-12-3

MW-12-2

MW-12-1

EB-6-2/4/13MS

EB-6-2/4/13MSD

EB-6-2/4/13DUP

MW-12-4MS

MW-12-4MSD

MW-12-4DUP

Introduction

This data review covers 16 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 with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Perchlorate	3.9731 ug/L	MW-12-5 MW-12-3 MW-12-2 MW-12-1

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-12-5	Perchlorate	1.9 ug/L	1.9U ug/L
MW-12-3	Perchlorate	3.9 ug/L	3.9U ug/L
MW-12-2	Perchlorate	8.9 ug/L	8.9U ug/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. 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-4-3 and DUP-4-1Q13 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce		
Analyte	MW-4-3	DUP-4-1Q13	RPD
Perchlorate	1.9 ug/L	1.5 ug/L	24
Hexavalent chromium	0.0011 mg/L	0.0011 mg/L	0

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1302331

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1302331

SDG	Sample	Analyte	Modified Final Concentration	A or P
1302331	MW-12-5	Perchlorate	1.9U ug/L	А
1302331	MW-12-3	Perchlorate	3.9U ug/L	А
1302331	MW-12-2	Perchlorate	8.9U ug/L	А

LDC #: 29373B6 SDG #: 1302331

VALIDATION COMPLETENESS WORKSHEET

Level III

Date:	<u>3-20-</u> 1
Page:	of (
Reviewer:	MG
2nd Reviewer.	<u> </u>

Laboratory: BC Laboratories, Inc.

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	Α	Sampling dates: 2-4-13
11	Initial calibration	A	
111.	Calibration verification	A	
IV	Blanks	SW	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD (SDG
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	Α	
X.	Field duplicates	SW	D=2+3
ΧI	Field blanks	ND	EB=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:

	all water					*****	
1	EB-6-2/4/13	11	EB-6-2/4/13MS	21		31	
2	MW-4-3	12	EB-6-2/4/13MSD	22		32	
3	DUP-4-1Q13	13	EB-6-2/4/13DUP	23		33	
4	MW-4-2	14	MW-12-4MS	24		34	
5	MW-4-1	15	MW-12-4MSD	25		35	
6	MW-12-5	16	MW-12-4DUP	26		36	
7	MW-12-4	17		27		37	
8	MW-12-3	18		28		38	
9	MW-12-2	19		29	·	39	
10	MW-12-1	20		30	PBW	40	

Notes:		

LDC#: 29373B6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1→5, 8 → 10	W	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR C)
6,7		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
QC 11→13		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR CO) CIO4
14→16		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4)
		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 CR8+ CIO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
	٠	ph TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 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
<u> </u>		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 NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+ 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 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⁺ CIO ₄
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺ CIO ₄
<u> </u>		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 CLF NO, NO, SO, PO, ALK CN NH, TKN TOC CR6+ CIO,

Comments:	

LDC #: 29373B6

VALIDATION FINDINGS WORKSHEET

Blanks

Page: of 1
Reviewer: MG
2nd Reviewer:

METHOD:Inorganics, Method See Cover

Conc. units:

Associated Samples:

6,8-10

	-		
	6	8.9	
	8	3.9	
	9	1.9	
Blank	Action Limit	19.866	
Blank ID	ICB/CCB (ug/L)	3.9731	
Blank ID	PB		
Analyte	January,	CIO4	

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#<u>29373B6</u>

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:	_of
Reviewer:	MG
2nd Reviewer:	

Inorganics: Method_See Cover_

	Concentra	200		
Analyte	2	3	RPD	
Perchlorate (ug/L)	1.9	1.5	24	
Hexavalent Chromium	0.0011	0.0011	0	

V:\FIELD DUPLICATES\FD_inorganic\29373B6.WPD

Laboratory Data Consultants, Inc. **Data Validation Report**

Project/Site Name:

NASA JPL

Collection Date:

February 5, 2013

LDC Report Date:

March 25, 2013

Matrix:

Water

Parameters:

Volatiles

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302480

Sample Identification

TB-7-2/5/13

EB-7-2/5/13

MW-11-4

MW-11-3

MW-11-2**

MW-11-1

MW-21-5

MW-21-4

MW-21-3

MW-21-2 MW-21-1

MW-21-1MS

MW-21-1MSD

MW-11-3MS

MW-11-3MSD

^{**}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 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
2/6/13 (CCV-06FEB02)	Bromomethane	31.9	All samples in SDG 1302480	J (all detects) UJ (all non-detects)	Р
2/6/13 (CCV-06FEB03)	trans-1,4-Dichloro-2-butene Methyl iodide Pentachloroethane	31.4 40.3 40.2	All samples in SDG 1302480	J (all detects) UJ (all non-detects)	Р

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

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-7-2/5/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-7-2/5/13 was identified as an equipment blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1302480

SDG	Sample	Compound	Flag	A or P	Reason
1302480	TB-5-2/1/13 EB-5-2/1/13 MW-23-3** MW-23-2 MW-23-1 MW-26-2 MW-26-1	Bromomethane Methyl iodide Pentachloroethane	J (all detects) UJ (all non-detects)	Р	Continuing calibration (%D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1302480

No Sample Data Qualified in this SDG

VALIDATION COMPLETENESS WORKSHEET LDC #:_ 29373C1 Level III/IV SDG #:

1302480

	Date: <u></u> 3	21	13
	Page: <u></u> (of	
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		7	

Laboratory: ^BC Laboratories, Inc.

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	Ā	Sampling dates: 2 5 13
il.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	RSD = 202 r2 1 CV CCV = 30?
įV.	Continuing calibration/ICV	SW	1 CVI CCV= 30?
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	AW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	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)	MAX A	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	7	
XVII.	Field blanks	ND	TB= EB=2

Note:

A = Acceptable

SW = See worksheet

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

valida	ted Samples. Indicates sample	e underwent Level IV validation		
1 1	TB-7-2/5/13	11 2 MW-21-1	21	31, BWB0365-MB 322 BWB0336-MB
2 1	EB-7-2/5/13	12 2 MW-21-1MS	22	322 BWB0336-MB
\$1	MW-11-4	13 2 -MW-21-1MSD	23	33
4 1	MW-11-3	14 j # 4 m S	24	34
۲ 5 ۱	MW-11-2**	15 1 # 4 MSD	25	35
6 1	MW-11-1	16	26	36
岁1	MW-21-5	17	27	37
8 1	MW-21-4	18	28	38
15 6 17 18 19 1	MW-21-3	19	29	39
10 (MW-21-2	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.				
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		L		
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) ≤ 20%?				·
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.				
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				
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?				

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: 82 2nd Reviewer: 4

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	ı	ı	· · · ·	
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	1	r	ı	
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?				
XII. Compound quantitation/CRQLs	ı	1	ı	
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.		1		
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.		/		
Target compounds were detected in the field duplicates.				
XVII. Field blanks				The second secon
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	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	OOO. 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. Pentach lo noethans
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000. methyl is did
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP. trans-14- pichlora-2-
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanoi	agag. buten
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
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	uuuu.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	www.

16.3

LDC#: 27373CI

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: L of 1 eviewer: 6K 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". Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? $\frac{\langle N | N | A \rangle}{|V | N | A \rangle}$ Were all percent differences (%D) $\leq 30\%$?

	# Date	Date Standard ID		Finding %D (Limit: ≤30.0%)	Associated Samples	Qualifications	
	2/6/13	CCV-06 FEB02	2	21.9	41	JINGIR	
- 1							
1 1							
į.	5	CA	0000	31.11	4	71.4	
- 1				7:7	20) (X) !	
- 1			0000	15.3			
- 1			NNNN	40.2		7	
- 11							
- 1							
1							
1							
1							
1							

29373C1 LDC#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

4 οę 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 following calculations:

 $RRF = (A_x)(C_{is})/(A_{is})(C_x)$

average RRF = sum of the RRFs/number of standards

 $C_x = Concentration of compound,$ A_x = Area of Compound

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

X = Mean of the RRFs

%RSD = 100 * (S/X)

S= Standard deviation of the RRFs,

					The same of the sa				
				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (IS)	(RRF 10 std)	(RRF 10 std)	(Initial)	(Initial)		
1	ICAL	1/28/2013	/28/2013 Chloroform (IS1)	0.867002	0.867002	0.8420579	0.8420579	8.477967	8.477973
	MS-V5		Trichloroethene (IS2)	0.358727	0.358727	0.3478301	0.3478301	10.678231	10.678231
			1,1,2,2-Tetrachloethane	0.621034	0.621034	0.5931176	0.5931176	4.359179	4.359162

Ais	287960	351323	89438	
Ax	249662	126029	55544	
Cis/Cx	10/10	10/10	10/10	

Sonc	Conc Chloroform	Trichloroethene	1,1,2,2-Tetrachloet
0.5	0.8918710	0.3713256	0.6113063
_	0.9355590	0.3988806	0.5971845
9	0.8670024	0.3587269	0.6210336
25	0.8319676	0.3436288	0.6000997
20	0.7856205	0.3195173	0.5808763
100	0.7403267	0.2949011	0.5482052
×	0.842058	0.347830	0.593118
S	0.0714	0.0371	0.0259

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 recalculated results.

29373C1 LDC #:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

لم BR ₹ 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 following calculations: $RRF = (A_x)(C_{is})/(A_{is})(C_x)$

A_x = Area of Compound

A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards

 $C_x = Concentration of compound,$

C_{is} = Concentration of internal standard

S= Standard deviation of the RRFs,

X = Mean of the RRFs

Recalculated

Reported

%RSD

Average RRF Recalculated

Average RRF

(Initial)

(RRF 32/80 std)

(RRF 32/80 std)

RRF

0.703647

0.703648 0.093356 0.182570

Reported

Recalculated

Reported

RRF

0.7066773 0.0935328 0.1720950

(Initial)

%RSD

7.559522 7.803165 7.927924

7.559528 7.803155 7.927922

0.0935328 0.7066773

0.1720950

0.182570 0.093356

t-1,4-dichloro-2-butene

	(SI)	(IS1)	ylate (IS;
	Compound (IS)	Allyl chloride	Methyl methacrylate (IS)
	Calibration Date	1/28/2013	
00 * (S/X)	Standard ID	ICAL	MS-V5
%RSD = 100 * (S/X)	*	1	

,								
-1,4-dichloro-2-but	0.1539661	0.1560499	0.1818048	0.1825702	0.1744647	0.1837142	0.1720950	0.0136
Methyl methacrylatet-1,4-dichloro-2-bu	0.1047586	0.0923109	0.0981355	0.0933556	0.0889169	0.0837192	0.0935328	0.0073
Conc Allyl chloride (0.7900931	0.7229656	0.7209230	0.7036475	0.6696828	0.6327515	0.7066773	0.0534
Conc	1.6/4	6.4/16	16/40	32/80	48/120	80/200	= ×	S
Ais	291272	368391	95466					

655849 275131 139434

¥

Cis/Cx 10/32 10/80 10/80

Conc	Conc Allyl chloride ((Methyl methacrylatet-1,4-dichloro-2-b	t-1,4-dichloro-2-b
1.6/4	0.7900931	0.1047586	0.15396
6.4/16	0.7229656	0.0923109	0.156049
16/40	0.7209230	0.0981355	0.18180
32/80	0.7036475	0.0933556	0.18257(
48/120	0.6696828	0.0889169	0.17446
80/200	0.6327515	0.0837192	0.18371
= ×	0.7066773	0.0935328	0.17209
S	0.0534	0.0073	0.013
•			

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 recalculated results.

LDC#: 29373C1

Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

BR Page: 1 of Reviewer:

2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

Where:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF Ax = Area of compound,

Ais = Area of associated internal standard Cx = Concentration of compound,

Cis = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
		Calibration		Average RRF	RRF	RRF	O %	Q%
#	Standard ID	Date	Compound (IS)	(Initial)	(၁၁)	(cc)		
7	06FEB02	2/6/2013	Chloroform (IS1)	0.84205787	0.8438561	0.8438561	0.2	0.2
			Trichloroethene (IS2)	0.34783005	0.3504245	0.3504245	0.7	2:0
			1,1,2,2-Tetrachloethane	0.59311760	0.6134228	0.6134228	3.4	3.4
2	06FEB03	2/6/2013	Allyl chloride (IS1)	0.7066773	0.642253	0.642253	9.1	9.1
			Methyl methacrylate (IS:	0.09353278	0.09095895	0.09095895	2.8	2.8
			t-1,4-dichloro-2-butene (0.17209498	0.1180231	0.1180231	31.4	31.4

	CCV1		CCV2	
Cis/Cx	Ax	Ais	Ax	Ais
10/25/32	608646	288507	592942	288507
10/25/80	307487	350988	255404	350988
10/25/80	139796	91158	02098	91158

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

LDC #: 29373C1 SDG #: See com

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	
Reviewer:	BR
2nd reviewer:	4_
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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

Sample ID:

JI -	Surrogate i Sunt
99 -	Surrogate Spiked
33 -	Surrogate Spikeu

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8	10.00	9.63	96.3	96.3	6
Bromofluorobenzene		9.52	95.2	95.2	0
1,2-Dichlorobenzene-d4		10.42	104	104	9
Dibromofluoromethane					

Sample ID:

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

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					

SDG# Second LDC #: 29335CI

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer:__ Reviewer:_

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 below

using the following calculation:

Where:

SC = Sample concentration

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

SSC = Spiked sample concentration SA = Spike added

MSDC = Matrix spike duplicate percent recovery

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

MSC = Matrix spike percent recovery

14 (5 MS/MSD sample:

	ias	ě	Sample	Spiked Sample	nole	Matrix Spike	pike	Matrix Spike Duplicate	Duplicate	SW	MS/MSD
	Added	pe	Concentration	Concentration	tion						
Compound	(wall	(J)	(120/1)	(1/m/)	_	Percent Recovery	ecovery	Percent Recovery	ecovery		RPD
	MS	MSD	٨	WS (MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	25.00	25.00 25.00	Q	24.230	23.520	97.1	1.76	24.2% 23.560 97.1 97.1 94.2 94.2 2.97 2.97	94.2	t6.8	2,97
Trichloroethene		_		23.72	23.100	74.9	94.9	23.72 23.100 74.9 94.9 92.4 92.4 2.65 2.65	92.4	2.65	2.65
Benzene				24.610	24.050	48.4	98.4	24.610 24.050 98.4 98.4 96.2 96.2 36.2 2.30 2.30	96.2	2.30	2.30
Toluene				24.100 23.600 96.4 96.4 94.6 95 1.84 1.84	23. 660	16.4	96.4	5.46	95	1.84	1.84
Chlorobenzene	1	Y	7	23.670 23.90 94.7 94.7 92.8 92.8 2.05 2.05	23. AO	4.76	94.7	92.8	92.8	2.05	2.05

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

LDC#: 29373C1 SDG#: SEC COME

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Page: of / Reviewer: \(\infty \)? 2nd Reviewer: \(\infty \)

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 recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where:

Where: SSC = Spiked sample concentration SA = Spike added

RPD = ILCS - LCSD I * 2/(LCS + LCSD)

LCS = Laboraotry control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS ID: BW18,0305-851

Spike Added	ike ded		Spiked Sample Concentration	Sample tration	SOI	S	I CSD	SD	108/	CS/I CSD
6 7)	100	16)	2)	(H	Percent Recovery	Recovery	Percent Recovery	tecovery	R	RPD
108		I CSD) SOI	I CSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
25.00		\-	24. 690	\ -	46.4	46.4			\	
			23.210		92.8	8.26				
			24.210		9.96	8.36				
			23.65		94.5	94.6				
→		→	23.25	>	93.0 13.0	3.0	7		J	
-										

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 recalculated results. LDC #: 29373 C)
SDG #: SCC Com

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	of
Reviewer:_	BK
2nd reviewer:	1
	,

METHOD: GC/MS VOA (EPA Method 524.2)

matrices only.

Compound re and verified u	sults for sing the following equation:	reported with a positive detect were	e recalculated	
Concentration = $\frac{(A_s)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$			k=0.12,y	
	rea of the characteristic ion (EICP) for the ompound to be measured	Sample I.D;	T	
10	rea of the characteristic ion (EICP) for the pecific internal standard			
•	mount of internal standard added in nanograms	$Conc. = \frac{(30)4}{(29374)^{6}} \frac{10}{0.8420579}$		
	telative response factor of the calibration tandard.			
v	olume or weight of sample purged in milliliters ml) or grams (g).	= 0.12185 mg		
Df = D	ilution factor.	T		
%S = D	ercent solids, applicable to soils and solid			

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

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

February 5, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Chromium

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302480

Sample Identification

EB-7-2/5/13

MW-11-3

MW-11-2**

MW-11-1

MW-21-5

MW-21-4

MW-21-3

MW-21-2

MW-21-1

MW-11-3MS

MW-11-3MSD

MW-21-1MS

MW-21-1MSD

MW-21-1DUP

MW-11-3DUP

^{**}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 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

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria 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)

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.

NASA JPL

Chromium - Data Qualification Summary - SDG 1302480

No Sample Data Qualified in this SDG

NASA JPL

Chromium - Laboratory Blank Data Qualification Summary - SDG 1302480

No Sample Data Qualified in this SDG

LDC #: 29373C4

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

Page: 1 of 1
Reviewer: M G

SDG #: 1302480 Laboratory: BC Laboratories, Inc.

Chromium

METHOD: Metals (EPA Method 200.8)

Reviewer: MG 2nd Reviewer: V

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: 2-5-13
II.	ICP/MS Tune	Α	
111.	Calibration	Α	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required MS/MSB
VI.	Matrix Spike Analysis	A	MS/MSB
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	Α	LCS
IX.	Internal Standard (ICP-MS)	A	not reviewed for level 111
X.	Furnace Atomic Absorption QC	7	not utilized
XI.	ICP Serial Dilution	7	not reviewed for level 111 not utilized not performed
XII.	Sample Result Verification	Α	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	Α	
XIV.	Field Duplicates	2	
XV	Field Blanks	ND	EB=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

	ail water	•				
1 1	EB-7-2/5/13	11	MW-11-3MSD	21		31
2 1	MVV-11-3	12	MVV-21-1MS	22		32
3 l	MVV-11-2**	13	MW-21-1MSD	23_		33
4 1	MVV-11-1	14	MW-21-1DUP	24		34
₅	MVV-21-5	15	#2 DUP	25		35
6 1	MW-21-4	16		26		36
7 1	MVV-21-3	17		27		37
8 l	MW-21-2	18		28		38
9	MVV-21-1	19		₂₉ l	PBW	39
10	MW-11-3MS	20		302	PBW	40

Notes:			 	
	 	<u></u>	 	

LDC#: 29373C4

VALIDATION FINDINGS CHECKLIST

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

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

moundainetais (Et 77 GVV 040 INCLISE GO 10B/1000/0525)								
Validation Area	Yes	No	NA	Findings/Comments				
I. Technical holding times								
All technical holding times were met.	1							
Cooler temperature criteria was met.								
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%?	/							
III. Calibration								
Were all instruments calibrated daily, each set-up time?	1							
Were the proper number of standards used?	/							
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?	/							
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?		/						
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.	/							
VII. Laboratory control samples	, , , , , , , , , , , , , , , , , , ,							
Was an LCS anaylzed for this SDG?	/							
Was an LCS analyzed per extraction batch?	V							
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?			_					

LDC#: 29373C4

VALIDATION FINDINGS CHECKLIST

Page: $\frac{\partial}{\partial}$ of $\frac{2}{\partial}$ Reviewer: $\frac{MG}{\partial}$ 2nd Reviewer: $\frac{1}{\partial}$

Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC	,	,	, "	
If MSA was performed, was the correlation coefficients > 0.995?			1	
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)?		/		
Were all percent differences (%Ds) < 10%?			/	
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?			/	
XII. Sample Result Verification		γ		
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/		<u> </u>	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/		<u> </u>	
XIV. Field duplicates	ų·····			
Field duplicate pairs were identified in this SDG.		/		
Target analytes were detected in the field duplicates.			/	
XV. Field blanks		,		
Field blanks were identified in this SDG.	/			
Target analytes were detected in the field blanks.			<u></u>	

LDC# 39373CH

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: Lof L Reviewer: HG 2nd Reviewer: L

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:

%R = <u>Found</u> x 100 True

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

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
1631 ICV	ICP/MS (Initial calibration)	Cr	49.153	50.000	98.3	98.3	\ \
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
9347 CCVC	ICP/MS (Continuing calibration)	CV	39.831	000.0h	9.66	9.66	>
	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. LDC# 39373CH

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Page: / of / Reviewer: M. 2nd 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:

 $%R = Found \times 100$ True

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

True = Concentration of each analyte in the source.

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

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

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

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

%D = [I-SDR] x 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		l				ļ
9315 9315	Laboratory control sample	Ċ	38.864 (Mf/L)	BGH (Mg/L) 40.000 (Mg/L)	97.2	97. Z	>-
9330	Matrix spike	Ç	(SSR-SR) 36.642 (mg/L)	642 (mg/L) 40.000 (mg/L)	9.16	9.16	
Hese / 1986	Duplicate	Cr	(mg/r) ON	ND (49/L)	0		>
l	ICP serial dilution			_	l	-	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.

Sec.

LDC#: 29373C4

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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

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

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

(Y)N (Y)N (Y)N	<u>N/A</u> N/A N/A	Have results Are results with Are all detect	ion limits belo	and calcula ated range o w the CRDL'	ted con of the in ?	rectly?	and within the line	ear range of the IC	P?
Detect equati	ted analy on:	te results for _	level 1	V sampl	e =	N.D.	were-recalcu	ılat ed and verified	using the following
Concen	tration =	(RD)(FV)(Dil) (In. Vol.)			Recalc	ulation:			
RD FV In. Vol. Dil	= = = =	Raw data conce Final volume (ml Initial volume (m Dilution factor	l)						
#	Sa	ample ID		Analyte			Reported Concentration (ペダイム)	Calculated Concentration	Acceptable (Y/N)
					· · · · · · · · · · · · · · · · · · ·				
					411.001				
									,

Note:

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

February 5, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302480

Sample Identification

EB-7-2/5/13

MW-11-4

MW-11-3

MW-11-2**

MW-11-1

MW-21-5

MW-21-4

MW-21-3

MW-21-2

MW-21-1

MW-11-3MS

MW-11-3MSD

MW-11-3DUP

MW-11-2MS

MW-11-2MSD

MW-11-2DUP

MW-21-1MS

MW-21-1MSD

MW-21-1DUP

^{**}Indicates sample underwent EPA Level IV review

Introduction

This data review covers 19 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. 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

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.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1302480

No Sample Data Qualified in this SDG

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1302480

No Sample Data Qualified in this SDG

LDC #: 29373C6

VALIDATION COMPLETENESS WORKSHEET

Level III/IV

SS WORKSHEET Date: _____ Page: ____ of Reviewer: ______

2nd Reviewer:

SDG #: 1302480 Laboratory: BC Laboratories, Inc.

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
1.	Technical holding times	A	Sampling dates: 2-5-13
Ш	Initial calibration	A	
III.	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	L A	Not reviewed for Level III validation.
IX.	Overall assessment of data	A	
X.	Field duplicates	N	
ΧI	Field blanks	ND	EB = (

Note:

A = Acceptable

ND = No compounds detected

D = Duplicate

N = Not provided/applicable

R = Rinsate

TB = Trip blank

SW = See worksheet FB = F

FB = Field blank EB = Equipment blank

Validated Samples:** Indicates sample underwent Level IV validation

	all water				7111		
1	EB-7-2/5/13	11	MW-11-3MS	21		31	·
2	MVV-11-4	12	MW-11-3MSD	22		32	
3	MVV-11-3	13	MW-11-3DUP	23		33	
4	MW-11-2**	14	MW-11-1/MS	24_	m &	34	
5	MW-11-1	15	2 MW-11- // MSD	25		35	
6	MW-21-5	16	MW-11-7DUP	26	<u> </u>	36	
7	MW-21-4	17	MW-21-1MS	27		37	
8	MW-21-3	18	MW-21-1MSD	28	PBWI	38	
9	MW-21-2	19	MW-21-1DUP	29	PBW2	39	
10	MW-21-1	20		30	PBW 3	40	

Notes:		

LDC#: 29373C6

VALIDATION FINDINGS CHECKLIST

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

Method:Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times			_	
All technical holding times were met.	/			
Cooler temperature criteria was met.	/			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	/			
Were the proper number of standards used?	/	!		
Were all initial calibration correlation coefficients ≥ 0.995?	<u>/</u>	!		
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)		<u> </u>	/	
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 anayized for this SDG?	1			
Was an LCS analyzed per extraction batch?	1			
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?			<u> </u>	
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?				
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		/		
Target analytes were detected in the field duplicates.			\	
X. Field blanks				
Field blanks were identified in this SDG.				
Target analytes were detected in the field blanks.				

LDC#: 29373C6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	<u> </u> of
Reviewer:	MG
2nd reviewer:	\sim

All circled methods are applicable to each sample.

Sample ID	<u>Matrix</u>	Parameter O
1, 3→10	W	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR69 CIO4
2		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
QC 11 → 13		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (R6) (104)
14-19		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR6+ CIO2
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR6+ ClO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		ph TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		ph TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 CLE NO, NO, SO, PO, ALK CN ⁻ NH, TKN TOC CR ⁶⁺ CIO,

Comments:	

LDC# 39373C6

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

2nd Reviewer: Reviewer: M Page:

> see cover METHOD: Inorganics, Method

The correlation coefficient (r) for the calibration of $\frac{C^{\kappa}}{V}$

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

1-24-13

was recalculated. Calibration date:

%R = Found x 100 True

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

			•	A	Recalculated	Reported	
Type of Analysis	Analyte	Standard ID	Found (units)	True (units)	ror%R	r or %R	Acceptable (Y/N)
Initial calibration	\$: :	Blank	(7/8m) 000.0	.0.003			
	:	Standard 1	0.002 (,)	0.003			
		Standard 2	0.005 ()	9.00.0			
	\$ -	Standard 3	0.035 ()	0.021		C	
• !	こくこ	Standard 4	0.050 ()	0.039	1 3= 0,999 B64	16666 .0=01	>
		Standard 5	0.100 (1)	220.0			
		Standard 6	l	-			
		Standard 7	ı	1			
Calibration verification		1393					
	C104	CCV2	10.638 (49/1)	(2/6m) 000.01 (1/6m) 869.	901	901	
Calibration verification	the man to the second to the second to the	D15H	\ . \ \		11	ų	
·	CrvI	CCVH	0.0506 (mg/L)	0500 (mg/L) 0.050 (mg/L)	101	101	>
Calibration verification							

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

LDC#. 39373C6

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

2nd Reviewer: Page: of Reviewer:_

> see cover METHOD: Inorganics, Method _

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

%R = <u>Found</u> x 100

Found =

Where,

concentration of each analyte $\frac{\text{measured}}{\text{meanuly}}$ in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).

True = concentration of each analyte in the source.

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

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

" " "

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)
osec	Laboratory control sample						
577		C* </td <td>0.0497 (mg/L) 0.0500 (mg/L)</td> <td>0.0500 (mg/L)</td> <td>49.4</td> <td>49.4</td> <td>></td>	0.0497 (mg/L) 0.0500 (mg/L)	0.0500 (mg/L)	49.4	49.4	>
bose	Matrix spike sample		(SSR-SR)				
I		C104	(7/8m) (mg/r)	(7/8m) 10:101 (7/8m) 10:101	103	103	
0808/0288	Duplicate sample						
13		C < < -	(7/Bm) GN	(7/8m) AN (7/8m)	0	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.

LDC#: 29373C6

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of
Reviewer:	MG
2nd reviewer:	1/

METHOD: Inorganics, Method	see cover	-		
Please see qualifications below for N/A Have results bee	n reported and the calibrated	calculated corr range of the ins	ectly?	questions are identified as "N/A".
Compound (analyte) results for _ recalculated and verified using the	level IV	sample = ation:	. N.D.	reported with a positive detect were
Concentration =		Recalculation:		

#	Sample ID	Analyte	Reported Concentration ()	Calculated Concentration ()	Acceptable (Y/N)
ļ					

Note:	

Laboratory Data Consultants, Inc. **Data Validation Report**

Project/Site Name:

NASA JPL

Collection Date:

February 6, 2013

LDC Report Date:

March 25, 2013

Matrix:

Water

Parameters:

Volatiles

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302612

Sample Identification

TB-8-2/6/13

MW-13

DUP-5-1Q13

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
2/7/13 (07FEB02)	Bromomethane	38.0	All samples in SDG 1302612	J (all detects) UJ (all non-detects)	Р
2/7/13 (07FEB03)	Pentachloroethane	36.5	All samples in SDG 1302612	J (all detects) UJ (all non-detects)	Р

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

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-13 and DUP-5-1Q13 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concenti	ation (ug/L)	
Compound	MW-13	DUP-5-1Q13	RPD
Bromodichloromethane	0.59	0.62	5
Carbon tetrachloride	0.65	0.64	2
Chloroform	9.4	9.5	1
1,1-Dichloroethane	0.14	0.13	7
1,1-Dichloroethene	0.65	0.63	3
Tetrachloroethene	0.54	0.53	2
Trichloroethene	0.17	0.18	6

XVII. Field Blanks

Sample TB-8-2/6/13 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1302612

SDG	Sample	Compound	Flag	A or P	Reason
1302612	TB-8-2/6/13 MW-13 DUP-5-1Q13 MW-6 MW-5	Bromomethane Pentachloroethane	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)

NASA JPL

Volatiles - Laboratory Blank Data Qualification Summary - SDG 1302612

No Sample Data Qualified in this SDG

VALIDATION COMPLETENESS WORKSHEET LDC #: 29373D1 SDG #: <u> 1302612</u>

Level III

Reviewer: 2nd Reviewer:

Laboratory: <u>BC Laboratories</u>, Inc.

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: 2/6 13
II.	GC/MS Instrument performance check	A-	
111.	Initial calibration	A	RSD = 207, 12
IV.	Continuing calibration/ICV	SY	RSD = 207, 12 1CV CCV = 307
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	BT X A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
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	જ	FD: 2+3
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

1	TB-8-2/6/13	11	21	31	BW130429-MB
2+	MVV-13 D	12	22	32	
3	DUP-5-1Q13 9	13	23	33	
4	MVV-6	14	24	34	
5	MVV-5	15	25	35	
6	MVV-13MS	16	26	36	
7	MVV-13MSD	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	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	OOO. 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. Yentach Graethan
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000 methy 10 hills
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	РРРР.
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	RRRR.
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	ттт.
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	www.

LDC# 28 2937301

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: 2nd Reviewer: 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 $(\%D) \le 30\%$?

Qualifications	J/47/8				J14518									
Associated Samples	A(1				A(1									
Finding %D (Limit: <30.0%)	38.0				36.5									
Compound	B				NNAN									
Standard ID	07FEB02	(((())			67 FEB303	(ccv)								
Date	a/7/13				2/4/13									
#														

LDC#: 29373D1

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: 1 of 1
Reviewer: 67
2nd Reviewer:

METHOD: GC MS Volatiles (EPA 524.2)

N NA VN NA Were field duplicate pairs identified in this SDG? Were target analytes detected in the field duplicate pairs?

	Concentrat	ion (ug/L)	
Compound	2	3	RPD
Р	0.59	0.62	5
0	0.65	0.64	2
К	9.4	9.5	1
	0.14	0.13	7
н	0.65	0.63	3
AA	0.54	0.53	2
s	0.17	0.18	6

V:\FIELD DUPLICATES\29373D1.wpd

Laboratory Data Consultants, Inc. **Data Validation Report**

Project/Site Name:

NASA JPL

Collection Date:

February 6, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Chromium

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302612

Sample Identification

MW-13

DUP-5-1Q13

MW-6

MW-5

MW-15

Introduction

This data review covers 5 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

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria 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-13 and DUP-5-1Q13 were identified as field duplicates. No chromium was detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)	
Analyte	MW-13	DUP-5-1Q13	RPD
Chromium	17	15	13

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL

Chromium - Data Qualification Summary - SDG 1302612

No Sample Data Qualified in this SDG

NASA JPL

Chromium - Laboratory Blank Data Qualification Summary - SDG 1302612

No Sample Data Qualified in this SDG

LDC #:	29373D4	VALIDATION COMPLETENESS V
SDG #:	1302612	 Level III

VORKSHEET Level III

Date:	3- <i>20</i> -13
Page:_	<u> </u>
Reviewer:	MG
2nd Reviewer	1~

mA.

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.

	Validation Area		Comments
I.	Technical holding times	Α	Sampling dates: 2-6-13
11.	ICP/MS Tune	Α	
111.	Calibration	Α	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	A	not required MS/MSD (SDG: 1302480)
VII.	Duplicate Sample Analysis	Α	DUP ()
VIII.	Laboratory Control Samples (LCS)	Α	LCS
IX.	Internal Standard (ICP-MS)	7	not reviewed
X.	Furnace Atomic Absorption QC	7	
XI.	ICP Serial Dilution	7	not utilized not performed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	Α	
XIV.	Field Duplicates	SW	D= 1+2
XV	Field Blanks	7	

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 21 31 11 MW-13 22 32 12 2 DUP-5-1Q13 13 23 33 MW-6 24 34 MW-5 14 35 25 MW-15 15 36 16 26 37 27 17 28 38 18 8 29 39 19 9 PBW 20 30

Notes:				
	,		 	

LDC#: 29373D4

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:	Lof_L
Reviewer:_	MG
2nd Reviewer:	1,~~

METHOD: Metals (EPA Method 6010B/7000)

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

	Concentration (ug/L)			
Analyte	1	2	RPD	
Chromium	17	15	13	

V:\FIELD DUPLICATES\FD_inorganic\29373D4.WPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

February 6, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302612

Sample Identification

MW-13

DUP-5-1Q13

MW-6

MW-5

MW-15

MW-13MS

MW-13MSD

MW-13DUP

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 300.0 for Chloride, Sulfate, and Nitrate as Nitrogen, EPA Method 353.2 for Nitrite as Nitrogen, EPA Method 365.1 for Orthophosphate as Phosphorus, 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 with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Chloride Orthophosphate as P	0.2090 mg/L 0.006638 mg/L	MW-13
ICB/CCB	Chloride	0.1570 mg/L	MW-13

Sample concentrations were compared to concentrations detected in the blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated 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-13 and DUP-5-1Q13 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce		
Analyte	MW-13	DUP-5-1Q13	RPD
Perchlorate	1400 ug/L	1400 ug/L	0
Hexavalent chromium	0.0060 mg/L	0.0058 mg/L	3

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1302612

No Sample Data Qualified in this SDG

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1302612

No Sample Data Qualified in this SDG

LDC #:	29373D6

VALIDATION COMPLETENESS WORKSHEET

Date: 3-20-13

SDG #: 1302612

Level III

Page: <u>I_</u>of<u>_l</u> Reviewer: <u>MG</u>

Laboratory: BC Laboratories, Inc.

and.

2nd Reviewer: V

Nitrate as N Nitrite as N

METHOD: Chloride Sulfate (EPA Method 300.0). Nitrate as N, Nitrate as NO₂(EPA Method 353.2), ortho-Phosphate as P (EPA Method 365.1), 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: 2 - 6 - 13
11	Initial calibration	A	
III.	Calibration verification	A	
IV	Blanks	SW	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD (SDG: 1302480)
VI.	Duplicates	Α	DUP (1)
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	sw	D=1+2
xı	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 all MW-13 21 31 11 32 2 DUP-5-1Q13 12 22 MW-6 13 23 33 24 34 MW-5 14 15 25 35 5 MW-15 26 MW-13MS 16 36 6 37 27 MW-13MSD 17 8 MW-13DUP 18 28 38 PBWI 29 19 39 9 20 PBW2 30 40 10

Notes:			
_			

LDC#: 29373D6

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: lof l Reviewer: MG 2nd reviewer: _____

All circled methods are applicable to each sample.

T		
Sample ID	Matrix	Parameter
11	W	PH TDS (CI)F (NO3)(NO2)(SO4) PO4) ALK CN NH3 TKN TOC (CRS) (CIO4)
2→4		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR6+) CIO4)
5		pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR5+) CIO4
Oc 6 →8	<u> </u>	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CRB) 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 NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
		pH TDS CI F NO3 NO2 SO4 PO4 ALK CNT 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 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 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 NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ CIO4
<i>F</i>		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		pH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 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 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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+ ClO4
		pH TDS CLE NO, NO, SO, PO, ALK CN- NH, TKN TOC CR6+ CIO.

Comments:		 	

LDC #: 29373D6

VALIDATION FINDINGS WORKSHEET Blanks

Page: of L Reviewer: MG 2nd Reviewer:

METHOD: Inorganics, Method See Cover

Associated Samples: 1 (>5x) No Qual. Blank Action Limit 1.045 0.033 ICB/CCB (mg/L) Blank ID 0.1570 Conc. units: mg/L Blank ID 0.006638 0.2090 ВВ PO4-P Analyte ರ

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#<u>29373D6</u>

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:_	of
Reviewer:	MG
2nd Reviewer:	10

Inorganics: Method_See Cover_

	Concentra			
Analyte	1	2	RPD	
Perchlorate (ug/L)	1400	1400	0	
Hexavalent Chromium	0.0060	0.0058	3	

V:\FIELD DUPLICATES\FD_inorganic\29373D6.WPD

Laboratory Data Consultants, Inc. **Data Validation Report**

Project/Site Name:

NASA JPL

Collection Date:

February 7, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Volatiles

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302723

Sample Identification

TB-9-2/7/13

MW-10

8-WM

DUP-6-1Q13

MW-16

MW-7

DUP-7-1Q13

MW-10MS

MW-10MSD

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% with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
2/8/13 (08FEB02)	Dichlorodifluoromethane	33.2	All samples in SDG 1302723	J (all detects) UJ (all non-detects)	Р
2/8/13 (08FEB03)	Pentachloroethane	44.8	All samples in SDG 1302723	J (all detects) UJ (all non-detects)	Р

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

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-8 and DUP-6-1Q13 and samples MW-7 and DUP-7-1Q13 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concent		
Compound	MW-8	DUP-6-1Q13	RPD
Trichlorofluoromethane	0.36	0.36	0

	Concentr		
Compound	MW-7	DUP-7-1Q13	RPD
Bromodichloromethane	7.5	7.3	3
Carbon tetrachloride	0.30	0.34	13
Chloroform	12	13	8
Dibromochloromethane	0.43	0.35	21
Methylene chloride	0.78	0.82	5
Tetrachloroethene	0.46	0.48	4

XVII. Field Blanks

Sample TB-9-2/7/13 was identified as a trip blank. No volatile contaminants were found.

NASA JPL Volatiles - Data Qualification Summary - SDG 1302723

SDG	Sample	Compound	Flag	A or P	Reason
1302723	TB-9-2/7/13 MW-10 MW-8 DUP-6-1Q13 MW-16 MW-7 DUP-7-1Q13	Dichlorodifluoromethane Pentachloroethane	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р	Continuing calibration (%D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 1302723

No Sample Data Qualified in this SDG

VALIDATION COMPLETENESS WORKSHEET LDC #: 29373E1 SDG #: 1302723

Laboratory: ^BC Laboratories, Inc.

Level III

Page: 1 of 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
l.	Technical holding times	4	Sampling dates: 217 1/3
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	¢	RSD = 202 12
IV.	Continuing calibration/ICV	3	RSD = 207, 12 1CV1 CCV = 307
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	BY A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	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	FO= 3+4,6+7
XVII.	Field blanks	ND	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: White

<u> </u>	7.2				
1	TB-9-2/7/13	11	21	31 BWB053	7-mB
1-2	MVV-10	12	22	32	
+ 3	MW-8 12	13	23	33	
4	DUP-6-1Q13 D	14	24	34	
5	MW-16	15	25	35	
}	MW-7 10	16	26	36	
7	DUP-7-1Q13 9	17	27	37	
8	MW-10MS	18	28	38	
9	MW-10MSD	19	29	39	
10		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	FFF. 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	OOO. 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. Yentachloroetham
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000. Methyl islish
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	РРРР.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	2000.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
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# (29373E)

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: of 1 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/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? (V) N/A Were all percent differences (V) 30%?

V N N/A

		1	 		7		T	7				 -	 	 ī	7	 -	_		1	7	_
Qualifications	J/45/8								JINJIP		:										
Associated Samples	H-II								A(1												
Finding %D (Limit: ≤30.0%)	33.2								44.8												
	3.7			-					FW# NNNN												
ate Standard ID	08FEB02	(۲۵۸)							OSFEBOS	(CCV)											
# Date	218/13								218/13												
#								┪	·												

LDC#: 29373E1

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: / of / Reviewer: / 2nd Reviewer: /

METHOD: GC MS Volatiles (EPA 524.2)

N NA VN NA

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

	Concentra	ition (ug/L)	222
Compound	3	4	RPD
KK	0.36	0.36	0

	Concentra	tion (ug/L)	DDD
Compound	6	7	RPD
Р	7.5	7.3	3
0	0.30	0.34	13
К	12	13	8
Т	0.43	0.35	21
E	0.78	0.82	5
AA	0.46	0.48	4

V:\FIELD DUPLICATES\29373E1.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

February 7, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Chromium

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302723

Sample Identification

MW-10

MW-8

DUP-6-1Q13

MW-16

MW-7

DUP-7-1Q13

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

The initial and continuing calibrations were performed at the required frequency.

The calibration standards criteria 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

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

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-8 and DUP-6-1Q13 and samples MW-7 and DUP-7-1Q13 were identified as field duplicates. No chromium was detected in any of the samples with the following exceptions:

	Concentr		
Analyte	MW-8	DUP-6-1Q13	RPD
Chromium	0.64	0.50U	200

	Concentr		
Analyte	MW-7	DUP-7-1Q13	RPD
Chromium	12	13	8

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL

Chromium - Data Qualification Summary - SDG 1302723

No Sample Data Qualified in this SDG

NASA JPL

Chromium - Laboratory Blank Data Qualification Summary - SDG 1302723

No Sample Data Qualified in this SDG

LDC #: 29373E4

VALIDATION COMPLETENESS WORKSHEET

SDG #: 1302723 Laboratory: BC Laboratories, Inc. Level III

Date: 3 - 20-13 Page: I of I Reviewer: MG 2nd Reviewer:

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
l.	Technical holding times	Α	Sampling dates: $2 - 7 - 13$
II.	ICP/MS Tune	A	
<u>III.</u>	Calibration	Α	
IV.	Blanks	Α	
V.	ICP Interference Check Sample (ICS) Analysis	7	not of required
VI.	Matrix Spike Analysis	7	not of required Client specified
VII.	Duplicate Sample Analysis	7	tc II
VIII.	Laboratory Control Samples (LCS)	Α	LCS
IX.	Internal Standard (ICP-MS)	2	not reviewed
X.	Furnace Atomic Absorption QC	2	not utilized
XI.	ICP Serial Dilution	N	not utilized not performed
XII.	Sample Result Verification	N	,
XIII.	Overall Assessment of Data	Α	
XIV.	Field Duplicates	SW	D=2+3, D=5+6
ΧV	Field Blanks	7	

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-10 .	11	21	31	
2	MVV-8	12	22	32	
3	DUP-6-1Q13	13	23	33	
4	MVV-16	14	24	34	
5	MVV-7	15	25	35	
6	DUP-7-1Q13	16	26	36	
7		17	27	37	
8		18	28	38	
9		19	29	39	
10		20 PBW	30	40	

Notes:	 		

LDC#: 29373E4

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: lof_l 2nd Reviewer:

METHOD: Metals (EPA Method 6010B/7000)

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

	Concentra			
Analyte	2	3	RPD	
Chromium	0.64	0.50U	200	

V:\FIELD DUPLICATES\FD_inorganic\29373E4.WPD

	Concentra			
Analyte	5	6	RPD	
Chromium	12	13	8	

V:\FIELD DUPLICATES\FD_inorganic\29373E4.WPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date:

February 7, 2013

LDC Report Date:

March 22, 2013

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

EPA Level III

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 1302723

Sample Identification

MW-10

8-WM

DUP-6-1Q13

MW-16

MW-7

DUP-7-1Q13

MW-8MS

MW-8MSD

MW-8DUP

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 300.0 for Chloride, Sulfate, and Nitrate as Nitrogen, EPA Method 353.2 for Nitrite as Nitrogen, EPA Method 365.1 for Orthophosphate as Phosphorus, 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 with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Chloride Sulfate	0.183 mg/L 0.276 mg/L	MW-8 MW-16 MW-7
ICB/CCB	Chloride Sulfate	0.214 mg/L 0.364 mg/L	MW-8 MW-16 MW-7

Sample concentrations were compared to concentrations detected in the blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated 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-8MS/MSD (All samples in SDG 1302723)	Hexavalent chromium	-	•	10.9 (≤10)	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-8 and DUP-6-1Q13 and samples MW-7 and DUP-7-1Q13 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce		
Analyte	MW-7	DUP-7-1Q13	RPD
Perchlorate	35 ug/L	35 ug/L	0
Hexavalent chromium	0.0096 mg/L	0.0095 mg/L	1

XI. Field Blanks

No field blanks were identified in this SDG.

NASA JPL Wet Chemistry - Data Qualification Summary - SDG 1302723

SDG	Sample	Analyte	Flag	A or P	Reason
1302723	MW-10 MW-8 DUP-6-1Q13 MW-16 MW-7 DUP-7-1Q13	Hexavalent chromium	J (all detects) UJ (all non-detects)	А	Matrix spike/Matrix spike duplicate (RPD)

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 1302723

No Sample Data Qualified in this SDG

LDC	#:	29373E6

VALIDATION COMPLETENESS WORKSHEET

Date:	<u>3-20-1</u>
Page:	1 of 1
Reviewer:	

SDG #: 1302723 Laboratory: BC Laboratories, Inc.

Level III gn.H.

Nitrite as N

2nd Reviewer:

METHOD: Chloride, Sulfate, Nitrate as N(EPA Method 300.0), Nitrate as NO2 (EPA Method 353.2), ortho-Phosphate as P (EPA Method 365.1), 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
1.	Technical holding times	Α	Sampling dates: 2 - 7 - 13
Ш	Initial calibration	A	
111.	Calibration verification	A	
IV	Blanks	SW	
V	Matrix Spike/Matrix Spike Duplicates	SW.	MS/MSD (506: 1302480)
VI.	Duplicates	Α	DUP ()
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N .	,
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	D=2+3* D=5+6
ΧI	Field blanks	17	

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 all 1 MW-10 21 31 12 22 32 8-WM DUP-6-1Q13 13 23 33 34 14 24 MW-16 5 MW-7 15 25 35 6 16 26 36 DUP-7-1Q13 MW-8MS 17 27 37 MW-8MSD 8 18 28 38 9 MW-8DUP 29 39 19 PBW 10 20 40

Notes:	 	 		 	 ·
	 	 			

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VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1,3,6	W	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC (CR6+)(ClO4)
2.4.5	1	pH TDS(CI)F (NO)(NO)(SO4)(PO4) ALK CN NH3 TKN TOC (CR ⁶)(CIO4)
Qc 7→9		pH TDS CI F NO3 (NO2) SO4 (PO4) ALK CN' NH3 TKN TOC (CR8+) CIO4
17	v	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		pH TDS CLE NO NO SO PO ALK CN NH TKN TOC CR6+ ClO
		pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺ CIO ₄
		PH TDS CLE NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		ph TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR6+ CIO4
		ph TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+ ClO4
		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 CLF NO, NO, SO, PO, ALK CN NH, TKN TOC CR6+ CIO.

Comments:				
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VALIDATION FINDINGS WORKSHEET Blanks

Page: Lof L Reviewer: MG 2nd Reviewer: C

METHOD: Inorganics, Method See Cover

Conc. units: mg/L

Associated Samples: 2,4,5 (>5x)

	No Qual's.		
	Action Limit	1.070	1.820
Blank ID	ICB/CCB (mg/L)	0.214	0.364
Blank ID	PB	0.183	0.276
Analyte		Ö	SO4

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

Page: Reviewer. 2nd Reviewer:

METHOD: Inorganics, EPA Method See Cover

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

Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor Was a matrix spike analyzed for each matrix in this SDG? A N N N N/A

of 4 or more, no action was taken.

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

LEVEL IV ONLY:

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

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*	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications	
	2/8	Water	Cr VI			(017) 6.01	10.9 (510) 411	4/50/1	
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VALIDATION FINDINGS WORKSHEET

Field Duplicates

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Inorganics: Method See Cover

	Concentra	ition (mg/L)	202	
Analyte	5	6	RPD	
Perchlorate (ug/L)	35	35	0	
Hexavalent Chromium	0.0096	0.0095	1	

V:\FIELD DUPLICATES\FD_inorganic\29373E6.WPD