

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

Project/Site Name: NASA JPL
Collection Date: April 28, 2003
LDC Report Date: June 17, 2003
Matrix: Water
Parameters: Metals
Validation Level: EPA Level III
Laboratory: Applied P & Ch Laboratory
Sample Delivery Group (SDG): 03-2933

Sample Identification

EB-6-4/28/03
MW-17-1
MW-17-2
MW-17-3
MW-17-4
MW-17-5
MW-17-2MS
MW-17-2MSD
MW-17-2DUP

Introduction

This data review covers 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This 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 flags 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 specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

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

An initial calibration was performed.

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

III. Blanks

Method blanks were reviewed for each matrix as applicable.

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. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Iron Magnesium Potassium	3.60 ug/L 14.43 ug/L 18.00 ug/L	All samples in SDG 03-2933

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

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. 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.

VI. Duplicate Sample Analysis

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

VII. Laboratory Control Samples (LCS)

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

VIII. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

Although ICP serial dilution analysis was not required by the method, it was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
MW-17-2L	Potassium	14.0 (≤ 10)	All samples in SDG 03-2933	J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

XIV. Field Blanks

Sample EB-6-4/28/03 was identified as an equipment blank. No metal contaminants were found in this blank.

**NASA JPL
Metals - Data Qualification Summary - SDG 03-2933**

SDG	Sample	Analyte	Flag	A or P	Reason
03-2933	EB-6-4/28/03 MW-17-1 MW-17-2 MW-17-3 MW-17-4 MW-17-5	Potassium	J (all detects)	A	ICP serial dilution (%D)

**NASA JPL
Metals - Laboratory Blank Data Qualification Summary - SDG 03-2933**

No Sample Data Qualified in this SDG

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: EB-6-4/28/03

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32933

Lab Sample ID: 03-2933-1

Sample Matrix: Water

Collection Date: 04/28/2003

Collected by: Leo Williamson

Received Date: 04/28/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	< 200	U	P		03M1409L	04/30/03	04/30/03	1	200.7
IRON	7439-89-6	µg/L	50	< 50	U	P		03M1409L	04/30/03	04/30/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	< 100	U	P		03M1409L	04/30/03	04/30/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	< 400	U	P		03M1409L	04/30/03	04/30/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	< 2000	U	P		03M1409L	04/30/03	04/30/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

Leo Williamson
 6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: MW-17-1

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 32933

Lab Sample ID: 03-2933-2

Sample Matrix: Water

Collection Date: 04/28/2003

Collected by: Leo Williamson

Received Date: 04/28/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	50700		P		03M1409L	04/30/03	04/30/03	1	200.7
IRON	7439-89-6	µg/L	50	69.6		P		03M1409L	04/30/03	04/30/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	16100		P		03M1409L	04/30/03	04/30/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2400	J	P		03M1409L	04/30/03	04/30/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	16100		P		03M1409L	04/30/03	04/30/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

Leo Williamson

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-17-2
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 32933
 Lab Sample ID: 03-2933-3
 Sample Matrix: Water

Collection Date: 04/28/2003
 Collected by: Leo Williamson
 Received Date: 04/28/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	41900		P		03M1409L	04/30/03	04/30/03	1	200.7
IRON	7439-89-6	µg/L	50	311		P		03M1409L	04/30/03	04/30/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	18100		P		03M1409L	04/30/03	04/30/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2480	J	P		03M1409L	04/30/03	04/30/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	15900		P		03M1409L	04/30/03	04/30/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

g/le/om

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-17-3
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 32933
 Lab Sample ID: 03-2933-4
 Sample Matrix: Water

Collection Date: 04/28/2003
 Collected by: Leo Williamson
 Received Date: 04/28/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	37600		P		03M1409L	04/30/03	04/30/03	1	200.7
IRON	7439-89-6	µg/L	50	822		P		03M1409L	04/30/03	04/30/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	16600		P		03M1409L	04/30/03	04/30/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2060	J	P		03M1409L	04/30/03	04/30/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	20400		P		03M1409L	04/30/03	04/30/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

7/6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL

Project No: 04-4428.10
 Service ID: 32933
 Lab Sample ID: 03-2933-5
 Sample Matrix: Water

Collection Date: 04/28/2003
 Collected by: Leo Williamson
 Received Date: 04/28/2003
 Moisture %: -

Sample ID: MW-17-4
 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	2.2	B	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	21900		P		03M1409L	04/30/03	04/30/03	1	200.7
IRON	7439-89-6	µg/L	50	639		P		03M1409L	04/30/03	04/30/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	11300		P		03M1409L	04/30/03	04/30/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1960	J	P		03M1409L	04/30/03	04/30/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	31400		P		03M1409L	04/30/03	04/30/03	1	200.7

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-17-5
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 32933
 Lab Sample ID: 03-2933-6
 Sample Matrix: Water

Collection Date: 04/28/2003
 Collected by: Leo Williamson
 Received Date: 04/28/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	3.2	B	F		03M1402E	04/29/03	04/29/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	25100		P		03M1409L	04/30/03	04/30/03	1	200.7
IRON	7439-89-6	µg/L	50	1280		P		03M1409L	04/30/03	04/30/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	7240		P		03M1409L	04/30/03	04/30/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2080	J	P		03M1409L	04/30/03	04/30/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	39500		P		03M1409L	04/30/03	04/30/03	1	200.7

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

6/18/03

LDC #: 10414G4

VALIDATION COMPLETENESS WORKSHEET

Date: 6/16/03

SDG #: 03-2933

Level III

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: HW

2nd Reviewer: [Signature]

METHOD: Metals (EPA Method 200.7 & 200.9)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/28/03
II.	Calibration	A	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCSD
VIII.	Internal Standard (ICP-MS)	N	N.T. Wheliger
IX.	Furnace Atomic Absorption QC	A	MSA was not performed
X.	ICP Serial Dilution	SW	
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	ND 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:

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

Notes: _____

LDC #: 1041464
 SDG #: 03-2933

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
 Reviewer: MB
 2nd reviewer: [Signature]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-b	As	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
or 7-8	✓	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
✓ 9	✓	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____

Analysis Method

ICP	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
ICP Trace	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
ICP-MS	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
GFAA	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____

Comments: Mercury by CVAA if performed

VALIDATION FINDINGS WORKSHEET
 PB/ICB/CCB QUALIFIED SAMPLES

LDC #: 1041464
 SDG #: 03-2933
 METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 0.9
 Sample Concentration units, unless otherwise noted: ug/L Associated Samples: 011

Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	Sample Identification
Al					
Sb					
As					
Ba					
Be					
Cd					
Ca					
Cr					
Co					
Cu					
Fe			3.60	18.0	
Pb			14.43	72.15	
Mg					
Mn					
Hg					
Ni					
K			18.00	90.0	
Se					
Ag					
Na					
Tl					
V					
Zn					
B					
Mo					
Sr					

No samples qualified

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

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

Project/Site Name: NASA JPL
Collection Date: April 29, 2003
LDC Report Date: June 17, 2003
Matrix: Water
Parameters: Metals
Validation Level: EPA Level III
Laboratory: Applied P & Ch Laboratory
Sample Delivery Group (SDG): 03-2964

Sample Identification

DUPE-4-2Q03
EB-7-4/29/03
MW-24-1
MW-24-2
MW-24-3
MW-24-4
MW-24-5

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This 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 flags 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 specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

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

An initial calibration was performed.

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

III. Blanks

Method blanks were reviewed for each matrix as applicable.

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. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Iron Potassium	13.6 ug/L 108 ug/L	All samples in SDG 03-2964
ICB/CCB	Iron Magnesium Potassium	41.97 ug/L 39.08 ug/L 120.94 ug/L	All samples in SDG 03-2964

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. 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-7-4/29/03	Iron Magnesium Potassium	24.6 ug/L 45.7 ug/L 112 ug/L	24.6U ug/L 45.7U ug/L 112U ug/L
MW-24-1	Iron	203 ug/L	203U ug/L
MW-24-3	Iron	198 ug/L	198U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-24-4	Iron	55.3 ug/L	55.3U ug/L
MW-24-5	Iron	26.1 ug/L	26.1U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. 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.

VI. Duplicate Sample Analysis

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

VII. Laboratory Control Samples (LCS)

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

VIII. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

Although ICP serial dilution analysis was not required by the method, it was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
MW-23-5L	Iron Magnesium Potassium	22.3 (≤ 10) 22.7 (≤ 10) 11.9 (≤ 10)	All samples in SDG 03-2964	J (all detects) J (all detects) J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

Samples DUPE-4-2Q03 and MW-24-2 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	DUPE-4-2Q03	MW-24-2	
Calcium	19600	19900	2
Iron	210	239	13
Magnesium	12300	12700	3
Potassium	2770	2920	5
Sodium	42100	43300	3

XIV. Field Blanks

Sample EB-7-4/29/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-7-4/29/03	Iron Magnesium Potassium	24.6 45.7 112

**NASA JPL
Metals - Data Qualification Summary - SDG 03-2964**

SDG	Sample	Analyte	Flag	A or P	Reason
03-2964	DUPE-4-2Q03 EB-7-4/29/03 MW-24-1 MW-24-2 MW-24-3 MW-24-4 MW-24-5	Iron Magnesium Potassium	J (all detects) J (all detects) J (all detects)	A	ICP serial dilution (%D)

**NASA JPL
Metals - Laboratory Blank Data Qualification Summary - SDG 03-2964**

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2964	EB-7-4/29/03	Iron Magnesium Potassium	24.6U ug/L 45.7U ug/L 112U ug/L	A
03-2964	MW-24-1	Iron	203U ug/L	A
03-2964	MW-24-3	Iron	198U ug/L	A
03-2964	MW-24-4	Iron	55.3U ug/L	A
03-2964	MW-24-5	Iron	26.1U ug/L	A

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL

Project No: 04-4428.10
 Service ID: 32964
 Lab Sample ID: 03-2964-1
 Sample Matrix: Water

Collection Date: 04/29/2003
 Collected by:
 Received Date: 04/29/2003
 Moisture %: -

Sample ID: **DUPE-4-2Q03**
 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	19600		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	210	J	P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	12300	J	P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2770	J	P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	42100		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Handwritten signature
 6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL

Project No: 04-4428.10
 Service ID: 32964
 Lab Sample ID: 03-2964-2
 Sample Matrix: Water

Collection Date: 04/29/2003
 Collected by:
 Received Date: 04/29/2003
 Moisture %: -

Sample ID: **EB-7-4/29/03**
 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	<200	U	P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	24.6 <i>UJ</i>	B	P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	45.7 <i>UJ</i>	B	P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	112 <i>UJ</i>	B	P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	<2000	U	P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

6/18/07

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-24-1
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 32964
 Lab Sample ID: 03-2964-3
 Sample Matrix: Water

Collection Date: 04/29/2003
 Collected by:
 Received Date: 04/29/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	60300		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	203		P	U J	03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	20400		P	J	03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2740		P	J	03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	20600		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

10/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL

Project No: 04-4428.10
 Service ID: 32964
 Lab Sample ID: 03-2964-4
 Sample Matrix: Water

Collection Date: 04/29/2003
 Collected by:
 Received Date: 04/29/2003
 Moisture %: -

Sample ID: MW-24-2
 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	19900		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	239		P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	12700		P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2920		P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	43300		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

Ref: 18/10/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-24-3
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 32964
 Lab Sample ID: 03-2964-5
 Sample Matrix: Water

Collection Date: 04/29/2003
 Collected by:
 Received Date: 04/29/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	4.4	B	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	16500		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	198				03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	12900				03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2370				03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	43900				03M1421M	05/02/03	05/02/03	1	200.7

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-24-4
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 32964
 Lab Sample ID: 03-2964-6
 Sample Matrix: Water

Collection Date: 04/29/2003
 Collected by:
 Received Date: 04/29/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	7470		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	55.3		P	UJ	03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	8460		P	J	03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2180		P	J	03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	43300		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

g/12/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-24-5
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 32964
 Lab Sample ID: 03-2964-7
 Sample Matrix: Water

Collection Date: 04/29/2003
 Collected by:
 Received Date: 04/29/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	2.7	B	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	29300		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	26.1 <i>UJ</i>	B	P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	9050 <i>J</i>		P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1850 <i>J</i>		P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	38900		P		03M1421M	05/02/03	05/02/03	1	200.7

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

7/6/18/03

LDC #: 1041414

VALIDATION COMPLETENESS WORKSHEET

SDG #: 03-2964

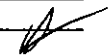
Level III

Laboratory: Applied P & Ch Laboratory

Date: 6/17/03

Page: 1 of 1

Reviewer: 14W

2nd Reviewer: **METHOD:** Metals (EPA Method 200.7 & 200.9)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/29/03
II.	Calibration	A	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	} MS/MSD / Dup from SDG 03-2987
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCSD
VIII.	Internal Standard (ICP-MS)	N	Not utilized
IX.	Furnace Atomic Absorption QC	A	MSA was not performed
X.	ICP Serial Dilution	SW	
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	(1,4)
XIV.	Field Blanks	SW	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:

A2

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

Notes:

LDC #: 1041424
 SDG #: 03-264

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
 Reviewer: H10
 2nd reviewer: [Signature]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-7	AS	Al, Sb, As, Ba, Be, Cd, <u>Ca</u> , Cr, Co, Cu, <u>Fe</u> , <u>Pb</u> , <u>Mg</u> , Mn, Hg, Ni, <u>K</u> , Se, Ag, <u>Na</u> , Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
ICP Trace		Al, Sb, As, Ba, Be, Cd, <u>Ca</u> , Cr, Co, Cu, <u>Fe</u> , <u>Pb</u> , <u>Mg</u> , Mn, Hg, Ni, <u>K</u> , Se, Ag, <u>Na</u> , Ti, V, Zn, Mo, B, Si, CN', _____
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____
GFAA		Al, Sb, <u>As</u> , Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN', _____

Comments: Mercury by CVAA if performed

VALIDATION FINDINGS WORKSHEET
 PB/ICB/CCB QUALIFIED SAMPLES

LDC #: 1041424
 SDG #: 03-2764
 METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 1
 Sample Concentration units, unless otherwise noted: µg/L Associated Samples: 641

Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	2	3	5	6	7	Sample Identification
Al										
Sb										
As										
Ba										
Be										
Cd										
Ca										
Cr										
Cc										
Cu		13.6	41.97	209.85	24.6	203	198	55.3	26.1	
Fe										
Pb			39.08	195.4	45.7					
Mg										
Mn										
Hg										
Ni										
K		108	120.94	604.7	112					
Se										
Ag										
Na										
Ti										
V										
Zn										
B										
Mo										
Sr										

Blank SMP 452
 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 #: 1041434
SDG #: 03-2964

Page: 1 of 1
Reviewer: ML
2nd Reviewer: [Signature]

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
 N N/A If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
 Y N N/A Were ICP serial dilution percent differences (%D) < 10%?
 Y N N/A Is there evidence of negative interference? if yes, professional judgement will be used to qualify the data.
LEVEL IV ONLY:
 Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualifications
1	MN-23-5 (SDG 03-2964)	A0	Fe Mg K	22.3 22.7 11.9	A1 ↓	J det / A ↓

Comments:

LDC #: 1041424
 SDG #: 03-2964

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
 Reviewer: MU
 2nd reviewer: [Signature]

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

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

Analyte	Concentration (ug/l)		RPD (Limits)	Difference (Limits)	Qualifications
	1	4			
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Cadmium					
Calcium	19600	19900	2		
Chromium					
Cobalt					
Copper					
Iron	210	239	13		
Lead					
Magnesium	12300	12900	3		
Manganese					
Mercury					
Nickel					
Potassium	2990	2920	5		
Selenium					
Silver					
Sodium	42100	43300	3		
Thallium					
Vanadium					
Zinc					
Cyanide					
Boron					
Molybdenum					
Strontium					
Silicon					

Notes: _____

LDC #: 1041424
SDG #: 03-2864

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: 1 of 1
Reviewer: MA
2nd reviewer: J

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

(Y) N N/A Were field blanks identified in this SDG?
(Y) N N/A Were target analytes detected in the field blanks?

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

Analyte	Concentration Units (ug/l)
Fe	24.6
Mg	45.7
K	112

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

Analyte	Concentration Units ()

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

Project/Site Name: NASA JPL
Collection Date: April 30, 2003
LDC Report Date: June 17, 2003
Matrix: Water
Parameters: Metals
Validation Level: EPA Level III
Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-2987

Sample Identification

EB-8-4/30/03
MW-23-1
MW-23-2
MW-23-3
MW-23-4
MW-23-5
MW-23-5MS
MW-23-5MSD
MW-23-5DUP

Introduction

This data review covers 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This 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 flags 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 specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

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

An initial calibration was performed.

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

III. Blanks

Method blanks were reviewed for each matrix as applicable.

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. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Iron Potassium	13.6 ug/L 108 ug/L	All samples in SDG 03-2987
ICB/CCB	Iron Magnesium Potassium	41.97 ug/L 39.08 ug/L 120.94 ug/L	All samples in SDG 03-2987

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. 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-8-4/30/03	Iron Magnesium Potassium	23.3 ug/L 39.0 ug/L 146 ug/L	23.3U ug/L 39.0U ug/L 146U ug/L
MW-23-2	Iron	49.2 ug/L	49.2U ug/L
MW-23-4	Iron	59.3 ug/L	59.3U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-23-5	Iron	189 ug/L	189U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. 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.

VI. Duplicate Sample Analysis

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

VII. Laboratory Control Samples (LCS)

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

VIII. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

Although ICP serial dilution analysis was not required by the method, it was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
MW-23-5L	Iron Magnesium Potassium	22.3 (≤ 10) 22.7 (≤ 10) 11.9 (≤ 10)	All samples in SDG 03-2987	J (all detects) J (all detects) J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

XIV. Field Blanks

Sample EB-8-4/30/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-8-4/30/03	Iron	23.3
	Magnesium	39.0
	Potassium	146

**NASA JPL
Metals - Data Qualification Summary - SDG 03-2987**

SDG	Sample	Analyte	Flag	A or P	Reason
03-2987	EB-8-4/30/03 MW-23-1 MW-23-2 MW-23-3 MW-23-4 MW-23-5	Iron Magnesium Potassium	J (all detects) J (all detects) J (all detects)	A	ICP serial dilution (%D)

**NASA JPL
Metals - Laboratory Blank Data Qualification Summary - SDG 03-2987**

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-2987	EB-8-4/30/03	Iron Magnesium Potassium	23.3U ug/L 39.0U ug/L 146U ug/L	A
03-2987	MW-23-2	Iron	49.2U ug/L	A
03-2987	MW-23-4	Iron	59.3U ug/L	A
03-2987	MW-23-5	Iron	189U ug/L	A

K

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
Project ID: JPL

Project No: 04-4428.10
Service ID: 32987
Lab Sample ID: 03-2987-1
Sample Matrix: Water

Collection Date: 04/30/2003
Collected by:
Received Date: 04/30/2003
Moisture %: -

Sample ID: EB-8-4/30/03
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	< 200	U	P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	23.3 <i>US</i>	B	P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	39.0	B	P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	146	B	P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	< 2000	U	P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

6/18/07

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL

Project No: 04-4428.10
 Service ID: 32987
 Lab Sample ID: 03-2987-2
 Sample Matrix: Water

Collection Date: 04/30/2003
 Collected by:
 Received Date: 04/30/2003
 Moisture %: -

Sample ID: MW-23-1
 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	147000		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	447	J	P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	50300	J	P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3030	J	P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	35900		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

per 6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-23-2
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 32987
 Lab Sample ID: 03-2987-3
 Sample Matrix: Water

Collection Date: 04/30/2003
 Collected by:
 Received Date: 04/30/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	106000		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	49.2 <i>µJ</i>	B	P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	39900 <i>J</i>		P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2950 <i>J</i>		P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	36700		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Handwritten signature/initials: G/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-23-3
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 32987
 Lab Sample ID: 03-2987-4
 Sample Matrix: Water

Collection Date: 04/30/2003
 Collected by:
 Received Date: 04/30/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	40700		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	677		P	J	03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	13800		P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1760		P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	27000		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - IGP A - FLAA F - GFAA CV - Cold Vapor

Handwritten: 6/18/07

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-23-4
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 32987
 Lab Sample ID: 03-2987-5
 Sample Matrix: Water

Collection Date: 04/30/2003
 Collected by:
 Received Date: 04/30/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	27400		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	59.3	U	J		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	12500	J	P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1990	J	P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	30500		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

Handwritten signature/initials

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL

Project No: 04-4428.10
 Service ID: 32987
 Lab Sample ID: 03-2987-6
 Sample Matrix: Water

Collection Date: 04/30/2003
 Collected by:
 Received Date: 04/30/2003
 Moisture %: -

Sample ID: MW-23-5
 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	3.2	B	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	5270		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	189 <i>UJ</i>		P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	450 <i>J</i>		P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2530 <i>J</i>		P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	97700		P		03M1421M	05/02/03	05/02/03	1	200.7

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Handwritten signature: P. G. Tolson

LDC #: 10414K4

VALIDATION COMPLETENESS WORKSHEET

Date: 6/17/03

SDG #: 03-2987

Level III

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: *HW*2nd Reviewer: *[Signature]***METHOD:** Metals (EPA Method 200.7 & 200.9)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/30/03
II.	Calibration	A	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCSD
VIII.	Internal Standard (ICP-MS)	N	Not Utilized
IX.	Furnace Atomic Absorption QC	A	MSA was not
X.	ICP Serial Dilution	SW	
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	SW	EB=1

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

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

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: *As*

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

Notes: _____

VALIDATION FINDINGS WORKSHEET
 PB/ICB/CCB QUALIFIED SAMPLES

LDC #: 10414k4
 SDG #: 03-2877
 METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied:
 Sample Concentration units, unless otherwise noted: ug/g Associated Samples: A1

Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	1	3	5	6	Sample Identification
Al									Al
Sb									Sb
As									As
Ba									Ba
Be									Be
Cd									Cd
Ca									Ca
Cr									Cr
Cc									Cc
Cu									Cu
Fe		13.6	41.99	209.85	23.3	49.2	59.3	189	Fe
Pb									Pb
Mg			39.08	195.4	79.0				Mg
Mn									Mn
Hg									Hg
Ni									Ni
K			120.94	6047				146	K
Se									Se
Ag									Ag
Na									Na
Tl									Tl
V									V
Zn									Zn
B									B
Mo									Mo
Sr									Sr

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

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

Project/Site Name: NASA JPL
Collection Date: May 1, 2003
LDC Report Date: June 17, 2003
Matrix: Water
Parameters: Metals
Validation Level: EPA Level III
Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-3015

Sample Identification

DUPE-5-2Q03
EB-9-5/1/03
MW-3-1
MW-3-2
MW-3-3
MW-3-4
MW-3-5

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This 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 flags 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 specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

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

An initial calibration was performed.

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

III. Blanks

Method blanks were reviewed for each matrix as applicable.

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. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Iron Potassium	13.6 ug/L 108 ug/L	All samples in SDG 03-3015
ICB/CCB	Iron Magnesium Potassium	41.97 ug/L 39.08 ug/L 120.94 ug/L	All samples in SDG 03-3015

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. 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-9-5/1/03	Iron Magnesium Potassium	50.5 ug/L 45.9 ug/L 134 ug/L	50.5U ug/L 45.9U ug/L 134U ug/L
MW-3-4	Iron	143 ug/L	143U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. 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.

VI. Duplicate Sample Analysis

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

VII. Laboratory Control Samples (LCS)

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

VIII. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

Although ICP serial dilution analysis was not required by the method, it was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
MW-23-5L	Iron Magnesium Potassium	22.3 (≤ 10) 22.7 (≤ 10) 11.9 (≤ 10)	All samples in SDG 03-3015	J (all detects) J (all detects) J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

Samples DUPE-5-2Q03 and MW-3-2 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	DUPE-5-2Q03	MW-3-2	
Calcium	49800	49900	0
Iron	278	326	16
Magnesium	18700	18000	4
Potassium	2540	2420	5
Sodium	18600	18900	2

XIV. Field Blanks

Sample EB-9-5/1/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-9-5/1/03	Iron	50.5
	Magnesium	45.9
	Potassium	134

**NASA JPL
Metals - Data Qualification Summary - SDG 03-3015**

SDG	Sample	Analyte	Flag	A or P	Reason
03-3015	DUPE-5-2Q03 EB-9-5/1/03 MW-3-1 MW-3-2 MW-3-3 MW-3-4 MW-3-5	Iron Magnesium Potassium	J (all detects) J (all detects) J (all detects)	A	ICP serial dilution (%D)

**NASA JPL
Metals - Laboratory Blank Data Qualification Summary - SDG 03-3015**

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-3015	EB-9-5/1/03	Iron Magnesium Potassium	50.5U ug/L 45.9U ug/L 134U ug/L	A
03-3015	MW-3-4	Iron	143U ug/L	A

L

Applied P & Ch Laboratory Metal Analysis Results

Client Name: GEOFON, Inc.
Project ID: JPL

Project No: 04-4428.10
Service ID: 33015
Lab Sample ID: 03-3015-1
Sample Matrix: Water

Collection Date: 05/01/2003
Collected by:
Received Date: 05/01/2003
Moisture %: -

Sample ID: DUPE-5-2Q03
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	49800		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	278	J	P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	18700	J	P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2540	J	P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	18600		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Handwritten signature/initials
0/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: **EB-9-5/1/03**
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33015
 Lab Sample ID: 03-3015-2
 Sample Matrix: Water

Collection Date: 05/01/2003
 Collected by:
 Received Date: 05/01/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	< 200	U	P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	50.5 <i>US</i>			P	03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	45.9		B	P	03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	134 <i>↓</i>		B	P	03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	< 2000	U	P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-3-1
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33015
 Lab Sample ID: 03-3015-3
 Sample Matrix: Water

Collection Date: 05/01/2003
 Collected by:
 Received Date: 05/01/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	57600		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	1160	J	P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	22600		P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3170		P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	23600		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

6/18/07

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-3-2
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33015
 Lab Sample ID: 03-3015-4
 Sample Matrix: Water

Collection Date: 05/01/2003
 Collected by:
 Received Date: 05/01/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	49900		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	326	J	P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	18000	↓	P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2420	↓	P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	18900		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

*g
6/18/03*

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-3-3
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33015
 Lab Sample ID: 03-3015-5
 Sample Matrix: Water

Collection Date: 05/01/2003
 Collected by:
 Received Date: 05/01/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	29800		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	288		P		03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	14000		P		03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3050		P		03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	42700		P		03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

Handwritten signature/initials
 6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-3-4
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33015
 Lab Sample ID: 03-3015-6
 Sample Matrix: Water

Collection Date: 05/01/2003
 Collected by:
 Received Date: 05/01/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1423E	05/02/03	05/02/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	9690		P		03M1421M	05/02/03	05/02/03	1	200.7
IRON	7439-89-6	µg/L	50	143			U J	03M1421M	05/02/03	05/02/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	6830			J	03M1421M	05/02/03	05/02/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2000			J	03M1421M	05/02/03	05/02/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	47600				03M1421M	05/02/03	05/02/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

*M
6/18/03*

LDC #: 10414L4

VALIDATION COMPLETENESS WORKSHEET

Date: 6/19/03

SDG #: 03-3015

Level III

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: [Signature]

2nd Reviewer: [Signature]

METHOD: Metals (EPA Method 200.7 & 200.9)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/1/03
II.	Calibration	A	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	} MS/MSD/ dup from SDG 03-2987
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCS0
VIII.	Internal Standard (ICP-MS)	N	Not utilized
IX.	Furnace Atomic Absorption QC	A	USA was not performed
X.	ICP Serial Dilution	SW	
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	(1,4)
XIV.	Field Blanks	SW	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:

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

Notes: _____

VALIDATION FINDINGS WORKSHEET
 PB/ICB/CCB QUALIFIED SAMPLES

SDG #: 1041424
 LDC #: 03-3015
 METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 0.48
 Sample Concentration units, unless otherwise noted: ug/L Associated Samples: A1

Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	2	6	Sample Identification
Al							Al
Sb							Sb
As							As
Ba							Ba
Be							Be
Cd							Cd
Ca							Ca
Cr							Cr
Co							Co
Cu							Cu
Fe		13.6	41.97	209.85	50.5	143	Fe
Pb							Pb
Mg			39.08	195.4	45.9		Mg
Mn							Mn
Hg							Hg
Ni							Ni
K		108	120.94	604.7	134		K
Se							Se
Ag							Ag
Na							Na
Tl							Tl
V							V
Zn							Zn
B							B
Mo							Mo
Sr							Sr

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 #: 10414 L4
 SDG #: 03-3015

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

Page: 1 of 1
 Reviewer: (signature)
 2nd Reviewer: (signature)

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
 Y N N/A If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
 Y N/A Were ICP serial dilution percent differences (%D) ≤ 10%?
 Y N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.
LEVEL IV ONLY:
 Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualifications
1	MW-13-5	AA	Fe	22.3	Ar1	J dete / A
	(SMG 03-2987)		Mg	22.7		↓
			K	11.9		

Comments: _____

LDC #: 1041424
 SDG #: 03-3015

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
 Reviewer: MU
 2nd reviewer: [Signature]

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

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

Analyte	Concentration (ug/l)		RPD (Limits)	Difference (Limits)	Qualifications
	1	4			
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Cadmium					
Calcium	49800	49900	0		
Chromium					
Cobalt					
Copper					
Iron	298	326	16		
Lead					
Magnesium	18900	18000	4		
Manganese					
Mercury					
Nickel					
Potassium	2540	2420	5		
Selenium					
Silver					
Sodium	18600	18900	2		
Thallium					
Vanadium					
Zinc					
Cyanide					
Boron					
Molybdenum					
Strontium					
Silicon					

Notes:

LDC #: 1041424
SDG #: 03-2015

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: MA
2nd reviewer: [Signature]

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

Y N N/A Were field blanks identified in this SDG?
 N N/A Were target analytes detected in the field blanks?

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

Analyte	Concentration Units ($\mu\text{g/l}$)
Fe	50.5
Mg	45.9
K	13.4

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

Analyte	Concentration Units ()

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

Project/Site Name: NASA JPL
Collection Date: May 6, 2003
LDC Report Date: June 17, 2003
Matrix: Water
Parameters: Metals
Validation Level: EPA Level III
Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-3082

Sample Identification

EB-10-5/6/03
MW-11-1
MW-11-2
MW-11-3
MW-11-4
MW-11-5
MW-11-3MS
MW-11-3MSD
MW-11-3DUP

Introduction

This data review covers 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This 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 flags 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 specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

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

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
5/13/03	CCV	Arsenic	113.2 (90-110)	MW-11-1 MW-11-2 MW-11-4 MW-11-5	J (all detects)	P

III. Blanks

Method blanks were reviewed for each matrix as applicable.

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. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Iron Magnesium Potassium Sodium	6.5 ug/L 22.5 ug/L 39.1 ug/L 400 ug/L	All samples in SDG 03-3082
ICB/CCB	Iron Magnesium Potassium Sodium	70.0 ug/L 163.85 ug/L 49.06 ug/L 568.97 ug/L	All samples in SDG 03-3082

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. 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-10-5/6/03	Iron Magnesium Potassium Sodium	31.4 ug/L 56.5 ug/L 59.3 ug/L 1200 ug/L	31.4U ug/L 56.5U ug/L 59.3U ug/L 1200U ug/L
MW-11-1	Iron	92.6 ug/L	92.6U ug/L
MW-11-2	Iron	216 ug/L	216U ug/L
MW-11-4	Iron	61.5 ug/L	61.5U ug/L
MW-11-5	Iron	250 ug/L	250U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. 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.

VI. Duplicate Sample Analysis

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

VII. Laboratory Control Samples (LCS)

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

VIII. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

Although ICP serial dilution analysis was not required by the method, it was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
MW-11-3L	Potassium	10.4 (≤10)	All samples in SDG 03-3082	J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

XIV. Field Blanks

Sample EB-10-5/6/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-10-5/6/03	Iron	31.4
	Magnesium	56.5
	Potassium	59.3
	Sodium	1200

NASA JPL

Metals - Data Qualification Summary - SDG 03-3082

SDG	Sample	Analyte	Flag	A or P	Reason
03-3082	MW-11-1 MW-11-2 MW-11-4 MW-11-5	Arsenic	J (all detects)	P	Calibration verification (%R)
03-3082	EB-10-5/6/03 MW-11-1 MW-11-2 MW-11-3 MW-11-4 MW-11-5	Potassium	J (all detects)	A	ICP serial dilution (%D)

NASA JPL

Metals - Laboratory Blank Data Qualification Summary - SDG 03-3082

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-3082	EB-10-5/6/03	Iron Magnesium Potassium Sodium	31.4U ug/L 56.5U ug/L 59.3U ug/L 1200U ug/L	A
03-3082	MW-11-1	Iron	92.6U ug/L	A
03-3082	MW-11-2	Iron	216U ug/L	A
03-3082	MW-11-4	Iron	61.5U ug/L	A
03-3082	MW-11-5	Iron	250U ug/L	A

M

Applied P & Ch Laboratory Metal Analysis Results

Client Name: GEOFON, Inc.
Project ID: JPL

Project No: 04-4428.10
Service ID: 33082
Lab Sample ID: 03-3082-1
Sample Matrix: Water

Collection Date: 05/06/2003
Collected by:
Received Date: 05/06/2003
Moisture %: -

Sample ID: EB-10-5/6/03
Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	< 200	U	P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	31.4 µ	B	P		03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	56.5	B	P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	59.3 J	B	P		03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	1200 ↓	B	P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

Handwritten signature and date: 6/18/07

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL

Project No: 04-4428.10
 Service ID: 33082
 Lab Sample ID: 03-3082-2
 Sample Matrix: Water

Collection Date: 05/06/2003
 Collected by:
 Received Date: 05/06/2003
 Moisture %: -

Sample ID: MW-11-1
 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	56200		P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	92.6 <i>U</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	18700		P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3130 <i>J</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	24700		P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-11-2
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33082
 Lab Sample ID: 03-3082-3
 Sample Matrix: Water

Collection Date: 05/06/2003
 Collected by:
 Received Date: 05/06/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	39200		P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	216 <i>u</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	15900		P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2770 <i>J</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	21200		P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-11-3
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33082
 Lab Sample ID: 03-3082-4
 Sample Matrix: Water

Collection Date: 05/06/2003
 Collected by:
 Received Date: 05/06/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	38600		P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	2310		P		03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	11900		P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2050	J	P		03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	24700		P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-11-4
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33082
 Lab Sample ID: 03-3082-5
 Sample Matrix: Water

Collection Date: 05/06/2003
 Collected by:
 Received Date: 05/06/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	9050		P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	61.5 <i>u</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	7550		P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	1820 <i>J</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	25100		P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

6/18/03

LDC #: 10414M4

VALIDATION COMPLETENESS WORKSHEET

SDG #: 03-3082

Level III

Laboratory: Applied P & Ch Laboratory

Date: 6/19/03

Page: 1 of 1

Reviewer: *MA*2nd Reviewer: *[Signature]***METHOD:** Metals (EPA Method 200.7 & 200.9)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/6/03
II.	Calibration	A SW	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCS D
VIII.	Internal Standard (ICP-MS)	N	Not Utilized
IX.	Furnace Atomic Absorption QC	A	MSA was not performed
X.	ICP Serial Dilution	SW	
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	N	
XIV.	Field Blanks	SW	EB21

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

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

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

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

Notes:

LDC #: 10414M4
SDG #: 03-3082

VALIDATION FINDINGS WORKSHEET
Calibration

Page: 1 of 1
Reviewer: MK
2nd Reviewer: [Signature]

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

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% for all analytes except mercury (80-120%) and cyanide (85-115%)?

LEVEL IV ONLY:

Y N N/A Was a midrange cyanide standard distilled?
Y N N/A Are all correlation coefficients ≥ 0.995 ?
Y N N/A Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recalculation Worksheet for recalculations.

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualification of Data
1	5/31/03	CCV	As	113.2 (90-110)	2, 3, 5, 6	Initial / P

Comments:

LDC #: 1041414
SDG #: 03-3082

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

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

Y N N/A Were field blanks identified in this SDG?
 Y N N/A Were target analytes detected in the field blanks?

Sample: 1 Field Blank / Trip Blank / Rinsate / Other EB (circle one)

Analyte	Concentration Units (ug/l)
Fe	31.4
Mg	56.5
K	59.3
Na	1200

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

Analyte	Concentration Units ()

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

Project/Site Name: NASA JPL
Collection Date: May 7, 2003
LDC Report Date: June 17, 2003
Matrix: Water
Parameters: Metals
Validation Level: EPA Level III
Laboratory: Applied P & Ch Laboratory
Sample Delivery Group (SDG): 03-3102

Sample Identification

DUPE-6-2Q03
EB-11-5/7/03
MW-12-1
MW-12-2
MW-12-3
MW-12-4
MW-12-5

Introduction

This data review covers 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Methods 200.7 and 200.9 for Metals. The metals analyzed were Arsenic, Calcium, Iron, Magnesium, Potassium, and Sodium.

This 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 flags 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 specified protocols or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

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

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
5/13/03	CCV (13:42)	Arsenic	111.2 (90-110)	DUPE-6-2Q03 EB-11-5/7/03 MW-12-1 MW-12-2	J (all detects)	P

III. Blanks

Method blanks were reviewed for each matrix as applicable.

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. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Iron Magnesium Potassium Sodium	6.5 ug/L 22.5 ug/L 39.1 ug/L 400 ug/L	All samples in SDG 03-3102
ICB/CCB	Iron Magnesium Potassium Sodium	70.0 ug/L 163.85 ug/L 49.06 ug/L 566.97 ug/L	All samples in SDG 03-3102

Sample concentrations were compared to the maximum contaminant concentrations detected in the ICB/CCB/PBs. 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
DUPE-6-2Q03	Iron	62.8 ug/L	62.8U ug/L
EB-11-5/7/03	Iron Magnesium Potassium Sodium	16.4 ug/L 25.9 ug/L 70.9 ug/L 931 ug/L	16.4U ug/L 25.9U ug/L 70.9U ug/L 931U ug/L
MW-12-2	Iron	204 ug/L	204U ug/L
MW-12-3	Iron	64.2 ug/L	64.2U ug/L
MW-12-4	Iron	74.4 ug/L	74.4U ug/L
MW-12-5	Iron	286 ug/L	286U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. 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.

VI. Duplicate Sample Analysis

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

VII. Laboratory Control Samples (LCS)

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

VIII. Internal Standards (ICP-MS)

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Raw data were not reviewed for this SDG.

X. ICP Serial Dilution

Although ICP serial dilution analysis was not required by the method, it was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
MW-11-3L	Potassium	10.4 (≤ 10)	All samples in SDG 03-3102	J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report.

XIII. Field Duplicates

Samples DUPE-6-2Q03 and MW-12-3 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	DUPE-6-2Q03	MW-12-3	
Calcium	44800	45300	1
Iron	62.8	64.2	2
Magnesium	14400	14600	1
Potassium	2790	2760	1
Sodium	23400	23600	1

XIV. Field Blanks

Sample EB-11-5/7/03 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration (ug/L)
EB-11-5/7/03	Iron Magnesium Potassium Sodium	16.4 25.9 70.9 931

**NASA JPL
Metals - Data Qualification Summary - SDG 03-3102**

SDG	Sample	Analyte	Flag	A or P	Reason
03-3102	DUPE-6-2Q03 EB-11-5/7/03 MW-12-1 MW-12-2	Arsenic	J (all detects)	P	Calibration verification (%R)
03-3102	DUPE-6-2Q03 EB-11-5/7/03 MW-12-1 MW-12-2 MW-12-3 MW-12-4 MW-12-5	Potassium	J (all detects)	A	ICP serial dilution (%D)

**NASA JPL
Metals - Laboratory Blank Data Qualification Summary - SDG 03-3102**

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-3102	DUPE-6-2Q03	Iron	62.8U ug/L	A
03-3102	EB-11-5/7/03	Iron Magnesium Potassium Sodium	16.4U ug/L 25.9U ug/L 70.9U ug/L 931U ug/L	A
03-3102	MW-12-2	Iron	204U ug/L	A
03-3102	MW-12-3	Iron	64.2U ug/L	A
03-3102	MW-12-4	Iron	74.4U ug/L	A
03-3102	MW-12-5	Iron	286U ug/L	A

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL

Project No: 04-4428.10
 Service ID: 33102
 Lab Sample ID: 03-3102-1
 Sample Matrix: Water

Collection Date: 05/07/2003
 Collected by:
 Received Date: 05/07/2003
 Moisture %: -

Sample ID: **DUPE-6-2Q03**
 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	44800		P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	62.8 <i>u</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	14400		P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2790 <i>J</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	23400		P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

u
6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL

Project No: 04-4428.10
 Service ID: 33102
 Lab Sample ID: 03-3102-2
 Sample Matrix: Water

Collection Date: 05/07/2003
 Collected by:
 Received Date: 05/07/2003
 Moisture %: -

Sample ID: EB-11-5/7/03
 Sample Type: Field Sample

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	< 200	U	P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	16.4 <i>u</i>	B	P		03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	25.9	B	P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	70.9 <i>J</i>	B	P		03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	931 <i>↓</i>	B	P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

*M
6/18/03*

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-12-1
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33102
 Lab Sample ID: 03-3102-3
 Sample Matrix: Water

Collection Date: 05/07/2003
 Collected by:
 Received Date: 05/07/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	60100				03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	572 272				03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	21600				03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	3430 J				03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	24500				03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

9/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-12-2
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33102
 Lab Sample ID: 03-3102-4
 Sample Matrix: Water

Collection Date: 05/07/2003
 Collected by:
 Received Date: 05/07/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	< 5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	56400		P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	204 <i>u</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	17000		P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2910 <i>J</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	23700		P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

G/8/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.

Project ID: JPL

Sample ID: MW-12-3

Sample Type: Field Sample

Project No: 04-4428.10

Service ID: 33102

Lab Sample ID: 03-3102-5

Sample Matrix: Water

Collection Date: 05/07/2003

Collected by:

Received Date: 05/07/2003

Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	45300		P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	64.2 <i>u</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	14600		P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2760 <i>J</i>		P		03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	23600		P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

6/18/03

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-12-4
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33102
 Lab Sample ID: 03-3102-6
 Sample Matrix: Water

Collection Date: 05/07/2003
 Collected by:
 Received Date: 05/07/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	56900		P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	74.4		P	U	03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	13500		P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2120		P	J	03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	23200		P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor
 C Qualifier: U - Not Detected or less than IDL B - Less than RL (PQL, EQL or CRDL), but greater than IDL.
 Q Qualifier: N - Spike recovery out of control * - Duplicate analysis out of control
 W - Post digestion spike for GFAA out of control E - Serial dilution difference out of control
 M Qualifier: P - ICP A - FLAA F - GFAA CV - Cold Vapor

G/18/07

Applied P & Ch Laboratory
Metal Analysis Results

Client Name: GEOFON, Inc.
 Project ID: JPL
 Sample ID: MW-12-5
 Sample Type: Field Sample

Project No: 04-4428.10
 Service ID: 33102
 Lab Sample ID: 03-3102-7
 Sample Matrix: Water

Collection Date: 05/07/2003
 Collected by:
 Received Date: 05/07/2003
 Moisture %: -

Element Name	CAS No	Unit	RL	Result	C	M	Q	Batch	D-Date	A-Date	DF	Method
ARSENIC	7440-38-2	µg/L	5	<5	U	F		03M1458E	05/13/03	05/13/03	1	200.9
CALCIUM	7440-70-2	µg/L	200	39500		P		03M1442L	05/08/03	05/08/03	1	200.7
IRON	7439-89-6	µg/L	50	286		P		03M1442L	05/08/03	05/08/03	1	200.7
MAGNESIUM	7439-95-4	µg/L	100	11100		P		03M1442L	05/08/03	05/08/03	1	200.7
POTASSIUM	7440-09-7	µg/L	400	2080		P		03M1442L	05/08/03	05/08/03	1	200.7
SODIUM	7440-23-5	µg/L	2000	35100		P		03M1442L	05/08/03	05/08/03	1	200.7

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

Note: RL: PQL (EQL) or CRDL D-Date: Digestion Date; A-Date: Analysis Date; DF: Dilution Factor

C Qualifier: U - Not Detected or less than IDL

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

Q Qualifier: N - Spike recovery out of control

* - Duplicate analysis out of control

W - Post digestion spike for GFAA out of control

E - Serial dilution difference out of control

M Qualifier: P - ICP

A - FLAA

F - GFAA

CV - Cold Vapor

6/18/03

LDC #: 10414N4

VALIDATION COMPLETENESS WORKSHEET

SDG #: 03-3102

Level III

Laboratory: Applied P & Ch Laboratory

Date: 6/19/03

Page: 1 of 1

Reviewer: MA

2nd Reviewer: [Signature]

METHOD: Metals (EPA Method 200.7 & 200.9)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/11/03
II.	Calibration	SWX	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Matrix Spike Analysis	A	3 MS/MSB/oup from SDG 03-3082
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS/LCSD
VIII.	Internal Standard (ICP-MS)	N	NOT Utilized
IX.	Furnace Atomic Absorption QC	A	MSA was not performed
X.	ICP Serial Dilution	SW	
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	(1,5)
XIV.	Field Blanks	SW	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:

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

Notes: _____

LDC #: 10414614
SDG #: 03-3102

VALIDATION FINDINGS WORKSHEET Calibration

Page: 1 of 1
Reviewer: MLK
2nd Reviewer: [Signature]

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

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% for all analytes except mercury (90-120%) and cyanide (85-115%)?

LEVEL IV ONLY:

- Y N N/A Was a midrange cyanide standard distilled?
- Y N N/A Are all correlation coefficients ≥ 0.995 ?
- Y N N/A Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recalculation Worksheet for recalculations.

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualification of Data
1	5/13/03	CV (1342)	As	111.2 (90-110)	1-4	J Date / p
2	5/13/03	CV 104				

Comments:

VALIDATION FINDINGS WORKSHEET
 PB/ICB/CCB QUALIFIED SAMPLES

LDC #: 1041464
 SDG #: 03-3102
 METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 1
 Sample Concentration units, unless otherwise noted: ug/L Associated Samples: M1

Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	1	2	4	5	6	7
Al										
Sb										
As										
Ba										
Be										
Cd										
Ca										
Cr										
Co										
Cu		6.5	70.0	350	62.8	16.4	20.4	64.2	74.4	286
Fe										
Pb		22.5	163.85	819.25		25.9				
Mg										
Mn										
Hg										
Ni										
K		39.1	49.06	245.3		90.9				
Se										
Ag										
Na		400	568.97	2844.85		93.1				
Tl										
V										
Zn										
B										
Mo										
Sr										

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 ICP Serial Dilution

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

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

N N/A If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?

Y N/A Were ICP serial dilution percent differences (%D) ≤ 10%?

Y N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

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

#	Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualifications
1	MW-1-3 (SDG 03-3082)	AO	K	10.4	A1	Delete A

Comments:

LDC #: 1041484
 SDG #: 03-3102

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
 Reviewer: MU
 2nd reviewer: [Signature]

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

(Y) N N/A Were field duplicate pairs identified in this SDG?
(Y) N N/A Were target analytes detected in the field duplicate pairs?

Analyte	Concentration ($\mu\text{g/l}$)		RPD (Limits)	Difference (Limits)	Qualifications
	1	5			
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Cadmium					
Calcium	44800	45300	1		
Chromium					
Cobalt					
Copper					
Iron	62.8	64.2	2		
Lead					
Magnesium	14400	14600	1		
Manganese					
Mercury					
Nickel					
Potassium	2790	2760	1		
Selenium					
Silver					
Sodium	23400	23600	1		
Thallium					
Vanadium					
Zinc					
Cyanide					
Boron					
Molybdenum					
Strontium					
Silicon					

Notes: _____

LDC #: 10414M4
 SDG #: 03-3102

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

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

Y N N/A Were field blanks identified in this SDG?
 Y N N/A Were target analytes detected in the field blanks?

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

Analyte	Concentration Units (<u>ug/l</u>)
Fe	16.4
Mg	25.9
K	90.9
Na	931

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

Analyte	Concentration Units ()