NASA JPL
Data Validation Reports
LDC# 11181

Wet Chemistry

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NASA JPL

Collection Date: October 23, 2003

LDC Report Date: December 1, 2003

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-5792

Sample Identification

Dupe-4-4Q03**
EB-2-10-23-03
MW-12-1
MW-12-2
MW-12-3
MW-12-4
MW-12-5
MW-23-1
MW-23-2
MW-23-3
MW-23-4
MW-23-5
MW-23-2MS
MW-23-2MSD

**Indicates sample underwent EPA Level IV review

Introduction

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

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification is provided at the end of this report. 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.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by 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.

N Presumptive evidence of presence of the constituent.

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. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
10/23/03	CCV2	Perchlorate	113 (90-110)	MW-23-2 MW-23-2MS MW-23-2MSD	J (all detects)	P
10/23/03	CCV1	Perchlorate	112 (90-110)	MB1	J (all detects)	P
10/23/03	CCV3	Perchlorate	113 (90-110)	Dupe-4-4Q03** EB-2-10-23-03 MW-12-1 MW-12-2 MW-12-3 MW-12-4 MW-12-5	J (all detects)	P
10/28/03	CCV1	Perchlorate	111 (90-110)	MW-23-1 MW-23-3 MW-23-4 MW-23-5 MB2	J (all detects)	P

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the method blanks.

IV. 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.

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

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

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

Samples Dupe-4-4Q03** and MW-12-1 were identified as field duplicates. No contaminant concentrations were detected in any of the samples.

X. Field Blanks

Sample EB-2-10-23-03 was identified as an equipment blank. No contaminant concentrations were found in this blank.

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-5792

SDG	Sample	Analyte	Flag	A or P	Reason
03-5792	MW-23-2 Dupe-4-4Q03** EB-2-10-23-03 MW-12-1 MW-12-2 MW-12-3 MW-12-4 MW-12-5 MW-23-1 MW-23-3 MW-23-4 MW-23-5	Perchlorate	J (all detects)	P	Calibration verification (%R)

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-5792

No Sample Data Qualified in this SDG

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

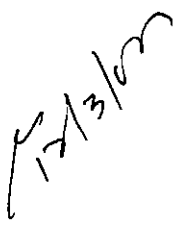
Client Name: GEOFON, Inc. Project No: 04.4428.10 Anal. Method 7196
Project ID: JPL Service ID: 35792 Collected by: JR

Component Name: Chromium (VI)
CAS No: 1333-82-0

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5792-1	DUPE-4-4-Q03	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-2	EB-2-10-23-03	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-3	MW-12-1	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-4	MW-12-2	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-5	MW-12-3	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-6	MW-12-4	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-7	MW-12-5	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-8	MW-23-1	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-9	MW-23-2	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-10	MW-23-3	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-11	MW-23-4	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03-5792-12	MW-23-5	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U
03W4950-MB-01	03W4950-MB-01	Water	10/23/03	10/23/03	10/23/03	03W4950	mg/L	0.01	<0.01	U

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: Q - Qualifier.
Qualifier: U - Not Detected or less than MDL
B - Less than RL (PQL, EQL or CRDL), but greater than MDL.



Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name: GEOFON, Inc. Project No: 04.4428.10 Anal. Method 314.0
Project ID: JPL Service ID: 35792 Collected by: JR

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5792-1	DUPE-4-4-Q03	Water	10/23/03	10/23/03	10/23/03	03W4946	µg/L	4	<4	U
03-5792-2	EB-2-10-23-03	Water	10/23/03	10/23/03	10/23/03	03W4946	µg/L	4	<4	U
03-5792-3	MW-12-1	Water	10/23/03	10/23/03	10/23/03	03W4946	µg/L	4	<4	U
03-5792-4	MW-12-2	Water	10/23/03	10/23/03	10/23/03	03W4946	µg/L	4	<4	U
03-5792-5	MW-12-3	Water	10/23/03	10/23/03	10/23/03	03W4946	µg/L	4	<4	U
03-5792-6	MW-12-4	Water	10/23/03	10/23/03	10/23/03	03W4946	µg/L	4	3.8	B J
03-5792-7	MW-12-5	Water	10/23/03	10/23/03	10/23/03	03W4946	µg/L	4	<4	U
03-5792-8	MW-23-1	Water	10/23/03	10/23/03	10/28/03	03W4973	µg/L	4	3.1	B J
03-5792-9	MW-23-2	Water	10/23/03	10/23/03	10/23/03	03W4946	µg/L	4	5.4	J
03-5792-10	MW-23-3	Water	10/23/03	10/23/03	10/28/03	03W4973	µg/L	4	<4	U
03-5792-11	MW-23-4	Water	10/23/03	10/23/03	10/28/03	03W4973	µg/L	4	<4	U
03-5792-12	MW-23-5	Water	10/23/03	10/23/03	10/28/03	03W4973	µg/L	4	<4	U
03W4946-MB-01	03W4946-MB-01	Water	10/24/03	10/24/03	10/24/03	03W4946	µg/L	4	<4	U
03W4973-MB-01	03W4973-MB-01	Water	10/28/03	10/28/03	10/28/03	03W4973	µg/L	4	<4	U

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: Q - Qualifier.
Qualifier: U - Not Detected or less than MDL
B - Less than RL (PQL, EQL or CRDL), but greater than MDL.

12/3/03

LDC #: 11181A6
SDG #: 03-5792
Laboratory: Applied P & Ch Laboratory

VALIDATION COMPLETENESS WORKSHEET
Level III/IV

Date: 11/26/07
Page: 1 of 1
Reviewer: MB
2nd Reviewer: [signature]

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

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: 10/23/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	SW	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	3MS/MSD
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	A	Not reviewed for Level III validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	ND	(1,3)
X.	Field blanks	ND	EB22

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	DUP-4-4Q03**	11	MW-23-4	21		31	
2	EB-2-10-23-03	12	MW-23-5	22		32	
3	MW-12-1	13	MW-23-2MS	23		33	
4	MW-12-2	14	MW-23-2MSD	24		34	
5	MW-12-3	15	LCS	25		35	
6	MW-12-4	16	MB	26		36	
7	MW-12-5	17		27		37	
8	MW-23-1	18		28		38	
9	MW-23-2	19		29		39	
10	MW-23-3	20		30		40	

Notes:

LDC #: 1118/186
SDG #: 63-5792

VALIDATION FINDINGS CHECKLIST

Reviewer: MIA
2nd Reviewer: [illegible]

Method: Inorganics (EPA Method See cont

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

LDC #: 11181 B6
SDG #: 03-0792

VALIDATION FINDINGS CHECKLIST

Reviewer: MB
2nd Reviewer:

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

LDC #: 11187M6
SDG #: 03-8492

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Reviewer: MH
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter
1-12	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC (CR^{6+}) clay
0C13,14	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC (CR^{6+}) clay
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:

LDC #: 1481A6
SDG #: 038492

VALIDATION FINDINGS WORKSHEET
Calibration

Page: 1 of 1
Reviewer: MW
2nd Reviewer: A

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 N/A Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?
Y N N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ?
Y N N/A Are all correlation coefficients ≥0.995 ?

LEVEL IV/D ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations.
Y N N/A Was a balance check conducted prior to the TDS analysis.?
Y N N/A Was the titrant normality checked?

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualifications
1	10/23/03	CCV2	CeO4	113	9, 13, 14	J det /P
2	10/23/03	CCV1	CeO4	112	MB1	
3	10/23/03	CCV3	CeO4	113	1-7	
4	10/28/03	CCV1	CeO4	111	8, 10-12, MB2	

Comments:

CAL.6

LDC #: 11187B6
SDG #: 03-8792

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: MH
2nd Reviewer:

METHOD: Inorganics, Method See cover

The correlation coefficient (r) for the calibration of Cd04 was recalculated. Calibration date: 3/12/03

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

%R = Found x 100 / True

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

Type of Analysis	Analyte		Conc. (ug/L) (units)	Area (units)	Recalculated r or %R	Reported r or %R	Acceptable (Y/N)
Initial calibration	Cd04	Blank	0	0	r=0.999682	r=0.999492	Y
Calibration verification		Standard 1	2	2910			
		Standard 2	10	16917			
		Standard 3	25	40902			
		Standard 4	50	83240			
		Standard 5	75	126274			
		Standard 6	100	171686			
		Standard 7					
Calibration verification ccv	Cd04	50	46.7		113	113	Y
Calibration verification ccv	Cd04	0.25	0.249		100	100	↓
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 #: 11187 B6
SDG #: 03-5992

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: MH
2nd Reviewer: [signature]

METHOD: Inorganics, Method hex cover

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

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

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

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

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

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

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	cadmium	26.56	25	106	106	Y
13	Matrix spike sample	lead	(SSR-SR) 0.242	0.25	97	97	↓
13|14	Duplicate sample	cadmium	34.1	33.9	1	1	↓

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

LDC #: W18186
SDG #: 03-8792

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: MH
2nd reviewer: [signature]

METHOD: Inorganics, Method See cover

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

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

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

Concentration = Recalculation: ND

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

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NASA JPL

Collection Date: October 24, 2003

LDC Report Date: December 1, 2003

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-5827

Sample Identification

DUPE-6-4-Q03**
MW-20-1
MW-20-2
MW-20-3
MW-20-4
MW-20-5
EB-3-10-24-03
DUPE-6-4-Q03MS
DUPE-6-4-Q03MSD
MW-20-2MS
MW-20-2MSD

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 11 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 314.0 for Perchlorate and EPA SW 846 Method 7196A for Hexavalent Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification is provided at the end of this report. 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.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by 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.

N Presumptive evidence of presence of the constituent.

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. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
10/28/03	CCV1	Perchlorate	111 (90-110)	MB	J (all detects)	P
10/28/03	CCV2	Perchlorate	114 (90-110)	DUPE-6-4-Q03** MW-20-1 MW-20-2 MW-20-3 MW-20-4 MW-20-5 EB-3-10-24-03	J (all detects)	P
10/28/03	CCV3	Perchlorate	116 (90-110)	MW-20-2MS MW-20-2MSD	J (all detects)	P

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the method blanks.

IV. 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.

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

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

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

Samples DUPE-6-4-Q03** and MW-20-2 were identified as field duplicates. No contaminant concentrations were detected in any of the samples.

X. Field Blanks

Sample EB-3-10-24-03 was identified as an equipment blank. No contaminant concentrations were found in this blank.

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-5827

SDG	Sample	Analyte	Flag	A or P	Reason
03-5827	DUPE-6-4-Q03** MW-20-1 MW-20-2 MW-20-3 MW-20-4 MW-20-5 EB-3-10-24-03	Perchlorate	J (all detects)	P	Calibration verification (%R)

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-5827

No Sample Data Qualified in this SDG

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

Client Name: GEOFON, Inc.
Project ID: JPL

Project No: 04-4428.10
Service ID: 35827

Anal. Method 7196
Collected by: J.Robinson

Component Name: Chromium (VI)
CAS No: 1333-82-0

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5827-1	DUPE-6-4-Q03	Water	10/24/03	10/24/03	10/24/03	03W4965	mg/L	0.01	<0.01	U
03-5827-2	MW-20-1	Water	10/24/03	10/24/03	10/24/03	03W4965	mg/L	0.01	<0.01	U
03-5827-3	MW-20-2	Water	10/24/03	10/24/03	10/24/03	03W4965	mg/L	0.01	<0.01	U
03-5827-4	MW-20-3	Water	10/24/03	10/24/03	10/24/03	03W4965	mg/L	0.01	<0.01	U
03-5827-5	MW-20-4	Water	10/24/03	10/24/03	10/24/03	03W4965	mg/L	0.01	<0.01	U
03-5827-6	MW-20-5	Water	10/24/03	10/24/03	10/24/03	03W4965	mg/L	0.01	<0.01	U
03-5827-8	EB-3-10-24-03	Water	10/24/03	10/24/03	10/24/03	03W4965	mg/L	0.01	<0.01	U
03W4965-MB-01	03W4965-MB-01	Water	10/24/03	10/24/03	10/24/03	03W4965	mg/L	0.01	<0.01	U

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

B - Less than RL (PQL, EQL or CRDL), but greater than MDL.

11/3/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name: GEOFON, Inc.
Project ID: JPL

Project No: 04-4428.10
Service ID: 35827

Anal. Method 314.0
Collected by: J.Robinson

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5827-1	DUPE-6-4-Q03	Water	10/24/03	10/24/03	10/28/03	03W4973	µg/L	4	<4	U
03-5827-2	MW-20-1	Water	10/24/03	10/24/03	10/28/03	03W4973	µg/L	4	4.1	J
03-5827-3	MW-20-2	Water	10/24/03	10/24/03	10/28/03	03W4973	µg/L	4	<4	U
03-5827-4	MW-20-3	Water	10/24/03	10/24/03	10/28/03	03W4973	µg/L	4	<4	U
03-5827-5	MW-20-4	Water	10/24/03	10/24/03	10/28/03	03W4973	µg/L	4	<4	U
03-5827-6	MW-20-5	Water	10/24/03	10/24/03	10/28/03	03W4973	µg/L	4	<4	U
03-5827-8	EB-3-10-24-03	Water	10/24/03	10/24/03	10/28/03	03W4973	µg/L	4	<4	U
03W4973-MB-01	03W4973-MB-01	Water	10/28/03	10/28/03	10/28/03	03W4973	µg/L	4	<4	U

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: Q - Qualifier.
Qualifier: U - Not Detected or less than MDL
B - Less than RL (PQL, EQL or CRDL), but greater than MDL.

12/3/03

LDC #: 11181B6
SDG #: 03-5827
Laboratory: Applied P & Ch Laboratory

VALIDATION COMPLETENESS WORKSHEET
Level III/IV

Date: 4/30/03
Page: 1 of 1
Reviewer: MB
2nd Reviewer:

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

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: 10/24/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	SW	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	3 MS/MSD
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	A	Not reviewed for Level III validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	ND	(1, 3)
X	Field blanks	ND	EB=7

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

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

RO

1	UPE Dupe-6-4-Q03**	11	MW-20-2MSD	21		31	
2	MW-20-1	12	MB	22		32	
3	MW-20-2	13		23		33	
4	MW-20-3	14		24		34	
5	MW-20-4	15		25		35	
6	MW-20-5	16		26		36	
7	EB-3-10-24-03	17		27		37	
8	UPE Dupe-6-4-Q03MS	18		28		38	
9	Dupe-6-4-Q03MSD	19		29		39	
10	MW-20-2MS	20		30		40	

Notes:

LDC #: 1118/B6
SDG #: 03-5927

VALIDATION FINDINGS CHECKLIST

Reviewer: MIZ
2nd Reviewer: A

Method: Inorganics (EPA Method See cover

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

LDC #: 1118B6
SDG #: 03-5827

VALIDATION FINDINGS CHECKLIST

Reviewer: MR
2nd Reviewer: A

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

LDC #: 11181B6
SDG #: 03-5827

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: [illegible]

All circled methods are applicable to each sample.

Sample ID	Parameter
1-7	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC (circled: CR^{6+}) (circled: ClO_4) ____ ____ ____
8, 9	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC (circled: CR^{6+}) ____ ____ ____ ____
10, 11	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} (circled: ClO_4) ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments: ______________________________

LDC #: 11181B6
SDG #: 03-5827

VALIDATION FINDINGS WORKSHEET
Calibration

Page: 1 of 1
Reviewer: MH
2nd Reviewer: [illegible]

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 N/A Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?
Y N N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ?
Y N N/A Are all correlation coefficients ≥0.995 ?

LEVEL IV/D ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations.
Y N N/A Was a balance check conducted prior to the TDS analysis.?
Y N N/A Was the titrant normality checked?

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualifications
1	10/28/03	CCV1	CO4	111	MB	J Lt /P
2	10/28/03	CCV2	CO4	114	1-7	↓
3	10/28/03	CCV3	CO4	116	10, 11	↓

Comments:

CAL.6

LDC #: 11187 Bb
SDG #: 03-0827

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: MH
2nd Reviewer: [signature]

METHOD: Inorganics, Method See cover

The correlation coefficient (r) for the calibration of Cr6+ was recalculated. Calibration date: 9/28/03

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

%R = Found x 100 / True

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

Type of Analysis	Analyte		Conc. (mg/L) (units)	Abs (units)	Recalculated r or %R	Reported r or %R	Acceptable (Y/N)
Initial calibration	Cr6+	Blank	0	0	r=0.9999	r=0.9999	Y
Calibration verification		Standard 1	0.0125	0.007			
		Standard 2	0.025	0.017			
		Standard 3	0.125	0.107			
		Standard 4	0.250	0.212			
		Standard 5	0.50	0.420			
		Standard 6					
		Standard 7					
Calibration verification CCV	CE04	50	56.98		114	114	Y
Calibration verification CCV	Cr6+	0.25	0.234		94	94	Y
Calibration verification							

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

LDC #: 11187B6
SDG #: 03-5827

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MH
2nd Reviewer: A

METHOD: Inorganics, Method ICP see cover

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

%R = Found / True x 100 Where,

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

True = concentration of each analyte in the source.

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

RPD = |S-D| / (S+D)/2 x 100 Where,

S = Original sample concentration

D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Cr6+	0.253	0.25	101	101	Y
MS 10	Matrix spike sample	Cr6+	(SSR-SR) 28.0	25	112	112	Y
DUP 9	Duplicate sample	Cr6+	0.226	0.230	2	2	Y

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 #: 14187B6
SDG #: 03-8827

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

METHOD: Inorganics, Method See cover

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

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

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

Concentration = Recalculation:

ND

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

Note: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NASA JPL

Collection Date: October 27, 2003

LDC Report Date: December 1, 2003

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III & IV

Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-5835

Sample Identification

DUPE-3-4-Q03**
EB-4-10-27-03
MW-4-1
MW-4-2
MW-4-3
MW-4-4
MW-4-5
DUPE-3-4-Q03MS
DUPE-3-4-Q03MSD

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 314.0 for Perchlorate and EPA SW 846 Method 7196A for Hexavalent Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification is provided at the end of this report. 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.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by 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.

N Presumptive evidence of presence of the constituent.

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. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
10/28/03	CCV1	Perchlorate	111 (90-110)	MB	J (all detects)	P
10/28/03	CCV2	Perchlorate	114 (90-110)	DUPE-3-4-Q03** EB-4-10-27-03	J (all detects)	P
10/28/03	CCV3	Perchlorate	116 (90-110)	MW-4-1 MW-4-2 MW-4-3 MW-4-4 MW-4-5	J (all detects)	P

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the method blanks.

IV. 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.

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

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

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

Samples DUPE-3-4-Q03** and MW-4-5 were identified as field duplicates. No contaminant concentrations were detected in any of the samples.

X. Field Blanks

Sample EB-4-10-27-03 was identified as an equipment blank. No contaminant concentrations were found in this blank.

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-5835

SDG	Sample	Analyte	Flag	A or P	Reason
03-5835	DUPE-3-4-Q03** EB-4-10-27-03 MW-4-1 MW-4-2 MW-4-3 MW-4-4 MW-4-5	Perchlorate	J (all detects)	P	Calibration verification (%R)

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-5835

No Sample Data Qualified in this SDG

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

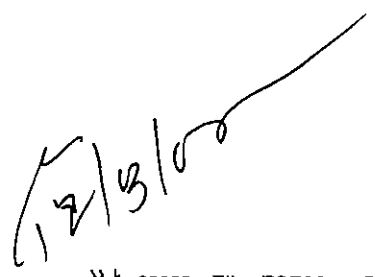
Client Name:	GEOFON, Inc.	Project No:	04-4428-10	Anal. Method	7196
Project ID:	JPL	Service ID:	35835	Collected by:	JR

Component Name: Chromium (VI)
CAS No: 1333-82-0

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5835-1	DUPE-3-4-Q03	Water	10/27/03	10/27/03	10/27/03	03W4971	mg/L	0.01	<0.01	U
03-5835-2	EB-4-10-27-03	Water	10/27/03	10/27/03	10/27/03	03W4971	mg/L	0.01	<0.01	U
03-5835-3	MW-4-1	Water	10/27/03	10/27/03	10/27/03	03W4971	mg/L	0.01	<0.01	U
03-5835-4	MW-4-2	Water	10/27/03	10/27/03	10/27/03	03W4971	mg/L	0.01	<0.01	U
03-5835-5	MW-4-3	Water	10/27/03	10/27/03	10/27/03	03W4971	mg/L	0.01	<0.01	U
03-5835-6	MW-4-4	Water	10/27/03	10/27/03	10/27/03	03W4971	mg/L	0.01	<0.01	U
03-5835-7	MW-4-5	Water	10/27/03	10/27/03	10/27/03	03W4971	mg/L	0.01	<0.01	U
03W4971-MB-01	03W4971-MB-01	Water	10/27/03	10/27/03	10/27/03	03W4971	mg/L	0.01	<0.01	U

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: Q - Qualifier.
Qualifier: U - Not Detected or less than MDL
B - Less than RL (PQL, EQL or CRDL), but greater than MDL.



Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name:	GEOFON, Inc.	Project No:	04-4428-10	Anal. Method	314.0
Project ID:	JPL	Service ID:	35835	Collected by:	JR

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5835-1	DUPE-3-4-Q03	Water	10/27/03	10/27/03	10/28/03	03W4973	µg/L	4	<4	U
03-5835-2	EB-4-10-27-03	Water	10/27/03	10/27/03	10/28/03	03W4973	µg/L	4	<4	U
03-5835-3	MW-4-1	Water	10/27/03	10/27/03	10/28/03	03W4973	µg/L	4	<4	U
03-5835-4	MW-4-2	Water	10/27/03	10/27/03	10/28/03	03W4973	µg/L	4	4.3	J
03-5835-5	MW-4-3	Water	10/27/03	10/27/03	10/28/03	03W4973	µg/L	4	<4	U
03-5835-6	MW-4-4	Water	10/27/03	10/27/03	10/28/03	03W4973	µg/L	4	<4	U
03-5835-7	MW-4-5	Water	10/27/03	10/27/03	10/28/03	03W4973	µg/L	4	<4	U
03W4973-MB-01	03W4973-MB-01	Water	10/28/03	10/28/03	10/28/03	03W4973	µg/L	4	<4	U

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: Q - Qualifier.
Qualifier: U - Not Detected or less than MDL
B - Less than RL (PQL, EQL or CRDL), but greater than MDL.

LDC #: 11181C6
SDG #: 03-5835
Laboratory: Applied P & Ch Laboratory

VALIDATION COMPLETENESS WORKSHEET
Level III/IV

Date: 11/20/03
Page: 1 of 1
Reviewer: MW
2nd Reviewer: A

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

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: 10/27/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	SW	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	3 MS/MSD
V	Duplicates	A	
VI.	Laboratory control samples	A	
VII.	Sample result verification	A	Not reviewed for Level III validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	ND	(1,7)
X	Field blanks	ND	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	Dupe-3-4-Q03**	11		21		31	
2	EB-4-10-27-03	12		22		32	
3	MW-4-1	13		23		33	
4	MW-4-2	14		24		34	
5	MW-4-3	15		25		35	
6	MW-4-4	16		26		36	
7	MW-4-5	17		27		37	
8	Dupe-3-4-Q03MS	18		28		38	
9	Dupe-3-4-Q03MSD	19		29		39	
10	MB	20		30		40	

Notes:

LDC #: 1118/06
SDG #: 63-5835

VALIDATION FINDINGS CHECKLIST

Reviewer: MH
2nd Reviewer: A

Method: Inorganics (EPA Method See comment)

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

LDC #: 11806
SDG #: 03-5835

VALIDATION FINDINGS CHECKLIST

Reviewer: MB
2nd Reviewer:

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

LDC #: 11181C6
SDG #: 03-5838

VALIDATION FINDINGS WORKSHEET

Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: [illegible]

All circled methods are applicable to each sample.

Sample ID	Parameter
1-7	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC (CR^{6+}) (ClO_4) ____ ____ ____
8,9	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC (CR^{6+}) ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:

LDC #: 11181c6
SDG #: 03-1835

VALIDATION FINDINGS WORKSHEET
Calibration

Page: 1 of 1
Reviewer: MH
2nd Reviewer: [signature]

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 N/A Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?
Y (N) N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ?
(Y) N N/A Are all correlation coefficients ≥0.995 ?

LEVEL IV/D ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations.
Y N (N/A) Was a balance check conducted prior to the TDS analysis.?
Y N (N/A) Was the titrant normality checked?

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualifications
1	10/28/03	ccv1	ceo4	111	MB	J bti/p
2	↓	ccv2	↓	114	1-2	↓
3	↓	ccv3	↓	116	3-7	

Comments:

LDC #: 11181C6
SDG #: 03-18835

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: MH
2nd Reviewer: A

METHOD: Inorganics, Method See cover

The correlation coefficient (r) for the calibration of CrVI was recalculated. Calibration date: 7/28/03

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

%R = Found x 100 / True

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

Type of Analysis	Analyte		Conc. (ug/L) (units)	Abs (units)	Recalculated r or %R	Reported r or %R	Acceptable (Y/N)
Initial calibration	CrVI	Blank	0	0	r=0.9999	r=0.9999	Y
Calibration verification		Standard 1	0.0125	0.007			
		Standard 2	0.025	0.017			
		Standard 3	0.125	0.107			
		Standard 4	0.250	0.212			
		Standard 5	0.50	0.420			
		Standard 6					
		Standard 7					
Calibration verification ICV	CrVI	0.25	0.248		99	99	Y
Calibration verification CCV	CrVI	50	57.27		115	114	Y
Calibration verification							

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

LDC #: 11184 c6
SDG #: 03-5835

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: MH
2nd Reviewer: A

METHOD: Inorganics, Method Hg cvaa

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

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

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

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

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Hg	26.87	25	107	108	Y
MS	Matrix spike sample	Hg	(SSR-SR) 0.226	0.25	90	90	Y
MSD	Duplicate sample	Hg	0.225	0.226	0	0	Y

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 #: M8/C6
SDG #: 03-0885

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

METHOD: Inorganics, Method See cover

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

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

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

UD

Concentration = Recalculation:

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

Note: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NASA JPL

Collection Date: October 22, 2003

LDC Report Date: December 3, 2003

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-5772

Sample Identification

EB-1-10-22-03
MW-11-1
MW-11-2
MW-11-3
MW-11-4
MW-11-5
MW-22-1
MW-22-2
MW-22-3
MW-22-4
MW-22-5
MW-11-1MS
MW-11-1MSD

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 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 Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification is provided at the end of this report. 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.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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.

N Presumptive evidence of presence of the constituent.

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. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
10/23/03	CCV1	Perchlorate	112 (90-110)	EB-1-10-22-03 MW-11-1 MW-11-2 MW-11-3 MW-11-4 MB	J (all detects)	P
10/23/03	CCV2	Perchlorate	113 (90-110)	MW-11-5 MW-22-1 MW-22-2 MW-22-3 MW-22-4 MW-22-5	J (all detects)	P

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the method blanks.

IV. 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.

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

Sample EB-1-10-22-03 was identified as an equipment blank. No contaminant concentrations were found in this blank.

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-5772

SDG	Sample	Analyte	Flag	A or P	Reason
03-5772	EB-1-10-22-03 MW-11-1 MW-11-2 MW-11-3 MW-11-4 MW-11-5 MW-22-1 MW-22-2 MW-22-3 MW-22-4 MW-22-5	Perchlorate	J (all detects)	P	Calibration verification (%R)

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-5772

No Sample Data Qualified in this SDG

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	7196
Project ID:	JPL	Service ID:	35772	Collected by:	JR

Component Name: Chromium (VI)
CAS No: 1333-82-0

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5772-1	EB-1-10-22-03	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03-5772-2	MW-11-1	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03-5772-3	MW-11-2	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03-5772-4	MW-11-3	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03-5772-5	MW-11-4	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03-5772-6	MW-11-5	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03-5772-7	MW-22-1	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03-5772-8	MW-22-2	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03-5772-9	MW-22-3	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03-5772-10	MW-22-4	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03-5772-11	MW-22-5	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U
03W4935-MB-01	03W4935-MB-01	Water	10/22/03	10/22/03	10/22/03	03W4935	mg/L	0.01	<0.01	U

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL
B - Less than RL (PQL, EQL or CRDL), but greater than MDL.

Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 314.0
Project ID: JPL Service ID: 35772 Collected by: JR

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q	
03-5772-1	EB-1-10-22-03	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	<4	U	
03-5772-2	MW-11-1	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	<4	U	
03-5772-3	MW-11-2	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	<4	U	
03-5772-4	MW-11-3	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	<4	U	
03-5772-5	MW-11-4	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	<4	U	
03-5772-6	MW-11-5	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	<4	U	
03-5772-7	MW-22-1	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	2.2	B	J
03-5772-8	MW-22-2	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	2.4	B	↓
03-5772-9	MW-22-3	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	2.6	B	↓
03-5772-10	MW-22-4	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	<4	U	
03-5772-11	MW-22-5	Water	10/22/03	10/22/03	10/23/03	03W4946	µg/L	4	<4	U	
03W4946-MB-01	03W4946-MB-01	Water	10/23/03	10/23/03	10/23/03	03W4946	µg/L	4	<4	U	

Not Detected is shown as PQL, with dilution and moisture corrected if applicable.

Note: Q - Qualifier.
Qualifier: U - Not Detected or less than MDL
B - Less than RL (PQL, EQL or CRDL), but greater than MDL.

LDC #: 11181D6
SDG #: 03-5772
Laboratory: Applied P & Ch Laboratory

VALIDATION COMPLETENESS WORKSHEET
Level III

Date: 11/30/13
Page: 1 of 1
Reviewer: MM
2nd Reviewer: A

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

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: 10/22/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	SW	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	ND	EB=1

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

Validated Samples: All

1	EB-1-10-22-03	11	MW-22-5	21		31	
2	MW-11-1	12	MW-11-1MS	22		32	
3	MW-11-2	13	MW-11-1MSD	23		33	
4	MW-11-3	14	MB	24		34	
5	MW-11-4	15		25		35	
6	MW-11-5	16		26		36	
7	MW-22-1	17		27		37	
8	MW-22-2	18		28		38	
9	MW-22-3	19		29		39	
10	MW-22-4	20		30		40	

Notes:

LDC #: 1118106
SDG #: 03-5772

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MH
2nd reviewer: A

All circled methods are applicable to each sample.

Sample ID	Parameter
1-11	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} clqc ____ ____ ____
m12,13	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
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	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+} ____ ____ ____ ____
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}

Comments:

LDC #: 1118/06
SDG #: 03-5772

VALIDATION FINDINGS WORKSHEET
Calibration

Page: 1 of 1
Reviewer: MH
2nd Reviewer:

METHOD: Inorganics, EPA Method See cover

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

(Y) N N/A Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?
Y (N) N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ?
(Y) N N/A Are all correlation coefficients ≥0.995 ?

LEVEL IV/D ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations.
Y N N/A Was a balance check conducted prior to the TDS analysis.?
Y N N/A Was the titrant normality checked?

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualifications
1	10/13/10	ccv1	clo4	112	1-5, MB	J Lt/p
2	↓	ccv2	↓	113	6-11	↓

Comments:

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Geofon, Inc.
22632 Golden Springs Drive, Suite 270
Diamond Bar, CA 91765
ATTN: Mr. Tony Ford

December 18, 2003

SUBJECT: NASA JPL, DO #01, Data Validation

Dear Mr. Williamson,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 11, 2003. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 11272:

SDG #	Fraction
03-5892, 03-5923, 03-5874, 03-5852, 03-5876, 03-6063	Volatiles, Chromium, Wet Chemistry

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

- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, February 1994
- 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

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

Sincerely,

Erlinda T. Rauto
Operations Manager/Senior Chemist

Attachment 1

LDC #11272 (Geofon-Diamond Bar / NASA JPL, DO#0001)

LDC	SDG#	DATE REC'D	DATE DUE	VOA (524.2)		Cr (200.8)		Cr(VI) (7196A)		CLO_4 (314.0)																							
Matrix: 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
A	03-5892	12-11-03	1-5-04	9	0	-	-	8	0	8	0																						
B	03-5923	12-11-03	1-5-04	7	0	-	-	6	0	4	0																						
C	03-5874	12-11-03.	1-5-04	16	0	-	-	13	0	13	0																						
D	03-5852	12-11-03	1-5-04	7	0	-	-	6	0	8	0																						
D	03-5852	12-11-03	1-5-04	1	0	-	-	1	0	1	0																						
E	03-5876/065632	12-11-03	1-5-04	-	-	54	0	-	-	-	-																						
E	03-5876/065632	12-11-03.	1-5-04	-	-	3	0	-	-	-	-																						
F	03-6063/065794	12-11-03	1-5-04	-	-	48	0	-	-	-	-																						
Total	TH			40	0	105	0	34	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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