# 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 fourth 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 fourth 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), perchlorate and metals were collected from monitoring wells MW-8, MW-10, MW-14 (Screen 1), MW-15, MW-16, MW-20 (Screen 4), MW-25 (Screen 2) and MW-26 (Screen 1). 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), with the exception of total chromium in the MW-16 and the MW-16 duplicate sample (260 μg/L and 180 μg/L, respectively).

*Equipment Rinsate Blanks.* Equipment rinsate blanks were collected each day that nondedicated 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. Total chromium was detected in one of the equipment blanks as shown in Table 1-1. Total chromium was present in many of the field samples and the detected concentrations in one equipment blank may have occurred during to the decontamination process. The source of the contamination could not be determined. Detected concentrations in the equipment blanks were compared to the detected concentrations in the equipment blanks were compared to the detected concentration guells during the data validation process described below to determine if data validation qualifiers were necessary. No other 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.* Two source blanks which consisted of distilled water used by sampling personnel for equipment decontamination were collected during the sampling event.

This QC sample serves as a check for any contamination present in the source water. No VOC contaminants or TICs were detected in the source blanks 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 fourth 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 OCT/NOV 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-1-10/21/13	MW-4, MW-12	3 U	0.5 U	1 U	10 U		
EQUIPMENT BLANK	EB-2-10/22/13	MW-19, MW-20	3 U	0.5 U	1 U	10 U		
EQUIPMENT BLANK	EB-3-10/23/13	MW-14. MW-23	3 U	0.5 U	1 U	10 U		
EQUIPMENT BLANK	EB-4-10/24/13	MW-22, MW-24, MW-26	1.7 U	0.5 U	1 U	10 U		
EQUIPMENT BLANK	EB-5-10/25/13	MW-21, MW-25	3 U	0.5 U	1 U	10 U		
EQUIPMENT BLANK	EB-6-10/28/13	MW-17, MW-18	3 U	0.5 U	1 U	10 U		
EQUIPMENT BLANK	EB-7-10/29/13	MW-3, MW-11	3 U	0.5 U	1 U	10 U		
SOURCE BLANK	SB-1-10/21/13		3 U	0.5 U	1 U	10 U		
SOURCE BLANK	SB-2-10/25/13		3 U	0.5 U	1 U	10 U		
TRIP BLANK	TB-1-10/21/13	MW-4, MW-12	NA	0.5 U	1 U	10 U		
TRIP BLANK	TB-2-10/22/13	MW-19, MW-20	NA	0.5 U	1 U	10 U		
TRIP BLANK	TB-3-10/23/13	MW-14, MW-23	NA	0.5 U	1 U	10 U		
TRIP BLANK	TB-4-10/24/13	MW-22, MW-24, MW-26	NA	0.5 U	1 U	10 U		
TRIP BLANK	TB-5-10/25/13	MW-21, MW-25	NA	0.5 U	1 U	10 U		
TRIP BLANK	TB-6-10/28/13	MW-17, MW-18	NA	0.5 U	1 U	10 U		
TRIP BLANK	TB-7-10/29/13	MW-3, MW-11	NA	0.5 U	1 U	10 U		
TRIP BLANK	TB-8-10/30/13	MW-7, MW-8, MW-13, MW-15	NA	0.5 U	1 U	10 U		
TRIP BLANK	TB-9-10/31/13	W-1, MW-5, MW-6, MW-10, MW-1	NA	0.5 U	1 U	10 U		
Notes								
NA	Not Analyzed							
U	Analyte was analyzed for	but not detected at or above the stated	limit					

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



December 5, 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 November 19, 2013. Attachment 1 is a summary of the samples that were reviewed for each analysis.

# LDC Project # 30870:

SDG #	Fraction
13-22918 13-23038	Volatiles, Total Recoverable 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

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

Sincerely,

Zà Fenc

Pei Geng Project Manager/Senior Chemist

	HC												At	tach	men	it 1																			
	90/10 (client sele	ct)		,			[	LDO	C #3	308	70	(Ba	ttel	le-S	San	Die	go	) / N	IAS	SA J	IPL	)													
LDC	SDG#	DATE REC'D	(3) DATE DUE	VC (524	DA 4.2)	C (200	r ).8)	CL (314	.O₄ 4.0)	Cr( (71	VI) 96)										<b></b>														
Matri	x: Water/Soil		8	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s
Α	13-22918	11/19/13	12/12/13	14	0	14	0	15	0	18	0												<u> </u>		<u> </u>	<u> </u>									
A	13-22918	11/19/13	12/12/13		0	<u>II</u>	0		. 🕘 🔬	劉慶	0									<u> </u>			┣—							—					
В	13-23038	11/19/13	12/12/13	15	0	16	0	13	0	16	0														ļ	<u> </u>				—					
В	13-23038	11/19/13	12/12/13	2	0	2	- 0, .	2	0	2	#O										<u> </u>		<u> </u>			<u> </u>				—					
_																		<u> </u>				<u> </u>					<u> </u>								
			┨────																	<u> </u>				<u> </u>	<u> </u>				<u> </u>			<u> </u>			
			<b> </b>							<u> </u>											<u> </u>		┣—			-				—					$- \ $
			<b> </b>																							-									
<u> </u>			<u> </u>					-		—	┣—	<u> </u>						<u> </u>			<u> </u>		┣												-
										<u> </u>																									
<b> </b>				-				<u> </u>																			<u> </u>					<u> </u>			
								<u> </u>																											
						<u> </u>												-				<del>                                      </del>			-										
┣			<u> </u>			-														-		-			-	-									
				<u> </u>																				-											
		1																																	
							-			<u> </u>																									
			<u> </u>						-												<u> </u>														
		1																																	
		1																				1													
		1																	1																
																					Ì														
		1												Ľ																					
Total	A/PG			32	0	33	0	31	0	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	133

#### LDC Report# 30870A1

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
--------------------	----------

Collection Date: October 21, 2013

LDC Report Date: December 5, 2013

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-22918

#### Sample Identification

TB-1-10/21/13 SB-1-10/21/13 EB-1-10/21/13 MW-12-5 MW-12-4 MW-12-3 MW-12-2 MW-12-2 MW-12-1 MW-4-5 MW-4-5 MW-4-3 MW-4-3 MW-4-2 MW-4-1 MW-12-1MS MW-12-1MSD

\*\*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 with the following exceptions:

Date	Compound	%RSD	Associated Samples	Flag	A or P
10/17/13	Pentachloroethane	29.54078	All samples in SDG 13-22918	J (all detects) UJ (all non-detects)	Р

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
10/22/13	Pentachloroethane	208	All samples in SDG 13-22918	J (all detects) UJ (all non-detects)	Ρ

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

Date	Compound	%D	Associated Samples	Flag	A or P
10/17/13	Pentachloroethane	80.5	All samples in SDG 13-22918	J (all detects) UJ (all non-detects)	Ρ

## V. Blanks

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

### VI. Surrogate Spikes

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

### VII. Matrix Spike/Matrix Spike Duplicates

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

### VIII. Laboratory Control Samples (LCS)

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

## IX. Regional Quality Assurance and Quality Control

Not applicable.

#### X. Internal Standards

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

### XI. Target Compound Identifications

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

#### XII. Compound Quantitation

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

## XIII. Tentatively Identified Compounds (TICs)

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

#### **XIV. System Performance**

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

#### XV. Overall Assessment of Data

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

#### XVI. Field Duplicates

No field duplicates were identified in this SDG.

#### XVII. Field Blanks

Sample TB-1-10/21/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-1-10/21/13 was identified as an equipment blank. No volatile contaminants were found.

Sample SB-1-10/21/13 was identified as a source blank. No volatile contaminants were found.

# NASA JPL Volatiles - Data Qualification Summary - SDG 13-22918

SDG	Sample	Compound	Flag	A or P	Reason
13-22918	TB-1-10/21/13 SB-1-10/21/13 EB-1-10/21/13 MW-12-5 MW-12-4 MW-12-3 MW-12-2 MW-12-2 MW-12-1 MW-4-5 MW-4-5 MW-4-4** MW-4-3 MW-4-2 MW-4-1	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Initial calibration (%RSD)
13-22918	TB-1-10/21/13 SB-1-10/21/13 EB-1-10/21/13 MW-12-5 MW-12-4 MW-12-3 MW-12-2 MW-12-1 MW-4-5 MW-4-5 MW-4-4** MW-4-3 MW-4-1	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (CCV %D)
13-22918	918 TB-1-10/21/13 SB-1-10/21/13 EB-1-10/21/13 MW-12-5 MW-12-4 MW-12-3 MW-12-1 MW-4-5 MWV-4-4** MWV-4-3 MWV-4-2 MWV-4-1 Pentachloroethane		J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-22918

No Sample Data Qualified in this SDG

VALIDATION COMP	<b>ETENESS</b>	WORKSHEET
-----------------	----------------	-----------

Level III/IV

Date: 12/ 4/13 Page: 1 of 1 Reviewer: F7 2nd Reviewer: 0

METHOD: GC/MS Volatiles (EPA Method 524.2)

30870A1

Laboratory: BC Laboratories, Inc.

SDG #: 13-22918

LDC #:\_\_\_

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

	Validation Area		Comments
Ι.	Technical holding times	Δ	Sampling dates: 10/21/13
١١.	GC/MS Instrument performance check	A	
111.	Initial calibration	SIN	% RSD = 20 12
IV.	Continuing calibration/ICV	ડપ	104/ COV = 30
V.	Blanks	A	
VI.	Surrogate spikes	۵	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	Les
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	4	
XI.	Target compound identification		Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	Δ	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	Δ	Not reviewed for Level III validation.
XIV.	System performance	Δ	Not reviewed for Level III validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	M	TB = 1 SB = 2 EB = 3

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

Note:

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

# Validated Samples:\*\* Indicates sample underwent Level IV validation

			· · · · · · · ·				
1 1	TB-1-10/21/13	11	MW-4-3	- 21	BINJ 1662	31	
2 '	SB-1-10/21/13	12	MW-4-2	22		32	
3 1	EB-1-10/21/13	13	MW-4-1	23		33	
4	MW-12-5	14	MW-12-1MS	24		34	
5	MW-12-4	15	MW-12-1MSD	25	·····	35	
6	MW-12-3	16		26		36	
7	MW-12-2	17		27		37	
8	MW-12-1	18		28		38	
9	MW-4-5	19		29		39	
10	MW-4-4**	20		30		40	

### VALIDATION FINDINGS CHECKLIST

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

# 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	14	Strates Served		
Were the BFB performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?			Sector Sector	
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				and the second
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) < 30%?	000000000000000000000000000000000000000			
V. Blanks				
Was a method blank associated with every sample in this SDG?	$\leq$	-		
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.			torest colorest	
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	$\leq$			
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?		Cardial Procession South Store		
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?		6494-1494/1001-147		
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:	<u>2_</u> of_	2
Reviewer:	FT	-
2nd Reviewer:		<u> </u>
	Ţ	

Validation Area	Yes	No	NA	Findings/Comments
IX. Regional Quality Assurance and Quality Control	an a			
Were performance evaluation (PE) samples performed?			/	
Were the performance evaluation (PE) samples within the acceptance limits?		GNuber 21 Hours		
X Internal standards				
Were internal standard area counts within +/-40% from the associated calibration standard?	/	r 		
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?	$\leq$			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	$\leq$			
Were chromatogram peaks verified and accounted for?				
XII. Compound quantitation/RLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	/			
Were compound quantitation and RLs 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.		$\square$		

# TARGET COMPOUND WORKSHEET

#### METHOD: VOA

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	III. 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. Iodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP. Pentachloro ethane
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	aaaa. Nethyl Methacrylate
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 alcoho!	тттт.
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	VVVV.

30870A/ LDC #:

# VALIDATION FINDINGS WORKSHEET Initial Calibration

Page:_	<u>of</u>	$\angle$
Reviewer:	FT	
2nd Reviewer:	S	
_		

### 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". N N/A Did the laboratory perform a 5 point calibration prior to sample analysis?



Did the laboratory perform a 5 point calibration prior to sample analysis? Were all percent relative standard deviations (%RSD)  $\leq$  20% ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: <u>&lt;</u> 20.0%)	Associated Samples	Qualifications
	10/17/13	1CAL M5-45	PPPP	29.54078	all	J/UJ/P
						//
				· ·		
L						· · · · · · · · · · · · · · · · · · ·
			·	l		
<u> </u>					· · · ·	
					l	

LDC #: 308 70 A/

## VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page:_	<u></u>
Reviewer:	FT
2nd Reviewer:	R

#### 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".  $\underline{N}$  N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?  $\underline{Y}$  N/N/A Were all percent differences (%D)  $\leq$  30% ?

#	Date	Standard ID	Compound	Finding %D (Limit: <u>&lt;</u> 30.0%)	Associated Samples	Qualifications
	10/17/13	1CV2 M5-45	PPPP	\$10.5	all	JUJIP
	10/22/13	1314211-COV2	PPPP	208	91/	JUJIP
						· · · · · · · · · · · · · · · · · · ·
<b> </b>			<u> </u>			
┣						
┣						
┣───	· · · · · · · · · · · · · · · · · · ·		·		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · ·
┣						
┣		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			
╟						
<b> </b>						
┣		<u> </u>				
<b> </b>				· · · · · · · · · · · · · · · · · · ·		
<b> </b>		<u>  </u>				

LDC #: \_\_\_\_\_

### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: \_\_\_\_\_ of \_\_\_\_\_ Reviewer: \_\_\_\_\_ FT\_\_\_\_ 2nd Reviewer: \_\_\_\_\_ Q\_\_\_\_

METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X) Where:

Ax = Area of compound Cx = Concentration of compound S = Standard deviation of the RRFs X = Mean of the RRFs

Ais = Area of associated internal standard

Cis = Concentration of internal Standard

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration				AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound	(RRF 10 std)	(RRF 10 std)	(Initial)	(Initial)		
	ICAL	10/17/2013	C (IS 1)	0.446210	0.446210	0.4403805	0.4403805	5.759154	5.759154
	MS-V5		S (IS 2)	0.353115	0.353115	0.3462535	0.3462535	7.483333	7.483333
			EE (IS 3)	1.854653	1.854653	1.8783910	1.8783910	13.16845	13.16845

### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification



METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X) Where:

Ax = Area of compound Cx = Concentration of compound

S = Standard deviation of the RRFs

X = Mean of the RRFs

Ais = Area of associated internal standard

Cis = Concentration of internal Standard

			-		Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration					AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Comp	ound	(RRF 160/40/8 std)	(RRF 160/40/8 std)	(Initial)	(Initial)		
	ICAL	10/17/2013	F	(IS 1)	0.0252902	0.0252902	0.0247595	0.0247595	3.379941	3.379941
	MS-V5		QQQQ	(IS 2)	0.0692452	0.0692452	0.0665553	0.0665553	5.630492	5.630492
			PPPP	(IS 3)	0.1220467	0.1220467	0.1793848	0.1793848	29.54078	29.54078

LDC #: 30870A/

## VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification



#### METHOD: GC/MS VOA (EPA Method 524.2)

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

% Difference = 100 \* (ave. RRF - RRF)/ave. RRF RRF =  $(A_x)(C_{is})/(A_{is})(C_x)$ 

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

 $A_x$  = Area of compound,  $C_x$  = Concentration of compound,  $A_{is}$  = Area of associated internal standard

C<sub>is</sub> = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	%D	%D
1	1314211-cev1	10/22/13	C (1st Internal Standard)	0.4403805	0.4072354	0.4072354	7.5	7.5
			S (2nd Internal Standard)	0.3462535	0. 3315172	0.3315172	4.3	4.3
L			EE (3rd Internal Standard)	1.878 3910	1.70 3189	1.703189	9.3	9-3
2	1314211-002	10/22/13	F (1st Internal Standard)	0.0247595	0.0239424	0.02 29424	3-3	3.3
		·	ୟୟର୍ଷ (2nd Internal Standard)	0.0665553	0.0649972	0.0649972	2.3	2-3
			PPPP (3rd Internal Standard)	0.1793848	0.5521961	0.5521961	209	208
3			(1st Internal Standard)					
			(2nd Internal Standard)					
			(3rd Internal Standard)					
4			(1st internal Standard)					
			(2nd Internal Standard)					
			(3rd Internal Standard)					

Comments: <u>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.</u>

LDC #: 30870A)

## VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page: \_\_\_\_\_of \_\_\_\_ Reviewer: \_\_\_\_FT\_\_\_ 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 Sample ID:  $\# I \mathcal{O}$  Where: SF = Surrogate Found SS = Surrogate Spiked

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8	10.0	10.010	100	100	0
Bromofluorobenzene		9.20	92.0	92	υ
1,2-Dichlorobenzene-d4	J	10.180	102	102	J
Dibromofluoromethane					

#### Sample ID:

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

#### Sample ID:

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

#### Sample ID:

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

## VALIDATION FINDINGS WORKSHEET <u>Matrix Spike/Matrix Spike Duplicates Results Verification</u>

Page: 1\_of\_1\_ Reviewer: \_\_\_\_FT\_\_\_ 2nd Reviewer: \_\_\_\_\_

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

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

Where: SSC = Spiked sample concentration SA = Spike added SC = Sample concentration

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

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD sample: 14 4 15

Compound	Sp Add ( ng	ike ded //L)	Sample Concentration ( ug/L )	Spiked Concer (и	Sample ntration g/L)	Matrix Percent	Spike	Matrix Spik	<u>e Duplicate</u>	<u>MS</u>	/MSD
an fa tha an	0	MSD		MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	25.0	×.0	סיז	24.610	25-190	98.4	98.4	101	101	2-33	2-33
Trichloroethene				23.970	25-170	95.9	95.9	101	[0]	4.88	4.88
Benzene				25.140	26.140	101	101	105	105	3.90	3.90
Toluene				25.090	26.480	100	100	106	106	5.37	5-37
Chlorobenzene				24.300	75.150	97.2	97-2	101	101	3.44	3.44

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.

# VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification



#### METHOD: GC/MS VOA (EPA Method 524.2)

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

% Recovery = 100 * SSC/SA	Where:	SSC = Spiked sample concentration SA = Spike added	
RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)		LCSC = Laboraotry control sample concentration	LCSDC = Laboratory control sample duplicate concentration

LCS ID: \_\_\_\_\_ BWJ1662 - LCS

	SI	oike Idead	Spiked Sample							CSD
Compound	( h	g/L)	( ug	r/4	Percent F	Recovery	Percent R	ecovery	RF	סי
	LCS	LCSD	LCS	LCSD	Reported	Recaic.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	25.0	5	24.300	NA	97-2	97.2				1
Trichloroethene			23.770		25.1	95.1				
Benzene			25.340		101	10)				
Toluene			24.610		98.4	98.4				
Chlorobenzene			2 3.570		94.3	94.3	NA			

Comments: <u>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.</u>

# VALIDATION FINDINGS WORKSHEET Sample Calculation Verification



S

#### METHOD: GC/MS VOA (EPA Method 524.2)

YN N/A N N/A

Were all reported results recalculated and verified for all level IV samples? Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concer	ntratior	$n = \frac{(A_{s})(I_{s})(DF)}{(A_{s})(RRF)(V_{o})(\%S)}$
A <sub>x</sub>	=	Area of the characteristic ion (EICP) for the compound to be measured
A <sub>is</sub>	=	Area of the characteristic ion (EICP) for the specific internal standard
l <sub>s</sub>	=	Amount of internal standard added in nanograms (ng)
RRF	=	Relative response factor of the calibration standard.
V,	=	Volume or weight of sample pruged in milliliters (ml) or grams (g).
Df	=	Dilution factor.
%S	=	Percent solids, applicable to soils and solid matrices

Example:

Sample I.D. BW J1662 - BS1

23.77 ng /L =

	oniy.	· · · · · · · · · · · · · · · · · · ·			
#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification
<u> </u>					

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
Collection Date:	October 21, 2013
LDC Report Date:	December 4, 2013
Matrix:	Water
Parameters:	Total Recoverable Chromium
Validation Level:	EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-22918

#### Sample Identification

SB-1-10/21/13 EB-1-10/21/13 MW-12-5 MW-12-4 MW-12-3 MW-12-2 MW-12-1 MW-4-5 MW-4-5 MW-4-4\*\* MW-4-3 MW-12-1MS MW-12-1MSD MW-4-2 MW-4-1 MW-4-1 MW-12-1DUP

\*\*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 200.8 for Total Recoverable 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 total recoverable 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.

## 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-1-10/21/13 was identified as an equipment blank. No total recoverable chromium was found.

Sample SB-1-10/21/13 was identified as a source blank. No total recoverable chromium was found.

# NASA JPL Total Recoverable Chromium - Data Qualification Summary - SDG 13-22918

No Sample Data Qualified in this SDG

NASA JPL

Total Recoverable Chromium - Laboratory Blank Data Qualification Summary - SDG 13-22918

No Sample Data Qualified in this SDG

ALIDATION	COMPL	ETENESS	WORKSHEFT

Level III/IV

LDC #: <u>30870A4</u> **V/** SDG #: <u>13-22918</u> Laboratory: <u>BC Laboratories, Inc</u>. Date: <u>12-2-</u>13 Page: <u>1 of 1</u> Reviewer: <u>MG</u> 2nd Reviewer: <u>V</u>

METHOD: Total Recoverable Chromium (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: 10 - 21 - 13
II.	ICP/MS Tune	Ą	
111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	A	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	not reviewed for level 111
Х.	Furnace Atomic Absorption QC	2	not utilized
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	N	
xv	Field Blanks	ND	SB = I 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

	<u> </u>						
1	SB-1-10/21/13	11	MW-12-1MS	21		31	
2	EB-1-10/21/13	12	MW-12-1MSD	22		32	
3	MW-12-5	132	MW-4-2	23		33	
4	MW-12-4	14 2	MW-4-1	24		34	
5	MW-12-3	15	#7 DUP	25		35	
6	MW-12-2	16		26		36	
7	MW-12-1	17		27		37	
8	MW-4-5	18		28		38	
9	MW-4-4**	19		29	PBWI	39	
10	MW-4-3	20		30 <sup>2</sup>	PBW2	40	

Notes:

LDC #: 30870A4

#### VALIDATION FINDINGS CHECKLIST

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

Welliou. Welas (EPA SVV 646 Welliou 6010B/7000/6020	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?	$\checkmark$								
Were the proper number of standards used?	V								
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?	$\checkmark$			······					
IV. Blanks									
Was a method blank associated with every sample in this SDG?	$\checkmark$								
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/							
V. ICP Interference Check Sample				·					
Were ICP interference check samples performed daily?		/							
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			$\checkmark$	<					
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?	$\checkmark$			<u></u>					
Was an LCS analyzed per extraction batch?			ł						
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?	~								

and the second second second second second

we concern the second grow we we set to the second

www.commence.com.com.com.com

Contraction and an experimental sector and a sector of the sector of the

LDC #: 30870A4

#### VALIDATION FINDINGS CHECKLIST

Page: $2 \text{ of } 2$
Reviewer: MG
2nd Reviewer:

X (

			<u> </u>					
Validation Area	Yes	NO	NA	Findings/Comments				
VIII. Furnace Atomic Absorption QC								
If MSA was performed, was the correlation coefficients > 0.995?	L							
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%?			$\checkmark$					
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			/					
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)								
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	<							
If the %Rs were outside the criteria, was a reanalysis performed?			$\checkmark$					
XI. Regional Quality Assurance and Quality Control								
Were performance evaluation (PE) samples performed?		1						
Were the performance evaluation (PE) samples within the acceptance limits?			~					
XII. Sample Result Verification								
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	$\checkmark$							
XIII. Overall assessment of data								
Overall assessment of data was found to be acceptable.	$\checkmark$	_						
XIV. Field duplicates								
Field duplicate pairs were identified in this SDG.		$\checkmark$						
Target analytes were detected in the field duplicates.			$\checkmark$					
XV. Field blanks								
Field blanks were identified in this SDG.	$\checkmark$							
Target analytes were detected in the field blanks.		$\checkmark$						

TO NEXT REPORT OF THE REPORT OF THE

Alternation of the second second

## VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification



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 <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)						
1332 ICV	ICP/MS (Initial calibration)	Cr	53.410	50.000	107	107	Ý
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1924 CCV8	ICP/MS (Continuing calibration)	Cv	40.138	40,000	100	100	
	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

CALCLC.4SW

recalculated results.


#### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page:_	of_	
Reviewer:	M	5_
2nd Reviewer:		$ \geq $

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).

 True
 True = Concentration of each analyte in the source.

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

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

meneter investigation and an and an and an an an and an and an and an an and an and an and an and an and an an

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

%D = <u>|I-SDR|</u> x 100

Where, I = Initial Sample Result (mg/L) 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)
-	ICP interference check	_	-	1	-	-	1
LCS	Laboratory control sample	Cr	41.050 (Mg/L)	40.000 (mg/L)	/03	103	Ý
19 v3   ]	Matrix spike	Cr	(SSR-SR) 38.60 (49/L)	40.000 (Mg/L)	96.5	96.5	
1904/1907 15	Duplicate	Cr	1.922 (mg/L)	1.884 (Mg/L)	2.00	2.00	
_	ICP serial dilution	_				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.

1.1.1.1.1

- management of the second second

TOTCLC.4SW

;#: 30870A4
;#: 30870A4

# VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of
Reviewer:	MG
2nd reviewer:	

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

			010/0020/1000			
Please (Y_N (Y_N (Y_N	e see qualifications belo <u>N/A</u> Have results <u>N/A</u> Are results w <u>N/A</u> Are all detec	ow for all questions a been reported and vithin the calibrated r tion limits below the	answered "N". Not ap calculated correctly? ange of the instrume CRDL?	pplicable questions ar	e identified as "N//	A". CP?
Detect equati	ted analyte results for _ on:	#9, C	v	were recalcu	lated and verified	using the following
Concen	tration = <u>(RD)(FV)(Dil)</u> (In. Vol.)	,	Recalculation:			
RD FV In. Vol. Dil	<ul> <li>Raw data conce</li> <li>Final volume (m</li> <li>Initial volume (n</li> <li>Dilution factor</li> </ul>	entration ( nl) nl) or weight (G)	1.136 Mg/L 0	)(0.050 L	) - = 1.130	o mg/L
#	Sample ID	A	nalyte	Reported Concentration (۳۹ / ۱۰)	Calculated Concentration (グイレ)	Acceptable (Y/N)
	9		<u> </u>	1.1	(.1	Ý
<b> </b>						
					{}	
╟───┤	·····					
<b> </b>		· · · · ·				
∦}						
┣──┤	<del></del>	 				
	····					
						· · · ·
	<u></u>					
11					I	

Note:

#### LDC Report# 30870A6

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA	JPL
--------------------	------	-----

Collection	Date:	October 21,	2013
Collection	Date:	October 21,	201

LDC Report Date: December 4, 2013

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-22918

# Sample Identification

SB-1-10/21/13	MW-4-2DUP
EB-1-10/21/13	
MW-12-5	
MW-12-4	
MW-12-3	
MW-12-2	
MW-12-1	
MW-4-5	
MW-4-4**	
MW-4-3	
MW-4-2	
MW-4-1	
SB-1-10/21/13MS	
SB-1-10/21/13MSD	
SB-1-10/21/13DUP	
MW-12-1MS	
MW-12-1MSD	
MW-12-1DUP	
MW-4-2MS	
MW-4-2MSD	

\*\*Indicates sample underwent EPA Level IV review

#### Introduction

This data review covers 21 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 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) samples 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-4-2MS/MSD (MW-4-2 MW-4-1)	Hexavalent chromium	37.9 (85-115)	39.1 (85-115)	-	J (all detects) UJ (all non-detects)	A

# VI. Duplicates

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

# VII. Laboratory Control Samples

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

# VIII. Sample Result Verification

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-1-10/21/13 was identified as an equipment blank. No contaminant concentrations were found with the following exceptions:

Blank ID	Analyte	Concentration (mg/L)
EB-1-10/21/13	Hexavalent chromium	0.00091

Sample SB-1-10/21/13 was identified as a source blank. No contaminant concentrations were found with the following exceptions:

Blank ID	Analyte	Concentration (mg/L)
SB-1-10/21/13	Hexavalent chromium	0.00091

# NASA JPL Wet Chemistry - Data Qualification Summary - SDG 13-22918

SDG	Sample	Analyte	Flag	A or P	Reason
13-22918	MW-4-2 MW-4-1	Hexavalent chromium	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

# NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 13-22918

No Sample Data Qualified in this SDG

<b>ALIDATION COMPLE</b>	<b>TENESS WORKSHEET</b>
-------------------------	-------------------------

Level III/IV

## 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> </u>	Technical holding times	A	Sampling dates: 10 - 21 - 13
Ш	Initial calibration	A	
<u> </u>	Calibration verification	Α	
١V	Blanks	A	
v	Matrix Spike/Matrix Spike Duplicates	SW	MS/MSD
VI.	Duplicates	A	DUP #18 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	
Х.	Field duplicates	N	
xı	Field blanks	SW	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

r					r		
1	SB-1-10/21/13	112	MW-4-2	212	MW-4-2DUP	31	
2	EB-1-10/21/13	122	MW-4-1	22		32	
3	MW-12-5	13	SB-1-10/21/13MS	23		33	
4	MW-12-4	14	SB-1-10/21/13MSD	24		34	
5	MW-12-3	15	SB-1-10/21/13DUP	25		35	
6	MW-12-2	16	MW-12-1MS	26		36	
7	MW-12-1	17.	MW-12-1MSD	27		37	
8	MW-4-5	18	MW-12-1DUP	28		38	
9	MW-4-4**	192	MW-4-2MS	29		39 I	PBW
10	MW-4-3	202	MW-4-2MSD	30		40 J	PBW

Notes:\_

-----

#### VALIDATION FINDINGS CHECKLIST

Page:	of2
Reviewer:	MG
2nd Reviewer:_	

Method Inorganics	EDA Method	see	cover
memournoiganus i		500	••••

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

.....

sense sense in a transmit of the measure of the transmitter in the transmitter of the transmitter of the sense in the sense of the

#### VALIDATION FINDINGS CHECKLIST

Page:	2 of 2
Reviewer:	MG
2nd Reviewer:	$\sim$

5

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.	$\checkmark$					
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.	$\checkmark$					
Target analytes were detected in the field blanks.	$\checkmark$					

المعادية سيويد ويرويهم والمركون والمرا

137

LDC #:\_\_\_\_\_30870A6

# VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: / of

Reviewer: 2nd reviewer: 1

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-212	<u> </u>	
QC13-15		ph TDS CFF NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC $(R^{-1})$ (O <sub>4</sub> )
		ph TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup><math>\circ</math></sup> Clo
V (6771	<u> </u>	ph TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>o</sup> ClO <sub>4</sub>
		ph TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup><math>\circ \bullet</math></sup> ClO <sub>4</sub>
		$\frac{\text{pH TDS CIF NO_3 NO_2 SO_4 PO_4 ALK CN^2 NH_3 TKN TOC CR^{++} ClO_4 }{2}$
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		ph TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		ph TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		DH TDS CI F NO <sub>3</sub> NO <sub>3</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>2</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>3</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>2</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CLE NO <sub>2</sub> NO <sub>2</sub> SO, PO, ALK CN <sup>-</sup> NH <sub>2</sub> TKN TOC $CR^{6+}$ ClO,
		pH TDS CLE NO, NO, SO, PO, ALK CN <sup><math>+</math> NH, TKN TOC CR<sup>6+</sup> ClO.</sup>
		ph TDS CLE NO NO SO PO ALK CN <sup>-</sup> NH TKN TOC $CR^{6+}$ CIO
		$\begin{array}{c} p_{11} \ 100 \ 011 \ 100_{3} \ 100_{2} \ 000_{4} \ 100_{4} $
		ph TDS CLE NO NO SO PO ALK CN: NH TKN TOC CR $^{6+}$ ClO
		phi 103 ci f $NO_3 NO_2 3O_4 FO_4 ALK CN NH_3 TKN 100 CK CIO_4$
		$\frac{1}{100} \text{ or } F = \frac{1}{100} $
		$\frac{1}{100} \text{ or } F = \frac{1}{100} $
		$\frac{1}{100} \text{ CLF NO}_3 \text{ NO}_2 \text{ SO}_4 \text{ PO}_4 \text{ ALK CN NH}_3 \text{ TKN TOC CK}^{\circ} \text{ ClO}_4$
	4	( DH IDS GLE NUS NUS SULPULAIK UN NHS IKN IOC CR <sup>®</sup> CIO.

Comments:

METHODS.6



# VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Pag	je:	<u>_</u> of_	
Review	/er:	M(	5
2nd Review	/er:_	V	$\simeq$

METHOD: Inorganics, EPA Method See cover

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

Was a matrix spike analyzed for each matrix in this SDG?

Y(N/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 of 4 or more, no action was taken.

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

LEVEL IV ONLY:

<u>**WN**</u> Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
1	19/20	water	CrVI	37.9 (85-115)	39.1 (85-115)		11,12	J/UJ/A
┞								
						······································		
┡				 				
┡								
			·					
┣								
E								
L						· ·		
╟─							· · · · · · · · · · · · · · · · · · ·	
╟								
L	L		<u> </u>	1			<u>L</u>	

5 . 6 **6** .

Comments:\_\_\_\_\_

MSD.6

LDC #: <u>30</u> SDG #:	087046	VALIDATION FINDINGS WORKSHEET Field Blanks	Page:lofl Reviewer:MG_ 2nd reviewer:
METHOD: I	norganics, EPA M	ethod See cover	
<u> N N/A</u> <u>V N N/A</u>	Were field blank Were target anly	s identified in this SDG? rtes detected in the field blanks?	
Sample:	<u> </u>	Field Blank / Trip Blank / Rinsate (circle one) (	SB
		Anaivte	Concentration mg/L
		CrVI	0.00091
Sample:	2	Field Blank / Trip Blank / Rinsate (circle one)	B
		Analyta	Concentration mg/L
		Cr VI	0.00091
	<u></u>		

FLDBLK2.6

ч.

LDC #: 30870A6

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

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

METHOD: Inorganics, Method See cover

The correlation coefficient (r) for the calibration of  $\frac{CIOY}{10}$  was recalculated. Calibration date:  $\frac{10-30-13}{10}$ 

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 measured in the analysis of the ICV or CCV solution

 True
 True = concentration of each analyte in the ICV or CCV solution

			Conc	Arca	Recalculated	Reported	Acceptable
Type of Analysis	Analyte	Standard ID	Found (units)	True (units)	r or %R	r or %R	(Y/N)
Initial calibration		Blank		~			
		Standard 1	20 (mg/L)	0.0073			
		Standard 2	4.0 ( )	0.0047			
	<u> </u>	Standard 3	6.0 ()	0.0069	0	<sup>v 2</sup> = 0,999501	,
-	CIUy	Standard 4	10.0 ()	0.0122	v <sup>2</sup> =0.999277		Ý
		Standard 5	20.0 (1)	0.0235			1
		Standard 6	-				
·		Standard 7	<u>``</u>	-			
Calibration verification		2148		(mal)			
	Cr VI	CCV2	0.053  (mg/L)	0.050 (mg/L)	106	106	
Collibration varification		0800					
	C104	CCV3	9.051 (mg/L)	10.000 (Mg/L)	90.5	90.5	
Calibration verification				~	_		
		1			l	、	

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.

The solution of t

CALCLC.6

LDC #: 30870A6

#### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet



12211.4

METHOD: Inorganics, Method See cover

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

%R = Found\_x 100 Where, True 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 = <u> S-D </u> x 100	Where,	S =	Original sample concentration
(S+D)/2		D =	Duplicate sample concentration

(1) 小学校理解的问题中心。如此不必必须不可以。

Samula ID	Ture of Archuic	Flamout	Found / S	True / D	Recalculated	Reported	Acceptable
Sample ID				(units)	%R / RPD	%R / RPD	(1/N)
2142	Laboratory control sample						
LCS		CrvI	0.047 (mg/L)	0.050( <sup>m</sup> g/L)	94.0	93.2	Ý
7712	Matrix spike sample		(SSR-SR)				
13		C104	9.436 (Mg/L)	10.101 (Mg/L)	93.4	93.4	
2142/2142	Duplicate sample						
18		CrvI	0.00070 (mg lL)	0,00078 <sup>(mg</sup> /y)	10.8	10.4	

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

NAME OF

TOTCLC.6

LDC #:_3087	VALIDATION FINDINGS WORKSHEET           Sample Calculation Verification	Page:of Reviewer:MG 2nd reviewer:
METHOD: Inorg	anics, Method See cover	
Please see qual	ifications below for all questions answered "N". Not applicable questions a Have results been reported and calculated correctly? Are results within the calibrated range of the instruments? Are all detection limits below the CRQL?	are identified as "N/A".

.....

.......

Compound (analyte) results for	level	<u>    (V     </u>	sample	=	N.D.	reported-with-a-positive-detect-were
recalculated and verified using the	following	equati	ion:			

Concentration =

Recalculation:

-----

.

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

Some and the source of the state of the source of the sourc

Note:\_

Construction of Participation Science and Sciences (1987)

#### LDC Report# 30870B1

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site	Name:	NASA	JPL

Collection Date: October 22, 2013

LDC Report Date: December 5, 2013

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23038

#### Sample Identification

TB-2-10/22/13 EB-2-10/22/13 MW-20-5 MW-20-4 DUPE-1-4Q13 MW-20-3 MW-20-2 MW-20-1 MW-19-5\*\* MW-19-4 MW-19-3\*\* MW-19-2 MW-19-1 **MW-20-2MS** MW-20-2MSD MW-19-1MS MW-19-1MSD

\*\*Indicates sample underwent EPA Level IV review

#### Introduction

This data review covers 17 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 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 with the following exceptions:

Date	Compound	%RSD	Associated Samples	Flag	A or P
10/17/13	Pentachloroethane	29.54078	All samples in SDG 13-23038	J (all detects) UJ (all non-detects)	Р

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
10/22/13 (1314301-CCV5)	Pentachloroethane	71.5	MW-19-2 MW-19-1 MW-19-1MS MW-19-1MSD BWJ1781	J (all detects) UJ (all non-detects)	Ρ

Date	Compound	%D	Associated Samples	Flag	A or P
10/22/13 (131430-CCV2)	Pentachloroethane	130	TB-2-10/22/13 EB-2-10/22/13 MW-20-5 MW-20-4 DUPE-1-4Q13 MW-20-3 MW-20-2 MW-20-1 MW-19-5** MW-19-5** MW-19-4 MW-19-3** MW-20-2MS MW-20-2MSD BWJ1780	J (all detects) UJ (all non-detects)	Ρ

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

Date	Compound	%D	Associated Samples	Flag	A or P
10/17/13	Pentachloroethane	80.5	All samples in SDG 13-23038	J (all detects) UJ (all non-detects)	Ρ

#### V. Blanks

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

# VI. Surrogate Spikes

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

#### VII. Matrix Spike/Matrix Spike Duplicates

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

# VIII. Laboratory Control Samples (LCS)

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

# IX. Regional Quality Assurance and Quality Control

Not applicable.

# X. Internal Standards

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

#### XI. Target Compound Identifications

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

#### XII. Compound Quantitation

All compound quantitations 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-20-4 and DUPE-1-4Q13 were identified as field duplicates. No volatiles were detected in any of the samples.

#### XVII. Field Blanks

Sample TB-2-10/22/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-2-10/22/13 was identified as an equipment blank. No volatile contaminants were found.

# NASA JPL Volatiles - Data Qualification Summary - SDG 13-23038

SDG	Sample	Compound	Flag	A or P	Reason
13-23038	TB-2-10/22/13 EB-2-10/22/13 MW-20-5 MW-20-4 DUPE-1-4Q13 MW-20-3 MW-20-2 MW-20-2 MW-20-1 MW-19-5** MW-19-4 MW-19-3** MW-19-2 MW-19-1	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Initial calibration (%RSD)
13-23038	TB-2-10/22/13 EB-2-10/22/13 MW-20-5 MW-20-4 DUPE-1-4Q13 MW-20-3 MW-20-2 MW-20-2 MW-20-1 MW-19-5** MW-19-5** MW-19-3	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (CCV %D)
13-23038	TB-2-10/22/13 EB-2-10/22/13 MW-20-5 MW-20-4 DUPE-1-4Q13 MW-20-3 MW-20-2 MW-20-2 MW-20-1 MW-19-5** MW-19-5** MW-19-4 MW-19-2 MW-19-1	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

# NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-23038

No Sample Data Qualified in this SDG

LDC #:	<u> </u>	<u>870</u>	<u>B1</u>		V
SDG #:_	13	-230	38		
Laborato	ory:	BC	Labor	atories.	Inc.

# ALIDATION COMPLETENESS WORKSHEET

Level III/IV

	Date:	<u>[]+ 5]</u>
	Page:_	_/of/
	Reviewer:	<u> = 7</u>
2nd	Reviewer:	1 à
		1

METHOD: GC/MS Volatiles (EPA Method 524.2)

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

	Validation Area		Comments
<u> </u>	Technical holding times	Δ	Sampling dates: 10 2213
II.	GC/MS Instrument performance check	4	
111.	Initial calibration	sw	1/0 RSD = 20, (2
IV.	Continuing calibration/ICV	SW	$ \alpha  < \omega \leq 3D$
V.	Blanks	А	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	$\mathbf{A}$	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	4	
XI.	Target compound identification	<[	Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	Δ	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	Δ	Not reviewed for Level III validation.
XIV.	System performance	Δ	Not reviewed for Level III validation.
XV.	Overall assessment of data	4	
XVI.	Field duplicates	ND	D = 4,5
XVII.	Field blanks	MO	TB = 1 $FB = 2$

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

			· · · · · · · · · · · · · · · · · · ·	
1 '	TB-2-10/22/13	11 <sup>1</sup> MW-19-3**	21 1 BW J1780	31
2 1	EB-2-10/22/13	12 <b>2</b> MW-19-2	222 BW 11781	32
3 1	MW-20-5	13 <b>2</b> MW-19-1	23	33
4 1	MW-20-4 p	14 <sup>1</sup> MW-20-2MS	24	34
5 1	DUPE-1-4Q13 19	15 <sup>1</sup> MW-20-2MSD	25	35
6 <sup>1</sup>	MW-20-3	162 # 13M5	26	36
7	MW-20-2	172 # 13 MSD	27	37
8 1	MW-20-1	18	28	38
9 <sup>+</sup> 1	MW-19-5**	19	29	39
10	MW-19-4	20	30	40

F

# VALIDATION FINDINGS CHECKLIST



# 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	( ar l			
Were the BFB performance results reviewed and found to be within the specified criteria?	/	-		
Were all samples analyzed within the 12 hour clock criteria?		I'm	ł	
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?	$\leq$			
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?		<u> </u>		
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?	$\leq$			
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: <u>2_</u> o	f_2
Reviewer:F	T
2nd Reviewer:/	
7	,

Validation Ana			<u> </u>	
	<u>  res</u>	<u>_ NO</u>	<u>  NA</u>	Findings/Comments
Were performance evaluation (PE) complex performed?				F
Were the performance evaluation (PE) samples within the accentance limits?				
X Internal standards				
Were internal standard area counts within +/-40% from the associated calibration standard?				
Were retention times within - 30% of the last continuing calibration or +/- 50% of the initial calibration?	/			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?				
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	/	-		
Were chromatogram peaks verified and accounted for?		/		
XII. Compound quantitation/RLs	1			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?		-		
Were compound quantitation and RLs 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			14 J	
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.			n gransen nav y	
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

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	III. 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. Iodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP. Pentachloroethare
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ Methyl Methacrylate
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-lsopropyltoluene	AAAA. Ethyl tert-butyl ether	UUUU.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	VVVV.

# VALIDATION FINDINGS WORKSHEET **Initial Calibration**

Page:_		/
Reviewer:	FT	-
2nd Reviewer:	Q	,
	ì	

#### 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".

Did the laboratory perform a 5 point calibration prior to sample analysis? Were all percent relative standard deviations (%RSD)  $\leq 20\%$ ? N N/A

Ň/N/A

#	Date	Standard ID	Compound	Finding %RSD (Limit: <u>&lt;</u> 20.0%)	Associated Samples	Qualifications
	10/17/13	ICAL MS-V5	PPPP	29.54078	an	JIMJ /P
			· · · · · · · · · · · · · · · · · · ·			<u> </u>
				1		
				····		

LDC #: 30870B)

# VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

Page:_	<u>/_of_</u>
Reviewer:	FT
2nd Reviewer:	0

METHOD: GC/MS VOA (EPA Method 524.2)Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".V N N/AWas a continuing calibration standard analyzed at least once every 12 hours for each instrument?Y N N/AWere all percent differences (%D)  $\leq$  30% ?

#_	Date	Standard ID	Compound	Finding %D (Limit: <u>&lt;</u> 30.0%)	Associated Samples	Qualifications
	10/17/13	1CV2 MS-V5	PPPP	80,5	a11	J/UJ/P
	10/23/13	131430-602	PPPP	130	BWJ1780, 1-011,	JUJP
					14,15	, .
				· · · · · · · · · · · · · · · · · · ·		
		·				
<b> </b>						
	10/23/13	1314301-0015	PPPP	71.5	BWJ1781, 12, 13,	J/4J/P
	/				16, 17	· · · · · · · · · · · · · · · · · · ·
					·	
<b> </b>					· · · · · · · · · · · · · · · · · · ·	
<b> </b>	· · · · · · · · · · · · · · · · · · ·					
<b> </b>						
<b> </b>						
<b> </b>				1		<u></u>
┣						
┣		· · · · · · · · · · · · · · · · · · ·				
					· · · · · · · · · · · · · · · · · · ·	
┣						

#### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: \_\_\_\_\_ of \_\_\_\_ Reviewer: \_\_\_\_\_ FT\_\_\_\_ 2nd Reviewer: \_\_\_\_\_ Reviewer: \_\_\_\_\_

METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X)

Where:

Ax = Area of compound

Cx = Concentration of compound

S = Standard deviation of the RRFs

X = Mean of the RRFs

Ais = Area of associated internal standard

Cis = Concentration of internal Standard

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration					AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound		(RRF 160/40/8 std)	(RRF 160/40/8 std)	(Initial)	(Initial)		
	ICAL	10/17/2013	F	(IS 1)	0.0252902	0.0252902	0.0247595	0.0247595	3.379941	3.379941
	MS-V5		QQQQ	(IS 2)	0.0692452	0.0692452	0.0665553	0.0665553	5.630492	5.630492
			PPPP	(IS 3)	0.1220467	0.1220467	0.1793848	0.1793848	29.54078	29.54078

#### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification



#### METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X)

Where:

Ax = Area of compound Cx = Concentration of compound

S = Standard deviation of the RRFs

X = Mean of the RRFs

Ais = Area of associated internal standard

Cis = Concentration of internal Standard

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration				AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound	(RRF 10 std)	(RRF 10 std)	(Initial)	(Initial)		
	ICAL	10/17/2013	C (IS 1)	0.446210	0.446210	0.4403805	0.4403805	5.759154	5.759154
	MS-V5		S (IS 2)	0.353115	0.353115	0.3462535	0.3462535	7.483333	7.483333
			EE (IS 3)	1.854653	1.854653	1.8783910	1.8783910	13.16845	13.16845

30870B/ LDC #:

# VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification



#### METHOD: GC/MS VOA (EPA Method 524.2)

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

% Difference = 100 \* (ave. RRF - RRF)/ave. RRF RRF =  $(A_x)(C_{is})/(A_{is})(C_x)$ 

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

 $A_x =$  Area of compound,  $C_y =$  Concentration of compound,  $A_{is}$  = Area of associated internal standard  $C_{is}$  = Concentration of internal standard

					Reported	Recalculated.	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	%D	%D
1	131430-	10/23/13	C (1st Internal Standard)	0.4403805	0.4161618	0.4161618	5.5	5-5
	CON		S (2nd Internal Standard)	0.346535	0.329 8099	0.3298099	4.7	4.7
			EE (3rd Internal Standard)	1.8783910	1.715896	1.715896	8.7	8.7
2	1314301-	10/23/13	F (1st Internal Standard)	0.0247595	0. 0240577	0.0240577	2.8	2.8
	CCV2		QQQQ (2nd Internal Standard)	0.0665553	0.06565628	0.06565628	1.4	1.4
			PPPP _(3rd Internal Standard)	0.179384B	0.4130575	0.4130575	130	130
3			(1st Internal Standard)					
			(2nd Internal Standard)	_				
		]	(3rd Internal Standard)					
4			(1st Internal Standard)					
			(2nd Internal Standard)					
			(3rd Internal Standard)					

Comments: <u>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.</u>

LDC #: 30870B/

# VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page: \_\_\_\_\_of \_\_\_\_ Reviewer: \_\_\_\_\_FT\_\_\_ 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

#### Sample ID: #9

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8	10. J	9.970	99.7	99.7	D
Bromofluorobenzene		9.070	90.7	90.7	1
1,2-Dichlorobenzene-d4	J	9.85	98.5	98.5	
Dibromofluoromethane					

#### Sample ID:\_\_\_\_\_

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

#### Sample ID:

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

#### Sample ID:\_\_\_\_\_

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

# VALIDATION FINDINGS WORKSHEET <u>Matrix Spike/Matrix Spike Duplicates Results Verification</u>



#### 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

Where: SSC = Spiked sample concentration SA = Spike added SC = Sample concentration

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

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD sample: \_\_\_\_\_14 \_ @\_\_\_15

Compound	Spike Addea Compound (Ng/L)		Sample Concentration ( ng /4	Spiked Sample Concentration (ロター4		Matrix Spike Percent Recovery		Matrix Spike Duplicate		MS/MSD	
	MS	MSD			MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated.
Benzene	25.0	25.0	NP	25.470	25.780	102	102	103	103	1.2/	1.2/
Chlorobenzene				24.860	25-130	99.4	994	101	10)	108	108
1,1-Dichloroethene				24.280	24.910	97.]	97./	99.6	919.6	2.54	2.56
Toluene				25.370	26.040	101	10]	104	401	2.4/	2.6/
Trichloroethene			0.48	24.620	25.060	96.6	96.L	98.3	98.3	1.77	1.77

#### 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#: 30870B/

# VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification



#### METHOD: GC/MS VOA (EPA Method 524.2)

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

% Recovery = 100 * SSC/SA	Where:	SSC = Spiked sample concentration SA = Spike added	
RPD = I LCSC - LCSDC   * 2/(LCSC + LCSDC)		LCSC = Laboraotry control sample concentration	LCSDC = Laboratory control sample duplicate concentration

# LCSID: BWJ1780 LCS

	S	pike	Spiked S	Spiked Sample		:s				
Compound	Added		Concentration		Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	25-0	NA	23,520	A	94.1	94-1				
Trichloroethene			23,180		92.7	92.7				
Benzene			24.860		99.4	99.4				
Toluene			24.430		97.7	97.7				
Chlorobenzene			23.650		94.6	94.6	NA			

Comments: <u>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.</u>

# VALIDATION FINDINGS WORKSHEET Sample Calculation Verification



#### METHOD: GC/MS VOA (EPA Method 524.2)

/	<u>Y</u>	<u>)</u> N	N/A	
(	Y/	Ν	N/A	
	7			
`	С	onc	entratio	on ≈

Were all reported results recalculated and verified for all level IV samples? Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

Concentra	ation	$= \frac{(A_{s})(I_{s})(DF)}{(A_{s})(RRF)(V_{o})(\%S)}$	
A <sub>x</sub>	=	Area of the characteristic ion (EICP) for the compound to be measured	
A <sub>is</sub>	=	Area of the characteristic ion (EICP) for the specific internal standard	
1 <sub>s</sub>	=	Amount of internal standard added in nanograms (ng)	
RRF	=	Relative response factor of the calibration standard.	
V <sub>o</sub>	=	Volume or weight of sample pruged in milliliters (ml) or grams (g).	
Df	Ξ	Dilution factor.	

Conc. = (10034) (10)(		)	
455534) (0.3290159	)(		)
=			
0.58 ng/L			

Sample I.D. <u>#9</u>, <u>AA</u>:

%S = Percent solids, applicable to soils and solid matrices only.

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ()	Qualification
		······································	·····		
				· · · · · · · · · · · · · · · · · · ·	
	<u></u>				

## LDC Report# 30870B4

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA	JPL
--------------------	------	-----

Collection Date:	October 22, 2013
------------------	------------------

LDC Report Date: December 4, 2013

Matrix:

Parameters: Total Recoverable Chromium

Water

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23038

#### Sample Identification

EB-2-10/22/13 MW-20-5 MW-20-4 DUPE-1-4Q13 MW-20-3 MW-20-2 MW-20-1 MW-19-5\*\* MW-19-4 MW-19-3\*\* MW-19-2 MW-19-1 **MW-20-2MS** MW-20-2MSD **MW-19-1MS** MW-19-1MSD MW-20-2DUP **MW-19-1DUP** 

\*\*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 Methods 200.8 for Total Recoverable 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 total recoverable 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.

# 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-20-4 and DUPE-1-4Q13 were identified as field duplicates. No total recoverable chromium was detected in any of the samples.

# XV. Field Blanks

Sample EB-2-10/22/13 was identified as an equipment blank. No total recoverable chromium was found.

# NASA JPL Total Recoverable Chromium - Data Qualification Summary - SDG 13-23038

# No Sample Data Qualified in this SDG

NASA JPL

Total Recoverable Chromium - Laboratory Blank Data Qualification Summary - SDG 13-23038

No Sample Data Qualified in this SDG

ALIDATION COMPLET	ENESS WORKSHEET
-------------------	-----------------

Level III/IV

LDC #: <u>30870B4</u> **V/** SDG #: <u>13-23038</u> Laboratory: <u>BC Laboratories, Inc.</u>

# Date: 12-3-13 Page: (of ) Reviewer: <u>MG</u> 2nd Reviewer:

METHOD: Total Recoverable Chromium (EPA Method 200.8)

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

	Validation Area		Comments
<u> </u>	Technical holding times	A	Sampling dates: 10 - 22 - 13
11.	ICP/MS Tune	A	
<b>1</b> 11.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	N	not required
VI.	Matrix Spike Analysis	A	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP #18 OK by difference
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	not reviewed for level 111
Х.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	N	not performed
XII.	Sample Result Verification	A	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	ND	D=3+4
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

 daiburour piarus

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

	<u>en 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1</u>						
1	EB-2-10/22/13	112	MW-19-2	21		31	
2	MVV-20-5	127	MW-19-1	22		32	
3	MW-20-4	13	MW-20-2MS	23		33	
4	DUPE-1-4Q13	14	MW-20-2MSD	24		34	
5	MW-20-3	15	MW-19-1MS	25		35	
6	MVV-20-2	16	MW-19-1MSD	26		36	
7	MVV-20-1	17	# 6 DUP	27		37	
8	MW-19-5**	182	#12 DUP	28		38	
9	MW-19-4	19		29	PBWI	39	
10	MW-19-3**	20		30 7	PBW2	40	

Notes:\_

LDC #: 30870 B4

# VALIDATION FINDINGS CHECKLIST

Page: <u>lof</u> 2 Reviewer: <u>MG</u> 2nd Reviewer: <u></u> 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.	1			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	1			
Were %RSD of isotopes in the tuning solution ≤5%?	/			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	$\checkmark$			
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?	1			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	/			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		$\checkmark$		
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.	$\checkmark$			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	/			
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq$ 20% for waters and $\leq$ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were $\leq$ 5X the RL, including when only one of the duplicate sample values were $\leq$ 5X the RL.	/			
VII. Laboratory control samples	~ 71		T	
Was an LCS anaylzed for this SDG?	$\checkmark$			
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	/			

### VALIDATION FINDINGS CHECKLIST

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

2

Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			$\checkmark$	
Do all applicable analysies have duplicate injections? (Level IV only)			1	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			/	
Were analytical spike recoveries within the 85-115% QC limits?			$\checkmark$	
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?	$\checkmark$			
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		·····		
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.	$\checkmark$			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	$\checkmark$			
Target analytes were detected in the field duplicates.		/		
XV. Field blanks				
Field blanks were identified in this SDG.	$\checkmark$			
Target analytes were detected in the field blanks.		$\checkmark$		

# VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

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

14 6.0

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
 Where,
 Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution

 True
 True = concentration (in ug/L) of each analyte in the ICV or CCV solution

• \*\* • \* • • • • •

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
1330 ICV	ICP/MS (Initial calibration)	Cr	53.415	50.000	107	107	Ý
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
PIZE CCVC	ICP/MS (Continuing calibration)	Cv	42.174	40.000	105	105	
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

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

CALCLC.4SW



# VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

	Page:_	of
	Reviewer	MG
2nd	Reviewer:	

Sec. 1944

#### 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,

 True
 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 = <u> S-D </u> x 100	Where,	S = Original sample concentration
(S+D)/2		D = Duplicate sample concentration

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

 $\%D = |I-SDR| \times 100$ 

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

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
_	ICP interference check	-	-	_	_	_	-
2106 LCS	Laboratory control sample	Cr	42.409 (Mg/L)	40.000 (mg/L)	106	106	Ý
9197 13	Matrix spike	Cr	(SSR-SR) 38.570 (49/L)	40.000 (mg/L)	96.4	96.4	
2112 / 2115 17	Duplicate	Cr	ND (Mg/L)	ND (mg/L)	0	_	
-	ICP serial dilution	-		_	-	_	

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.

TOTCLC.4SW

LDC #	<u>30870</u> B4	VALIDATION FINDINGS Sample Calculation V	WORKSHEET <u>(erification</u>	Re 2nd re	Page: <u> </u>
METH	IOD: Trace Metals (EP	A SW 846 Method 6010/6020/7000)			
Please Y N Y N Detect equati	e see qualifications belo <u>N/A</u> Have results <u>N/A</u> Are results w <u>N/A</u> Are all detect ted analyte results for _ on:	bw for all questions answered "N". Not applications been reported and calculated correctly? within the calibrated range of the instrument ion limits below the CRDL? $\# \mathcal{B}, Cr$	blicable questions an off and within the line were recalcu	e identified as "N/. ear range of the IC lated and verified	A". CP? using the following
Concen	tration = <u>(RD)(FV)(Dil)</u> (In. Vol.)	Recalculation:			
RD FV In. Vol. Dil	<ul> <li>Raw data conce</li> <li>Final volume (m</li> <li>Initial volume (m</li> <li>Dilution factor</li> </ul>	Intration I) I) or weight (G) $(1.069         $	)(0.050L) 50 L	= 1.069	мg / _
#	Sample ID	Analyte	Reported Concentration ( <sup>Mg</sup> /L)	Calculated Concentration ( // / L )	Acceptable (Y/N)
	8	Cr	1.1	1.1	Y
2	10	Cr	2.6	2.6	
		· · · · · · · · · · · · · · · · · · ·			
			· · · · · · · · · · · · · · · · · · ·		
	· · · · · · · · · · · · · · · · · · ·				

and the second states

Note:

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: N	√ASA JP	1
----------------------	---------	---

|--|

LDC Report Date: December 4, 2013

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23038

# Sample Identification

EB-2-10/22/13 MW-20-5 MW-20-4 **DUPE-1-4Q13** MW-20-3 MW-20-2 MW-20-1 MW-19-5\*\* MW-19-4 MW-19-3\*\* MW-19-2 MW-19-1 MW-20-2MS MW-20-2MSD MW-20-2DUP MW-19-2MS MW-19-2MSD **MW-19-2DUP** 

\*\*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 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-20-4 and DUPE-1-4Q13 were identified as field duplicates. No contaminant concentrations were detected in any of the samples.

# XI. Field Blanks

Sample EB-2-10/22/13 was identified as an equipment blank. No contaminant concentrations were found.

# NASA JPL Wet Chemistry - Data Qualification Summary - SDG 13-23038

No Sample Data Qualified in this SDG

NASA JPL

Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 13-23038

No Sample Data Qualified in this SDG

Level III/IV

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

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

	Validation Area		Comments
١.	Technical holding times	A	Sampling dates: 10 - 22 - 13
	Initial calibration	A	
- 10.	Calibration verification	A	
١٧	Blanks	A	
v	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	Not reviewed for Level III validation.
IX.	Overall assessment of data	A	
Х.	Field duplicates	ND	D=3+4
XI	Field blanks	ND	EB=1

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

LDC #: 30870B6

SDG #: 13-23038

Laboratory: BC Laboratories, Inc.

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

4	EB 0 40/00/40	44	NBA( 40.2	21		21
	EB-2-10/22/13	+	10100-19-2	21		
2	MW-20-5	12	MW-19-1	22		32
3	MW-20-4	13	MW-20-2MS	23		33
4	DUPE-1-4Q13	14	MW-20-2MSD	24		34
5	MW-20-3	15	MW-20-2DUP	25		35
6	MW-20-2	16	MW-19-2MS	26		36
7	MW-20-1	17	MW-19-2MSD	27		37
8	MW-19-5**	18	MW-19-2DUP	28	PBWI	38
9	MW-19-4	19		29	PBW2	39
10	MW-19-3**	20		30	PBW3	40

Notes:

Note:

F

#### VALIDATION FINDINGS CHECKLIST



# Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	1			· · · · · · · · · · · · · · · · · · ·
Cooler temperature criteria was met.	1			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	/			
Were the proper number of standards used?	/			
Were all initial calibration correlation coefficients ≥ 0.995?	$\checkmark$			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	$\checkmark$			
Were titrant checks performed as required? (Level IV only)			1	·
Were balance checks performed as required? (Level IV only)				
III. Blanks	, <u> </u>			
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.		$\checkmark$		
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.	1			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	/			
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq$ 20% for waters and $\leq$ 35% for soil samples? A control limit of $\leq$ CRDL( $\leq$ 2X CRDL for soil) was used for samples that were $\leq$ 5X the CRDL, including when only one of the duplicate sample values were $\leq$ 5X the CRDL.				
V. Laboratory control samples				· · · · ·
Was an LCS anaylzed for this SDG?	$\checkmark$			
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	/			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		$\checkmark$		
Were the performance evaluation (PE) samples within the acceptance limits?			$\checkmark$	

name is a server of the Color of Calebra and the table of the server of

The American American Contract Street American Street American

aweareans

#### VALIDATION FINDINGS CHECKLIST

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

5

and the second second completion of

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

1023

والمتعار فالمتواجع وسيعرج فترقي والان

# VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

All circled methods are applicable to each sample.

Semala ID	Blotnin	Devenuetor
	Wallix	Parameter
1->12	Ŵ	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $(CR^{6+}CIO_4)$
QC 13->15		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $(CR^6)$ $(CiO_4)$
1 16-18	L	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC $(CR^6)$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO₄ PO₄ ALK CN <sup>-</sup> NH₃ TKN TOC CR <sup>5+</sup> CIO₄
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		PH TDS CLE NO, NO, SO, PO, ALK CN NH, TKN TOC CR6+ CIO,

Comments:\_

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

1

# VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

	Page:_	1 0	F
	Reviewer:	μ	16
2nd	Reviewer:		$\sim$

METHOD Inorganics Method See cover		•
		10-11-13
The correlation coefficient (r) for the calibration of	$(\nabla v)$ was recalculated. Calibration date:	4-10-13

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 measured in the analysis of the ICV or CCV solution

 True
 True = concentration of each analyte in the ICV or CCV source

. . . ...

				<u> </u>	Recalculated	Reported	
Type of Analysis	Analyte	Standard ID	Cられて Found (units)	つりり True (units)	r or %R	r or %R	Acceptable (Y/N)
Initial calibration		Blank	0.000 (mg/L)	0.001			
		Standard 1	0.002 (1)	0.003			
		Standard 2	0.005 ()	0.005			
		Standard 3	0.025 ()	0.080	2	2	
	CrVI	Standard 4	0.050 ()	0.040	1 0.999901	V = 0.999993	Ý
		Standard 5	0.100 (1)	0.078			,
		Standard 6	-	-			1
		Standard 7	-	-			
Calibration verification		2038					
	C104	CCV3	9.373 (mg/L)	10.000 (mg/L)	93.7	93.7	
Calibration verification		0003					
	Cr VI	(CV2	0.0489 (mg/L)	0.050 (mg/L)	97.8	97.8	J
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.

and a substantiation of the second second

CALCLC.6

### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: of Reviewer: MG 2nd Reviewer:

METHOD: Inorganics, Method See cover

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

 %R = 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).

 True
 True = concentration of each analyte in the source.

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

. . . .

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

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated.	Reported %R / RPD	Acceptable (Y/N)
1343	Laboratory control sample						
LCS		CIOy	10.156 (mg/L)	10.000 (mg/L)	102	102	Ý
2357	Matrix spike sample		(SSR-SR)				
13		CrvI	0.0526 (mg/2)	0.052632 (mg/L)	99.9	99.9	
2106 / 0033	Duplicate sample						
15		C104	2.344 (mg/L)	2.354 (mg/L)	0.426	0.426	

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.

TOTCLC.6

LDC #:     Page:     Of       Sample Calculation Verification     Reviewer:       2nd reviewer:							
ETHO	D: Inorganics, Method	see cover			U		
ease s / N N/ / N N/ / N N/	ee qualifications belov A Have results b A Are results wit A Are all detection	v for all questions answered "N". Not ap een reported and calculated correctly? hin the calibrated range of the instrume on limits below the CRQL?	oplicable questions are ents?	e identified as "N/	'A".		
Compound (analyte) results for $\underline{\#9}$ , $C10q$ reported with a positive detect were recalculated and verified using the following equation:							
Concentration = Recalculation:							
$= m \times + 6$ 0.004=0.0012(x) +0.0000							
ene = 0.9 = 0.0	0000 0017	3.333 Mg/L = >	۲,				
<u>= 1)</u> #	X Sample ID	Analyte	Reported Concentration (#9 ( )	Calculated Concentration (パタイレ)	Acceptable (Y/N)		
1	8	C104	3.8	3.3	Y *		
		· · · · · · · · · · · · · · · · · · ·					
2	10	C104	3.4	3.3			
		and a state of the					
		······································					
		· · · · · · · · · · · · · · · · · · ·					
		<u> </u>					
	·····						

\$2. 2



December 12, 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 November 21, 2013. Attachment 1 is a summary of the samples that were reviewed for each analysis.

# LDC Project # 30879:

# SDG #Fraction13-23134Volatiles, Total Recoverable Chromium, Wet Chemistry13-23218

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

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

Sincerely,

Par Ferrg

Pei Geng Project Manager/Senior Chemist

	HC												At	tach	mer	nt 1											_								
	90/10:(client sele	et)					, kal	ĽD	C.#	308	79	(Ba	ttel	le=S	San	Die	egc	)/ R	<b>IAS</b>	A J	IPĽ	) 🦛													
LDC	SDG#	DATE REC'D	(3) DATE DUE	V( (52	DA 4.2)	C (200	;r 0.8)	CI, NO (30	SO₄ ₃-N 0.0)	NO (35:	₂-N 3.2)	0-I (36	2O₄ 5.1)	Cr( (71	VI) 96)	CL (314	O₄ I.0)																		
Matr	x-Water/Soil			w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s
A	13-23134	11/21/13	12/16/13	12	0	14	0	-	<u> </u>	-	-	-	-	17	0	17	0																		
A	13-23134	11/21/13	12/16/13	1	٢	1	0	-		-	-	-	-	Ĵ	0		0																		
В	13-23218	11/21/13	12/16/13	15	0	18	0	1	0	4	0	4	0	18	0	15	0								<u> </u>										
B	13-23218	11/21/13	12/16/13	2	6	2	0	0	0	0	<u>(</u> )	0	0	2	0	2	0																		$\square$
			<b> </b>	<u> </u>	ļ		<b> </b>									<u> </u>																<b> </b> '	$\left  - \right $	$\square$	
			<b> </b>						┣—–					—																			$\vdash$	$\left  - \right $	
		1															<u> </u>															<sup> </sup>	$\left  - \right $		
					-								<u> </u>					-		-												$\vdash$			$\vdash$
┣		1	}	<u>}                                    </u>	┢						}		}	<u> </u>		┣												<u> </u>				'			$\left  - \right $
ŀ							-			<u> </u>						┣──			<u> </u>	<u> </u>												┝──┤		┢──┦	$\vdash$
╟───			<u> </u>																																$\vdash$
															<u> </u>																				$\square$
			<u> </u>						<u> </u>														<u> </u>												
																<u>├</u> ─																			
																																			$\square$
<b> </b>																																			
									<u> </u>																										
<u> </u>				<u> </u>	<u> </u>		<u> </u>									<u> </u>					<u> </u>														
I		ļ		<b>_</b>	ļ				<u> </u>		<u> </u>	<b> </b>				<u> </u>							ļ												
╟——		Į		<u> </u>	-			L					<u> </u>		<b> </b>						<u> </u>												$\vdash$	$\left  - \right $	$\vdash$
┣—				<u> </u>	<u> </u>	<u> </u>						<u> </u>			<u> </u>		<b> </b>				<u> </u>											$\vdash$	$\square$	$\left  - \right $	$\left  - \right $
<b> </b>	· · · · · · · · · · · · · · · · · · ·			<u> </u>				<u> </u>								<u> </u>	<u> </u>				<u> </u>											$\vdash$		$\mid$	$\left  - \right $
┣			<u> </u>						┣							┣—				<u> </u>			-											$\vdash$	$\vdash$
				-	<u> </u>				<u> </u>					00		05																		$\vdash$	
lli otal	I1/PG	<u> </u>	<u> </u>	30	0	35	10	1	10	4	0	4	0	38	0	35	U	U	0	10	10	L 0	10	U	0	U	U	U	U	U	U		<u> </u>	U	14/

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
Collection Date:	October 23, 2013
LDC Report Date:	December 11, 2013
Matrix:	Water
Parameters:	Volatiles
Validation Level:	EPA Level III & IV
Laboratory:	BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23134

# Sample Identification

TB-3-10-23-13 EB-3-10-23-13 MW-23-5 MW-23-4 MW-23-3 MW-23-2 MW-23-1 MW-14-5 MW-14-5 MW-14-4 MW-14-3\*\* MW-14-2 MW-14-1 DUPE-2-4Q13

\*\*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 with the following exceptions:

Date	Compound	%RSD	Associated Samples	Flag	A or P
10/17/13	Pentachloroethane	29.54078	All samples in SDG 13-23134	J (all detects) UJ (all non-detects)	Р

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
10/24/13	Pentachloroethane	246	All samples in SDG 13-23134	J (all detects) UJ (all non-detects)	Ρ

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

Date	Compound	%D	Associated Samples	Flag	A or P
10/17/13	Pentachloroethane	80.5	All samples in SDG 13-23134	J (all detects) UJ (all non-detects)	Р

# V. Blanks

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

# VI. Surrogate Spikes

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

# VII. Matrix Spike/Matrix Spike Duplicates

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

All compound quantitations 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-14-1 and DUPE-2-4Q13 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concent	ration (ug/L)	
Compound	MW-14-1	DUPE-2-4Q13	RPD
Chloroform	0.50	0.41	20
cis-1,2-Dichloroethene	0.090	0.085U	200
Methyl-tert-butyl ether	0.40	0.38	5
Tetrachloroethene	0.18	0.14	25
Trichloroethene	1.6	1.3	21

# XVII. Field Blanks

Sample TB-3-10-23-13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-3-10-23-13 was identified as an equipment blank. No volatile contaminants were found.

NASA JPL		
Volatiles - Data Qualification Summary	/ - SDG 1	3-23134

SDG	Sample	Compound	Flag	A or P	Reason
13-23134	TB-3-10-23-13 EB-3-10-23-13 MW-23-5 MW-23-4 MW-23-3 MW-23-2 MW-23-1 MW-14-5 MW-14-5 MW-14-4 MW-14-3** MW-14-2 MW-14-1 DUPE-2-4Q13	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Initial calibration (%RSD)
13-23134	TB-3-10-23-13 EB-3-10-23-13 MW-23-5 MW-23-4 MW-23-3 MW-23-2 MW-23-2 MW-23-1 MW-14-5 MW-14-5 MW-14-4 MW-14-3** MW-14-2 MW-14-1 DUPE-2-4Q13	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
13-23134	TB-3-10-23-13 EB-3-10-23-13 MW-23-5 MW-23-4 MW-23-3 MW-23-2 MW-23-1 MW-14-5 MW-14-5 MW-14-4 MW-14-3** MW-14-2 MW-14-1 DUPE-2-4Q13	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-23134

No Sample Data Qualified in this SDG

LDC #: <u>30879A1</u>	VALIDATION COMPLETENESS WORKSHEET	Date: 12/4/13
SDG #: <u>13-23134</u>		Page: <u>1</u> of <u>1</u>
Laboratory: BC Laboratories,	Inc.	Reviewer: <u>F7</u>
•		2nd Reviewer:

#### METHOD: GC/MS Volatiles (EPA Method 524.2)

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

	Validation Area		Comments
Ι.	Technical holding times	Δ	Sampling dates: 10 2313
П.	GC/MS Instrument performance check	Δ	
111.	Initial calibration	SW	% PSD = 20, (2
IV.	Continuing calibration/ICV	sω	ICV ICON E 30
V.	Blanks	Δ	
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	А	LCS
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	$\overline{\nabla}$	
XI.	Target compound identification	4	Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	Δ	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	Δ	Not reviewed for Level III validation.
XIV.	System performance	Δ	Not reviewed for Level III validation.
XV.	Overall assessment of data	\$	
XVI.	Field duplicates	<u>م</u> دیں	0=12,13
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:\*\* Indicates sample underwent Level IV validation

1	TB-3-10-23-13	11	MW-14-2	21	BWJ1881	31	
2	EB-3-10-23-13	12	MW-14-1 0	22		32	
3	MVV-23-5	13	DUPE-2-4Q13 17	23		33	
4	MVV-23-4	14		24		34	
5	MW-23-3	15		25		35	
6	MW-23-2	16		26		. 36	
7	MW-23-1	17		27		37	
8	MW-14-5	18		28		38	
9	MW-14-4	19		29		39	
<b>†</b> 10	MW-14-3**	20		30		40	

6

# Method: Volatiles (EPA Method 524.2)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	1997 - 1997 1997 - 1997 1997 - 1997			
All technical holding times were met.	<			
Cooler temperature criteria was met.	/			
11. 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) $\leq$ 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.	a stanic literature del			
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?			$\sim$	
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 Area	Yes	No	NA	Findings/Comments
IX Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			$\leq$	
Were the performance evaluation (PE) samples within the acceptance limits?		anna annsa da ann		
X. Internal standards				
Were internal standard area counts within +/-40% from the associated calibration standard?	/			
Were retention times within - 30% of the last continuing calibration or +/- 50% of the initial calibration?			-44.45	
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	$\leq$			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?				
Were chromatogram peaks verified and accounted for?			areas a	
XII. Compound quantitation/RLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	<			
Were compound quantitation and RLs 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				and a second
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.	$\sim$			
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**

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. lodomethane	
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.1,1-Difluoroethane	
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP. Pentachloroethane	
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ. Methyl Methacrylate	
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	тттт.	
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	VVVV.	

LDC #: 30879A

# VALIDATION FINDINGS WORKSHEET **Initial Calibration**

Page:_	
Reviewer:	FT
2nd Reviewer:	L
-	

**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". Did the laboratory perform a 5 point calibration prior to sample analysis?

Were all percent relative standard deviations (%RSD)  $\leq$  20% ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: <u>&lt;</u> 20.0%)	Associated Samples	Qualifications
	10/17/13	ICAL MS-V5	PPPP	29.54078	ail	J/W/P
						//
						·····
		,				
		· · · · · · · · · · · · · · · · · · ·				
				l		
		· · · · · · · · · · · · · · · · · · ·				· · · · · · · · · · · · · · · · · · ·
		· · · · · · · · · · · · · · · · · · ·				

LDC #: 30879A/

# VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page:_		/
Reviewer:	FT	_
2nd Reviewer:	2	

METHOD: GC/MS VOA (EPA Method 524.2)

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

<u>YNN/A</u> Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

<u>Y N/A</u> Were all percent differences (%D)  $\leq$  30% ?

#	Date	Standard ID	Compound	Finding %D (Limit: <u>&lt;</u> 30.0%)	Associated Samples	Qualifications
	10/17/13	1042 MS-45	PPPP	80.5	ail	Jusip
						/ / / /
	<u> </u>					
	10/24/13	1 314398-car2	PPPP	246	01	JWIP
	<u>,</u>					
					······································	
#### LDC#: 30 8794 VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: \_\_\_\_\_\_\_of \_\_\_\_ Reviewer: \_\_\_\_\_\_\_ 2nd Reviewer: \_\_\_\_\_\_

Y∕N NA

METHOD: GC/MS VOA (EPA SW 846 Method 524.2) Were target analytes detected in the field duplicate pairs?

	Concentra	Concentration (ug/L)				
Compound	12	13	RPD			
К	0.50	0.41	20			
QQQ	0.090	0.085U	200			
LL	0.40	0.38	5			
AA	0.18	0.14	25			
S	1.6	1.3	21			

V:\FIELD DUPLICATES\templates\30879A1.wpd

#### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page:	<u></u>	_
Reviewer:	FT	
2nd Reviewer:	R	

METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X)

Where:

Ax = Area of compound Cx = Concentration of compound S = Standard deviation of the RRFs X = Mean of the RRFs Ais = Area of associated internal standard Cis = Concentration of internal Standard

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration					AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	c	compound	(RRF 160/40/8 std)	(RRF 160/40/8 std)	(Initial)	(Initial)		
	ICAL	10/17/2013	F	(IS 1)	0.0252902	0.0252902	0.0247595	0.0247595	3.379941	3.379941
	MS-V5		QQQQ	(IS 2)	0.0692452	0.0692452	0.0665553	0.0665553	5.630492	5.630492
			PPPP	(IS 3)	0.1220467	0.1220467	0.1793848	0.1793848	29.54078	29.54078

LDC #: 30879A/

#### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

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

METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X) Where:

Ax = Area of compound Cx = Concentration of compound S = Standard deviation of the RRFs X = Mean of the RRFs Ais = Area of associated internal standard Cis = Concentration of internal Standard

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration	1			AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound	(RRF 10 std)	(RRF 10 std)	(Initial)	(Initial)		
	ICAL	10/17/2013	C (IS 1)	0.446210	0.446210	0.4403805	0.4403805	5.759154	5.759154
	MS-V5		S (IS 2)	0.353115	0.353115	0.3462535	0.3462535	7.483333	7.483333
			EE (IS 3)	1.854653	1.854653	1.8783910	1.8783910	13.16845	13.16845

LDC #: 30879A/

# VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification

Page: of Reviewer: 2nd Reviewer:\_

#### METHOD: GC/MS VOA (EPA Method 524.2)

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

% Difference = 100 \* (ave. RRF - RRF)/ave. RRF RRF =  $(A_x)(C_{is})/(A_{is})(C_x)$ 

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

 $A_x = Area of compound,$ 

 $C_{x} = Concentration of compound,$ 

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

					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	%D	%D
1	1314398-	10/24/13	C (1st Internal Standard)	0.4403805	0.4631591	0.4631591	5.2	5.2
	cart		5 (2nd Internal Standard)	0. 346 2535	0.3532029	0.3532029	7.0	2.0
		l	EE (3rd Internal Standard)	1.8783910	1.776554	1.776554	5.4	5.4
2	1314398-	10/24/13	F (1st Internal Standard)	0.0247595	0.0229028	0.0725078	9,7)	9.1
	cw 2		ØQQQ (2nd Internal Standard)	0.066553	0.0647079	0.0647079	2.8	2.8
	· · · · · · · · · · · · · · · · · · ·		PPPP (3rd Internal Standard)	0.1793848	0.6206334	0.6206334	246	246
3			(1st Internal Standard)			·····		
			(2nd Internal Standard)					
			(3rd Internal Standard)					
4			(1st Internal Standard)					
			(2nd Internal Standard)					
			(3rd Internal Standard)					

Comments: <u>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.</u>

LDC #: 30879A )

# VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page: \_\_\_\_\_of \_\_\_\_ Reviewer: \_\_\_\_FT\_\_\_\_ 2nd reviewer: \_\_\_\_\_f

#### 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:

	Surrogate Spiked	Surrogate Percent Found Recovery		Percent Recovery	Percent Difference	
			Reported	Recalculated		
Toluene-d8	10	10.10	101	10]	υ	
Bromofluorobenzene	10	9.63	96.3	96.3	1	
1,2-Dichlorobenzene-d4	10	10.0	100	100		
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					

#### Sample ID:

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

LDC #:\_ 30879A1

# VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Page: <u>of</u> Reviewer: <u>FT</u> 2nd Reviewer: <u>\_</u>

#### 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: SSC = Spiked sample concentration SA = Spike added

RPD = I LCSC - LCSDC | \* 2/(LCSC + LCSDC)

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: \_\_\_\_\_\_BWJ1881- LCS\_\_\_

Compound	ร Ac ( น	pike dded gr/L)	Spiked S Concent ( Ug	Sample tration	Percent F	2S	Percent R	SD	LCS/	<u></u> csD
	LCS	LCSD		LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	25.0	NA	25.470	NA	102	102				,
Trichloroethene			25.500		102	102				
Benzene			26.510		106	106				
Toluene			26.310		105	105				
Chlorobenzene			25.410		102	102	NA			

Comments: <u>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.</u>

LDC #: 308794 /

# VALIDATION FINDINGS WORKSHEET Sample Calculation Verification



# METHOD: GC/MS VOA (EPA Method 524.2)

<u>/ĭ</u>	ΛN	N/A
$\overline{Y}$	N	N/A

Were all reported results recalculated and verified for all level IV samples?

Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

Concen	tratio	$n = \frac{(A_{i})(I_{s})(DF)}{(A_{s})(RRF)(V_{s})(\%S)}$
A <sub>x</sub>	=	Area of the characteristic ion (EICP) for the compound to be measured
A <sub>is</sub>	=	Area of the characteristic ion (EICP) for the specific internal standard
l <sub>s</sub>	=	Amount of internal standard added in nanograms (ng)
RRF	=	Relative response factor of the calibration standard.
V <sub>o</sub>	=	Volume or weight of sample pruged in milliliters (ml) or grams (g).

0.52 ng/L

Sample I.D. <u>#10</u>, <u>K</u>

Df Dilution factor. =

%S = Percent solids, applicable to soils and solid matrices only.

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration (  )	Qualification
					****
			· · · · · · · · · · · · · · · · · · ·		
			· · · ·		
		· · · · · · · · · · · · · · · · · · ·			
			5		
·					

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
Collection Date:	October 23, 2013
LDC Report Date:	December 10, 2013
Matrix:	Water
Parameters:	Total Recoverable Chromium
Validation Level:	EPA Level III & IV
Laboratory:	BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23134

# Sample Identification

EB-3-10-23-13 MW-23-5 MW-23-4 MW-23-3 MW-23-2 MW-23-1 MW-14-5 MW-14-5 MW-14-4 MW-14-3\*\* MW-14-2 DUPE-2-4Q13 MW-23-3MS MW-23-3MSD MW-23-3DUP MW-14-1

\*\*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 Total Recoverable 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. 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 total recoverable chromium was found in the initial, continuing and preparation blanks.

# V. ICP Interference Check Sample (ICS) Analysis

ICP Interference check sample 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 DUPE-2-4Q13 and MW-14-1 were identified as field duplicates. No total recoverable chromium was detected in any of the samples with the following exceptions:

	Concentr				
Analyte	DUPE-2-4Q13	MW-14-1	RPD		
Chromium	1.0	0.76	27		

# XV. Field Blanks

Sample EB-3-10-23-13 was identified as an equipment blank. No total recoverable chromium was found.

# NASA JPL Total Recoverable Chromium - Data Qualification Summary - SDG 13-23134

No Sample Data Qualified in this SDG

NASA JPL

Total Recoverable Chromium - Laboratory Blank Data Qualification Summary - SDG 13-23134

No Sample Data Qualified in this SDG

LDC #: 30879A4 V	ALIDATION COMPLETENESS WORKSHEET	Date: 12 - 3 - 13
SDG #: <u>13-23134</u>	Level III/IV	Page:_ (_of_
Laboratory: <u>BC Laboratories, Inc.</u>	_	Reviewer: MG
		2nd Reviewer:

METHOD: Total Recoverable Chromium (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	A	Sampling dates: 10 - 23 - 13
١١.	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	N	not required
VI.	Matrix Spike Analysis	A	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	_ <u>A</u>	not reviewed for level 111
Х.	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not performed
XII.	Sample Result Verification	A	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	D = 11 + 15
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

1 I	EB-3-10-23-13	11	DUPE-2-4Q13	21		31	
21	MW-23-5	12	MVV-23-3MS	22		32	
31	MW-23-4	13	MW-23-3MSD	23		33	
4	MW-23-3	14	MW-23-3DUP	24		34	
5	MW-23-2	15	MW-14-1	25		35	
6	MW-23-1	16		26		36	
7	MW-14-5	17		27		37	
8	MW-14-4	18		28		38	
9	MW-14-3**	19		<sub>29</sub>	PBWI	39	
10	MW-14-2	20		30 Z	PBWJ	40	

Notes:

LDC #: 30879A4



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

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	$\checkmark$			
Cooler temperature criteria was met.				
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	$\checkmark$			
Were %RSD of isotopes in the tuning solution ≤5%?	1			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	$\checkmark$			
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 <a> 0.995?</a>				
IV. Blanks				
Was a method blank associated with every sample in this SDG?	$\checkmark$			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?		$\checkmark$		
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			/	
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	$\checkmark$			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	/			
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq$ 20% for waters and $\leq$ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were $\leq$ 5X the RL, including when only one of the duplicate sample values were $\leq$ 5X the RL.	/			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	$\checkmark$			
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	~			

المنارية بالمنارك بالمركب والمركب والمنارك والمنارك والمنارك والمنارك والمنارك والمنارك والمنارك والمركب والم

# LDC #: 30879A4

# VALIDATION FINDINGS CHECKLIST

Page:	2 of 2
Reviewer:	MG
2nd Reviewer:	$\sim$

•

Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			$\checkmark$	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)			1	
Were analytical spike recoveries within the 85-115% QC limits?			$\backslash$	
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		/		
Were all percent differences (%Ds) < 10%?			$\checkmark$	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			~	
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	$\checkmark$			
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				
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.	$\checkmark$			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	$\checkmark$			
Target analytes were detected in the field duplicates.	1			
XV. Field blanks	_			
Field blanks were identified in this SDG.	~			
Target analytes were detected in the field blanks.		$\checkmark$		

www.eta

#### LDC#: 30879A4

# VALIDATION FINDINGS WORKSHEET Field Duplicates



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	11	15	RPD	
Chromium	1.0	0.76	27	

V:\FIELD DUPLICATES\FD\_inorganic\30879A4.WPD

LDC #: 30879A4

# VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: 1 of 1 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
 Where,
 Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution

 True
 True = concentration (in ug/L) of each analyte in the ICV or CCV solution

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
1651 ICV	ICP/MS (Initial calibration)	Cr	51.792	50.000	104	104	Ý
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
0103 CCVF	ICP/MS (Continuing calibration)	Cr	41.297	40.000	103	/03	
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments: <u>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.</u>

LDC #: 30879A4

#### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

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.

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

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

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

%D = <u>|I-SDR|</u> x 100

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

						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	_	-		-	-
7370 LCS	Laboratory control sample	Cr	41.021 (mg/L)	40.000 (mg/L)	103	103	Ý
2336 12	Matrix spike	Cr	(SSR-SR) 39.162 (Mg/L)	40.000 (mg/L)	97.9	97.9	
2326/8329 14	Duplicate	Cr	2.689 (Mg/L)	2.717 (mg/L)	1.04	1.04	
_	ICP serial dilution	-	~	_	_	-	_

#### 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.



Note:

RECALC.4SW

# Sample ID Analyte

level IV sample = N.D. were recalculated and verified using the following Detected analyte results for \_\_\_\_

(RD)(FV)(Dil) (In. Vol.) Concentration = RD Ξ FV = Final volume (ml) In. Vol. = Initial volume (ml) or weight (G)

Raw data concentration

Dilution factor Dil =

equation:

#

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". N/A Have results been reported and calculated correctly? Are results within the calibrated range of the instruments and within the linear range of the ICP? Are results within the calibrated range of the instruments and within the linear range of the ICP?  $(\tilde{Y})$ N N/A Are all detection limits below the CRDL?

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of
Reviewer:	MG
2nd reviewer:	
	V -

Acceptable

(Y/N)

	200	
LDC #:	30819A4	

Recalculation:

Reported

Concentration

)

1

Calculated

Concentration

1

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL

Collection	Date:	October 23,	2013

LDC Report Date: December 10, 2013

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23134

# Sample Identification

EB-3-10-23-13	MW-14-1
MW-23-5	
MW-23-4	
MW-23-3	
MW-23-2	
MW-23-1	
MW-14-5	
MW-14-4	
MW-14-3**	
MW-14-2	
DUPE-2-4Q13	
EB-3-10-23-13MS	
EB-3-10-23-13MSD	
EB-3-10-23-13DUP	
MW-14-1MS	
MW-14-1MSD	
MW-14-1DUP	
DUPE-2-4Q13MS	
DUPE-2-4Q13MSD	
DUPE-2-4Q13DUP	

\*\*Indicates sample underwent EPA Level IV review

# Introduction

This data review covers 21 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 DUPE-2-4Q13 and MW-14-1 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concentra		
Analyte	DUPE-2-4Q13	MW-14-1	RPD
Perchlorate	3.7	4.0	8

# XI. Field Blanks

Sample EB-3-10-23-13 was identified as an equipment blank. No contaminant concentrations were found.

# NASA JPL Wet Chemistry - Data Qualification Summary - SDG 13-23134

No Sample Data Qualified in this SDG

NASA JPL

Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 13-23134

No Sample Data Qualified in this SDG

LDC #: 30879A6	VALIDATION COMPLETENESS WORKSHEET	Date: <u>12-3-</u> 13
SDG #: <u>13-23134</u>	Level III/IV	Page: <u>    (    </u> of <u>     (    </u>
Laboratory: BC Laboratories, Inc	<u>.                                     </u>	Reviewer: MG
-		2nd Reviewer:

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

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

	Validation Area		Comments
١.	Technical holding times	A	Sampling dates: 10 - 23-13
H	Initial calibration	A	
111.	Calibration	A	
IV	Blanks	A	
v	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP #17 CIO4 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	
Х.	Field duplicates	รพ	D = 11 + 21
xi	Field blanks	DN	EB=1

Note: A

Ŧ

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

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

EB = Equipment blank

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

1	EB-3-10-23-13	112	DUPE-2-4Q13	21 2	MW-14-1	31	
2	MW-23-5	12	EB-3-10-23-13MS	22		32	
3	MW-23-4	13	EB-3-10-23-13MSD	23		33	
4	MW-23-3	14	EB-3-10-23-13DUP	24		34	
5	MW-23-2	152	MW-14-1MS	25		35	
6	MW-23-1	16 <b>7</b>	MW-14-1MSD	26		36	
7	MW-14-5	17 <b>2</b>	MW-14-1DUP	27		37	
8	MW-14-4	18 2	DUPE-2-4Q13MS	28		38	
9	MW-14-3**	192	DUPE-2-4Q13MSD	29		39 I	PBWI
10	MW-14-2	20 <sup>2</sup>	DUPE-2-4Q13DUP	30		40 <sup>2</sup>	PBW2

Notes:\_

And the second second

Method:Inorganics	(EPA Method	see cover
-------------------	-------------	-----------

Validation Area	Yes	No	NA	Findings/Comments			
I. Technical holding times							
All technical holding times were met.	V						
Cooler temperature criteria was met.	$\bigvee$						
II. Calibration							
Were all instruments calibrated daily, each set-up time?	$\checkmark$						
Were the proper number of standards used?	$\checkmark$		ļ				
Were all initial calibration correlation coefficients	V		ļ				
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	~						
Were titrant checks performed as required? (Level IV only)			$\checkmark$				
Were balance checks performed as required? (Level iV only)				1			
III. Blanks				• • • • • • • • • • • • • • • • • • •			
Was a method blank associated with every sample in this SDG?	$\checkmark$						
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.							
IV. Matrix spike/Matrix spike duplicates and Duplicates							
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	1						
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	~						
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq$ 20% for waters and $\leq$ 35% for soil samples? A control limit of $\leq$ CRDL( $\leq$ 2X CRDL for soil) was used for samples that were $\leq$ 5X the CRDL, including when only one of the duplicate sample values were $\leq$ 5X the CRDL.	~						
V. Laboratory control samples							
Was an LCS anaylzed for this SDG?	$\checkmark$						
Was an LCS analyzed per extraction batch?	$\checkmark$						
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?							
VI. Regional Quality Assurance and Quality Control							
Were performance evaluation (PE) samples performed?		/					
Were the performance evaluation (PE) samples within the acceptance limits?			$\checkmark$				

#### VALIDATION FINDINGS CHECKLIST



a . •

a an a succession remained the

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

الارداد والمعصور والمعاولية والمراجع والم

LDC #: 30879A6

# VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

موجود المتعود المتعاد المرزو المراجع

Page: \_ l\_of\_

Reviewer: 2nd reviewer:

All circled methods are applicable to each sample.

0	<b>1 4 -</b> 4 <b>- 5 -</b>	Davanakan
		Parameter
[->11, ∂]	W	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $(CR^{6+}CIO_4)$
6 12→14		ph TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^6$ $CO_4$
15-717		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> $(CO_4)$
↓ 18→20		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $\mathbb{CR}^{6}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		PH TDS CLF NOS NOS SOS POL ALK CN" NHS TKN TOC CR6+ CIO

Comments:\_

METHODS.6

LDC#<u>30879A6</u>

# VALIDATION FINDINGS WORKSHEET Field Duplicates

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

Inorganics: Method See Cover

	Concentra			
Analyte	11	21	RPD	
Perchlorate	3.7	4.0	8	

V:\FIELD DUPLICATES\FD\_inorganic\30879A6.WPD

# LDC #: 30879A6

# VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification



METHOD: Inorganics, Method \_\_\_\_\_ See cover

The correlation coefficient (r) for the calibration of 2104 was recalculated. Calibration date: 11-5-13

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 <u>measured</u> in the analysis of the ICV or CCV solution True = concentration of each analyte in the ICV or CCV source

			Cas	٨	Recalculated	Reported	
Type of Analysis	Analyte	Standard ID	ー ひれ こ Found (units)	A√Ca True (units)	r or %R	r or %R	Acceptable (Y/N)
Initial calibration		Blank	-	-			
		Standard 1	2.0 (mg/L)	0.0021			
		Standard 2	4.0 ()	0.0043			
	-	Standard 3	6.0 ()	0.0070		r <sup>2</sup> = 0.997286	,
	CIOH	Standard 4	(0.0)	0.0117	r?=0.997516		Ý
	,	Standard 5	20.0 ()	0.0718			
		Standard 6	-	-			
		Standard 7	-	-			
Calibration verification		2323					
	Cr VI	CCV2	0.0502 (mg/y	0.050 (mg/L)	100	100	
Calibration verification		1603	(				
	C104	CCV6	10.733 (mg/L)	10.000 (mg/L)	107	107	$\checkmark$
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 #: 30879A6

#### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

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

.

METHOD: Inorganics, Method See cover

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

%R = Found x 100 Where, True 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 = <u> S-D </u> x 100	Where,	S =	Original sample concentration
(S+D)/2		D =	Duplicate sample concentration

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	%R / RPD	%R / RPD	Acceptable (Y/N)
2317	Laboratory control sample						
LCS		Cr VI	0.0489 (mg/L)	0.050 (mg/y)	97.8	97.8	Ý
1359	Matrix spike sample		(SSR-SR)	· · · · · · · · · · · · · · · · · · ·			
12		C104	10.823 (mg/L)	10.101 (mg/L)	107	107	
2317 /2317	Duplicate sample			:			
14		Cr VI	ND (mg/L)	ND (mg/L)	0	-	

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 #	DC #:_30879A6     VALIDATION FINDINGS WORKSHEET     Page: 1 of 1       Sample Calculation Verification     Reviewer: MG       2nd reviewer: V								
METH	IOD: Inorganics, Metho	d see cover							
Pleas Pleas N N N N	Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". $\bigcirc$ N N/AHave results been reported and calculated correctly? $\bigcirc$ N N/AAre results within the calibrated range of the instruments? $\bigcirc$ N N/AAre all detection limits below the CRQL?								
Comp recalc	ound (analyte) results f ulated and verified usin	or <u># 9, CIO4</u> g the following equation:	repo	orted with a positi	ve detect were				
Concer	itration =	Recalculation:							
Y = Whe	$m \times + 6$	0.006 = 0.0011 (x)	()+0.0000						
m b	= 0.0011 = 0.0000	5.455 Mg/L =	x						
$\frac{d(1)}{d(1)}$	<u> </u>								
#	Sample ID	Analyte	Reported Concentration (Mg / L)	Calculated Concentration (۳۹ / ۲)	Acceptable (Y/N)				
	9	CIOY	5.7	5.5	Y				
<u></u>	mathed 710				L				

.....

····· · -

FULL M. MARTINE, A MARTINE MARTINE MARTINE AND ADDRESS OF A DESCRIPTION OF A DESCRIPANTA DESCRIPTION OF A DESCRIPTION OF A .....

# LDC Report# 30879B1

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site	Name:	NASA J	PL

Collection	Date:	October 24	2013
00110011011	Duto.		, 2010

LDC Report Date: December 11, 2013

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23218

# Sample Identification

TB-4-10/24/13 EB-4-10/24/13 MW-22-5 MW-22-4\*\* MW-22-3 MW-22-2 MW-22-1 MW-24-5 MW-24-4 MW-24-3 MW-24-2\*\* MW-24-1 MW-26-2 MW-26-1 **DUPE-3-4Q13 MW-24-2MS** MW-24-2MSD

\*\*Indicates sample underwent EPA Level IV review

# Introduction

This data review covers 17 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 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 with the following exceptions:

Date	Compound	%RSD	Associated Samples	Flag	A or P
10/17/13	Pentachloroethane	29.54078	All samples in SDG 13-23218	J (all detects) UJ (all non-detects)	Р

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
10/28/13	tert-Butyl alcohol trans-1,4-Dichloro-2-butene Pentachloroethane	30.3 46.8 249	TB-4-10/24/13 EB-4-10/24/13 MW-22-5 MW-22-3 MW-22-2 MW-22-1 MW-24-5 MW-24-4 MW-24-3 MW-24-2 MW-24-2 MW-24-1 MW-26-1 DUPE-3-4Q13 MW-24-2MS MW-24-2MSD BWJ2115	J (all detects) UJ (all non-detects)	Ρ

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

Date	Compound	%D	Associated Samples	Flag	A or P
10/17/13	Pentachloroethane	80.5	All samples in SDG 13-23218	J (all detects) UJ (all non-detects)	Ρ

# V. Blanks

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

# VI. Surrogate Spikes

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

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
MW-22-3	Bromofluorobenzene	72.3 (80-120)	All TCL compounds	J (all detects) UJ (all non-detects)	Ρ
MW-24-1	Bromofluorobenzene	79.5 (80-120)	All TCL compounds	J (all detects) UJ (all non-detects)	Р
1314511-CCB2	Bromofluorobenzene	59.70 (80-120)	All TCL compounds	J (all detects) UJ (all non-detects)	Р
### 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

All compound quantitations 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-26-1 and DUPE-3-4Q13 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentr		
Compound	<b>MW-26-1</b>	DUPE-3-4Q13	RPD
Chloroform	0.27	0.30	11
Tetrachloroethene	0.40	0.46	14
Trichloroethene	0.35	0.42	18

#### XVII. Field Blanks

Sample TB-4-10/24/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-4-10/24/13 was identified as an equipment blank. No volatile contaminants were found.

### NASA JPL Volatiles - Data Qualification Summary - SDG 13-23218

SDG	Sample	Compound	Flag	A or P	Reason
13-23218	TB-4-10/24/13 EB-4-10/24/13 MW-22-5 MW-22-4** MW-22-3 MW-22-2 MW-22-1 MW-24-5 MW-24-5 MW-24-5 MW-24-3 MW-24-3 MW-24-2** MW-24-1 MW-26-2 MW-26-1 DUPE-3-4Q13	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Initial calibration (%RSD)
13-23218	TB-4-10/24/13 EB-4-10/24/13 MW-22-5 MW-22-3 MW-22-2 MW-22-1 MW-24-5 MW-24-5 MW-24-3 MW-24-3 MW-24-2** MW-24-1 MW-24-1 MW-26-2 MW-26-1 DUPE-3-4Q13	tert-Butyl alcohol trans-1,4-Dichloro-2-butene Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
13-23218	TB-4-10/24/13 EB-4-10/24/13 MW-22-5 MW-22-4** MW-22-3 MW-22-2 MW-22-1 MW-24-5 MW-24-5 MW-24-4 MW-24-3 MW-24-2** MW-24-1 MW-24-1 MW-26-2 MW-26-1 DUPE-3-4Q13	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)
13-23218	MW-22-3 MW-24-1	All TCL compounds	J (all detects) UJ (all non-detects)	₽	Surrogate spikes (%R)

### NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-23218

# No Sample Data Qualified in this SDG

LDC #: <u>30879B1</u>	VALIDATION COMPLETENESS WORKSHEET	Date: <u>12/4/</u> /3
SDG #: <u>13-23218</u>		Page:_/_of/
Laboratory: BC Laboratories,	Inc.	Reviewer:
		2nd Reviewer:(人

## 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
١.	Technical holding times	Δ	Sampling dates: 10/24/3
II.	GC/MS Instrument performance check	4	
111.	Initial calibration	5W	% PSP = 20, 12
IV.	Continuing calibration/ICV	sw	1W/CW = 30
V.	Blanks	$\bigtriangleup$	
VI.	Surrogate spikes	sw	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	Les
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	4	
XI.	Target compound identification	Δ	Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	4	Not reviewed for Level III validation.
<b>X</b> 111.	Tentatively identified compounds (TICs)	Δ	Not reviewed for Level III validation.
XIV.	System performance	Δ	Not reviewed for Level III validation.
XV.	Overall assessment of data	4	
XVI.	Field duplicates	$\mathcal{S}\mathcal{W}$	D = 14, 15
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

1 1

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

11	TB-4-10/24/13	11	MW-24-2**	21	BWJ 2115	31
2 1	EB-4-10/24/13	12	MW-24-1	$_{22} \nu$	1314511-CCB2	32
31	MW-22-5	13	MW-26-2	23		33
42	MW-22-4**	14	MW-26-1 0	24		34
<sub>5</sub> 1	MW-22-3	15	DUPE-3-4Q13	25		35
6	MW-22-2	16	MW-24-2MS	26		36
7 1	MW-22-1	17	MW-24-2MSD	27		37
8 1	MW-24-5	18		28		38
9	MW-24-4	19		29		39
101	MW-24-3	20		30		40

F

ĺ

----

### Method: Volatiles (EPA Method 524.2)

Validation Area	Yes	No	NA	Findings/Comments
I Technical holding times			i de la compañía de la	
All technical holding times were met.	$\left  \right $			
Cooler temperature criteria was met.				
II. GC/MS Instrument performance.check			a sang p Kasal	
Were the BFB performance results reviewed and found to be within the specified criteria?	/	-		
Were all samples analyzed within the 12 hour clock criteria?	$\checkmark$	لصرً	-	
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	$\leq$			
Were all percent relative standard deviations (%RSD) $\leq$ 20%?	Contraction of the local		-	
IV. Continuing calibration	dina di Mana			
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	<u> </u>	-		
Were all percent differences (%D) <u>&lt;</u> 30%?				
V. Blanks				
Was a method blank associated with every sample in this SDG?	$\square$			
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	<u> </u>			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.			and the second second second second	
VI/Surrogate spikes				
Were all surrogate %R within QC limits?	<u> </u>	$\leq$		
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			1999 1997	
Was a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for this SDG?	$\leq$			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
VIII. Laboratory control samples		(j. 200		
Was an LCS analyzed for this SDG?		[]		
Was an LCS analyzed per analytical batch?		ĺ		
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				

# VALIDATION FINDINGS CHECKLIST

·.

Page:	<u>2_of_2</u>
Reviewer:	FT
2nd Reviewer:	A

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			94	
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 <u>+ 0.06 RRT units of the standard?</u>	$\leq$			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	$\leq$			
Were chromatogram peaks verified and accounted for?				
XII. Compound quantitation/RLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	<	-		
Were compound quantitation and RLs 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

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	EEE. 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. Iodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP. Pentachloro e thane
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	aaaa Methyl Methacrylate
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR. frans - 1, 4 - Dichloro -
Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS. 2-Butene
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-lsopropyltoluene	AAAA. Ethyl tert-butyl ether	υυυυ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	www

LDC #:\_ 3087913 /

## VALIDATION FINDINGS WORKSHEET Initial Calibration

Page:_	<u></u>	_
Reviewer:_	FT	
2nd Reviewer:	_ 2	
	- \	

#### 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".



Did the laboratory perform a 5 point calibration prior to sample analysis? Were all percent relative standard deviations (%RSD)  $\leq 20\%$  ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤20.0%)	Associated Samples	Qualifications
	10/17/12	ICAL M5-45	PPPP	29.540.18	all	JUJP
					· · · · · · · · · · · · · · · · · · ·	
<b> </b>						
			· · · · · · · · · · · · · · · · · · ·	······································	· · · · · · · · · · · · · · · · · · ·	
<u>├</u> ──						
		,,,,,,,,_,,_,_,_				
				<u>}</u>		
╞──				<u> </u>		
┣		<u></u>				
		· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·	
┣──			· · · · · · · · · · · · · · · · · · ·			
┣					· · · · · · · · · · · · · · · · · · ·	
┣───						
┣						<u> </u>
╞──	I	·····		<u> </u>		
┣──						
						<b></b>
						·····
┠───						
┣				· · · · · · · · · · · · · · · · · · ·		
┣		·				
		<u></u>			l	

LDC #: 30879B/

### VALIDATION FINDINGS WORKSHEET Continuing Calibration

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

METHOD: GC/MS VOA (EPA Method 524.2)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>VNNA</u> Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

<u>Y N/N/A</u> Were all percent differences (%D)  $\leq$  30%?

#	Date	Standard ID	Compound	Finding %D (Limit: <u>&lt;</u> 30.0%)	Associated Samples	Qualifications
	10/17/12	1042 MB-45	PPPP	80.5	ail	1/W/P
			·····		· · · · · · · · · · · · · · · · · · ·	
	10/28/13	1314511-COV2	222	30.3	BWJ2115, 1-123,	9 LNL
			RRRR	46.8	5-17	
			PPPP	249	J	
				· · · · · · · · · · · · · · · · · · ·	(m	
	· · · · · · · · · · · · · · · · · · ·					
			· · · · ·			<u> </u>
					·····	
		· · · · · · · · · · · · · · · · · · ·		<u>↓</u>		
			· · · · · · · · · · · · · · · · · · ·	······································		
				<u> </u>		
	<u>├────</u> ──────	<u></u>		<u> </u>		
				<u> </u>		

LDC #: 30879B/

#### VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page:		)
Reviewer:	FT	
2nd Reviewer:		
	2	

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/A Were all surrogate %R within QC limits?

Y/N/A If the percent recovery (%R) was out of QC limits, was a reanalysis performed to confirm samples with %R out of outside of criteria?

l	<b>.</b>				<b></b>		
<u>#</u>		Lab IU/Reference	Surrogate	<u>%Recovery</u>		Associated Samples	
		>>	PFD	12-3	(80-120)		2/02/12
		<u> </u>			()		
					<u>()</u>		· · · · · · · · · · · · · · · · · · ·
		-			· · · · · · · · · · · · · · · · · · ·		
		12	V	79.5	( )		L
					()		
					()		
					<u>()</u>		l
		1314511-CCB2	V	59.70	( )		
			-		( )		
					()		
		·····			()		
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
					<u>,                                    </u>		
					· · · ·		
					() ()	· · · · · · · · · · · · · · · · · · ·	

(BFB) = Bromofluorobenzene

(DCB) = 1,2-Dichlorobenzene-d4

(TOL) = Toluene-d8

(DFM) = Dibromofluoromethane

# LDC#: 30879B)

#### VALIDATION FINDINGS WORKSHEET Field Duplicates



METHOD: GC/MS VOA (EPA SW 846 Method 524.2) Y N NA Were field duplicate pairs identified in this SDG?

 $\frac{1}{\sqrt{N}}$  NA Were target analytes detected in the field duplicate pairs?

	Concentra		
Compound	14	15	RPD
к	0.27	0.30	11
AA	0.40	0.46	14
S	0.35	0.42	18

V:\FIELD DUPLICATES\templates\30879B1.wpd

#### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

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

METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X)

Where:

Ax = Area of compound Cx = Concentration of compound S = Standard deviation of the RRFs X = Mean of the RRFs Ais = Area of associated internal standard Cis = Concentration of internal Standard

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration					AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	C	Compound	(RRF 160/40/8 std)	(RRF 160/40/8 std)	(Initial)	(Initial)		
	ICAL	10/17/2013	F	(IS 1)	0.0252902	0.0252902	0.0247595	0.0247595	3.379941	3.379941
	MS-V5		QQQQ	(IS 2)	0.0692452	0.0692452	0.0665553	0.0665553	5.630492	5.630492
			PPPP	(IS 3)	0.1220467	0.1220467	0.1793848	0.1793848	29.54078	29.54078

#### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page:	<u></u>	
Reviewer:	F	Γ
2nd Reviewer:	_	,

METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X)

Where:

Ax = Area of compound Cx = Concentration of compound S = Standard deviation of the RRFs X = Mean of the RRFs Ais = Area of associated internal standard Cis = Concentration of internal Standard

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration	- -				AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Comp	ound	(RRF 10 std)	(RRF 10 std)	(Initial)	(Initial)		
	ICAL	10/17/2013	С	(IS 1)	0.446210	0.446210	0.4403805	0.4403805	5.759154	5.759154
	MS-V5		S	(IS 2)	0.353115	0.353115	0.3462535	0.3462535	7.483333	7.483333
			EE	(IS 3)	1.854653	1.854653	1.8783910	1.8783910	13.16845	13.16845

LDC #: 30879B/

#### VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification

#### METHOD: GC/MS VOA (EPA Method 524.2)

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

% Difference = 100 \* (ave. RRF - RRF)/ave. RRF RRF =  $(A_x)(C_{is})/(A_{is})(C_x)$ 

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

 $A_x$  = Area of compound,  $C_x$  = Concentration of compound,  $A_{is}$  = Area of associated internal standard  $C_{is}$  = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	%D	%D
1	1 314511	10/28/13	C (1st Internal Standard)	0.4403805	0.4463761	0.4463761	1-4	1-4
	CCN		S (2nd Internal Standard)	6.3462535	0.3397841	0.3397841	1.9	1.9
			EE (3rd Internal Standard)	1.8783910	1.705248	1.705248	9.2	9.2
2	1314511	10/28/13	F (1st Internal Standard)	0.0247595	0.02358992	0,02388992	3.5	3.5
	CW 2		යිගිහිගී (2nd Internal Standard)	0.0665553	0.06751429	0.06751429	1.4	1.4
			PPPP (3rd Internal Standard)	0.1793848	0.6259287	0.62591287	249	249
3	1314511	10/28/13	(1st Internal Standard)		0.4590449	0.4590449	4.2	4.2
	CU3	i i	S (2nd Internal Standard)		0.3477343	0.3477343	0.4	0.4
			EE (3rd Internal Standard)		1.702852	1.702852	9,3	9.3
4			F (1st Internal Standard)		0.02249916	0.0224996	9.1	9.1
			ର୍ଷ୍ୟ (2nd Internal Standard)		0.06722.555	0.06722555	1.0	1.0
			PPPP (3rd Internal Standard)		0.2155650	0.2155658	20.2	20.V

Comments: <u>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.</u>

LDC #: 30879B)

# VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page: \_\_\_\_\_of \_\_\_\_ Reviewer: \_\_\_\_FT\_\_\_\_ 2nd reviewer: \_\_\_\_\_⁄A

#### 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

11

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8	10.0	10.060	101	101	U
Bromofluorobenzene	1	89.3	89.3	89	1
1,2-Dichlorobenzene-d4		9-78	97.8	97.8	V
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			· ·		

LDC#: 30879B1

### VALIDATION FINDINGS WORKSHEET <u>Matrix Spike/Matrix Spike Duplicates Results Verification</u>



#### 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

Where: SSC = Spiked sample concentration SA = Spike added SC = Sample concentration

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

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD sample: 16 4 17

	S	pike	Sample	Spiked S	Sample	Matrix	Spike	Matrix Spike	Duplicate	M	S/MSD
Compound	Ac ניטי	ided	Concentration (ハタレ	Concen ( หฐ	tration	Percent F	lecovery	Percent F	Recovery		RPD
		MSD			MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Benzene	x.0	25.0	NN	25.480	25.800	102	102	103	103	1.25	1.25
Chlorobenzene				25.900	2.4.93	104	104	99.7	99.7	3.82	3.82
1,1-Dichloroethene				25.080	24.840	100	100	99.4	99.4	0.962	0.962
Toluene				25. 480	25.680	102	102	103	P3	0.782	0.782
Trichloroethene			0.1600	25.00	25.250	99.4	99.1	100	100	ŀυ	1-1)

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.

#### VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Page:_	of
Reviewer:	FT
2nd Reviewer:	e

#### 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: SSC = Spiked sample concentration SA = Spike added

RPD = I LCSC - LCSDC | \* 2/(LCSC + LCSDC)

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCSID: BWJ2115 Les

	S	pike	Spiked S	Sample	<u> </u>	:s	1.05	<u></u>		CSD
Compound	Ad ( V.)	all)			Percent F	Recovery	Percent R	lecovery	RI	סי
	LCS		LCS	U LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	x.D	NA	23,760	NA	95.0	95.0				
Trichloroethene			24.880		99.5	99,5				
Benzene			24.080		96.3	96.3.				
Toluene			25.550		102	102				
Chlorobenzene			24.180		96.7	96.7	NA			

Comments: <u>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.</u>

LDC #: 30879B)

### VALIDATION FINDINGS WORKSHEET Sample Calculation Verification



#### METHOD: GC/MS VOA (EPA Method 524.2)

<u>/ Y</u>	N N	<u>N/A</u>
$\sqrt{2}$	N	N/A

F

Were all reported results recalculated and verified for all level IV samples?

Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

Concenti	ration	$= \frac{(A_{r})(I_{s})(DF)}{(A_{s})(RRF)(V_{o})(\%S)}$
A <sub>x</sub>	=	Area of the characteristic ion (EICP) for the compound to be measured
A <sub>is</sub>	=	Area of the characteristic ion (EICP) for the specific internal standard
l <sub>s</sub>	=	Amount of internal standard added in nanograms (ng)
RRF	=	Relative response factor of the calibration standard.

V<sub>o</sub> = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Conc. = (30064) (10) (0.703)= 1.1 ng/L

Sample I.D. \_\_\_\_\_ K\_:

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration (  )	Qualification
				· · · · · · · · · · · · · · · · · · ·	
		· · · · · · · · · · · · · · · · · · ·			
			·		
			<u> </u>		

### LDC Report# 30879B4

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
Collection Date:	October 24, 2013
LDC Report Date:	December 10, 2013
Matrix:	Water
Parameters:	Total Recoverable Chromium
Validation Level:	EPA Level III & IV
Laboratory:	BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23218

### Sample Identification

EB-4-10/24/13 MW-22-5 MW-22-4\*\* MW-22-3 MW-22-2 MW-22-1 MW-24-5 MW-24-4 MW-24-3 MW-24-2\*\* MW-24-1 MW-26-2 MW-26-1 DUPE-3-4Q13 MW-24-2MS MW-24-2MSD MW-24-2DUP MW-24-1MS MW-24-1MSD MW-24-1DUP

#### 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 200.8 for Total Recoverable 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. 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 total recoverable chromium was found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Chromium	0.966 ug/L	EB-4-10/24/13 MW-22-5 MW-22-4** MW-22-3 MW-22-2 MW-22-1 MW-24-5 MW-24-5 MW-24-4 MW-24-3 MW-24-2**

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-4-10/24/13	Chromium	1.7 ug/L	1.7U ug/L
MW-22-4**	Chromium	2.0 ug/L	2.0U ug/L
MW-22-3	Chromium	3.2 ug/L	3.2U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-22-2	Chromium	2.4 ug/L	2.4U ug/L
MW-22-1	Chromium	1.0 ug/L	1.0U ug/L
MW-24-5	Chromium	3.1 ug/L.	3.1U ug/L
MW-24-2**	Chromium	2.3 ug/L	2.3U ug/L

# V. ICP Interference Check Sample (ICS) Analysis

ICP Interference check sample 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-26-1 and DUPE-3-4Q13 were identified as field duplicates. No total recoverable chromium was detected in any of the samples with the following exceptions:

	Concentr		
Analyte	MW-26-1	DUPE-3-4Q13	RPD
Chromium	0.50U	7.2	200

#### XV. Field Blanks

Sample EB-4-10/24/13 was identified as an equipment blank. No total recoverable chromium was found with the following exceptions:

Blank ID	Analyte	Concentration (ug/L)
EB-4-10/24/13	Chromium	1.7

# NASA JPL Total Recoverable Chromium - Data Qualification Summary - SDG 13-23218

No Sample Data Qualified in this SDG

# NASA JPL

# Total Recoverable Chromium - Laboratory Blank Data Qualification Summary - SDG 13-23218

SDG	Sample	Analyte	Modified Final Concentration	A or P
13-23218	EB-4-10/24/13	Chromium	1.7U ug/L	А
13-23218	MW-22-4**	Chromium	2.0U ug/L	A
13-23218	MW-22-3	Chromium	3.2U ug/L	A
13-23218	MW-22-2	Chromium	2.4U ug/L	A
13-23218	MW-22-1	Chromium	1.0U ug/L	A
13-23218	MW-24-5	Chromium	3.1U ug/L	A
13-23218	MW-24-2**	Chromium	2.3U ug/L	A

LDC #: <u>30879B4</u>	VALIDATION COMPLETENESS WORKSHEET	Date: <u>12-3-</u> (3
SDG #: <u>13-23218</u>		Page:of
Laboratory: BC Laboratories,	Inc.	Reviewer: MG
		2nd Reviewer:

#### METHOD: Total Recoverable Chromium (EPA Method 200.8)

Į

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: 10 - 24 - 13
11.	ICP/MS Tune	A	
Ш.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	N	not required
VI.	Matrix Spike Analysis	A	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP #17 OK by difference
VIII.	Laboratory Control Samples (LCS)	Â	LCS
IX.	Internal Standard (ICP-MS)	A	not veriewed for level 111
Х.	Furnace Atomic Absorption QC	2	not utilized
XI.	ICP Serial Dilution	Z	not performed
XII.	Sample Résult Verification	A	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	รพ	D = 13 + 14
xv	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

	ull availut					
1	EB-4-10/24/13	11 <b>2</b>	MW-24-1	21		31
2	MW-22-5	12 Z	MW-26-2	22		32
3	MW-22-4**	13 2	MW-26-1	23		33
4	MW-22-3	142	DUPE-3-4Q13	24		34
5	MW-22-2	15	MW-24-2MS	25		35
6	MW-22-1	16	MW-24-2MSD	26		36
7	MW-24-5	17	MW-24-2DUP	27		37
8	MW-24-4	18 Z	MW-24-1MS	28		38
9	MW-24-3	19 <b>2</b>	MW-24-1MSD	29	PBWI	39
10	MW-24-2**	<sub>20</sub> J	MW-24-1DUP	30 <sup>2</sup>	PBW2	40

Notes:\_

LDC #: 30879В4

-----

#### VALIDATION FINDINGS CHECKLIST

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.	$\checkmark$			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	$\checkmark$			
Were %RSD of isotopes in the tuning solution ≤5%?	$\checkmark$			
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 <a> 0.995?</a>	/			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	$\checkmark$			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	~			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?		_/		
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			1	
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	$\checkmark$			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	/			
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq$ 20% for waters and $\leq$ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were $\leq$ 5X the RL, including when only one of the duplicate sample values were $\leq$ 5X the RL.	~			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	/			
Was an LCS analyzed per extraction batch?	$\checkmark$			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	~			

# LDC #: 30879B4

. مېرىپ - مېرىپىيە بەر مەرەپ بەرەپىيە ئاللەر بەرەپىيە بەيچىچە بەرەپ يەرەپ بەرەپ بەرەپ بەرەپ بەرەپ بەرەپ بەرەپ بەرە

#### VALIDATION FINDINGS CHECKLIST

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

Validation Area	Yes	No	NA	Findings/Comments					
VIII. Furnace Atomic Absorption QC	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)			$\checkmark$						
Were analytical spike recoveries within the 85-115% QC limits?			$\checkmark$						
IX. ICP Serial Dilution									
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		<							
Were all percent differences (%Ds) < 10%?			$\checkmark$						
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			/						
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)									
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	/								
If the %Rs were outside the criteria, was a reanalysis performed?									
XI. Regional Quality Assurance and Quality Control									
Were performance evaluation (PE) samples performed?		/							
Were the performance evaluation (PE) samples within the acceptance limits?									
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.	$\checkmark$								
XIV. Field duplicates									
Field duplicate pairs were identified in this SDG.	$\checkmark$								
Target analytes were detected in the field duplicates.	/								
XV. Field blanks									
Field blanks were identified in this SDG.	$\checkmark$								
Target analytes were detected in the field blanks.	/								

#### LDC #: 30879B4

SDG #: See Cover

**METHOD:** Trace metals (EPA SW 864 Method 6010B/6020/7000) Sample Concentration units, unless otherwise noted: <u>ug/L</u>

#### VALIDATION FINDINGS WORKSHEET <u>PB/ICB/CCB QUALIFIED SAMPLES</u>

Soil preparation factor applied: <u>NA</u> Associated Samples: <u>1-10</u>

Page:	of
Reviewer:	MG
2nd Reviewer:	$\sim$

Analyte	Maximum PB <sup>a</sup> (mg/Kg)	Maximum PBª (ug/L)	Maximum ICB/CCB <sup>a</sup> (ug/L)	Action Limit	1	3	4	5	6	7	10		
Cr		0.966		4.83	1.7	2.0	3.2	2.4	1.0	3.1	2.3		-

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC#: 30879B4

#### VALIDATION FINDINGS WORKSHEET Field Duplicates

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

METHOD: Metals (EPA Method 6010B/7000)

<u>QN NA</u> **WN NA** 

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

	Concentra	ntion (ug/L)		
Analyte	13	14	RPD	
Chromium	0.50U	7.2	200	

V:\FIELD DUPLICATES\FD\_inorganic\30879B4.WPD

LDC #: 3087	1934	VALIDATION FINDINGS WO <u>Field Blanks</u>	RKSHEET	Page: <u>1_of_1</u> Reviewer: <u>MG</u> 2nd reviewer:
METHOD: Trace	Metals (EPA SW 84	6 Method 6010/6020/7000)		
<u>YN N/A</u>	Nere field blanks ide Nere target analytes	ntified in this SDG? detected in the field blanks?		
Sample:	Fiel	d Blank / Trip Blank / Rinsate Other	EB (circle one)	
		Analyte		Concentration Mg/L
		Cr		1.7
	·····			
	······			
	• • • • • • • • • • • • • • • • • • •			
	······································			
L	<u></u>		<u></u>	
Sample:	Field	d Blank / Trip Blank / Rinsate / Other_	(circle one)	
		Analyte		Concentration
	<u></u>		·····	
	· · · · · · · · · · · · · · · · · · ·			

:

THE REPORT OF A PROPERTY OF A

and the second s un en la substantia de la seconda de la s ....

LDC #: 30879B4

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

Page: 1 of 1 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 = <u>Found</u> 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)						
1155 ICV	ICP/MS (Initial calibration)	Cr	51.711	50.000	103	103	Ý
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1717 CCV8	ICP/MS (Continuing calibration)	Cr	41.003	40.000	103	103	
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments: <u>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.</u>

LDC #: 30879 B4

#### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

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.

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

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

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

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

%D = <u>|I-SDR|</u> x 100

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

Sample ID	Tuno of Analysis	Elomont	Found / S / I	True / D / SDR (units)	Recalculated	Reported	Acceptable
Sample ID		Liement	(units)		%R/RPD/%D	%R/RPD/%D	
	ICP interference check	-		-		-	-
LCS	Laboratory control sample	Cr	43.843 (mg/L)	40.000 (Mg/L)	110	110	Y
1703	Matrix spike	Cr	(SSR-SR) 39,229 (Mg/L)	40.000 (mg/L)	98.1	98.1	
1653/1656	Duplicate	Cr	2.319 (mg/L)	3.374 (mg/L)	37.1	37.1	
	ICP serial dilution	-		_	-	-	-

#### 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 #: 30879B4

# VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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

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

Please N N N N	e see qualifications belo <u>N/A</u> Have results <u>N/A</u> Are results w <u>N/A</u> Are all detect	ow for all questions answered "N". Not been reported and calculated correctl ithin the calibrated range of the instru- tion limits below the CRDL?	applicable questions ar y? nents and within the line	e identified as "N// ear range of the IC	4". :P?			
Detect equati	Detected analyte results for# 3, $C \sim$ were recalculated and verified using the following equation:							
Concen	tration = <u>(RD)(FV)(Dil)</u> (In. Vol.)	Recalculatio	in:					
RD FV In. Vol. Dil	<ul> <li>Raw data conce</li> <li>Final volume (m</li> <li>Initial volume (m</li> <li>Dilution factor</li> </ul>	$(\mathcal{J}, \mathcal{O46}  \mathcal{Mg/L})$	)(0.050L) 050L	- = 2.04	16 mg/L			
#	Sample ID	Analyte	Reported Concentration ( <sup>Mg</sup> /)	Calculated Concentration ( Mg / L)	Acceptable (Y/N)			
1	3	Cr	2.0	2.0	Ý			
2	10	Cv	2.3	2.3				
	· · · · · · · · · · · · · · · · · · ·							
		· · · · · · · · · · · · · · · · · · ·						
					· · · · · · · · · · · · · · · · · · ·			

Note:

#### LDC Report# 30879B6

# Laboratory Data Consultants, Inc. Data Validation Report

Projecti Site Name: NASA JF	Project/Site	Name:	NASA JP
-----------------------------	--------------	-------	---------

Collection	Date:	October 24,	2013
		,	

LDC Report Date: December 10, 2013

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23218

### Sample Identification

EB-4-10/24/13	MW-24-1MS
MW-22-5	MW-24-1MSD
MW-22-4**	MW-24-1DUP
MW-22-3	
MW-22-2	
MW-22-1	
MW-24-5	
MW-24-4	
MW-24-3	
MW-24-2**	
MW-24-1	
MW-26-2	
MW-26-1	
DUPE-3-4Q13	
MW-24-3MS	
MW-24-3MSD	
MW-24-3DUP	
MW-24-2MS	
MW-24-2MSD	
MW-24-2DUP	

\*\*Indicates sample underwent EPA Level IV review

### Introduction

This data review covers 23 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 300.0 for Chloride, Sulfate, Nitrate a Nitrogen, EPA Method 314.0 for Perchlorate, EPA Method 353.2 for Nitrite as Nitrogen, EPA SW 846 Method 7196 for Hexavalent Chromium, and EPA Method 365.1 for Orthophosphate as Phosphorus.

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

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

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

The following are definitions of the data qualifiers:

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

# I. Technical Holding Times

All technical holding time requirements were met.

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

#### II. Initial Calibration

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

### III. Continuing Calibration

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

### IV. Blanks

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

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Chloride	0.127 mg/L	MW-24-1
ICB/CCB	Chloride Sulfate	0.097 mg/L 0.269 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 with the following exceptions:

	Analyte	%R (Limits)	Associated Samples	Flag	A or P
LCS	Orthophosphate as P	111 (90-110)	MW-24-1	J (all detects)	Р

## VIII. Sample Result Verification

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

## IX. Overall Assessment of Data

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

## X. Field Duplicates

Samples MW-26-1 and DUPE-3-4Q13 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concentr		
Analyte	MW-26-1	DUPE-3-4Q13	RPD
Perchlorate	4.5	4.2	7

#### XI. Field Blanks

Sample EB-4-10/24/13 was identified as an equipment blank. No contaminant concentrations were found.

## NASA JPL Wet Chemistry - Data Qualification Summary - SDG 13-23218

SDG	Sample	Analyte	Flag	A or P	Reason
13-23218	MW-24-1	Orthophosphate as P	J (all detects)	Ρ	Laboratory control samples (%R)

NASA JPL

.

Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 13-23218

No Sample Data Qualified in this SDG

LDC #:_	<u>30879B6</u>	V
SDG #:	13-23218	
Laborat	ory: BC Laborator	ries, Inc.
	4	

#### VALIDATION COMPLETENESS WORKSHEET Level III/IV

Date: 12 - 3 - 13 Page: 1\_of 1 Reviewer: Mo 2nd Reviewer:

METHOD: Chloride, Sulfate, Nitrate-N (EPA Method 300.0), Perchlorate (EPA Method 314.0), Nitrite-N (EPA Method 353.2), Hexavalent Chromium (EPA SW846 Method 7196), Orthophosphate-P (EPA Method 365.1)

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

	Validation Area		Comments
١.	Technical holding times	A	Sampling dates: 10 - 24 - 13
11	Initial calibration	Α	
111.	Calibration verification	A	
IV	Blanks	SW	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP #23 NO2-N
VII.	Laboratory control samples	SW	LCS
VIII.	Sample result verification	A	Not reviewed for Level III validation.
IX.	Overall assessment of data	A	
Х.	Field duplicates	SW	D=13+14
xı	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	EB-4-10/24/13	11	MW-24-1	21	MW-24-1MS	31	
2	MW-22-5	12	MW-26-2	22	MW-24-1MSD	32	
3	MW-22-4**	13	MW-26-1	23	MW-24-1DUP	33	
4	MW-22-3	14	DUPE-3-4Q13	24		34	
5	MW-22-2	15	MW-24-3MS	25		35	
6	MW-22-1	16	MW-24-3MSD	26		36	
7	MW-24-5	17	MW-24-3DUP	27		37	
8	MW-24-4	18	MW-24-2MS	28		38	
9	MW-24-3	19	MW-24-2MSD	29		39	PBWI
10	MW-24-2**	20	MW-24-2DUP	30		40	PBW2

Notes:

1

ŝ,

The second consecution of the second strategies.

\_\_\_\_\_

1.245.4

Wethouthorganics (EPA Wethod See over)				
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	<b></b>			· · · · · · · · · · · · · · · · · · ·
All technical holding times were met.	$\checkmark$			
Cooler temperature criteria was met.	$\checkmark$			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	$\checkmark$	_		
Were the proper number of standards used?	$\checkmark$			
Were all initial calibration correlation coefficients <a> 0.995?</a>	$\checkmark$			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	V			
Were titrant checks performed as required? (Level IV only)			$\checkmark$	
Were balance checks performed as required? (Level IV only)			$\checkmark$	
III. Blanks				
Was a method blank associated with every sample in this SDG?	1			
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		• <b></b>		· · · · ·
Was an LCS anaylzed for this SDG?	$\checkmark$			
Was an LCS analyzed per extraction batch?	$\checkmark$			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?		/		
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		7		
Were the performance evaluation (PE) samples within the acceptance limits?				

#### Method: Inorganics (EPA Method See cover)

The second s

#### VALIDATION FINDINGS CHECKLIST

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

the second second

a contract of a second contractment of

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	$\checkmark$			
Were detection limits < RL?	$\checkmark$			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	$\checkmark$			
IX. Field duplicates				· · · · · · · · · · · · · · · · · · ·
Field duplicate pairs were identified in this SDG.	1			
Target analytes were detected in the field duplicates.	$\checkmark$			
X. Field blanks				
Field blanks were identified in this SDG.	1			
Target analytes were detected in the field blanks.		$\checkmark$		

المتحيدة فستحتج فستجر بالمتهج

# LDC #: 30879B6

## VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

------

\_\_\_\_\_

Page: <u>lof</u> Reviewer: <u>MG</u> 2nd reviewer: <u>V</u>

All circled methods are applicable to each sample.

Comple ID	BRodwing	Paramotor
	Watrix	raidilieler
12-14	W	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6}$ CO
11	1	pH TDS CI F NO NO SO PO ALK CN' NH3 TKN TOC CR CO
OC 15→17		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$
18→20		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $(CR^{9})$ CIO <sub>4</sub>
1 21->23	1	ph TDS CI F NO <sub>3</sub> (NO) SO <sub>4</sub> (PO) ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC (CR <sup>3</sup> ) CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
<u> </u>		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
ļ		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		PH TDS CLE NO, NO, SO, PO, ALK CN' NH, TKN TOC CR6+ CIO,

Comments:\_\_

#### LDC #: <u>30879B6</u>

## VALIDATION FINDINGS WORKSHEET Blanks

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

#### METHOD:Inorganics, Method See Cover

Conc. units	onc. units: mg/L Associated Samples: <u>11 (&gt;5x)</u>											
Analyte	Blank ID	Blank ID	Blank									
	РВ	ICB/CCB (mg/L)	Action Limit	No Qual's.								
СІ	0.127	0.097	0.635									
SO4		0.269	1.345						L			

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".



#### VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)



## METHOD: Inorganics, Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". YN N/A YN N/A Was a laboratory control sample (LCS) analyzed for each matrix in this SDG? Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits? **LEVEL IV ONLY:** YN N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#		Matrix	Analyte	LCS %R (limits)	LCSD %R (limits)	RPD (limits)	Associated Samples	Qualifications
1	LCS	water	POy-P	111 (90-110)			11	J dets/P
L								
		L						
			· · · · · · · · · · · · · · · · · · ·					
	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·					
				······································				
<u> </u>								
<b> </b> _								
				·				
<u> </u>		<u>L</u>				<u> </u>	<u> </u>	<u> </u>
	·····				· · · · · · · · · · · · · · · · · · ·			
		<u> </u>						
L		L					<u> </u>	

Comments:

1

LDC#<u>30879B6</u>

### VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: \_\_\_\_of \_\_\_ Reviewer: \_\_\_\_MG-2nd Reviewer: \_\_\_\_\_

Inorganics: Method See Cover

	Concentra			
Analyte	13	14	RPD	
Perchlorate	4.5	4.2	7	

V:\FIELD DUPLICATES\FD\_inorganic\30879B6.WPD

LDC #: 30879B6

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

Page:	_of
Reviewer:	MG
2nd Reviewer:	h

METHOD: Inorganics, Method See cover

10-11-13

The correlation coefficient (r) for the calibration of Cr VI was recalculated. Calibration date: 41-10-13

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

			Conc	Arcan	Recalculated	Reported	
Type of Analysis	Analyte	Standard ID	Found (units)	True (units)	r or %R	r or %R	Acceptable (Y/N)
Initial calibration		Blank	0.000 (mg/2	0.001			
		Standard 1	0.002 (   )	0.003			
		Standard 2	0.005 ()	0.005			
	Cr VI	Standard 3	0.025 ()	0.020		K2 0 00000	
		Standard 4	0.050 ()	0.039	r <sup>2</sup> =0.999898	• =0.999995	Y
		Standard 5	0.100 (])	0.078			1
		Standard 6	~	-			
		Standard 7	-	-			
Calibration verification		8842					
	C104	CCVI	10.393 (mg/L)	10.000 (mg/L)	104	104	
Calibration verification		3930		(			
	Cr VI	CCVI	0.0512 (mg/L)	0.050 (mg/L)	102	102	$\downarrow$
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.

#### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page:\_\_\_of\_\_\_ Reviewer:\_\_\_MG\_ 2nd Reviewer:\_\_A\_\_\_

METHOD: Inorganics, Method See cover

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

 %R = Found
 x 100
 Where,
 Found =
 concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation,

 True
 Found =
 SSR (spiked sample result) - SR (sample result).

 True = concentration of each analyte in the source.
 True = concentration of each analyte in the source.

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

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

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	%R / RPD	%R / RPD	Acceptable (Y/N)
0101 1900	Laboratory control sample						
LCS		C104	10.652 (mg/L)	10.000 (mg/L)	107	107	Y
2.820	Matrix spike sample		(SSR-SR)				
18		Cu VI	0.05211 (mg/L)	0.052632 <sup>(mg</sup> /L)	99.0	99.0	
0114/0156	Duplicate sample			_			
17		C104	ND (mg/L)	ND (mg/L)	Ø	-	

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.

TOTCLC.6

LDC #	<u>30879</u> B6	VALIDATION FINDINGS W Sample Calculation Ve	ORKSHEET	Pag Reviev 2nd reviev	ge:of ver:M_G ver:
метн	OD: Inorganics, Metho	d see cover			
Please Y)N Y)N Y)N	e see qualifications belo <u>N/A</u> Have results <u>N/A</u> Are results w <u>N/A</u> Are all detect	ow for all questions answered "N". Not ap been reported and calculated correctly? ithin the calibrated range of the instrume ion limits below the CRQL?	plicable questions an nts?	e identified as "N//	<b>A</b> ".
Comp recalc	ound (analyte) results f ulated and verified using	or <u># 3, Cr VI</u> g the following equation:	repo	orted with a positiv	e detect were
Concen	tration =	Recalculation:			
act	ar = 1.306	Cr VI= 1.306 x (0	.002 - 0.001	)	
dil:	= 1x	= 0.00131	mg / _		
#	Sample ID	Analyte	Reported Concentration (Mg / L)	Calculated Concentration ( <sup>M</sup> g / ட)	Acceptable (Y/N)
	3	Cr VI	0.0017	0.0013	Ý
			(Mg/L)	(mg/L)	
2	U)	СІОч	9.7	10.0	
	11 1.1 20	sing many significant for	sures than a	licolourd .	n saudo

-----

and a second second

(i) A driven strategy and strategy and strategy and strategy and strategy are strategy and the strategy and strategy an



December 11, 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 November 25, 2013. Attachment 1 is a summary of the samples that were reviewed for each analysis.

## LDC Project # 30905:

SDG #	<u>Fraction</u>
13-23307 13-23375	Volatiles, Total Recoverable 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

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

Sincerely,

Pei Geng Project Manager/Senior Chemist

	HC												A	tach	men	t 1																			
	90/10 (client sele	ct)						LDO	\$#.	309	05	(Ba	ttel	le-S	San	Die	ego	) / N	IAS	A J	PL	)							=						
LDC	SDG#	DATE REC'D	(3) DATE DUE	V( (52	DA 4.2)	C (20	r 0.8)	Cr( (71	VI) 96)	CL (314	.O₄ 4.0)												_		r										
Matrix	Water/Soil	<u> </u>		w	s	w	s	w	S	w	S	w	s	w	s	W	s	w	S	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s
A	13-23307	11/25/13	12/18/13	15	0	15	0	15	0	18	0	<u> </u>																							
A	13-23307	11/25/13	12/18/13		0		0.	診園	Ō.		0										<b> </b>														
В	13-23375	11/25/13	12/18/13	12	0	12	0	12	0	12	0		ļ																ļ						
В	13-23375	11/25/13	12/18/13		0	國建	0		0	21	0																								
			<u> </u>																																
		_			<b> </b>																		<b>_</b>												
	· · · · ·																																		
		_																																	
																														:					
																														_					
																		11																	
					-																														
Total	T/PG			29	0	29	0	29	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	119
	·									-																									

#### LDC Report# 30905A1

## Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NASA JI	ct/Site Name: NASA	JPL
----------------------------	--------------------	-----

Collection Date: October 25, 2013

LDC Report Date: December 10, 2013

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23307

#### Sample Identification

TB-5-10/25/13 SB-5-10/25/13 EB-5-10/25/13 MW-25-5 MW-25-4 MW-25-3 MW-25-2\*\* DUPE-4-4Q13 MW-25-1 MW-21-5 MW-21-4 MW-21-3 MW-21-2 MW-21-1 **MW-21-2MS** MW-21-2MSD

\*\*Indicates sample underwent EPA Level IV review

1

#### 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 with the following exceptions:

Date	Compound	%RSD	Associated Samples	Flag	A or P
10/17/13	Pentachloroethane	29.54078	All samples in SDG 13-23307	J (all detects) UJ (all non-detects)	Р

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.

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

Date	Compound	%D	Associated Samples	Flag	A or P
10/17/13	Pentachloroethane	80.5	All samples in SDG 13-23307	J (all detects) UJ (all non-detects)	Ρ

### V. Blanks

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

#### VI. Surrogate Spikes

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

#### VII. Matrix Spike/Matrix Spike Duplicates

Although matrix spike (MS) and matrix spike duplicate (MSD) samples were not required by the method, MS and MSD samples were reported by the laboratory. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
MW-21-2MS/MSD (MW-21-2)	1,4-Dichlorobenzene	-	-	28.7 (≤20)	J (all detects)	A

#### VIII. Laboratory Control Samples (LCS)

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

#### IX. 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

All compound quantitations 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-25-2<sup>\*\*</sup> and DUPE-4-4Q13 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentr		
Compound	MW-25-2**	DUPE-4-4Q13	RPD
Chloroform	0.14	0.19	19
Trichloroethene	0.20	0.20	0

#### XVII. Field Blanks

Sample TB-5-10/25/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-5-10/25/13 was identified as an equipment blank. No volatile contaminants were found.

Sample SB-5-10/25/13 was identified as a source blank. No volatile contaminants were found.

## NASA JPL Volatiles - Data Qualification Summary - SDG 13-23307

SDG	Sample	Compound	Flag	A or P	Reason
13-23307	TB-5-10/25/13 SB-5-10/25/13 EB-5-10/25/13 MW-25-5 MW-25-4 MW-25-3 MW-25-2** DUPE-4-4Q13 MW-25-1 MW-21-5 MW-21-5 MW-21-3 MW-21-2 MW-21-1	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Initial calibration (%RSD)
13-23307	TB-5-10/25/13 SB-5-10/25/13 EB-5-10/25/13 MW-25-5 MW-25-4 MW-25-3 MW-25-2** DUPE-4-4Q13 MW-25-1 MW-21-5 MW-21-5 MW-21-3 MW-21-2 MW-21-1	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)
13-23307	MW-21-2	1,4-Dichlorobenzene	J (all detects)	A	Matrix spike/Matrix spike duplicate (RPD)

## NASA JPL

## Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-23307

No Sample Data Qualified in this SDG

LDC #: 30905A1	VALIDATION COMPLETENESS WORKSHEET
SDG #: <u>13-23307</u>	
Laboratory: BC Laboratori	es, Inc

Date: 12/4//3 Page: 1 of 1 Reviewer: 17 2nd Reviewer: 17

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	Δ	Sampling dates: 10 25 13
11.	GC/MS Instrument performance check	Δ	
Ш.	Initial calibration	sus	% PSD = 20, 12
IV.	Continuing calibration/ICV	১৯	$ w  \leq w \leq 30$
V.	Blanks	$\bigtriangleup$	
VI.	Surrogate spikes	4	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	ics
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	$\bigtriangleup$	
XI.	Target compound identification	5	Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	5	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	Δ	Not reviewed for Level III validation.
XIV.	System performance	Δ	Not reviewed for Level III validation.
XV.	Overall assessment of data	4	
XVI.	Field duplicates	sW	D = 7, B
XVII.	Field blanks	ND	TB=1 SB=2 EB=3

Note:

A = Acceptable N = Not provided/applicable SW = See worksheet ND = No compounds detected

R = Rinsate FB = Field blank D = Duplicate TB = Trip blank EB = Equipment blank

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

¥							
1	TB-5-10/25/13	11	MVV-21-4	21	BWJ2114	31	
2	-5-10/25/13 SB-5/10/25/13 FT	12	MW-21-3	22		32	
- 3	EB-5-10/25/13	13	MW-21-2	23	· · · · · · · · · · · · · · · · · · ·	33	
4	MW-25-5	14	MW-21-1	24		34	
5	MW-25-4	15	MW-21-2MS	25		35	
6	MW-25-3	16	MW-21-2MSD	26		36	
7	MVV-25-2** 0	17		27		37	
8	DUPE-4-4Q13 0	18		28		38	
9	MVV-25-1	19		29		39	
10	MW-21-5	20		30		40	

## Method: Volatiles (EPA Method 524.2)

Validation Area	Yes	No	NA	Findings/Comments
II Technical holding times				
All technical holding times were met.	/	ſ		
Cooler temperature criteria was met.				
II. GC/MS Instrument performance check	1 1			
Were the BFB performance results reviewed and found to be within the specified criteria?	/	-		
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration	anta i			
Did the laboratory perform a 5 point calibration prior to sample analysis?	/	<u> </u>		
Were all percent relative standard deviations (%RSD) < 20%?	SINS TOOL		24400075	
IV: Continuing calibration				and the second of the same of the second statement of
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	/	-		
Were all percent differences (%D) <u>&lt;</u> 30%?				
V. Blanks		r F		
Was a method blank associated with every sample in this SDG?	$\leq$			
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?	$\square$			
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?		/	-	an an an an an tao an
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	$\leq$			
Was an LCS analyzed per analytical batch?	$ \leq $			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				

¥

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?	Contraction of the last	C.D. Martines		
X. Internal standards			i i i i i i i i i i i i i i i i i i i	
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 <u>+</u> 0.06 RRT units of the standard?	$\sim$			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	_			
Were chromatogram peaks verified and accounted for?				
XII. Compound quantitation/RLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	/			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 25 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			/	
Were relative intensities of the major ions within <u>+</u> 20% between the sample and the reference spectra?			/	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?			/	/
XIV. System performance				
System performance was found to be acceptable.				
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	1			
XVI. Field duplicates		CF 103		
Field duplicate pairs were identified in this SDG.	/	1		
Target compounds were detected in the field duplicates.	_			
XVII. Field blanks				
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.		/		

## TARGET COMPOUND WORKSHEET

#### METHOD: VOA

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. lodomethane	
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.1,1-Difluoroethane	
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP. Pentachloroethane	
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	aqaa Methy Methacry late	
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	ТТТТ.	
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	vvvv.	

LDC #: 30905A)

## VALIDATION FINDINGS WORKSHEET Initial Calibration

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

#### METHOD: GC/MS VOA (EPA Method 524.2)

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

<u>VN N/A</u> Did the laboratory perform a 5 point calibration prior to sample analysis?

Y N N/A

Were all percent relative standard deviations (%RSD)  $\leq$  20% ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: <u>&lt;</u> 20.0%)	Associated Samples	Qualifications
	10/17/13	ICAL MS-V5	PPPP	29.54078	all	g/ w/L
<b> </b>			· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	
<b> </b>						
┣					·····	
					· · · · · · · · · · · · · · · · · · ·	
			· · · · · · · · · · · · · · · · · · ·			
		· · · · · · · · · · · · · · · · · · ·				
<b>  </b>		· · · · · · · · · · · · · · · · · · ·				
<b> </b>						
<b> </b>	<u> </u>					
╟───						
		· <u></u>				
		······································				
		······································	<u> </u>	· · · · · · · · · · · · · · · · · · ·		

LDC #: 30905A1

#### VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page:		/
Reviewer:_	FT	
2nd Reviewer:_	R	

#### 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".N/AWas a continuing calibration standard analyzed at least once every 12 hours for each instrument?YN/AWere all percent differences (%D)  $\leq$  30% ?

#	Date	Standard ID	Compound	Finding %D (Limit: <u>&lt;</u> 30.0%)	Associated Samples	Qualifications
	10/17/12	1CV2 MS-V5	PPPP	80,5	ail	SILVIL
						······
					······································	
	· · · · · · · · · · · · · · · · · · ·					
<b> </b>		·····	······································			
		· · · · · · · · · · · · · · · · · · ·		·		
	······································					
	· · · · · · · · · · · · · · · · · · ·					
			·······			
<b> </b>	<u> </u>			······	· · · · · · · · · · · · · · · · · · ·	
<b> </b>					·	
<b> </b>						
			· · · · · · · · · · · · · · · · · · ·			
			• · · · · · · · · · · · · · · · · · · ·			
		······································				

LDC #: 30905 A

M/A N

## VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

	_
FT	
~	
	of FT

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".

YÍN N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water. N/A

Was a MS/MSD analyzed every 20 samples of each matrix?

Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		15 + 16	ННН	( )	( )	28.7 (20)	13	J/A dut
				( )	( )	( )		
				( )	( )	()		
				()	()	( )		
				()	()	()		
				( )	( )	()		
				()	( )	()		· · · · · · · · · · · · · · · · · · ·
∥		<u></u>		()	()	()		
				()	()	()		
				()	()	()		
┣──┼──		·		()	()	()		
┝┷┷				()	( )	()		
				()	()	()		
				( )	()	()		
				( )	()	()		
				( )	( )	()		
				( )	( )	()	· · · · · · · · · · · · · · · · · · ·	
				( )	( )	( )		
		····		( )	( )	( )		
		· · · · · · · · · · · · · · · · · · ·		( )	( )	( )		· · · · · · · · · · · · · · · · · · ·
	_			( )	( )	( )	· · · · · · · · · · · · · · · · · · ·	
				( )	( )	( )		
				( )	( )	( )		
				()	( )	()		
				( )	( )	( )		

## VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_		
Reviewer:	FT	
2nd reviewer:	l	
	Γ	

#### METHOD: GC/MS VOA (EPA Method 524.2)

Y N N/A Y N N/A

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

	Concentratio	n(ng l)	
Compound	7	8	RPD
K	0.14	0.17	19
S	0.20	0.20	J

	Concentratio	n ()	
Compound			RPD
		·	

	Concentratio	n ()	
Compound			RPD
			· · · · · · · · · · · · · · · · · · ·
		· · · · · · · · · · · · · · · · · · ·	

#### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification



METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X)

Where:

Ax = Area of compound

Cx = Concentration of compound

S = Standard deviation of the RRFs

X = Mean of the RRFs

Ais = Area of associated internal standard

Cis = Concentration of internal Standard

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration				AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound	(RRF 10 std)	(RRF 10 std)	(Initial)	(Initial)		
	ICAL	10/17/2013	C (IS 1)	0.446210	0.446210	0.4403805	0.4403805	5.759154	5.759154
	MS-V5		S (IS 2)	0.353115	0.353115	0.3462535	0.3462535	7.483333	7.483333
			EE (IS 3)	1.854653	1.854653	1.8783910	1.8783910	13.16845	13.16845

LDC #: 30905 A/

#### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification



METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X) Where:

Ax = Area of compound

Cx = Concentration of compound

S = Standard deviation of the RRFs

X = Mean of the RRFs

Ais = Area of associated internal standard

Cis = Concentration of internal Standard

	And			Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration				AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound	(RRF 160/40/8 std)	(RRF 160/40/8 std)	(Initial)	(Initial)		
	ICAL	10/17/2013	F (IS 1)	0.0252902	0.0252902	0.0247595	0.0247595	3.379941	3.379941
	MS-V5		QQQQ (IS 2)	0.0692452	0.0692452	0.0665553	0.0665553	5.630492	5.630492
			PPPP (IS 3)	0.1220467	0.1220467	0.1793848	0.1793848	29.54078	29.54078

LDC#: 30905A)

#### VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification



#### METHOD: GC/MS VOA (EPA Method 524.2)

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

% Difference = 100 \* (ave. RRF - RRF)/ave. RRF RRF =  $(A_x)(C_{is})/(A_{is})(C_x)$ 

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

 $A_x$  = Area of compound,  $C_x$  = Concentration of compound,  $A_{is}$  = Area of associated internal standard  $C_{is}$  = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	%D	%D
_1	1314511	10/28/13	C (1st Internal Standard)	0.4403805	0.459 0449	0.4590449	4.2	4-2
	CW3		5 (2nd Internal Standard)	0, 3462535	0.3477343	0.3477343	0.4	0,4
			EE (3rd Internal Standard)	1.878 3910	1.702.852	1.702852	9,3	9-3
2	1314511		F (1st Internal Standard)	0.0247595	0.0224996	0.0224996	9,1	9.
	CCVY		<b>ሲዪዪዪ</b> (2nd Internal Standard)	0.0665553	0.06722555	0.06727555	1.0	J·O
			(3rd Internal Standard)	0.1793848	0.2155658	0.2155658	20.2	20.2
3			(1st Internal Standard)					
			(2nd Internal Standard)				_	
			(3rd Internal Standard)					
4			(1st Internal Standard)					
			(2nd Internal Standard)					
			(3rd Internal Standard)					

Comments: <u>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.</u>

LDC #: 30905 A/

#### VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page: \_\_\_\_of \_\_\_\_ Reviewer: \_\_\_\_FT 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

Sample ID: #7

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8	10.0	9-2900	92.9	92.9	υ
Bromofluorobenzene	)	10.860	109	109	1
1,2-Dichlorobenzene-d4	J	9.8200	98.2	98.2	
Dibromofluoromethane					

#### Sample ID:\_\_\_\_\_

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

#### Sample ID:\_\_\_\_\_

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

#### Sample ID:

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

## VALIDATION FINDINGS WORKSHEET <u>Matrix Spike/Matrix Spike Duplicates Results Verification</u>



#### 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

Where: SSC = Spiked sample concentration SA = Spike added SC = Sample concentration

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

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD sample: \_\_\_\_ 15 \_4 \_16

Compound	ς Α (ι	bpike dded (g/L)	Sample Concentration ( ug /L)	Spiked S Concent	Sample tration /L)	Matrix Percent F	<u>Spike</u> Recovery	Matrix Spike Percent R	<u>Duplicate</u>	Ms	S/MSD
	MS	MSD			MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Benzene	25.0	25,0	ND	25.050	25.450	100	100	102	102	1.58	1.58
Chlorobenzene				26.570	25.370	106	106	101	101	4.62	4.62
1,1-Dichloroethene				24.650	26.010	98.6	98.6	104	104	5.37	5.37
Toluene				24.510	25.980	980	98.0	104	104	5.82	5-82
Trichloroethene			1,0.290	26.420	26.460	105	105	105	105	0.15)	0.151

#### 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#: 30905A/

## VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification



#### METHOD: GC/MS VOA (EPA Method 524.2)

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

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

RPD = I LCSC - LCSDC I \* 2/(LCSC + LCSDC)

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: \_\_\_\_\_ BW J2116- BS

	S	pike	Spiked Sample		1 <u>CS</u>					
Compound	Ас ( И	ided 9x11	Concentration		Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	) LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	75.0	NA	24.760	NA	98.8	98.8		. 1		
Trichloroethene			27.250		109	109				
Benzene			24.390		97.6	97.6				
Toluene			24.650		98.6	918.6				
Chlorobenzene			24.710		98.8	78.8	NA			

Comments: <u>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.</u>

#### VALIDATION FINDINGS WORKSHEET Sample Calculation Verification



## METHOD: GC/MS VOA (EPA Method 524.2)

	N	<u>N/A</u>
$\nabla$	Ν	N/A

I/AWere all reported results recalculated and verified for all level IV samples?I/AWere all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

=

Sample I.D. # 7 K :

0.14 ug/L

Concer	itration	$= \frac{(A_{*})(I_{*})(DF)}{(A_{**})(RRF)(V_{*})(WS)}$
A <sub>x</sub>	=	Area of the characteristic ion (EICP) for the compound to be measured
A <sub>is</sub>	=	Area of the characteristic ion (EICP) for the specific internal standard
l <sub>s</sub>	=	Amount of internal standard added in nanograms (ng)
RRF	=	Relative response factor of the calibration standard.
V₀	=	Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification
	• • • • • • • • • • • • • • • • • • •	· · · · · · · · · · · · · · · · · · ·	<u> </u>		
			· · · · · ·		
			· · · · · ·		
		-			
			· · · · · · · · · · · · · · · · · · ·		
			· · · · · · · · · · · · · · · · · · ·		·

## Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
Collection Date:	October 25, 2013
LDC Report Date:	December 5, 2013
Matrix:	Water
Parameters:	Total Recoverable Chromium
Validation Level:	EPA Level III & IV
Laboratory:	BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23307

#### Sample Identification

SB-5/10/25/13 EB-5-10/25/13 MW-25-5 MW-25-4 MW-25-3 MW-25-2\*\* DUPE-4-4Q13 MW-25-1 MW-21-5 MW-21-4 MW-21-3 MW-21-2 MW-21-1 MW-21-2MS MW-21-2MSD MW-21-2DUP

\*\*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 200.8 for Total Recoverable 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 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)	Chromium	1.416 ug/L	DUPE-4-4Q13 MW-25-1 MW-21-5 MW-21-4 MW-21-3 MW-21-2 MW-21-2

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
DUPE-4-4Q13	Chromium	3.7 ug/L	3.7U ug/L
MW-25-1	Chromium	2.3 ug/L	2.3U ug/L
MW-21-5	Chromium	2.3 ug/L	2.3U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-21-4	Chromium	1.9 ug/L	1.9U ug/L
MW-21-3	Chromium	2.0 ug/L	2.0U ug/L
MW-21-2	Chromium	1.3 ug/L	1.3U ug/L
MW-21-1	Chromium	3.9 ug/L	3.9U ug/L

### V. ICP Interference Check Sample (ICS) Analysis

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

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

	Concenti			
Analyte	MW-25-2**	DUPE-4-4Q13	RPD	
Chromium	2.5	3.7	39	

### XV. Field Blanks

Sample EB-5-10/25/13 was identified as an equipment blank. No chromium was found.

Sample SB-5/10/25/13 was identified as a source blank. No chromium was found.

# NASA JPL Total Recoverable Chromium - Data Qualification Summary - SDG 13-23307

No Sample Data Qualified in this SDG

## NASA JPL Total Recoverable Chromium - Laboratory Blank Data Qualification Summary - SDG 13-23307

SDG	Sample	Analyte	Modified Final Concentration	A or P
13-23307	DUPE-4-4Q13	Chromium	3.7U ug/L	A
13-23307	MW-25-1	Chromium	2.3U ug/L	A
13-23307	MW-21-5	Chromium	2.3U ug/L	A
13-23307	MW-21-4	Chromium	1.9U ug/L	A
13-23307	MW-21-3	Chromium	2.0U ug/L	A
13-23307	MW-21-2	Chromium	1.3U ug/L	A
13-23307	MVV-21-1	Chromium	3.9U ug/L	A

LDC #: <u>30905A4</u>	VALIDATION COMPLETENESS WORKSHEET	Date: 12-5-13
SDG #: <u>13-23307</u>	Level III/IV	Page: / of (
Laboratory: BC Laboratories	s, Inc	Reviewer: MG

Reviewer: <u>MG</u> 2nd Reviewer:

METHOD: Total Recoverable Chromium (EPA Method 200.8)

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

	Validation Area		Comments
Ι.	Technical holding times	Ą	Sampling dates: 10 - 25 - 13
١١.	ICP/MS Tune	A	
Ш.	Calibration	A	
Í۷.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	A	MS/MJD (SDG 13-23218)
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	_ A	not reviewed for level 111
Х.	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not performed
XII.	Sample Result Verification	_A	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	D=6+7
xv	Field Blanks	ND	SB = I 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

2.4.1							
1 I	SB-5/10/25/13	11	MVV-21-3	21		31	
271	EB-5-10/25/13	12	MW-21-2	22		32	
31	MVV-25-5	13	MW-21-1	23	a contrata a contrata	33	
4 I	MVV-25-4	14	MW-21-2MS	24		34	
5 l	MW-25-3	15	MW-21-2MSD	25		35	
<sub>6</sub>	MW-25-2**	16	MW-21-2DUP	26		36	
7	DUPE-4-4Q13	17		27		37	
8,	MW-25-1	18		28		38	
9	MVV-21-5	19		29	PBWI	39	
10	MW-21-4	20		30 d	PBWZ	40	

Notes:\_

LDC #: 30905A4

#### VALIDATION FINDINGS CHECKLIST

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

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

Validation Area		No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	$\checkmark$			
Cooler temperature criteria was met.	1			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	1	 		
Were %RSD of isotopes in the tuning solution ≤5%?	$\checkmark$			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	1			
Were the proper number of standards used?				
Were all initial and continuing calibration verification %Rs within the 90-110% (80- 120% for mercury) QC limits?	/			
Were all initial calibration correlation coefficients 2.995?				
IV. Blanks				
Was a method blank associated with every sample in this SDG?	$\checkmark$			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?		/		
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.	1			
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq$ 20% for waters and $\leq$ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were $\leq$ 5X the RL, including when only one of the duplicate sample values were $\leq$ 5X the RL.	⁄			
VII. Laboratory control samples	·			
Was an LCS anaylzed for this SDG?	$\checkmark$			
Was an LCS analyzed per extraction batch?	$\checkmark$			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	$\checkmark$			

الارار المتركي يتمارك المعطي تتروي ويتحدث تتروي والمتين

LDC #:\_\_\_\_

.....

#### VALIDATION FINDINGS CHECKLIST

Page:	<u>2 of 2</u>
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?			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		<u></u>				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		1				
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?			$\checkmark$			
XI. Regional Quality Assurance and Quality Control						
Were performance evaluation (PE) samples performed?	_	$\checkmark$				
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?	$\checkmark$					
XIII. Overall assessment of data						
Overall assessment of data was found to be acceptable.	$\checkmark$		·			
XIV. Field duplicates						
Field duplicate pairs were identified in this SDG.	$\checkmark$					
Target analytes were detected in the field duplicates.						
XV. Field blanks						
Field blanks were identified in this SDG.						
Target analytes were detected in the field blanks.		$\checkmark$				

LDC #: 30905A4

SDG #: See Cover

# METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

Sample Concentration units, unless otherwise noted: ug/

#### VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES

of
MG
1-

20/7000)	Soil preparation factor applied: <u>NA</u>
<u>/L</u>	Associated Samples: 7-13

Analyte	Maximum PB <sup>ª</sup> (mg/Kg)	Maximum PBª (ug/L)	Maximum ICB/CCB <sup>a</sup> (ug/L)	Action Limit	7	8	9	10	11	12	13		
Cr		1.416		7.08	3.7	2.3	2.3	1.9	2.0	1.3	3.9		

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC#:<u>30905A4</u>

### VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	l_of_(
Reviewer:	MG
2nd Reviewer:	12

METHOD: Metals (EPA Method 6010B/7000)

<u>ON NA</u> <u>ON NA</u>

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

	Concentra			
Analyte	6	7	RPD	
Chromium	2.5	3.7	39	:

V:\FIELD DUPLICATES\FD\_inorganic\30905A4.WPD

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



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 <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)						
1311 ICV	ICP/MS (Initial calibration)	Cr	52.321	50.000	105	105	Ý
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1910 CCV8	ICP/MS (Continuing calibration)	Cr	39.964	40.000	99.9	99.9	
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

an an a' dharailtean a geo

Comments: <u>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.</u>

CALCLC.4SW

1. 1.4



#### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

	Page:	1	_of_	$\bot$
	Reviewer:		M	5
2nd	Reviewer:		$\mathbf{i}$	_

144

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).

 True
 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 100Where,S = Original sample concentration(S+D)/2D = Duplicate sample concentration

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

 $%D = ||-SDR| \times 100$ 

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

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
	ICP interference check				·	_	-
1840 LCS	Laboratory control sample	Cr	39.040 (mg/L)	40.000 (mg/L)	97.6	97.6	Ý
1856 MW-84-1 MS	Matrix spike	Cr	(SSR-SR) 36.062 (Mg/L)	40.000 (mg/L)	90.2	90.2	
1846/1849 MW-24-1 DUP	Duplicate	Cr	9.940 (mg/L)	10.098 (Mg/L)	1.58	1.58	
	ICP serial dilution	-	-			_	

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.

TOTCLC.4SW

LDC #	309	05A4

#### VALIDATION FINDINGS WORKSHEET **Sample Calculation Verification**

Page:_	of_[
Reviewer:	MĠ
2nd reviewer:	-n

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

Please see qua	lifications below for all questions answered "N". Not applicable questions are identified as "N/A".
(Y) N N/A	Have results been reported and calculated correctly?
<u>QN N/A</u>	Are results within the calibrated range of the instruments and within the linear range of the ICP?
<u>(Ý) N N/A</u>	Are all detection limits below the CRDL?

Detected analyte results for	#6,	Cr	were recalculated and verified using the following
equation:			

(RD)(FV)(Dil) (In. Vol.) Concentration = RD = Ξ

ſŕ

Recalculation:

Raw data concentration FV In. Vol. Final volume (ml) Initial volume (ml) or weight (G) = Dil Ξ Dilution factor

(2.506 Mg/L)(0.050L) = 2.506 Mg/L 0.050L

energies and the states and the second states and the

#	Sample ID	Analyte	Reported Concentration (パリーム)	Calculated Concentration ( <sup>M</sup> 9/L)	Acceptable (Y/N)
1	6	Cr	2.5	2.5	Ý
		······································			
		· · · · · · · · · · · · · · · · · · ·	···· =		
					· · · · · · · · · · · · · · · · · · ·
<u> </u>					

Note:

# Laboratory Data Consultants, Inc. Data Validation Report

Water

Project/Site Name:
--------------------

Collection Date: October 25, 2013

LDC Report Date: December 6, 2013

Matrix:

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23307

### Sample Identification

SB-5/10/25/13	MW-21-2MSD
EB-5-10/25/13	MW-21-2DUP
MW-25-5	
MW-25-4	
MW-25-3	
MW-25-2**	
DUPE-4-4Q13	
MW-25-1	
MW-21-5	
MW-21-4	
MW-21-3	
MW-21-2	
MW-21-1	
SB-5/10/25/13MS	
SB-5/10/25/13MSD	
SB-5/10/25/13DUP	
MW-25-2MS	
MW-25-2MSD	
MW-25-2DUP	
MW-21-2MS	

\*\*Indicates sample underwent EPA Level IV review

#### 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.

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) samples 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-25-2\*\* and DUPE-4-4Q13 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce		
Analyte	MW-25-2**	RPD	
Perchlorate	15 ug/L	16 ug/L	6
Hexavalent Chromium	0.0011 mg/L	0.0011 mg/L	0

#### XI. Field Blanks

Sample EB-5-10/25/13 was identified as an equipment blank. No contaminant concentrations were found.

Sample SB-5/10/25/13was identified as a source blank. No contaminant concentrations were found.

### NASA JPL Wet Chemistry - Data Qualification Summary - SDG 13-23307

No Sample Data Qualified in this SDG

NASA JPL

Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 13-23307

No Sample Data Qualified in this SDG

LDC #:	30905A6	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	13-23307	Level III/IV
Laborato	ry BC Laboratories	nc

Date: <u>12-5</u> -13
Page:of
Reviewer: MG_
2nd Reviewer:

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

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: 10 - 25-13
	Initial calibration	A	
111.	Calibration verification	A	
IV	Blanks	A	
v	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	Not reviewed for Level III validation.
IX.	Overall assessment of data	A	
Х.	Field duplicates	SW	D=6+7
XI	Field blanks	ND	SB=1 EB=2

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

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

		1				1	
1	SB-5/10/25/13	11	MW-21-3	21	MW-21-2MSD	31	
2	EB-5-10/25/13	12	MW-21-2	22	MW-21-2DUP	32	
3	MW-25-5	13	MW-21-1	23		33	
4	MW-25-4	14	SB-5/10/25/13MS	24		34	
5	MW-25-3	15	SB-5/10/25/13MSD	25		35	
6	MW-25-2**	16	SB-5/10/25/13DUP	26		36	
7	DUPE-4-4Q13	17	MW-25-2MS	27		37	
8	MW-25-1	18	MW-25-2MSD	28		38	
9	MW-21-5	,19	MW-25-2DUP	29		39	PBWI
10	MW-21-4	20	MW-21-2MS	30		40	PBW2

Notes:

Note:

3

ŝ

-

LDC #: 30905A6

ñ

# Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	1			
Cooler temperature criteria was met.	1			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	1			
Were the proper number of standards used?	V			·
Were all initial calibration correlation coefficients > 0.995?	1			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	V			
Were titrant checks performed as required? (Level IV only)			$\checkmark$	
Were balance checks performed as required? (Level IV only)				
III. Blanks				
Was a method blank associated with every sample in this SDG?	$\checkmark$			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		$\checkmark$		
IV. Matrix spike/Matrix spike duplicates and Duplicates	_			
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	$\checkmark$			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.				
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 < 5X the CRDL.				
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	$\checkmark$			
Was an LCS analyzed per extraction batch?	$\checkmark$			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?				
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		$\checkmark$		
Were the performance evaluation (PE) samples within the acceptance limits?				

A server of the lange compared to the experiments

.....

Antiparties

المراجع والمرام فالمراجع والمراجع والمراجع والمراجع

. . . . . . . . . . . . . .

11 Sec. 1

#### **VALIDATION FINDINGS CHECKLIST**

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

See Aller

a la la la construction de la construction de

4.5

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

4

والمعار فالإفاطية بموسور ورقار والمورد ال

LDC #: 30905A6

## VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

-----

Sample ID	Matrix	Parameter
$1 \rightarrow 13$	W	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $(CR^{6+})CO_4$
QC 14→16		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $(CR^6)$ ClO <sub>4</sub>
17> 19		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ $CO_4$
• 20→22		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $(CR^{\circ})$ $(CO_{2})$
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
ļļ		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CLF NO, NO, SO, PO, ALK CN NH, TKN TOC CR6+ CIO,

Comments:\_\_\_

### LDC#<u>30905A6</u>

### VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:		
Reviewer:	MG	
2nd Reviewer:		/

Inorganics: Method See Cover

	Concentra			
Analyte	6	7	RPD	
Perchlorate (ug/L)	15	16	6	
Hexavalent Chromium	0.0011	0.0011	0	

V:\FIELD DUPLICATES\FD\_inorganic\30905A6.WPD

LDC #: 30905A6

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

Page:_	l of [
Reviewer:	MG
2nd Reviewer:	$\overline{V}$

METHOD: Inorganics, Method \_\_\_\_\_\_

The correlation coefficient (r) for the calibration of CIOu was recalculated. Calibration date: 11-5-13

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 measured in the analysis of the ICV or CCV solution

 True
 True = concentration of each analyte in the ICV or CCV source

			Conc.	Area	Recalculated	Reported	Acceptable	
Type of Analysis	Analyte	Standard ID	Found (units)	True (units)	r or %R	r or %R	(Y/N)	
Initial calibration		Blank		~				
		Standard 1	2.0 (Mg/L)	0.0021				
		Standard 2	4.0 ( )	0.0043				
		Standard 3	6.0 ()	0.0070				
	Cloy	Standard 4	10.0 ( )	0.0117	V2=0.997516	<sup>VD</sup> =0.997786	$\checkmark$	
		Standard 5	20.0 ()	0.0218			1	
		Standard 6		-				
·	i	Standard 7	_					
Calibration verification		2226	(m, l)	(mal)				
	CrvI	CCV2	0.0508 (mg/L)	0.050 ("g/L)	102	102		
Calibration verification		1306						
	Cloy	ICV	10.776 (mg/L)	10.000 (mg/L)	108	108	$\downarrow$	
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.

server a set of the server of the server of the

CALCLC.6

and the second secon

LDC #: 30905A6

#### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet



METHOD: Inorganics, Method See cover

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

%R = Found x 100 Where, True 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 = <u> S-D </u> x 100	Where,	S =	Original sample concentration
(S+D)/2		D =	Duplicate sample concentration

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	%R / RPD	%R / RPD	Acceptable (Y/N)
2219	Laboratory control sample						
LCS		Cr VI	0,0501 (mg/L)	0.050 (mg/L)	100	100	Ý
1634	Matrix spike sample	······································	(SSR-SR)				
17		CIDY	10.922 ("9/2)	10.101 (mg/L)	108	108	
2219/2219	Duplicate sample			( . )			
16		CrvI	ND (mg/L)	ND (mg/L)	. 0	_	

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.

TOTCLC.6

METHOD: Inorganics, Method See cover Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". $\underline{CN}$ N/A Have results bleen reported and calculated correctly? $\underline{CN}$ N/A Are results within the calculated range of the instruments? $\underline{CN}$ N/A Are results within the calculated range of the instruments? $\underline{CN}$ N/A Are results within the calculated range of the instruments? $\underline{CN}$ N/A Are all detection limits below the CRQL? Compound (analyte) results for $\underline{\#C}$ , $\underline{C1O4}$ reported with a positive detect were recalculated and verified using the following equation: Concentration = $\underline{M} = A + b$ $\underline{O} \cdot O17 = O \cdot O011 (X) + O \cdot O000$ $\underline{M} = 0 \cdot 0011$ $b = 0 \cdot 0000$ $15 \cdot 455 \text{ Mg}/L = X$ $\underline{M} = \frac{Concentration}{(Mg/L_1)} \frac{Calculated}{(Mg/L_2)} \frac{Acceptable}{(Mg/L_2)} \frac{Acceptable}{(Mg/L_2)} \frac{(Mg/L_2)}{(Mg/L_2)} \frac{Acceptable}{(Mg/L_2)} \frac{Acceptable}{(Mg/L_2$	LDC #: 30905A6 VALIDATION FINDINGS WORKSHEET Pag Sample Calculation Verification Review 2nd review										
Plase see qualifications below for all questions answered "N". Not applicable questions are identified as "NA". $\frac{Q'N NA}{Q'N NA}$ Are results been reported and calculated correctly? $\frac{Q'N NA}{Q'N NA}$ Are results been reported and calculated correctly? $\frac{Q'N NA}{Q'N NA}$ Are results for $\pm G$ , $C104$ reported with a positive detect were recalculated and verified using the following equation: $\frac{Q'N NA}{Q'N NA}$ Are all detection limits below the CR0L? Compound (analyte) results for $\pm G$ , $C104$ reported with a positive detect were recalculated and verified using the following equation: $\frac{Q'N NA}{Q'N NA}$ Are all detection limits below the CR0L? Compound (analyte) results for $\pm G$ , $C104$ reported with a positive detect were recalculated and verified using the following equation: $\frac{Q'N NA}{Q'N NA}$ $\frac{Q'N NA}{Q'N NA}$	METH	IOD: Inorganics, Metho	d <u>See cover</u>								
Compound (analyte) results for <u>#6</u> <u>C104</u> reported with a positive detect were recalculated and verified using the following equation: Concentration = Recalculaton: y = mx + 6 $0.017 = 0.0011(x) + 0.0000where m = 0.0011$ $15.455$ Mg/L = X $x^{12} = 1X$ <b>Reported</b> Concentration (Kg /L) (ViN) 1 = 6 C104 $15$ $15$ Y (mg/L) ( $mg/L$ ) ( $mg/L$ ) (mg/L) ( $mg/L$ ) ( $mg/L$ ) (mg/L) ( $mg/L$ ) ( $mg/L$ ) (mg/L) $(mg/L)$ ( $mg/L$ ) (mg/L) $(mg/L)$ $(mg/L$	Pleas N N N	Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". $M$ N/AHave results been reported and calculated correctly? $M$ N/AAre results within the calibrated range of the instruments? $M$ N/AAre all detection limits below the CRQL?									
Concentration = Y = Mx + b M = 0.0011 b = 0.0000 d)(1 = 15.455 Mg/L = X f(Mg/L)	Comp recalc	ound (analyte) results f ulated and verified usin	for $\#6$ , $C1O4$ g the following equation:	repc	orted with a positiv	ve detect were					
#         Sample ID         Analyte         Reported Concentration (Mg/L)         Calculated Mg/L)         Acceptable (Mg/L)           I         6         C1Oy         15         15         Y           I         I         Image: Concentration (Mg/L)         Image: Concentration	Concer Y = n whe m = b = di(=	ntration = nx + 6 me = 0.0011 = 0.000 = 1x	Recalculation: 0.017=0.0011 (x 15.455 Mg/L	) +0.0000 = X							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	#	Sample ID	Analyte	Reported Concentration (M9/L)	Calculated Concentration (ルg / ட)	Acceptable (Y/N)					
		6	СІОЦ	15	15	Ý					
				(mg / L)	(mg (L)						
Image: Section of the section of th			Cr VI	0.0011	0.0013						
Image: series of the series											
Image: Section of the section of th											
Image: selection of the											
Image: Sector											
		······	· · · · · · · · · · · · · · · · · · ·		:						

#### LDC Report# 30905B1

# Laboratory Data Consultants, Inc. Data Validation Report

December 10, 2013

Project/Site Name: NASA JPL

Collection Date: October 28, 2013

LDC Report Date:

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23375

#### Sample Identification

TB-6-10/28/13 EB-6-10/28/13 MW-17-5 MW-17-4 MW-17-3 MW-17-2 MW-17-1 MW-18-5 MW-18-5 MW-18-4 MW-18-3\*\* MW-18-3MS MW-18-3MS MW-18-3MSD

\*\*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
10/30/13 (1314647-CCV2)	Pentachloroethane	127	TB-6-10/28/13 EB-6-10/28/13 MW-17-5 MW-17-4 MW-17-3 MW-17-2 MW-18-3** MW-18-3MS MW-18-3MSD BWJJ2329	J (all detects) UJ (all non-detects)	Ρ
10/30/13 (1314647-CCV5)	Pentachloroethane	74.5	MW-17-1 MW-18-5 MW-18-4 MW-18-2 1314647-CCB2	J (all detects) UJ (all non-detects)	Ρ

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

Date	Compound	%D	Associated Samples	Flag	A or P
10/29/13	Pentachloroethane	81.9	All samples in SDG 13-23375	J (all detects) UJ (all non-detects)	Р

### V. Blanks

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

#### VI. Surrogate Spikes

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

#### VII. Matrix Spike/Matrix Spike Duplicates

Although matrix spike (MS) and matrix spike duplicate (MSD) samples were not required by the method, MS and MSD samples were reported by the laboratory. 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

All compound quantitations 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-6-10/28/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-6-10/28/13was identified as an equipment blank. No volatile contaminants were found.

### NASA JPL Volatiles - Data Qualification Summary - SDG 13-23375

SDG	Sample	Compound	Flag	A or P	Reason
13-23375	TB-6-10/28/13 EB-6-10/28/13 MW-17-5 MW-17-4 MW-17-3 MW-17-2 MW-17-1 MW-18-5 MW-18-4 MW-18-3** MW-18-2	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (CCV %D)
13-23375	TB-6-10/28/13 EB-6-10/28/13 MW-17-5 MW-17-4 MW-17-3 MW-17-2 MW-17-1 MW-18-5 MW-18-4 MW-18-3** MW-18-2	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

## NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-23375

No Sample Data Qualified in this SDG

LDC #:_	30905B1	VALIDATION COMPLETENESS WORKSHEET	Date: 12/4/13
SDG #:_	13-23375		Page: / of /
Laborato	ory: <u>BC Laboratories,</u>	Inc	Reviewer: <u>F1</u>
			2nd Reviewer:

METHOD: GC/MS Volatiles (EPA Method 524.2)

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

	Validation Area		Comments
١.	Technical holding times	Δ	Sampling dates: 10 28 13
11.	GC/MS Instrument performance check	Δ	
111.	Initial calibration	ક્રપ્ન	FT % RGD 520, (2
IV.	Continuing calibration/ICV	SW	101/cw = 30
V.	Blanks	$\wedge$	
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	Â	LCS
IX.	Regional Quality Assurance and Quality Control	N	
<b>X</b> .	Internal standards		
XI.	Target compound identification	Δ	Not reviewed for Level III validation.
XII.	Compound quantitation/RL/LOQ/LODs	Δ	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	${\bf \Delta}$	Not reviewed for Level III validation.
XIV.	System performance	$\mathbf{\Sigma}$	Not reviewed for Level III validation.
XV.	Overall assessment of data	Δ	
XVI.	Field duplicates	N	
XVII.	Field blanks	ND	TB = I = B = Z

Note:

ND = No compounds detected

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

R = Rinsate FB = Field blank D = Duplicate TB = Trip blank EB = Equipment blank

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

1 1	TB-6-10/28/13	11 <b>2</b>	MW-18-2	21 <b>1</b>	BWJ2329	31
2 1	EB-6-10/28/13	12 1	MW-18-3MS	22 <b>2</b>	1314647- CCB2	32
<u>3</u>	MW-17-5	13 <b> </b>	MW-18-3MSD	23		33
4 1	MW-17-4	14		24		34
<u>5</u>	MW-17-3	15		25		35
<sub>6</sub> 1	MW-17-2	16		26		36
7 V	MW-17-1	17		27	······	37
82	MW-18-5	18		28		38
9 V	MVV-18-4	19		29		39
10	MW-18-3**	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?		10.7949.002	5-00-11-520-04	
1II. 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	•			and the second
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	/			
Were all percent differences (%D) < 30%?				
V. Blanks		a senten an		
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.		/		۰.
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	$\leq$			
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?	2.0012/014/02-0449		_	<u></u>
VII. Matrix spike/Matrix spike duplicates				
Was a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for this SDG?	$\leq$	· · ·		
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?	$\square$			
Was an LCS analyzed per analytical batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the OC limits?	/		/	

LDC #: 30905B)

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?	la Mattalana ang a	and the second secon		
X. Internal standards				
Were internal standard area counts within +/-40% from the associated calibration standard?	$\leq$	-		
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?	$\leq$			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?		_		
Were chromatogram peaks verified and accounted for?				
XII. Compound quantitation/RLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	/	-		
Were compound quantitation and RLs 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)?		<u></u>		
XIV. System performance				
System performance was found to be acceptable.				
XV. Overall assessment of data	er hieren. Selen			
Overall assessment of data was found to be acceptable.				
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.			1	
Target compounds were detected in the field duplicates.			/	
XVII Field blanks				
Field blanks were identified in this SDG.	/			
Target compounds were detected in the field blanks.				

## TARGET COMPOUND WORKSHEET

#### METHOD: VOA

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 ałcohol
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. lodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP. Perstachloroethane
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ Methyl Methacrylate
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	тттт.
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	VVVV.
LDC #: 309053)

### VALIDATION FINDINGS WORKSHEET Continuing Calibration

	/
FT	
A	
	_of FT

### 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/A Y N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? Y N/A/A Were all percent differences (%D) < 30% ?

#	Date	Standard ID	Compound	Finding %D (Limit: <u>&lt;</u> 30.0%)	Associated Samples	Qualifications
	10/29/13	1012 MS-45	PPPP	81.9	all	JUJ/AP
						F7
	10/30/13	1314647- CCV2	PPPP	127	BWJ2329,	J[N]/P
<b> </b>					1-1-10, 10, 12, 13	
<b> </b>			, 			
<b> </b>				·		
				<u>+</u>		
┣───	10/20/12	10,111,117,0015	0000	74 5	1211/17 (12)	1110112
		1314641-0012		17/5	7-29 11	
	·····		·······	· · · · · · · · · · · · · · · · · · ·	<u></u>	
<b> </b>	<u> </u>	····	······································			
┣					· · · · · · · · · · · · · · · · · · ·	
					···	
				L		

LDC #: 30903B/

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification



METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X) Where:

Ax = Area of compound Cx = Concentration of compound S = Standard deviation of the RRFs

X = Mean of the RRFs

Ais = Area of associated internal standard

Cis = Concentration of internal Standard

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration				AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound	(RRF 10 std)	(RRF 10 std)	(Initial)	(Initial)		
	ICAL	10/29/2013	C (IS 1)	0.611253	0.611253	0.6183554	0.6183554	6.768750	6.768750
	MS-V5		S (IS 2)	0.335190	0.335190	0.3400419	0.3400419	7.541073	7.541073
			EE (IS 3)	1.924297	1.924297	1.8877350	1.8877350	11.55637	11.55637

### VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification



METHOD: GCMS 524.2

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx) average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X) Where:

Ax = Area of compound Cx = Concentration of compound S = Standard deviation of the RRFs X = Mean of the RRFs

Ais = Area of associated internal standard

Cis = Concentration of internal Standard

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration					AverageRRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Comp	oound	(RRF 160/40/8 std)	(RRF 160/40/8 std)	(Initial)	(Initial)		
	ICAL	10/29/2013	F	(IS 1)	0.02962954	0.02962954	0.0288510	0.0288510	6.070736	6.070736
	MS-V5		QQQQ	(IS 2)	0.07425519	0.07425519	0.0720642	0.0720642	2.968773	2.968773
			PPPP	(IS 3)	0.27499250	0.27499250	0.2670485	0.2670485	17.55854	17.55854

30905 B/ LDC #:

### VALIDATION FINDINGS WORKSHEET **Continuing Calibration Results Verification**



#### METHOD: GC/MS VOA (EPA Method 524.2)

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

% Difference = 100 \* (ave. RRF - RRF)/ave. RRF  $\mathsf{RRF} = (\mathsf{A}_{\mathsf{v}})(\mathsf{C}_{\mathsf{is}})/(\mathsf{A}_{\mathsf{is}})(\mathsf{C}_{\mathsf{v}})$ 

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

A, = Area of compound,  $C_{x} = Concentration of compound,$  A<sub>is</sub> = Area of associated internal standard C<sub>is</sub> = Concentration of internal standard

					Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	%D	%D
1	1314647-	10/30/13	C (1st Internal Standard)	0.6183554	0.636712	0.636712	3.0	3.0
	cov)		S (2nd Internal Standard)	0.3400419	0.3367771	0.336771)	1.0	1.0
		1	EE (3rd Internal Standard)	1-55 7735	1-873091	1-873091	0-8	0.X
2	1314647-	10/30/17	F (1st Internal Standard)	0.02885098	0.02805384	0.02805384	2.8	2.8
	CEN2		QQQQ (2nd Internal Standard)	0.07206415	0.07496036	0.07496036	4.0	4.0
		]	PPPP (3rd Internal Standard)	0.2670485	0.6062277	0.6062277	127	127
3			(1st Internal Standard)					
			(2nd Internal Standard)					
			(3rd Internal Standard)					-
4			(1st Internal Standard)					
			(2nd Internal Standard)		·			
			(3rd Internal Standard)					

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

LDC #: 30905B )

### VALIDATION FINDINGS WORKSHEET Surrogate Results Verification



#### 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: / 0

	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
			Reported	Recalculated	
Toluene-d8	10.0	9.9500	99.5	99.5	0
Bromofluorobenzene	1	9.9700	99.7	99.7	1
1,2-Dichlorobenzene-d4	J J	10.550	106	106	
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					

LDC#: 30905B/

## VALIDATION FINDINGS WORKSHEET <u>Matrix Spike/Matrix Spike Duplicates Results Verification</u>



#### 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

Where: SSC = Spiked sample concentration SA = Spike added SC = Sample concentration

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

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD sample: \_\_\_\_/ 2 4 / 3

	S	oike	Sample	Spiked Sample		Matrix Spike		Matrix Spike Duplicate		MS/MSD	
Compound	Added C (ug/L)		Concentration	Concentration		Percent Recovery		Percent Recovery		RPD	
	MS	MSD			MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Benzene	25.0	X.U	M	26.070	26.550	104	104	106	106	1.82	1.82
Chlorobenzene				2 4.330	25.630	97-3	97.3	103	103	5.20	5.20
1,1-Dichloroethene				26.420	27.140	104	106	109	107	2.69	2-69
Toluene			T	25.940	25.790	104	104	103	103	0.580	0.530
Trichloroethene			1.520	27.020	76.160	102	102	98.4	98.4	3.23	3.23

#### 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 #: 30905 B/

### VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification



#### METHOD: GC/MS VOA (EPA Method 524.2)

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

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

RPD = I LCSC - LCSDC | \* 2/(LCSC + LCSDC) LCS

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

## LCS ID: \_\_\_\_ BWJ2329- BS /

Compound	Si Ad ( W	bike de <b>d</b> 4/L-)	Spiked Sample Concentration ( ug/k		LCS Percent Recovery		LCSD Percent Recovery		L CS/L CSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	25.0	NA	26.660	NA	107	[0]				
Trichloroethene		1	25.230		101	[0]				
Benzene			24.130		105	105				
Toluene			25. 590		102	102				
Chlorobenzene		24.450		97.8	97.8	NA				

Comments: <u>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.</u>

LDC #: 30905B/

## VALIDATION FINDINGS WORKSHEET Sample Calculation Verification



#### METHOD: GC/MS VOA (EPA Method 524.2)

I	<u>Y</u>	N	<u>N/A</u>
	Y/	'N	N/A

Were all reported results recalculated and verified for all level IV samples?

Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

=

Concer	ntratior	$= \frac{(A_{\cdot})(I_{\bullet})(DF)}{(A_{t_{0}})(RRF)(V_{\bullet})(\%S)}$
A <sub>x</sub>	=	Area of the characteristic ion (EICP) for the compound to be measured
$A_{is}$	Ξ	Area of the characteristic ion (EICP) for the specific internal standard
۱ <sub>s</sub>	=	Amount of internal standard added in nanograms (ng)
RRF	=	Relative response factor of the calibration standard.
V,	=	Volume or weight of sample pruged in milliliters (ml) or grams (g).
Df	=	Dilution factor.
A/ <b>A</b>		Develop Reference Results for a 21 to 21 to 21 to 21

Conc. = (201919) (10) ()27 (8779) (0.4635342) () ) ()

16 ng/L

%S	= Perc only	cent solids, app	blicable to soils and solid ma	atrices	· · · · · ·		
#	Sam	ple ID	Comp	ound	Reported Concentration ()	Calculated Concentration ( )	Qualification
				· · · · · · · · · · · · · · · · · · ·			
			·				
						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
 			<u> </u>				
		· · ·					
		· · · · · · · · · · · · · · · · · · ·	<u> </u>	·			
						· · · · · · · · · · · · · · · · · · ·	

### LDC Report# 30905B4

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

NASA JPL

Collection Date: October 28, 2013

LDC Report Date:

Matrix:

Water

December 6, 2013

Total Recoverable Chromium

Parameters:

Validation Level: EPA Level III & IV

Laboratory:

BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23375

### Sample Identification

EB-6-10/28/13 MW-17-5 MW-17-4 MW-17-3 MW-17-2 MW-17-1 MW-18-5 MW-18-5 MW-18-4 MW-18-3\*\* 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 Total Recoverable 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 contaminant concentrations were found in the initial, continuing and preparation blanks.

### V. ICP Interference Check Sample (ICS) Analysis

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

### 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-6-10/28/13 was identified as an equipment blank. No chromium was found.

## NASA JPL Total Recoverable Chromium - Data Qualification Summary - SDG 13-23375

No Sample Data Qualified in this SDG

NASA JPL

Total Recoverable Chromium - Laboratory Blank Data Qualification Summary - SDG 13-23375

No Sample Data Qualified in this SDG

LDC #:	30905B4	VALIDATION COMPLETENESS WORKSHEET	Date: 12-5-13
SDG #:_	13-23375	Level III/IV	Page:of
1 1 1.	DOLLAR DE L		

Reviewer: 2nd Reviewer:

SDG #: Laboratory: BC Laboratories, Inc.

METHOD: Total Recoverable Chromium (EPA Method 200.8)

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

	Validation Area		Comments
Ι.	Technical holding times	A	Sampling dates: 10 - 28-13
11.	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	A	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP OK by difference
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	not reviewed for level 111
<u>X.</u>	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not performed
XII.	Sample Result Verification	A	Not reviewed for Level III validation.
XIII.	Overall Assessment of Data	_A	
XIV.	Field Duplicates	N	
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 blankEB = Equipment blank

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

-	2111 000110	· · · · · · · · · · · · · · · · · · ·			I	<u> </u>	
1	EB-6-10/28/13	11	MW-18-3MS	21		31	
2	MW-17-5	12	MVV-18-3MSD	22		32	
3	MVV-17-4	13	MW-18-3DUP	23		33	
4	MW-17-3	14		24		34	
5	MW-17-2	15		25		35	
6	MVV-17-1	16		26		36	
7 7	MW-18-5	<u></u> 17		27		37	
8	MVV-18-4	18		28		38	
9	MW-18-3** &	19		29		39	
10	MW-18-2	20		30	PBW	40	
9 10	MW-18-3** MW-18-2	19 20		29 30	PBW	39 40	_

Notes:

÷.	秦	

\$ 30905B4W.wpd

LDC #: 30905B4

### VALIDATION FINDINGS CHECKLIST

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

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.	1			
II. ICP/MS Tune	·			
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	$\checkmark$			++
Were %RSD of isotopes in the tuning solution	$\checkmark$			
III. Calibration				
Were all instruments calibrated daily, each set-up time?	/			
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?	$\checkmark$			
Were all initial calibration correlation coefficients <a> 0.995?</a>	1			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	1			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		$\checkmark$		
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?		$\checkmark$		· ·····
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			$\checkmark$	
VI. Matrix spike/Matrix spike duplicates	<b>.</b>			
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	/			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	$\checkmark$			
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq 20\%$ for waters and $\leq 35\%$ for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were $\leq 5X$ the RL, including when only one of the duplicate sample values were $\leq 5X$ the RL.				
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	$\checkmark$			·····
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	~			

ومحمورهم ومرورتهم والروابي والوالي ومحمد موتيتين المعارية والمرادي المرادي المراد

LDC #:\_\_\_\_\_

and a second state of the

## VALIDATION FINDINGS CHECKLIST

	Page:	2_of_2_
	Reviewer:	MG
2nd	Reviewer:	1

Validation Area	Yes	No	NA	Findings/Comments		
VIII. Furnace Atomic Absorption QC						
If MSA was performed, was the correlation coefficients > 0.995?			$\checkmark$			
Do all applicable analysies have duplicate injections? (Level IV only)	ļ		$\checkmark$			
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			$\checkmark$	·		
Were analytical spike recoveries within the 85-115% QC limits?			$\square$			
IX. ICP Serial Dilution						
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		$\checkmark$				
Were all percent differences (%Ds) < 10%?			$\checkmark$			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.						
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)	<b></b>		······			
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?			$\checkmark$			
XI. Regional Quality Assurance and Quality Control	<b></b>					
Were performance evaluation (PE) samples performed?		$\checkmark$				
Were the performance evaluation (PE) samples within the acceptance limits?			$\checkmark$			
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.	$\checkmark$					
XIV. Field duplicates						
Field duplicate pairs were identified in this SDG.		/				
Target analytes were detected in the field duplicates.			$\checkmark$			
XV. Field blanks						
Field blanks were identified in this SDG.	$\checkmark$					
Target analytes were detected in the field blanks.		$\checkmark$				

. Na kaominina mampimpika manjara amin'ny fisiana amin'ny faritr'ora dia 1914. Ilay kaominina dia kaominina dia m

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

Page: 1 of 1 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
 Where,
 Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution

 True
 True = concentration (in ug/L) of each analyte in the ICV or CCV solution

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
1153 ICV	ICP/MS (Initial calibration)	Cr	52.313	50.000	105	105	Ý
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1946 CCVD	ICP/MS (Continuing calibration)	Cr	38.989	40.000	97.5	97.5	
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

Comments: <u>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.</u>

ويحتجز والمتحجر والمجور والمحافظ والمحافظ

1.54

CALCLC.4SW

### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page:_	of
Reviewer:	MG
2nd Reviewer:	

1.14

#### 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.

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

 RPD = <u>[S-D]</u> x 100
 Where, S = Original sample concentration

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

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

 $%D = |I-SDR| \times 100$ 

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

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
_	ICP interference check	_		1	-	-	_
1958 LCS	Laboratory control sample	Cr	40.822 (mg/L)	40.000 (mg/L)	102	102	Ý
२०14 । ।	Matrix spike	Cr	(SSR-SR) 36.276 (Mg/L)	40.000 (mg/L)	90.6	90.6	
2004 / 2007 13	Duplicate	Cr	2.948 (Mg/L)	1.774 (mg/L)	49.7	49.7	
	ICP serial dilution	-		-	-	_	_

#### 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.

TOTCLC.4SW

LDC #: 30905 B	4
----------------	---

### VALIDATION FINDINGS WORKSHEET **Sample Calculation Verification**

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

.

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". (Y) <u>N N/A</u> Have results been reported and calculated correctly? Are results within the calibrated range of the instruments and within the linear range of the ICP? <u>N N/A</u> Are all detection limits below the CRDL?

Detected analyte results for	<u># 9,</u>	Cr	were recalculated and verified using the following
equation:			

Concentration = (RD)(FV)(Dil) (In. Vol.) RD = Raw data concentration Final volume (ml) FV = In. Vol. = Initial volume (ml) or weight (G)

Dil

Ξ

Dilution factor

Recalculation:

(2.948 Mg/L)(0.050L) = 2.948 Mg/L 0.050L

#	Sample ID	Analyte	Reported Concentration ( <sup>M</sup> 2 <sup>/</sup> )	Calculated Concentration (Mg/L)	Acceptable (Y/N)
1	9	Cr	2.9	2.9	Ý
	-				

Note:

### LDC Report# 30905B6

# Laboratory Data Consultants, Inc. Data Validation Report

Water

Collection Date:	October 28,	2013
Collection Date:	October 28,	201

LDC Report Date: December 6, 2013

Matrix:

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23375

### Sample Identification

EB-6-10/28/13 MW-17-5 MW-17-4 MW-17-3 MW-17-2 MW-17-1 MW-18-5 MW-18-4 MW-18-3\*\* MW-18-2 EB-6-10/28/13MS EB-6-10/28/13MSD EB-6-10/28/13DUP MW-18-3MS MW-18-3MSD **MW-18-3DUP** 

\*\*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 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-6-10/28/13 was identified as an equipment blank. No contaminant concentrations were found.

## NASA JPL Wet Chemistry - Data Qualification Summary - SDG 13-23375

No Sample Data Qualified in this SDG

NASA JPL

Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 13-23375

No Sample Data Qualified in this SDG

LDC #: <u>30905B6</u>	VALIDATION COMPLETENESS WORKSHEET							
SDG #: <u>13-23375</u>	Level III/IV							
Laboratory: BC Laboratories, Inc.								

Date: 12-5-13 Page: 1 of 1 Reviewer: MG 2nd Reviewer:

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

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: 10 - 28 - 13
- 11	Initial calibration	A	
ĎI.	Calibration verification	A	
IV	Blanks -	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	DUP #16 OK by difference
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	Not reviewed for Level III validation.
с IX.	Overall assessment of data	A	
<b>X</b> .	Field duplicates	2	
XI	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

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

Notes:

LDC #:\_\_\_\_\_\_30905 B6

-----

#### VALIDATION FINDINGS CHECKLIST

Page: Lof 2 Reviewer: <u>MG</u> 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.	1					
Cooler temperature criteria was met.						
II. Calibration						
Were all instruments calibrated daily, each set-up time?	1					
Were the proper number of standards used?	~					
Were all initial calibration correlation coefficients	1					
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?	1					
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?	/					
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?		$\checkmark$				
Were the performance evaluation (PE) samples within the acceptance limits?			$\checkmark$			

Commences and a second participation of the second second

#### VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: MG 2nd Reviewer: \_\_\_\_\_ 5

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.	$\checkmark$			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		$\checkmark$		
Target analytes were detected in the field duplicates.			/	
X. Field blanks				
Field blanks were identified in this SDG.	$\checkmark$			
Target analytes were detected in the field blanks.		$\checkmark$		

- Control Construction and the statement of the statem

# LDC #: 30905 136

## VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: <u>of</u> Reviewer: <u>MG</u> 2nd reviewer: <u>V</u> 8748 T

1997 - 1997 - 1997 - 19

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-710	$\sim$	DH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR (CIO,)
Qe 11->13	[	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}(ClO_4)$
\$ 14→16		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{69}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		_ pH_TDS_CI_F_NO <sub>3</sub> _NO <sub>2</sub> _SO <sub>4</sub> _PO <sub>4</sub> _ALK_CN <sup>-</sup> NH <sub>3</sub> _TKN_TOC_CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		PH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH_TDS_CLF_NO_NO_SO_PO_ALK_CN_NH_TKN_TOC_CR6+ CIO_

Comments:\_

METHODS.6

LDC #: 30905 B6

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

Page:_	l of 1
Reviewer:	ME
2nd Reviewer:	n

METHOD: Inorganics, Method Sec cover

The correlation coefficient (r) for the calibration of CrVl was recalculated. Calibration date: 10-11-13

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 measured in the analysis of the ICV or CCV solution

 True
 True = concentration of each analyte in the ICV or CCV source

			Conc	Abs	Recalculated	Reported	Accentable			
Type of Analysis	Analyte	Standard ID	Found (units)	True (units)	r or %R	r or %R	(Y/N)			
Initial calibration		Blank	0.000 (mg/L)	0.001						
		Standard 1	0.002 (1)	0.003						
	CrvI	Standard 2	0.005 ()	0.005			·			
		Standard 3	0.025 ()	0.020	•	12				
		Standard 4	0.050 ()	0.040	r=0.999907	**=0.999993	Y I			
		Standard 5	0.100 (1)	0.078			í			
		Standard 6	-							
·		Standard 7	~							
Calibration verification		0949								
	C104	CCV5	10.405 (mg/L)	10.000 (Mg/L)	104	104				
Calibration verification		2230								
	CrVI	CCVI	0.0524 (mg/L)	0.050 (mg/L)	105	105	↓ ↓			
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.\_\_\_\_\_

المحاجبة الموجدين ووودي والمحاجبة المحاجب

a ta Cellar

المستعجب وهيرجرين

 $\sim 10^{-6}$ 

CALCLC.6

 Design of the second s Second s Second se Second sec

LDC #: 30905B6

### VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet



METHOD: Inorganics, Method \_\_\_\_\_\_

.

1. 時間にの意味になった。 見い いっかん (新賀銀行の) アンコン (新潟路) とうぶ

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 measured in the analysis of the sample. For the matrix spike calculation,

 True
 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 = <u> S-D </u> x 100	Where,	S =	Original sample concentration
(S+D)/2		D =	Duplicate sample concentration

			Found / S	True / D	Recalculated	Reported	Acceptable
Sample ID	Type of Analysis	Element	(units)	(units)	%R / RPD	%R / RPD	(Y/N)
0002	Laboratory control sample						
LCS		C104	10.878 ( <sup>µg1</sup> )	10.000 (Mg/L)	109	109	Ý
7230	Matrix spike sample		(SSR-SR)				
14		Crvl	0.0518 (mg/L)	0.052632 <sup>(mg</sup> /L)	98.4	98.3	
0016/0058	Duplicate sample						
13		CIOY	ND (mg/L)	ND (mg/L)	0		

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.

222.54

TOTCLC.6

LDC # <u>30905</u> B6	VALIDATION FINDINGS WO Sample Calculation Veri	DRKSHEET	Pa Reviev 2nd reviev	ge:of ver: ver:
METHOD: Inorganics, Metho	d See cover			
Please see qualifications belo N N/A Have results N N/A Are results w N N/A Are all detect	ow for all questions answered "N". Not appl been reported and calculated correctly? rithin the calibrated range of the instrument tion limits below the CRQL?	licable questions are	e identified as "N//	<b>4</b> ".
Compound (analyte) results f recalculated and verified usin	for#_ 9 C+V1 g the following equation:	repc	orted with a positiv	ve detect were
Concentration =	Recalculation:			
Factor = 1.295 Bias = 0.001	Cr VI = (0.003 - 0.00)	DI) × 1.295		
dil= 1x	= 0.0013 (	g / L		
# Sample ID	Analyte	Reported Concentration	Calculated Concentration (Mg/L)	Acceptable (Y/N)
1 9	C104	44	45	Ý
		(ma /	(ma 1)	
	· · · · · · · · · · · · · · · · · · ·	("972)		
	Cr VI	0.00083	0.0013 *	
	· · ·			
		· · · · · · · · · · · · · · · · · · ·		
Note: * the lab i in the	s using more significant raw data.	t figures th	nan display	,ed

194015

where the second second second second

وبالهو ممتورج



December 19, 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 November 27, 2013. Attachment 1 is a summary of the samples that were reviewed for each analysis.

### LDC Project # 30933:

### <u>SDG #</u>

### **Fraction**

13-23495	Volatiles, Total Recoverable Chromium, Wet Chemistry
13-23598	
13-23687	

The data validation was performed under EPA Level III 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,

er Fren

Pei Geng Project Manager/Senior Chemist

	НС												At	tach	men	t 1																			
	90/10 (client sele	ct)						LD	C #:	309	33	(Ba	ttel	le-S	San	Die	ego	) / N	IAS	A J	PL	)													
LDC	SDG#	DATE REC'D	(3) DATE DUE	V( (52	DA 4.2)	C (20	r 0.8)	CI, NO (30	SO₄ 9₃-N 0.0)	NO (35	₂-N 3.2)	O-1 (36	°O₄ 5.1)	Cr( (71	VI) 96)	CL (314	O₄ 0)																		
Matri	x: Water/Soil	18 N. T. S.		w	s	w	s	w	s	w	s	w	s	w	S	W	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s	w	s
A	13-23495	11/27/13	12/20/13	14	0	14	0	4	0	4	0	4	0	17	0	14	0																	┝──┤	
в	13-23598	11/27/13	12/20/13	9	0	9	0	3	0	6	0	6	0	9	0	9	0																$\square$	┝──┨	
С	13-23687	11/27/13	12/20/13	10	0	10	0	1	0	4	0	4	0	10	0	10	0																	┢───┨	
		1																																┟──╉	
		<u> </u>		<b> </b>	<b> </b>																	<u> </u>						<u> </u>						┝──╉	-
									<b> </b>																									┝──╂	-
																																		┟──╋	
												┣───																				$\mid - \mid$	$\left  - \right $	┟──╂	
									-																									<b> </b>	
									<u> </u>							<u> </u>																┢──┥		}	
				<u> </u>					-																		<u> </u>	<u> </u>			-	┢━┥		<del> </del>	
																						-												i+	
		1														·																			
			-																															$\square$	
																												i							
																																		$\square$	
																																	<b></b>	<b></b>	
		ļ			L		<u> </u>					<u> </u>																					<b></b>	<b></b>	
		<b> </b>				<u> </u>		<u> </u>	<u> </u>		<b> </b>	<u> </u>																				$\vdash$			
								<u> </u>	<u> </u>		<b> </b>	<u> </u>																						<b></b>	
			<b> </b>						<u> </u>		<b> </b>																							<b></b>	
							<u> </u>		<b> </b>		<u> </u>																						<b> </b>		
			<b> </b>									<u> </u>																						$ \rightarrow$	-
																																		-	
Total	T/PG		1	33	0	33	0	8	0	14	0	14	0	36	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site	Name:	NASA JPL

Collection Date: October 29, 2013

LDC Report Date: December 10, 2013

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23495

### Sample Identification

TB-7-10/29/13 EB-7-10/29/13 MW-11-5 MW-11-4 MW-11-3 MW-11-2 MW-11-1 MW-3-5 MW-3-5 MW-3-4 MW-3-3 MW-3-2 MW-3-1 MW-11-5MS MW-11-5MSD

### Introduction

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

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

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

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.

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
10/30/13	Pentachloroethane ′	74.5	All samples in SDG 13-23495	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 with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
10/29/13	Pentachloroethane	81.9	All samples in SDG 13-23495	J (all detects) UJ (all non-detects)	Р
# V. Blanks

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

#### VI. Surrogate Spikes

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

#### VII. Matrix Spike/Matrix Spike Duplicates

Although matrix spike (MS) and matrix spike duplicate (MSD) samples were not required by the method, MS and MSD samples were reported by the laboratory. 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

Raw data were not reviewed for this SDG.

### XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

#### XIV. System Performance

Raw data were not reviewed for this SDG.

### XV. Overall Assessment of Data

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

# **XVI. Field Duplicates**

No field duplicates were identified in this SDG.

#### **XVII. Field Blanks**

Sample TB-7-10/29/13 was identified as a trip blank. No volatile contaminants were found.

Sample EB-7-10/29/13 was identified as an equipment blank. No volatile contaminants were found.

# NASA JPL Volatiles - Data Qualification Summary - SDG 13-23495

SDG	Sample	Compound	Flag	A or P	Reason
13-23495	TB-7-10/29/13 EB-7-10/29/13 MW-11-5 MW-11-4 MW-11-3 MW-11-2 MW-11-2 MW-11-1 MW-3-5 MW-3-4 MW-3-3 MW-3-2 MW-3-1	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
13-23495	TB-7-10/29/13 EB-7-10/29/13 MW-11-5 MW-11-4 MW-11-3 MW-11-2 MW-11-1 MW-3-5 MW-3-4 MW-3-3 MW-3-2 MW-3-1	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

# NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-23495

No Sample Data Qualified in this SDG

LDC #: <u>30933A1</u>	VALIDATION COMPLETENESS WORKSHEET	Date:12/4/1
SDG #: 13-23495	_ Level III	Page: <u>/</u> of <u>/</u>
Laboratory: BC Laboratories,	Inc.	Reviewer:
		2nd Reviewer:

#### METHOD: GC/MS Volatiles (EPA Method 524.2)

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

	Validation Area		Comments
I.	Technical holding times	Δ	Sampling dates: 10)とのしろ
11.	GC/MS Instrument performance check	A	
	Initial calibration	А	°/. PSD = 20, 12
IV.	Continuing calibration/ICV	SW	$104/cW \leq 30$
V.	Blanks	4	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	Д	LUS
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	Δ	
XI.	Target compound identification	N	
XII.	Compound guantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	Δ	
XVI.	Field duplicates	N	
XVII.	Field blanks	ND	TB = 1 = B = 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:

1	TB-7-10/29/13	11	MW-3-2	21	BWJZ33D	31	
2	EB-7-10/29/13	12	MW-3-1	22		32	
3	MW-11-5	13	MW-11-5MS	23		33	
4	MW-11-4	14	MW-11-5MSD	24		34	
5	MW-11-3	15		25	· · · · · · · · · · · · · · · · · · ·	35	
6	MW-11-2	16		26		36	
7	MVV-11-1	17		27		37	
8	MW-3-5	18		28		38	
9	MVV-3-4	19		29		39	
10	MVV-3-3	20	<u> </u>	30		40	

# TARGET COMPOUND WORKSHEET

#### METHOD: VOA

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 aicohol
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. lodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP. Pentachloroethane
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	ТТТТ.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-lsopropyltoluene	AAAA. Ethyl tert-butyl ether	ບບບບ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	vvvv.

LDC #: 30933 4 /

# VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

Page:	/of_/
Reviewer:	FT
2nd Reviewer:	ß

**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?

Y/N N/A Were all percent differences  $(\%D) \leq 30\%$ ?

#	Date	Standard ID	Compound	Finding %D (Limit: <u>≤</u> 30.0%)	Associated Samples	Qualifications
	10/29/13	1042 M5-45	PPPP	81.9	RI	JUIP
	/					
	······································				······································	······································
	······································				• • • • • • • • • • • • • • • • • • •	
	10/30/13	1314647-005	PPPP	74.5	J.	1
					<u>×</u>	
					<u> </u>	
	······································					
			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	······································		
				· · · · · · · · · · · · · · · · · · ·		
					······································	
[						
<b> </b> -						
	······································					
						· · · · · · · · · · · · · · · · · · ·
					· · · · · · · · · · · · · · · · · · ·	<del></del> _
			· · · · · · · · · · · · · · · · · · ·			
	· · · · · · · · · · · · · · · · · · ·					
<b> </b> -						
			· <u> </u>			
	· · · · · · · · · · · · · · · · · · ·				<u> </u>	
			*			
				<u> </u>		

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
--------------------	----------

Collection Date: October 30, 2013

LDC Report Date: December 10, 2013

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23598

### Sample Identification

TB-8-10/30/13 MW-13 MW-8 DUPE-5-4Q13 MW-15 DUPE-6-4Q13 MW-7 MW-13MS MW-13MS

#### 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.

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
10/31/13 (1314708-CCV1)	Bromomethane	35.0	All samples in SDG 13-23598	J (all detects) UJ (all non-detects)	Р
10/31/13 (1314708-CCV2	Methyl iodide Pentachloroethane	45.0 128	All samples in SDG 13-23598	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Ρ

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

Date	Compound	%D	Associated Samples	Flag	A or P
10/29/13	Pentachloroethane	81.9	All samples in SDG 13-23598	J (all detects) UJ (all non-detects)	Р

#### V. Blanks

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

#### VI. Surrogate Spikes

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

#### VII. Matrix Spike/Matrix Spike Duplicates

Although matrix spike (MS) and matrix spike duplicate (MSD) samples were not required by the method, MS and MSD samples were reported by the laboratory. 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

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 DUPE-5-4Q13 and samples MW-15 and DUPE-6-4Q13 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concent		
Compound	MW-8	DUPE-5-4Q13	RPD
Bromodichloromethane	0.86	0.88	2
Chloroform	1.1	1.2	9
Dibromochloromethane	0.50	0.56	11
Trichloroethene	0.090	0.090	0
Trichlorofluoromethane	0.34	0.32	6

# XVII. Field Blanks

Sample TB-8-10/30/13 was identified as a trip blank. No volatile contaminants were found.

# NASA JPL Volatiles - Data Qualification Summary - SDG 13-23598

SDG	Sample	Compound	Flag	A or P	Reason
13-23598	TB-8-10/30/13 MW-13 MW-8 DUPE-5-4Q13 MW-15 DUPE-6-4Q13 MW-7	Bromomethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
13-23598	TB-8-10/30/13 MW-13 MW-8 DUPE-5-4Q13 MW-15 DUPE-6-4Q13 MW-7	Methyl Iodide Pentachloroethane	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
13-23598	TB-8-10/30/13 MW-13 MW-8 DUPE-5-4Q13 MW-15 DUPE-6-4Q13 MW-7	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

# NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-23598

No Sample Data Qualified in this SDG

LDC #: 30933B1 VALIDATION COMPLETENESS WORK	SHEET Date:/2///
SDG #: <u>13-23598</u> Level III	Page:_/of_/
Laboratory: BC Laboratories, Inc.	Reviewer: <u>F</u>
	2nd Reviewer:
METHOD: GC/MS Volatiles (EPA Method 524.2)	

METHOD: GC/MS Volatiles (EPA Method 524.2)

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

	Validation Area		Comments
1.	Technical holding times	А	Sampling dates: 10 30 13
11.	GC/MS Instrument performance check	Δ	
- 111.	Initial calibration	4	0% RSD = 20, 12
IV.	Continuing calibration/ICV	s3	104/CW = 30
V.	Blanks	$\diamond$	
VI.	Surrogate spikes	5	
VII.	Matrix spike/Matrix spike duplicates	4	
VIII.	Laboratory control samples	A	Les
IX.	Regional Quality Assurance and Quality Control	N	
<b>X</b> .	Internal standards	$\land$	
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	Д	
XVI.	Field duplicates	SW	D=3,4 $*5,b$
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-8-10/30/13	11	BWJ2415	21	31	
2	MW-13	12		22	 32	
3	мvv-в Р	13		23	 33	
4	DUPE-5-4Q13 D	14	· · · · · · · · · · · · · · · · · · ·	24	34	
5	MVV-15 P1	15		25	35	
6	DUPE-6-4Q13	16		26	 36	
7	MW-7	17		27	 37	
8	MW-13MS	18		28	 38	
9	MW-13MSD	<u>1</u> 9		29	 39	
10		20		30	 40	

# TARGET COMPOUND WORKSHEET

ż

#### METHOD: VOA

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. Iodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP. Pentachloroethane
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	ТТТТ.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-isopropyltoluene	AAAA, Ethyl tert-butyl ether	υυυυ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	vvvv.

# VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: \_\_\_\_\_of \_\_\_ Reviewer: \_\_\_\_FT\_\_\_ 2nd Reviewer: \_\_\_\_s\_\_\_

METHOD: GC/MS VOA (EPA Method 524.2)

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

<u>VN\_N/A</u> Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

<u>Y(N)N/A</u> Were all percent differences (%D)  $\leq$  30% ?

#	Date	Standard ID	Compound	Finding %D (Limit: <u>&lt;</u> 30.0%)	Associated Samples	Qualifications
	10/29/13	1CV2 MS-45	PPPP	81.9	All	JUNIP
				/	·····	
	3					
	10/29/13	1314708-CCV1	В	35-0	AI	L.
	FI					
<b> </b>						
	10/31/13	131470B-CW2	Methy I Iudiole	45.0		
			PPYP	128	J	
ļ						
ļ						
		<u> </u>			I	I
ļ						
┣			· · · · · · · · · · · · · · · · · · ·			
				<u> </u>		
<b> </b>		·			· · · · ·	
<b> </b>	· · · · · · · · · · · · · · · · · · ·					
				l		

#### LDC#: 30933B) VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	<u>/_of_/</u>
Reviewer:	<u>F7</u>
2nd Reviewer:	ĺ-
	1

METHOD: GC/MS VOA (EPA SW 846 Method 524.2) <u>Y N NA</u> Were field duplicate pairs identified in this SDG?

Y/N NA Were target analytes detected in the field duplicate pairs?

	Concentra		
Compound	3	4	RPD
Р	0.86	0.88	2
к	1.1	1.2	9
Т	0.50	0.56	11
S	0.090	0.090	0
КК	0.34	0.32	6

V:\FIELD DUPLICATES\templates\30933B1.wpd

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL
--------------------	----------

Collection Date: October 31, 2013

LDC Report Date: December 10, 2013

Matrix: Water

Parameters: Volatiles

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23687

# Sample Identification

TB-9-10/31/13 MW-6 MW-16-grab DUPE-7-4Q13 MW-1 MW-5 MW-10 DUPE-8-4Q13 MW-1MS MW-1MSD

#### Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

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

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

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.

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
11/1/13	Methyl lodide Pentachloroethane	34.1	BWK0021 TB-9-10/31/13 MW-6 MW-16-grab MW-1 MW-5 MW-10 DUPE-8-4Q13 MW-1MS MW-1MSD	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Ρ
11/4/13 (1314863-CCV1)	Bromomethane	34.8	1314863-CCB1 DUPE-7-4Q13	J (all detects) UJ (all non-detects)	Ρ
11/4/13 (1314863-CCV2)	Methyl Iodide Pentachloroethane	42.9 92.0	1314863-CCB1 DUPE-7-4Q13	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Ρ

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

Date	Compound	%D	Associated Samples	Flag	A or P
10/29/13	Pentachloroethane	81.9	All samples in SDG 13-23687	J (all detects) UJ (all non-detects)	Р

# V. Blanks

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

### VI. Surrogate Spikes

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

### VII. Matrix Spike/Matrix Spike Duplicates

Although matrix spike (MS) and matrix spike duplicate (MSD) samples were not required by the method, MS and MSD samples were reported by the laboratory. 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

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 DUPE-5-4Q13 and samples MW-15 and DUPE-6-4Q13 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentr		
Compound	MW-16-grab	DUPE-7-4Q13	RPD
Bromodichloromethane	7.3	8.1	10
Bromoform	2.2	2.0	10
Chloroform	6.0	6.6	10
Dibromochloromethane	6.4	6.7	5

	Concentr		
Compound	MVV-10	DUPE-8-4Q13	RPD
Chloroform	0.93	0.91	2
1,1-Dichloroethane	0.21	0.22	5
cis-1,2-Dichloroethene	0.16	0.18	12
trans-1,2-Dichloroethene	0.24	0.26	8
Tetrachloroethene	0.90	0.89	1
Trichloroethene	8.0	8.1	1

# XVII. Field Blanks

Sample TB-8-10/30/13 was identified as a trip blank. No volatile contaminants were found.

# NASA JPL Volatiles - Data Qualification Summary - SDG 13-23687

SDG	Sample	Compound	Flag	A or P	Reason
13-23687	TB-9-10/31/13 MW-6 MW-16-grab DUPE-7-4Q13 MW-1 MW-5 MW-10 DUPE-8-4Q13	Methyl Iodide Pentachloroethane	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (%D)
13-23687	DUPE-7-4Q13	Bromomethane	J (all detects) UJ (all non-detects)	Р	Continuing calibration (%D)
13-23687	TB-9-10/31/13 MW-6 MW-16-grab DUPE-7-4Q13 MW-1 MW-5 MW-5 MW-10 DUPE-8-4Q13	Pentachloroethane	J (all detects) UJ (all non-detects)	Ρ	Continuing calibration (ICV %D)

# NASA JPL Volatiles - Laboratory Blank Data Qualification Summary - SDG 13-23687

No Sample Data Qualified in this SDG

LDC #: <u>30933C1</u>	VALIDATION COMPLETENESS WORKSHEET	Date: 12/4/13
SDG #: <u>13-23687</u>	Level III	Page: 1 of /
Laboratory: BC Laboratories,	, Inc	Reviewer:
		2nd Reviewer:
METHOD: CC/MS Volatiles /	= DA Method 524.2)	ſ

#### METHOD: GC/MS Volatiles (EPA Method 524.2)

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

	Validation Area		Comments
Ι.	Technical holding times	<	Sampling dates: 10) ろ   ) ろ
11.	GC/MS Instrument performance check	$\triangle$	
.	Initial calibration	$\triangle$	% PSD = 20, 12
IV.	Continuing calibration/ICV	SW	INICON 230
V.	Blanks	<u>A</u>	1
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates		
VIII.	Laboratory control samples	Δ	LC>
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	$\Delta$	
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	Δ	
XVI.	Field duplicates	SW	D=3,4 7,8
XVII.	Field blanks	NP	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: and

1)	TB-9-10/31/13		11 )	BWK0021	21	31
2)	MVV-6	AP FI	122	1314863-603)	22	32
31	MW-16-grab	D	13		23	33
42	DUPE-7-4Q13	0	14		24	 34
5 I	MVV-1		15		25	35
6 <sup>\</sup>	MVV-5		16		26	36
7	MVV-10	р,	17		27	37
۱ 8	DUPE-8-4Q13	D,	18		28	 38
9	MW-1MS	!	19		29	39
10 1	MW-1MSD		20		30	 40

# TARGET COMPOUND WORKSHEET

#### METHOD: VOA

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	EEE. 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. lodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP. Pentachloroethane
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	ТТТТ.
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	vvvv.

LDC #: <u>309330/</u>

# VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

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

METHOD: GC/MS VOA (EPA Method 524.2)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". YN N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

Were all percent differences  $(\%D) \le 30\%$ ? Y N N/A

#	Date	Standard ID	Compound	Finding %D (Limit: <u>&lt;</u> 30.0%)	Associated Samples	Qualifications
	10/29/13	1012 MS- 45	PPPP	81.9	AU	JUJIP
						<u></u>
	11/01/13	1314784-cev2	Methyl Iodide	34.1	BWK0021, 1-+3,	JUJP
	· · · · · · · · · · · · · · · · · · ·		PPPP	73	5-010	
	····					
			l			
	11 4 13	1314863-CCV1	В	34.8	1314863-CCB1,	<u> </u>
	<u> </u>				1	·····
	11 1 11 12	. 2 01.7 - 0.012	Dell Triling	10.0		
	11 9112	1214005- 2000	pppo	92.9		
	<u> </u>		ITTP -			
	<u> </u>					

#### LDC#: <u>30933C)</u> VALIDATION FINDINGS WORKSHEET **Field Duplicates**



N NA

METHOD: GC/MS VOA (EPA SW 846 Method 524.2) Y N NA Were field duplicate pairs identified in this SDG? Were target analytes detected in the field duplicate pairs?

	Concentra		
Compound	3	4	RPD
P	7.3	8.1	10
x	2.2	2.0	10
к	6.0	6.6	10
Т	6.4	6.7	5

	Concentra		
Compound	7	8	RPD
к	0.93	0.91	2
l	0.21	0.22	5
QQQ	0.16	0.18	12
PPP	0.24	0.26	8
AA	0.90	0.89	1
S	8.0	8.1	1

V:\FIELD DUPLICATES\templates\30933C1.wpd

# Laboratory Data Consultants, Inc. Data Validation Report

Total Recoverable Chromium

Project/Site	Name:	NASA JP	L

Collection Date: October 29, 2013

LDC Report Date: December 13, 2013

Matrix: Water

Parameters:

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23495

# Sample Identification

EB-7-10/29/13 MW-11-5 MW-11-4 MW-11-3 MW-11-2 MW-11-1 MW-3-5 MW-3-5 MW-3-4 MW-3-3 MW-3-2 MW-3-1 EB-7-10/29/13MS EB-7-10/29/13DUP

#### Introduction

This data review covers 14 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for Total Recoverable 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 total recoverable chromium was found in the initial, continuing and preparation blanks.

### V. ICP Interference Check Sample (ICS) Analysis

ICP Interference check sample 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-7-10/29/13 was identified as an equipment blank. No total recoverable chromium was found.

# NASA JPL Total Recoverable Chromium - Data Qualification Summary - SDG 13-23495

No Sample Data Qualified in this SDG

NASA JPL

Total Recoverable Chromium - Laboratory Blank Data Qualification Summary - SDG 13-23495

No Sample Data Qualified in this SDG

LDC #: <u>30933A4</u>	VALIDATION COMPLETENESS WORKSHEET	Date: <u>(∂-1∂-</u> 13
SDG #: <u>13-23495</u>	Level III	Page: <u></u> of <u></u>
Laboratory: BC Laboratori	es, Inc.	Reviewer: MG
NETUOR TILLE		2nd Reviewer:

METHOD: Total Recoverable Chromium (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: 10 - 29 - 13
н.	ICP/MS Tune	A	
III.	Calibration	Α	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	2	not required
VI.	Matrix Spike Analysis	A	MS/MSD (SDG: 13-23598
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	2	not reviewed
Х.	Furnace Atomic Absorption QC	2	not utilized
XI.	ICP Serial Dilution	2	not performed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	Ą	
XIV.	Field Duplicates	N	
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

	- · · · · ·	
FR =	Equipment blank	

Validated Samples:

	<u></u>						
1	EB-7-10/29/13	11 J	MW-3-1	21		31	
2	MW-11-5	12	EB-7-10/29/13MS	22		32	
3	MW-11-4	13	EB-7-10/29/13MSD	23		33	
4	MW-11-3	14	EB-7-10/29/13DUP	24		34	
5	MW-11-2	15		25		35	
6	ری MW-11-1	16		26		36	
7	MW-3-5	17		27		37	
8	MW-3-4	18		28		38	
9	MVV-3-3	19		29 <sup>I</sup>	PBWI	39	
10	MW-3-2	20		30)	PBWJ	40	

Notes:\_

# LDC Report# 30933B4

# Laboratory Data Consultants, Inc. Data Validation Report

BC Laboratories, Inc.

Project/Site Name:	NASA JPL
r rojectoric Hame.	

Collection Date: October 30, 2013

LDC Report Date: December 13, 2013

Matrix: Water

Parameters: Total Recoverable Chromium

Validation Level: EPA Level III

Laboratory:

Sample Delivery Group (SDG): 13-23598

#### Sample Identification

MW-13 MW-8 DUPE-5-4Q13 MW-15 DUPE-6-4Q13 MW-7 MW-13MS MW-13MSD MW-13DUP

#### 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 200.8 for Total Recoverable 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 total recoverable chromium was found in the initial, continuing and preparation blanks.

# V. ICP Interference Check Sample (ICS) Analysis

ICP Interference check sample 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-8 and DUPE-5-4Q13 and samples MW-15 and DUPE-6-4Q13 were identified as field duplicates. No total recoverable chromium was detected in any of the samples with the following exceptions:

	Concentration (ug/L)		
Analyte	MW-8	DUPE-5-4Q13	RPD
Total recoverable chromium	2.4	2.1	13

### XV. Field Blanks

No field blanks were identified in this SDG.
### NASA JPL Total Recoverable Chromium - Data Qualification Summary - SDG 13-23598

No Sample Data Qualified in this SDG

NASA JPL

Total Recoverable Chromium - Laboratory Blank Data Qualification Summary - SDG 13-23598

No Sample Data Qualified in this SDG

11

Ι.	Technical holding times	A	Sampling dates: 10-30-13
11.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	7	not required
VI.	路 Matrix Spike Analysis	A	MS/MSD
VII.	Duplicate Sample Analysis	Â	9UD
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	not reviewed
Х.	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not performed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	D=2+3 $D=4+5$
xv	ہ Field Blanks	N	
Note:	A = Acceptable $\#$ = ND = Nd	o compound	s detected D = Duplicate

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

Level III

METHOD: Total Recoverable Chromium (EPA Method 200.8)

А

R = Rinsate

FB = Field blank

3-23598 Laboratory: BC Laboratories, Inc.

Validation Area

Notes:

30933B4W.wpd

Note:

Validated Samples:

all

MW-13

N = Not provided/applicable

water

SW = See worksheet

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

21

VALIDATION COMPLETENESS WORKSHEET

Comments

10-30-13

TB = Trip blank

EB = Equipment blank

31

Date: 12-12-13 Page: [of Reviewer: MG 2nd Reviewer:

LDC #: 30933B4

LDC	<i>"</i>	
SDG	#:	1

#### VALIDATION FINDINGS WORKSHEET Field Duplicates



#### Method: Metals

	Concentration (ug/L)		RPD	
Analyte	2	3		
Chromium	2.4	2.1	13	

# Laboratory Data Consultants, Inc. Data Validation Report

LDC Report Date: December 13, 2013

Matrix: Water

Parameters: Total Recoverable Chromium

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23687

### Sample Identification

MW-6 MW-16-grab DUPE-7-4Q13 MW-1 MW-5 MW-10 DUPE-8-4Q13 MW-1MS MW-1MSD MW-1DUP

### 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 Total Recoverable 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 total recoverable chromium was found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Total recoverable chromium	0.50660 ug/L	MW-6 MW-16-grab DUPE-7-4Q13 MW-5 MW-10 DUPE-8-4Q13

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

## V. ICP Interference Check Sample (ICS) Analysis

ICP Interference check sample 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-16-grab and DUPE-7-4Q13 and samples MW-10 and DUPE-8-4Q13 were identified as field duplicates. No total recoverable chromium was detected in any of the samples with the following exceptions:

	Concent	ration (ug/L)		
Analyte	MW-16-grab	DUPE-7-4Q13	RPD	
Total recoverable chromium	260	180	36	

	Concent	ration (ug/L)		
Analyte	MW-10	DUPE-8-4Q13	RPD	
Total recoverable chromium	2.9	3.4	16	

# XV. Field Blanks

No field blanks were identified in this SDG.

### NASA JPL Total Recoverable Chromium - Data Qualification Summary - SDG 13-23687

No Sample Data Qualified in this SDG

NASA JPL

Total Recoverable Chromium - Laboratory Blank Data Qualification Summary - SDG 13-23687

No Sample Data Qualified in this SDG

LDC #: <u>30933C4</u>	VALIDATION COMPLETENESS WORKSHEET	Date: 12-12-13
SDG #: <u>13-23687</u>	Level III	Page:_/_of
Laboratory: BC Laboratories, I	<u>nc</u>	Reviewer: MG
		2nd Reviewer:

#### METHOD: Total Recoverable Chromium (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
١.	Technical holding times	A	Sampling dates: 10 - 31 - 13
11.	ICP/MS Tắne	A	
111.	Calibration	Α	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	N	not required
VI.	Matrix Spike Analysis	Α	MS/MSD
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	Â	LCS
IX.	Internal Standard (ICP-MS)	N	not reviewed
Х.	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not performed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	รพ	D=2+3 $D=6+7$
xv	Field Blanks	N	

Note: A = Acceptable N = Not provided

N = Not provided/applicable SW = See worksheet ND = No compounds detected R = Rinsate

R = Rinsate FB = Field blank D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples:

	an ware						
1	MVV-6	11		21	31		
2	MW-16-grab	12		22	32		
3	DUPE-7-4Q13	13		23	33	· · · · · · · · · · · · · · · · ·	
4	MW-1	14		24	34		
5	MW-5	15		25	35		
6	MVV-10	16		26	36		
7	DUPE-8-4Q13	17		27	37		
8	MVV-1MS	18		28	38		
9	MW-1MSD	19		29	39		
10	MW-1DUP	20	PBW	30	40		
Note	lotes:						

#### LDC #: 30933C4

SDG #: See Cover

**METHOD:** Trace metals (EPA SW 864 Method 6010B/6020/7000) Sample Concentration units, unless otherwise noted: ug/L

#### VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES

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

Soil preparation factor applied: <u>NA</u> Associated Samples: <u>1-3,5-7 (>5x or ND)</u>

14										
Analyte	Maximum PB <sup>a</sup> (mg/Kg)	Maximum PB <sup>a</sup> (ug/L)	Maximum ICB/CCB <sup>a</sup> (ug/L)	Action Limit	No Qual's.					
Cr			0.50600	2.53						

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

#### VALIDATION FINDINGS WORKSHEET Field Duplicates

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

#### Method: Metals

	Concentra	tion (ug/L)	RPD	
Analyte	2	3		
Chromium	260	180	36	

#### VALIDATION FINDINGS WORKSHEET Field Duplicates



#### Method: Metals

	Concentra	ation (ug/L)	RPD	
Analyte	6	7		
Chromium	2.9	3.4	16	

### LDC Report# 30933A6

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	NASA JPL

Collection Da	ate <sup>.</sup>	October 29	2013
CONSCION DA	ale.		2013

LDC Report Date: December 13, 2013

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23495

### Sample Identification

EB-7-10/29/13 MW-11-5 MW-11-4 MW-11-3 MW-11-2 MW-11-1 MW-3-5 MW-3-4 MW-3-3 MW-3-2 MW-3-1 EB-7-10/29/13MS EB-7-10/29/13MSD EB-7-10/29/13DUP MW-11-1MS MW-11-1MSD MW-11-1DUP **MW-3-1MS** MW-3-1MSD MW-3-1DUP

### 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 300.0 for Chloride, Sulfate, and Nitrate as Nitrogen, EPA Method 314.0 for Perchlorate, EPA Method 353.2 for Nitrite as Nitrogen, EPA SW 846 Method 7196 for Hexavalent Chromium, and EPA Method 365.1 for Orthophosphate as P.

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	0.8246 ug/L	MW-3-3 MW-3-2 MW-3-1
PB (prep blank)	Orthophosphate as P	0.0050670 mg/L	MW-11-1
ІСВ/ССВ	Orthophosphate as P	0.0047010 mg/L	MW-11-1

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-3-3	Perchlorate	0.91 ug/L	0.91 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

No field duplicates were identified in this SDG.

#### XI. Field Blanks

Sample EB-7-10/29/13 was identified as an equipment blank. No contaminant concentrations were found.

# NASA JPL Wet Chemistry - Data Qualification Summary - SDG 13-23495

# No Sample Data Qualified in this SDG

### NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 13-23495

SDG	Sample	Analyte	Modified Final Concentration	A or P
13-23495	MW-3-3	Perchlorate	0.91U ug/L	A

LDC #: <u>30933A6</u>	VALIDATION COMPLETENESS WORKSHEET	Date: <u>///-</u>
SDG #: <u>13-23495</u>	Level III	Page:_/_of_
Laboratory: BC Laboratories.	Inc.	Reviewer: M
		-

2nd Reviewer:

2-13

METHOD: Chloride, Sulfate, Nitrate-N (EPA Method 300.0), Perchlorate (EPA Method 314.0), Nitrite-N (EPA Method 353.2), Hexavalent Chromium (EPA SW846 Method 7196), Orthophosphate-P (EPA Method 365.1)

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

	Validation Area		Comments
١.	Technical holding times	A	Sampling dates: 10 - 29 - 13
Ш	Initial calibration	A	
111.	Calibration verification	A	
١V	Blanks	SW	
V	Matrix Spike/Matrix Spike Duplicates	Α	MS/MSD
VI.	Duplicates	A	DUP # 17 POy-P OK by diff.
VII.	Laboratory control samples	Â	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
Х.	Field duplicates	ン	
	Field blanks	ND	EB=1

Note: A = Acceptable

N = Not provided/applicable 14 Jun

SW = See worksheet

Water

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

D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples: all

1	EB-7-10/29/13	11	MW-3-1	21	31
2	MW-11-5	12	EB-7-10/29/13MS	22	32
3	MW-11-4	13	EB-7-10/29/13MSD	23	33
4	MVV-11-3	14	EB-7-10/29/13DUP	24	34
5	MW-11-2	15	MW-11-1MS	25	35
6	MW-11-1	16	MW-11-1MSD	26	36
7	MW-3-5	17	MW-11-1DUP	27	37
8	MW-3-4	18	# 11 MS	28	38
9	MW-3-3	19	#11 MSD	291 PBW1	39
10	MW-3-2	20	#11 DUP	302 PBW2	40

Notes:

LDC #: 30933A6

### VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
$ \rightarrow 5,$		
, ,	1	$\frac{1}{2} \frac{1}{2} \frac{1}$
00		$pH$ TDS CLE NO NO SO PO ALK CN' NH TKN TOC CR $^{\circ}$ CIO
15-217		$p_{11}$ TDS CIT NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> TO <sub>4</sub> ALK CIT NH <sub>3</sub> THE TOC CIT (CIO <sub>4</sub> )
18-220		ph TDS CLE NO NO SO PO ALK CN NH TKN TOC $(\mathbb{R}^{6+})$ CIO
		pH TDS CLE NO. NO. SO, PO, ALK CN <sup>-</sup> NH, TKN TOC $CR^{6+}$ ClO.
		pH TDS CLE NO. NO. SO, PO, ALK CN <sup>-</sup> NH. TKN TOC $CR^{6+}$ ClO.
		ph TDS CLE NO. NO. SO, PO, ALK CN <sup>-</sup> NH, TKN TOC $CR^{5+}$ ClO.
		pH TDS CLE NO. NO. SO, PO, ALK CN <sup>2</sup> NH. TKN TOC $CR^{5+}$ ClO.
		ph TDS CLF NO, NO, SO, PO, ALK CN NH, TKN TOC $CR^{6+}$ ClO,
		pH TDS CI F NO <sub>2</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>2</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>2</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>2</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CiO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		ph TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		PH TDS CLE NO, NO, SO, PO, ALK CN' NH, TKN TOC CR6+ CIO,

Comments:\_

والمردية والمحاجر مراجر

METHODS.6

#### LDC #: <u>30933A6</u>

## VALIDATION FINDINGS WORKSHEET Blanks

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

#### METHOD: Inorganics, Method <u>See Cover</u>

Conc. units	s: <u>ug/L</u>				Assoc	iated Sample	s: <u> </u>	-11		· · ·	 
Analyte	Blank ID	Blank ID	Blank								
	PB	ICB/CCB (ug/L)	Action Limit	9							
CIO4		0.8246	4.123	0.91		1L-3					

Conc. units	s: <u>mg/L</u>	·			Assoc	iated San	nples:	<u>6 (&gt;5x)</u>	 	 	
Analyte	Blank ID	Blank ID	Blank						 ·····		
	РВ	ICB/CCB (mg/L)	Action Limit	No Qual.							
PO4-P	0.0050670	0.0047010	0.0253								

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".

V:\Mark\Blanks\30933A6.wpd

### LDC Report# 30933B6

# Laboratory Data Consultants, Inc. Data Validation Report

BC Laboratories, Inc.

Project/Site	Name:	NASA J	PL

Collection Date: October 30, 2013

LDC Report Date: December 13, 2013

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory:

Sample Delivery Group (SDG): 13-23598

# Sample Identification

MW-13 MW-8 DUPE-5-4Q13 MW-15 DUPE-6-4Q13 MW-7 MW-13MS MW-13MSD MW-13DUP

### 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 314.0 for Perchlorate, EPA Method 353.2 for Nitrite as Nitrogen, EPA SW 846 Method 7196 for Hexavalent Chromium, and EPA Method 365.1 for Orthophosphate as P.

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	0.81510 ug/L	MW-15 DUPE-6-4Q13 MW-7
ICB/CCB	Orthophosphate as P	0.0053910 mg/L	MW-13 MW-8 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 with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-8	Orthophosphate as P	0.0097 mg/L	0.0097U mg/L
MW-7	Orthophosphate as P	0.021 mg/L	0.021U mg/L

### V. Matrix Spike/Matrix Spike Duplicates

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

### VI. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. 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 DUPE-5-4Q13 and samples MW-15 and DUPE-6-4Q13 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce		
Analyte	MW-8	DUPE-5-4Q13	RPD
Perchlorate	71 ug/L	71 ug/L	0
Hexavalent chromium	0.0010 mg/L	0.0011 mg/L	10

### XI. Field Blanks

No field blanks were identified in this SDG.

# NASA JPL Wet Chemistry - Data Qualification Summary - SDG 13-23598

No Sample Data Qualified in this SDG

NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 13-23598

SDG	Sample	Analyte	Modified Final Concentration	A or P
13-23598	MW-8	Orthophosphate as P	0.0097U mg/L	A
13-23598	MW-7	Orthophosphate as P	0.021U mg/L	A

LDC #: <u>30933B6</u> VAL	IDATION COMPLETENESS WORKSHEET	Date: <u>12-12-</u> 13
SDG #: <u>13-23598</u>	Level III	Page:_/_of_/
Laboratory: <u>BC Laboratories, Inc.</u>		Reviewer: MG

2nd Reviewer:

METHOD: Chloride, Sulfate, Nitrate-N (EPA Method 300.0), Perchlorate (EPA Method 314.0), Nitrite-N (EPA Method 353.2), Hexavalent Chromium (EPA SW846 Method 7196), Orthophosphate-P (EPA Method 365.1)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10 - 30 - 13
11	Initial calibration	A	
111.	Calibration verification	A	
١V	Blanks	SW	
v	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
VI.	Duplicates	A	90 <i>0</i>
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
Х.	Field duplicates	SW	$D = 2 + 3$ $D = 4^{+} 5^{+}$
L	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: ail

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

Notes:

P

# LDC # 30933B6

### VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1.2.6	W	pH TDS (CI)F NO, NO, SO, PO, ALK CN NH, TKN TOC (CR. CIO,
3→5	1	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR CIO
QC 7-79		ph tds ci f NO <sub>3</sub> $(0)$ SO <sub>4</sub> $(0)$ ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $(CR^6)$ $(0)$
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN $NH_3$ TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
	·····	pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK $CN^-$ NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		PH TDS CLE NO, NO, SO, PO, ALK CN' NH, TKN TOC CR <sup>6+</sup> CIO,

Comments:

. . . . . . . . . .

#### LDC #: 30933B6

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

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

#### METHOD: Inorganics, Method See Cover

Conc. units	s: <u>ug/L</u>				Associated S	amples: <u>4-</u>	<u>6 (&gt;5x or N</u>	ND)		 
Analyte	Blank ID	Blank ID	Blank				- ut-			 
	PB	ICB/CCB (ug/L)	Action Limit	No Qual's.						
CIO4		0.81510	4.076							

Conc. units	onc. units:mg/L Associated Samples:1,2,6										
Analyte	Blank ID	Blank ID	Blank						· · ·	 	
	РВ	ICB/CCB (mg/L)	Action Limit	2	6						
PO4-P		0.0053910	0.0270	0.0097	0.021						

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".

#### VALIDATION FINDINGS WORKSHEET Field Duplicates

### Method: Inorganics (see cover)

	Page: $\_of \_$	
	Reviewer: MG	/
2nd	Reviewer:	

Annahata	Concentra	tion (ug/L)	RPD	
Analyte	2	3		
Perchlorate	71	71	0	
Hexavalent Chromium (mg/L)	0.0010	0.0011	10	

## LDC Report# 30933C6

# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: NASA	JPL
-------------------------	-----

Collection Date: October 31, 2013

LDC Report Date: December 16, 2013

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory: BC Laboratories, Inc.

Sample Delivery Group (SDG): 13-23687

### Sample Identification

MW-6 MW-16-grab DUPE-7-4Q13 MW-1 MW-5 MW-10 DUPE-8-4Q13 MW-16-grabMS MW-16-grabMSD MW-16-grabDUP MW-16-grabDUP MW-1MS MW-1MSD MW-1DUP

### 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 300.0 for Chloride, Sulfate, and Nitrate as Nitrogen, EPA Method 314.0 for Perchlorate, EPA Method 353.2 for Nitrite as Nitrogen, EPA SW 846 Method 7196 for Hexavalent Chromium, and EPA Method 365.1 for Orthophosphate as Phosphorus.

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

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

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

The following are definitions of the data qualifiers:

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

## I. Technical Holding Times

All technical holding time requirements were met.

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

### II. Initial Calibration

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

### III. Continuing Calibration

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

### IV. Blanks

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

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Orthophosphate as P	0.0049970 mg/L	MW-16-grab
ICB/CCB	Chloride Orthophosphate as P	0.1292 mg/L 0.0051390 mg/L	MW-16-grab
PB (prep blank)	Hexavalent chromium	0.0010440 mg/L	All samples in SDG 13-23687

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-6	Hexavalent chromium	0.0014 mg/L	0.0014U mg/L
MW-10	Hexavalent chromium	0.0014 mg/L	0.0014U mg/L
DUPE-8-4Q13	Hexavalent chromium	0.0014 mg/L	0.0014U mg/L

## V. Matrix Spike/Matrix Spike Duplicates

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
MW-16-grabMS/MSD (MW-16-grab)	Nitrite as N	78.8 (90-110)	78.4 (90-110)	-	J (all detects) UJ (all non-detects)	A

### VI. Duplicates

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

### VII. Laboratory Control Samples

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

### VIII. Sample Result Verification

Raw data were not reviewed for this SDG.

### IX. Overall Assessment of Data

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

### X. Field Duplicates

Samples MW-16-grab and DUPE-7-4Q13 and samples MW-10 and DUPE-8-4Q13 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concentr		
Analyte	MW-16-grab	DUPE-7-4Q13	RPD
Hexavalent chromium	0.014	0.014	0

	Conce		
Analyte	MW-10	DUPE-8-4Q13	RPD
Perchlorate	6.4 ug/L	6.4 ug/L	0

	Conce		
Analyte	MW-10	DUPE-8-4Q13	RPD
Hexavalent chromium	0.0014 mg/L	0.0014 mg/L	0

# XI. Field Blanks

No field blanks were identified in this SDG.

## NASA JPL Wet Chemistry - Data Qualification Summary - SDG 13-23687

SDG	Sample	Analyte	Flag	A or P	Reason
13-23687	MW-16-grab	Nitrite as N	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

# NASA JPL Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 13-23687

SDG	Sample	Analyte	Modified Final Concentration	A or P
13-23687	MW-6	Hexavalent chromium	0.0014U mg/L	A
13-23687	MW-10	Hexavalent chromium	0.0014U mg/L	A
13-23687	DUPE-8-4Q13	Hexavalent chromium	0.0014U mg/L	A
LDC #: <u>30933C6</u>	VALIDATION COMPLETENESS WORKSHEET	Date: 12-12-13		
---------------------------------	-----------------------------------	---------------------		
SDG #: <u>13-23687</u>	Level III	Page: <u> </u>		
Laboratory: BC Laboratories, In	<u>C.</u>	Reviewer: <u>MG</u>		

2nd Reviewer:

METHOD: Chloride, Sulfate, Nitrate-N (EPA Method 300.0), Perchlorate (EPA Method 314.0), Nitrite-N (EPA Method 353.2), Hexavalent Chromium (EPA SW846 Method 7196), Orthophosphate-P (EPA Method 365.1)

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 10 - 31 - 13
11	Initial calibration	A	
111.	Calibration verification	A	
١٧	Blanks	SW	
v	Matrix Spike/Matrix Spike Duplicates	SW	MS/MSD
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
ίΧ.	Overall assessment of data	A	
Х.	Field duplicates	SW	D = 2 + 3 $D = 6 + 7$
XI	Field blanks	N	

Note:

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

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

D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples: all

	<u>ail water</u>						
1	MVV-6	11	MW-1MS	21		31	
2	MW-16-grab <sup>®</sup>	12	MW-1MSD	22		32	
3	DUPE-7-4Q13	13	MW-1DUP	23		33	
4	MVV-1	14		24		34	
5	MVV-5	15		25		35	
6	MVV-10	16		26		36	
7	DUPE-8-4Q13	17	· · · · · · · · · · · · · · · · · · ·	27		37	
8	MW-16-grabMS	18		28		38	
9	MW-16-grabMSD	19		29		39	
10	MW-16-grabDUP	20		30	PBW	40	

Notes:

i

# LDC #: 30933C6

## VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: <u>l\_of</u> Reviewer: <u>MG</u> 2nd reviewer: <u>\</u>

All circled methods are applicable to each sample.

		Durante
Sample ID	Matrix	Parameter
1,3→7		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC(CR <sup>6</sup> )(ClO <sub>4</sub> )
2		pH TDS (CI) F (NO) (NO) (O) FO) ALK CN NH3 TKN TOC (CR) (O)
Qc 8→10		ph TDS CI F NO <sub>3</sub> NO <sub>3</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
↓11→13		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}CO_4$
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ ClO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC $CR^{6+}$ CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN <sup>-</sup> NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH TDS CI F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN NH <sub>3</sub> TKN TOC CR <sup>6+</sup> CIO <sub>4</sub>
		pH_TDS_CL_F_NONOSOPOALK_CNNHTKN_TOC_CR6+_CIO_

Comments:

#### LDC #: 30933C6

## VALIDATION FINDINGS WORKSHEET Blanks

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

### METHOD: Inorganics, Method See Cover

PΒ

ICB/CCB

(mg/L)

Conc. units	<u>s:mg/L</u>				Ass	ociated Sa	mples:	<u>2 (&gt;5x)</u>		 	
Analyte	Blank ID	Blank ID	Blank		-					 	
	РВ	ICB/CCB (mg/L)	Action Limit	No Qual.	=						
CI		0.1292	0.96								
PO4-P	0.0049970	0.0051390	0.0257								
Conc. units: mg/L Associated Samples: all											
Analyte	Blank ID	Blank ID	Blank								 
	4 <b></b>	· · · · · · · · · · · · · · · · · · ·	Action Limit							Г	

7

Cr VI	0.0010440	0.00522	0.0014	0.0014	0.0014			

7

6

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".

1



#### VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates



METHOD: Inorganics, EPA Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". (Y) N/A Was a matrix spike analyzed for each matrix in this SDG? (90-110)

Y N/A Was a matrix spike analyzed for each matrix in this SDG? 90-110

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

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

LEVEL IV ONLY:

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

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
$\lceil$	8/9	Water	NO2-N	78.8	78.4		2	J/UJ/A
L								
┝		<u> </u>	· · · · · · · · · · · · · · · · · · ·					
┝								·····
-								
	·							
$\parallel$	<u> </u>				ļ			
╟─								
╟								
								······································

Comments:

#### VALIDATION FINDINGS WORKSHEET Field Duplicates



Method: Inorganics (see cover)

	Concentra	tion (mg/L)	RPD	
Analyte	2	3		
Hexavalent Chromium	0.014	0.014	0	

#### VALIDATION FINDINGS WORKSHEET Field Duplicates



Method: Inorganics (see cover)

	Concentr	ation (ug/L)	RPD	
Analyte	6	7		
Perchlorate	6.4	6.4	0	
Hexavalent Chromium (mg/L)	0.0014	0.0014	0	