Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NASA JPL

Collection Date: April 23, 2003

LDC Report Date: June 17, 2003

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-2843

Sample Identification

DUPE-2-2Q03
EB-4-4/23/03
MW-14-1
MW-14-2
MW-14-3
MW-14-4
MW-14-5
DUPE-2-2Q03MS
DUPE-2-2Q03MSD
DUPE-2-2Q03DUP
MW-14-1MS
MW-14-1MSD

Introduction

This data review covers 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.1 for Total Dissolved Solids, EPA Method 300.0 for Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, EPA SW 846 Method 9040B for pH, and Standard Method 2320B for Carbonate and Bicarbonate.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

Samples DUPE-2-2Q03 and MW-14-3 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD
	DUPE-2-2Q03	MW-14-3	
Bicarbonate	210 mg/L	210 mg/L	0
pH	7.63 units	7.61 units	0
Total dissolved solids	669 mg/L	613 mg/L	9
Perchlorate	5.4 ug/L	5.7 ug/L	5
Chloride	96.7 mg/L	94.3 mg/L	3
Nitrate as N	13.1 mg/L	13.1 mg/L	0
Sulfate	139 mg/L	136 mg/L	2

X. Field Blanks

Sample EB-4-4/23/03 was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration
EB-4-4/23/03	pH Chloride Nitrate as N Sulfate	7.00 units 0.23 mg/L 0.088 mg/L 0.73 mg/L

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-2843

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-2843

No Sample Data Qualified in this SDG

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	32843	Collected by:	Leo Williamson

Component Name: Bicarbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2843-1	DUPE-2-2Q03	Water	04/23/03	04/23/03	04/24/03	03W2540	mg/L	2	210	
03-2843-2	EB-4-4/23/03	Water	04/23/03	04/23/03	04/24/03	03W2540	mg/L	2	<2	U
03-2843-3	MW-14-1	Water	04/23/03	04/23/03	04/24/03	03W2540	mg/L	2	245	
03-2843-4	MW-14-2	Water	04/23/03	04/23/03	04/24/03	03W2540	mg/L	2	234	
03-2843-5	MW-14-3	Water	04/23/03	04/23/03	04/24/03	03W2540	mg/L	2	210	
03-2843-6	MW-14-4	Water	04/23/03	04/23/03	04/24/03	03W2539	mg/L	2	156	
03-2843-7	MW-14-5	Water	04/23/03	04/23/03	04/24/03	03W2539	mg/L	2	129	
03W2540-MB-01	03W2540-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2540	mg/L	2	<2	U
03W2539-MB-01	03W2539-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2539	mg/L	2	<2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	32843	Collected by:	Leo Williamson

Component Name: Carbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2843-1	DUPE-2-2Q03	Water	04/23/03	04/23/03	04/24/03	03W2540	mg-$CaCO_3$/L	2	<2	U
03-2843-2	EB-4-4/23/03	Water	04/23/03	04/23/03	04/24/03	03W2540	mg-$CaCO_3$/L	2	<2	U
03-2843-3	MW-14-1	Water	04/23/03	04/23/03	04/24/03	03W2540	mg-$CaCO_3$/L	2	<2	U
03-2843-4	MW-14-2	Water	04/23/03	04/23/03	04/24/03	03W2540	mg-$CaCO_3$/L	2	<2	U
03-2843-5	MW-14-3	Water	04/23/03	04/23/03	04/24/03	03W2540	mg-$CaCO_3$/L	2	<2	U
03-2843-6	MW-14-4	Water	04/23/03	04/23/03	04/24/03	03W2539	mg-$CaCO_3$/L	2	<2	U
03-2843-7	MW-14-5	Water	04/23/03	04/23/03	04/24/03	03W2539	mg-$CaCO_3$/L	2	7.6	
03W2540-MB-01	03W2540-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2540	mg-$CaCO_3$/L	2	<2	U
03W2539-MB-01	03W2539-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2539	mg-$CaCO_3$/L	2	<2	U

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

Note: Q - Qualifier.
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Wet Analysis Results for Method 9040B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	9040B
Project ID:	JPL	Service ID:	32843	Collected by:	Leo Williamson

Component Name: pH
CAS No: 10-29-7

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2843-1	DUPE-2-2Q03	Water	04/23/03	04/23/03	04/23/03	03W2518	pH unit	0.01	7.63	
03-2843-2	EB-4-4/23/03	Water	04/23/03	04/23/03	04/23/03	03W2518	pH unit	0.01	7.00	
03-2843-3	MW-14-1	Water	04/23/03	04/23/03	04/23/03	03W2518	pH unit	0.01	6.77	
03-2843-4	MW-14-2	Water	04/23/03	04/23/03	04/23/03	03W2518	pH unit	0.01	7.18	
03-2843-5	MW-14-3	Water	04/23/03	04/23/03	04/23/03	03W2518	pH unit	0.01	7.61	
03-2843-6	MW-14-4	Water	04/23/03	04/23/03	04/23/03	03W2518	pH unit	0.01	7.98	
03-2843-7	MW-14-5	Water	04/23/03	04/23/03	04/23/03	03W2518	pH unit	0.01	8.22	
03W2518-MB-01	03W2518-MB-01	Water	04/23/03	04/23/03	04/23/03	03W2518	pH unit	0.01	6.86	

Note: Q - Qualifier.
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Wet Analysis Results for Method 160.1

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	160.1
Project ID:	JPL	Service ID:	32843	Collected by:	Leo Williamson

Component Name: Solids, Total Dissolved (TDS)
CAS No: 10-33-3

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2843-1	DUPE-2-2Q03	Water	04/23/03	04/23/03	04/24/03	03W2543	mg/L	10	669	
03-2843-2	EB-4-4/23/03	Water	04/23/03	04/23/03	04/24/03	03W2543	mg/L	10	<10	U
03-2843-3	MW-14-1	Water	04/23/03	04/23/03	04/24/03	03W2543	mg/L	10	731	
03-2843-4	MW-14-2	Water	04/23/03	04/23/03	04/24/03	03W2543	mg/L	10	740	
03-2843-5	MW-14-3	Water	04/23/03	04/23/03	04/24/03	03W2543	mg/L	10	613	
03-2843-6	MW-14-4	Water	04/23/03	04/23/03	04/24/03	03W2543	mg/L	10	300	
03-2843-7	MW-14-5	Water	04/23/03	04/23/03	04/24/03	03W2543	mg/L	10	174	
03W2543-MB-01	03W2543-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2543	mg/L	10	<10	U

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

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

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Wet Analysis Results for Method 7196

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	7196
Project ID:	JPL	Service ID:	32843	Collected by:	Leo Williamson

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2843-1	DUPE-2-2Q03	Water	04/23/03	04/23/03	04/23/03	03W2517	mg/L	0.01	<0.01	U
03-2843-2	EB-4-4/23/03	Water	04/23/03	04/23/03	04/23/03	03W2517	mg/L	0.01	<0.01	U
03-2843-3	MW-14-1	Water	04/23/03	04/23/03	04/23/03	03W2517	mg/L	0.01	<0.01	U
03-2843-4	MW-14-2	Water	04/23/03	04/23/03	04/23/03	03W2517	mg/L	0.01	<0.01	U
03-2843-5	MW-14-3	Water	04/23/03	04/23/03	04/23/03	03W2517	mg/L	0.01	<0.01	U
03-2843-6	MW-14-4	Water	04/23/03	04/23/03	04/23/03	03W2517	mg/L	0.01	<0.01	U
03-2843-7	MW-14-5	Water	04/23/03	04/23/03	04/23/03	03W2517	mg/L	0.01	<0.01	U
03W2517-MB-01	03W2517-MB-01	Water	04/23/03	04/23/03	04/23/03	03W2517	mg/L	0.01	<0.01	U

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

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

6/18/03

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Wet Analysis Results for Method 314.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	314.0
Project ID:	JPL	Service ID:	32843	Collected by:	Leo Williamson

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2843-1	DUPE-2-2Q03	Water	04/23/03	04/23/03	04/24/03	03W2531	μg/L	4	5.4	
03-2843-2	EB-4-4/23/03	Water	04/23/03	04/23/03	04/24/03	03W2531	μg/L	4	<4	U
03-2843-3	MW-14-1	Water	04/23/03	04/23/03	04/24/03	03W2531	μg/L	4	2.8	B
03-2843-4	MW-14-2	Water	04/23/03	04/23/03	04/24/03	03W2531	μg/L	4	3.3	B
03-2843-5	MW-14-3	Water	04/23/03	04/23/03	04/24/03	03W2531	μg/L	4	5.7	
03-2843-6	MW-14-4	Water	04/23/03	04/23/03	04/24/03	03W2531	μg/L	4	2.4	B
03-2843-7	MW-14-5	Water	04/23/03	04/23/03	04/24/03	03W2531	μg/L	4	<4	U
03W2531-MB-01	03W2531-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2531	μg/L	4	<4	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL	Service ID:	32843	Collected by:	Leo Williamson

Component Name: Chloride Cl^-
CAS No: 16887-00-6

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2843-1	DUPE-2-2Q03	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	4	96.7	
03-2843-2	EB-4-4/23/03	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.25	0.23	B
03-2843-3	MW-14-1	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	4	136	
03-2843-4	MW-14-2	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	4	111	
03-2843-5	MW-14-3	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	4	94.3	
03-2843-6	MW-14-4	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.8	37.9	
03-2843-7	MW-14-5	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.25	9.9	
03W2520-MB-01	03W2520-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2520	mg/L	0.2	<0.2	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL	Service ID:	32843	Collected by:	Leo Williamson

Component Name: Nitrate as N
CAS No: 14797-55-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2843-1	DUPE-2-2Q03	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.8	13.1	
03-2843-2	EB-4-4/23/03	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.05	0.088	
03-2843-3	MW-14-1	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.8	17.1	
03-2843-4	MW-14-2	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.8	14.8	
03-2843-5	MW-14-3	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.8	13.1	
03-2843-6	MW-14-4	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.16	10.1	
03-2843-7	MW-14-5	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.05	0.15	
03W2520-MB-01	03W2520-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2520	mg/L	0.04	<0.04	U

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

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6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL	Service ID:	32843	Collected by:	Leo Williamson

Component Name: Sulfate SO_4^{--}
CAS No: 14808-79-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2843-1	DUPE-2-2Q03	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	10	139	
03-2843-2	EB-4-4/23/03	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.63	0.73	
03-2843-3	MW-14-1	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	10	194	
03-2843-4	MW-14-2	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	10	179	
03-2843-5	MW-14-3	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	10	136	
03-2843-6	MW-14-4	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	2	30.0	
03-2843-7	MW-14-5	Water	04/23/03	04/23/03	04/24/03	03W2520	mg/L	0.63	16.9	
03W2520-MB-01	03W2520-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2520	mg/L	0.5	<0.5	U

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

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6/18/03

LDC #: 10414E6

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 6/16/03

SDG #: 03-2843

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: MH

2nd Reviewer: A

METHOD: (Analyte) ~~Alkalinity~~ Carbonate Bicarbonate (SM2320B), Chloride, Nitrate-N, Sulfate (EPA Method 300.0), Hexavalent Chromium (EPA SW846 Method 7196), Perchlorate (EPA Method 314.0), pH (EPA SW846 Method 9040), TDS (EPA Method 160.1)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/23/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	(1, 5)
X.	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: All

1 ✓	DUPE-2-2Q03	11	MW-14-1MS	21		31	
2	FB-4-4/23/03	12	MW-14-1MSD	22		32	
3	MW-14-1	13	MB	23		33	
4	MW-14-2	14		24		34	
5 ✓	MW-14-3	15		25		35	
6	MW-14-4	16		26		36	
7	MW-14-5	17		27		37	
8	DUPE-2-2Q03MS	18		28		38	
9	DUPE-2-2Q03MSD	19		29		39	
10	DUPE-2-2Q03DUP	20		30		40	

Notes:

LDC #: 104146
SDG #: 03-2843

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Parameter																	
1-7	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}	CO_3	carbonate	bicarbonate	
02 8, 9	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
10	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
✓ 4, 12	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				

Comments:

LDC #: 10414E6
SDG #: 03-2843

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

METHOD: Inorganics, Method See cover

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 (mg/l)		RPD (Limit)	Difference (Limit)	Qualifier
	1	5			
Bicarbonate	210	210	0		
pH (unit)	7.63	7.61	0		
TDS	669	613	9		
ClO4 (ug/l)	5.4	5.7	5		
Cl	96.7	94.3	3		

Analyte	Concentration (mg/l)		RPD (Limit)	Difference (Limit)	Qualifier
	1	5			
NO3-N	13.1	13.1	0		
SO4	139	136	2		

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

LDC #: 10414 E6
SDG #: 03-2843

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

METHOD: Inorganics, EPA Method See cover

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

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

Analyte	Concentration Units (mg/l)
pH (unit)	7.00
Cl	0.23
NO_3-N	0.088
SO4	0.73

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

Analyte	Concentration Units ( )

FLDBLK2.6

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NASA JPL

Collection Date: April 24, 2003

LDC Report Date: June 17, 2003

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-2866

Sample Identification

DUPE-3-2Q03
EB-5-4/24/03
MW-20-1
MW-20-2
MW-20-3
MW-20-4
MW-20-5
DUPE-3-2Q03MS
DUPE-3-2Q03MSD
DUPE-3-2Q03DUP
MW-20-3MS
MW-20-3MSD

Introduction

This data review covers 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.1 for Total Dissolved Solids, EPA Method 300.0 for Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, EPA SW 846 Method 9040B for pH, and Standard Method 2320B for Carbonate and Bicarbonate.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

Samples DUPE-3-2Q03 and MW-20-1 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD
	DUPE-3-2Q03	MW-20-1	
Bicarbonate	166 mg/L	164 mg/L	1
pH	7.66 units	7.64 units	0
Total dissolved solids	298 mg/L	311 mg/L	4
Chloride	18.9 mg/L	18.5 mg/L	2
Nitrate as N	2.9 mg/L	2.8 mg/L	4
Sulfate	56.2 mg/L	54.5 mg/L	3

X. Field Blanks

Sample EB-5-4/24/03 was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration
EB-5-4/24/03	pH Chloride Nitrate as N Sulfate	6.21 units 0.24 mg/L 0.070 mg/L 0.69 mg/L

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-2866

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-2866

No Sample Data Qualified in this SDG

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	32866	Collected by:	Leo Williamson

Component Name: Bicarbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2866-1	DUPE-3-2Q03	Water	04/24/03	04/24/03	04/29/03	03W2617	mg/L	2	166	
03-2866-2	EB-5-4/24/03	Water	04/24/03	04/24/03	04/29/03	03W2617	mg/L	2	<2	U
03-2866-3	MW-20-1	Water	04/24/03	04/24/03	04/29/03	03W2617	mg/L	2	164	
03-2866-4	MW-20-2	Water	04/24/03	04/24/03	04/29/03	03W2617	mg/L	2	153	
03-2866-5	MW-20-3	Water	04/24/03	04/24/03	04/29/03	03W2617	mg/L	2	202	
03-2866-6	MW-20-4	Water	04/24/03	04/24/03	04/29/03	03W2617	mg/L	2	115	
03-2866-7	MW-20-5	Water	04/24/03	04/24/03	04/29/03	03W2617	mg/L	2	114	
03W2617-MB-01	03W2617-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2617	mg/L	2	<2	U

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

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

6/12/03

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	32866	Collected by:	Leo Williamson

Component Name: Carbonate

CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2866-1	DUPE-3-2Q03	Water	04/24/03	04/24/03	04/29/03	03W2617	mg-$CaCO_3$/L	2	<2	U
03-2866-2	EB-5-4/24/03	Water	04/24/03	04/24/03	04/29/03	03W2617	mg-$CaCO_3$/L	2	<2	U
03-2866-3	MW-20-1	Water	04/24/03	04/24/03	04/29/03	03W2617	mg-$CaCO_3$/L	2	<2	U
03-2866-4	MW-20-2	Water	04/24/03	04/24/03	04/29/03	03W2617	mg-$CaCO_3$/L	2	<2	U
03-2866-5	MW-20-3	Water	04/24/03	04/24/03	04/29/03	03W2617	mg-$CaCO_3$/L	2	<2	U
03-2866-6	MW-20-4	Water	04/24/03	04/24/03	04/29/03	03W2617	mg-$CaCO_3$/L	2	20.4	
03-2866-7	MW-20-5	Water	04/24/03	04/24/03	04/29/03	03W2617	mg-$CaCO_3$/L	2	38.4	
03W2617-MB-01	03W2617-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2617	mg-$CaCO_3$/L	2	<2	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 9040B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	9040B
Project ID:	JPL	Service ID:	32866	Collected by:	Leo Williamson

Component Name: pH
CAS No: 10-29-7

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2866-1	DUPE-3-2Q03	Water	04/24/03	04/24/03	04/24/03	03W2546	pH unit	0.01	7.66	
03-2866-2	EB-5-4/24/03	Water	04/24/03	04/24/03	04/24/03	03W2546	pH unit	0.01	6.21	
03-2866-3	MW-20-1	Water	04/24/03	04/24/03	04/24/03	03W2546	pH unit	0.01	7.64	
03-2866-4	MW-20-2	Water	04/24/03	04/24/03	04/24/03	03W2546	pH unit	0.01	7.71	
03-2866-5	MW-20-3	Water	04/24/03	04/24/03	04/24/03	03W2546	pH unit	0.01	7.90	
03-2866-6	MW-20-4	Water	04/24/03	04/24/03	04/24/03	03W2546	pH unit	0.01	8.79	
03-2866-7	MW-20-5	Water	04/24/03	04/24/03	04/24/03	03W2546	pH unit	0.01	9.08	
03W2546-MB-01	03W2546-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2546	pH unit	0.01	6.83	

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

5/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 160.1

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	160.1
Project ID:	JPL	Service ID:	32866	Collected by:	Leo Williamson

Component Name: Solids, Total Dissolved (TDS)
CAS No: 10-33-3

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2866-1	DUPE-3-2Q03	Water	04/24/03	04/24/03	04/28/03	03W2607	mg/L	10	298	
03-2866-2	EB-5-4/24/03	Water	04/24/03	04/24/03	04/28/03	03W2607	mg/L	10	<10	U
03-2866-3	MW-20-1	Water	04/24/03	04/24/03	04/28/03	03W2607	mg/L	10	311	
03-2866-4	MW-20-2	Water	04/24/03	04/24/03	04/28/03	03W2607	mg/L	10	235	
03-2866-5	MW-20-3	Water	04/24/03	04/24/03	04/28/03	03W2607	mg/L	10	333	
03-2866-6	MW-20-4	Water	04/24/03	04/24/03	04/28/03	03W2607	mg/L	10	201	
03-2866-7	MW-20-5	Water	04/24/03	04/24/03	04/28/03	03W2607	mg/L	10	347	
03W2607-MB-01	03W2607-MB-01	Water	04/28/03	04/28/03	04/28/03	03W2607	mg/L	10	<10	U

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

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

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	7196
Project ID:	JPL	Service ID:	32866	Collected by:	Leo Williamson

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2866-1	DUPE-3-2Q03	Water	04/24/03	04/24/03	04/24/03	03W2542	mg/L	0.01	<0.01	U
03-2866-2	EB-5-4/24/03	Water	04/24/03	04/24/03	04/24/03	03W2542	mg/L	0.01	<0.01	U
03-2866-3	MW-20-1	Water	04/24/03	04/24/03	04/24/03	03W2542	mg/L	0.01	<0.01	U
03-2866-4	MW-20-2	Water	04/24/03	04/24/03	04/24/03	03W2542	mg/L	0.01	<0.01	U
03-2866-5	MW-20-3	Water	04/24/03	04/24/03	04/24/03	03W2542	mg/L	0.01	<0.01	U
03-2866-6	MW-20-4	Water	04/24/03	04/24/03	04/24/03	03W2542	mg/L	0.01	<0.01	U
03-2866-7	MW-20-5	Water	04/24/03	04/24/03	04/24/03	03W2542	mg/L	0.01	<0.01	U
03W2542-MB-01	03W2542-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2542	mg/L	0.01	<0.01	U

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

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

5/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	314.0
Project ID:	JPL	Service ID:	32866	Collected by:	Leo Williamson

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2866-1	DUPE-3-2Q03	Water	04/24/03	04/24/03	04/24/03	03W2531	μg/L	4	<4	U
03-2866-2	EB-5-4/24/03	Water	04/24/03	04/24/03	04/24/03	03W2531	μg/L	4	<4	U
03-2866-3	MW-20-1	Water	04/24/03	04/24/03	04/24/03	03W2531	μg/L	4	<4	U
03-2866-4	MW-20-2	Water	04/24/03	04/24/03	04/24/03	03W2531	μg/L	4	<4	U
03-2866-5	MW-20-3	Water	04/24/03	04/24/03	04/29/03	03W2612	μg/L	4	<4	U
03-2866-6	MW-20-4	Water	04/24/03	04/24/03	04/29/03	03W2612	μg/L	8	124	
03-2866-7	MW-20-5	Water	04/24/03	04/24/03	04/29/03	03W2612	μg/L	4	<4	U
03W2531-MB-01	03W2531-MB-01	Water	04/24/03	04/24/03	04/24/03	03W2531	μg/L	4	<4	U
03W2612-MB-01	03W2612-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2612	μg/L	4	<4	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL	Service ID:	32866	Collected by:	Leo Williamson

Component Name: Chloride Cl^-
CAS No: 16887-00-6

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2866-1	DUPE-3-2Q03	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.5	18.9	
03-2866-2	EB-5-4/24/03	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.25	0.24	B
03-2866-3	MW-20-1	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.5	18.5	
03-2866-4	MW-20-2	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.25	7.6	
03-2866-5	MW-20-3	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	1	37.0	
03-2866-6	MW-20-4	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.4	10	
03-2866-7	MW-20-5	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.4	8.9	
03W2550-MB-01	03W2550-MB-01	Water	04/25/03	04/25/03	04/25/03	03W2550	mg/L	0.2	<0.2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL	Service ID:	32866	Collected by:	Leo Williamson

Component Name: Nitrate as N
CAS No: 14797-55-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2866-1	DUPE-3-2Q03	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.1	2.9	
03-2866-2	EB-5-4/24/03	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.05	0.070	
03-2866-3	MW-20-1	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.1	2.8	
03-2866-4	MW-20-2	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.05	0.98	
03-2866-5	MW-20-3	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.2	3.0	
03-2866-6	MW-20-4	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.08	<0.08	U
03-2866-7	MW-20-5	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.08	0.12	
03W2550-MB-01	03W2550-MB-01	Water	04/25/03	04/25/03	04/25/03	03W2550	mg/L	0.04	<0.04	U

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

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

APCL Data Highway to GEOFON, Inc. 05/22/2003 11:25 (p8) № 32866 File: FORM-1 Page: 3887

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL	Service ID:	32866	Collected by:	Leo Williamson

Component Name: Sulfate SO_4^{--}
CAS No: 14808-79-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2866-1	DUPE-3-2Q03	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	1.3	56.2	
03-2866-2	EB-5-4/24/03	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.63	0.69	
03-2866-3	MW-20-1	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	1.3	54.5	
03-2866-4	MW-20-2	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	0.63	28.9	
03-2866-5	MW-20-3	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	2.5	30.4	
03-2866-6	MW-20-4	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	1	10.3	
03-2866-7	MW-20-5	Water	04/24/03	04/24/03	04/25/03	03W2550	mg/L	1	5.4	
03W2550-MB-01	03W2550-MB-01	Water	04/25/03	04/25/03	04/25/03	03W2550	mg/L	0.5	<0.5	U

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

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

6/18/03

LDC #: 10414F6

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 6/16/03

SDG #: 03-2866

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: MW

2nd Reviewer: [illegible]

METHOD: (Analyte) ~~Alkalinity~~ Carbonate, Bicarbonate (SM2320B), Chloride, Nitrate-N, Sulfate (EPA Method 300.0), Hexavalent Chromium (EPA SW846 Method 7196), Perchlorate (EPA Method 314.0), pH (EPA SW846 Method 9040), TDS (EPA Method 160.1)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/24/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	1, 3
X	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: All

1	DUPE-3-2Q03	11	MW-20-3MS	21		31	
2	EB-5-4/24/03	12	MW-20-3MSD	22		32	
3	MW-20-1	13	MB	23		33	
4	MW-20-2	14		24		34	
5	MW-20-3	15		25		35	
6	MW-20-4	16		26		36	
7	MW-20-5	17		27		37	
8	DUPE-3-2Q03MS	18		28		38	
9	DUPE-3-2Q03MSD	19		29		39	
10	DUPE-3-2Q03DUP	20		30		40	

Notes:

LDC #: 10414F6
SDG #: 03-2866

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Parameter			
1-7	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}	CO_3	carbonate	bicarbonate
8, 9	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
10	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}		carbonate	bicarbonate
11, 12	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}			

Comments:

LDC #: 10414F6
SDG #: 03-2866

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

METHOD: Inorganics, Method See cover

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 (mg/l)		RPD (Limit)	Difference (Limit)	Qualifier
	1	3			
Bicarbonate	166	164	1		
PH	7.66	7.64	0		
TDS	298	311	4		
Cl	18.9	18.5	2		
NO3-N	2.9	2.8	4		

Analyte	Concentration (mg/l)		RPD (Limit)	Difference (Limit)	Qualifier
	1	3			
SO4	56.2	54.5	3		

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

LDC #: 10414 E6
SDG #: 03-2866

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

METHOD: Inorganics, EPA Method see cover

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

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

Analyte	Concentration Units (mg/l)
pH (unit)	6.21
cl	0.24
NO_3-N	0.070
SO_4	0.69

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

Analyte	Concentration Units ( )

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: Wet Chemistry

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-17-1DUP
MW-17-2MS
MW-17-2MSD

Introduction

This data review covers 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.1 for Total Dissolved Solids, EPA Method 300.0 for Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, EPA SW 846 Method 9040B for pH, and Standard Method 2320B for Carbonate and Bicarbonate.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

Sample EB-6-4/28/03 was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration
EB-6-4/28/03	pH Chloride Nitrate as N	6.54 units 0.20 mg/L 0.071 mg/L

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-2933

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-2933

No Sample Data Qualified in this SDG

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	32933	Collected by:	Leo Williamson

Component Name: Bicarbonate

CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2933-1	EB-6-4/28/03	Water	04/28/03	04/28/03	05/01/03	03W2665	mg/L	2	<2	U
03-2933-2	MW-17-1	Water	04/28/03	04/28/03	05/01/03	03W2665	mg/L	2	176	
03-2933-3	MW-17-2	Water	04/28/03	04/28/03	05/01/03	03W2665	mg/L	2	164	
03-2933-4	MW-17-3	Water	04/28/03	04/28/03	05/01/03	03W2665	mg/L	2	167	
03-2933-5	MW-17-4	Water	04/28/03	04/28/03	05/01/03	03W2665	mg/L	2	137	
03-2933-6	MW-17-5	Water	04/28/03	04/28/03	05/01/03	03W2665	mg/L	2	156	
03W2665-MB-01	03W2665-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2665	mg/L	2	<2	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	32933	Collected by:	Leo Williamson

Component Name: Carbonate

CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2933-1	EB-6-4/28/03	Water	04/28/03	04/28/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-2933-2	MW-17-1	Water	04/28/03	04/28/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-2933-3	MW-17-2	Water	04/28/03	04/28/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-2933-4	MW-17-3	Water	04/28/03	04/28/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-2933-5	MW-17-4	Water	04/28/03	04/28/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-2933-6	MW-17-5	Water	04/28/03	04/28/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03W2665-MB-01	03W2665-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

6/18/03

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Wet Analysis Results for Method 9040B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	9040B
Project ID:	JPL	Service ID:	32933	Collected by:	Leo Williamson

Component Name: pH
CAS No: 10-29-7

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2933-1	EB-6-4/28/03	Water	04/28/03	04/28/03	04/28/03	03W2592	pH unit	0.01	6.54	
03-2933-2	MW-17-1	Water	04/28/03	04/28/03	04/28/03	03W2592	pH unit	0.01	7.44	
03-2933-3	MW-17-2	Water	04/28/03	04/28/03	04/28/03	03W2592	pH unit	0.01	7.97	
03-2933-4	MW-17-3	Water	04/28/03	04/28/03	04/28/03	03W2592	pH unit	0.01	8.08	
03-2933-5	MW-17-4	Water	04/28/03	04/28/03	04/28/03	03W2592	pH unit	0.01	8.01	
03-2933-6	MW-17-5	Water	04/28/03	04/28/03	04/28/03	03W2592	pH unit	0.01	8.17	
03W2592-MB-01	03W2592-MB-01	Water	04/28/03	04/28/03	04/28/03	03W2592	pH unit	0.01	6.87	

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

6/18/03

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Wet Analysis Results for Method 160.1

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	160.1
Project ID:	JPL	Service ID:	32933	Collected by:	Leo Williamson

Component Name: Solids, Total Dissolved (TDS)
CAS No: 10-33-3

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2933-1	EB-6-4/28/03	Water	04/28/03	04/28/03	04/28/03	03W2607	mg/L	10	<10	U
03-2933-2	MW-17-1	Water	04/28/03	04/28/03	04/28/03	03W2607	mg/L	10	253	
03-2933-3	MW-17-2	Water	04/28/03	04/28/03	04/28/03	03W2607	mg/L	10	250	
03-2933-4	MW-17-3	Water	04/28/03	04/28/03	04/28/03	03W2607	mg/L	10	247	
03-2933-5	MW-17-4	Water	04/28/03	04/28/03	04/28/03	03W2607	mg/L	10	198	
03-2933-6	MW-17-5	Water	04/28/03	04/28/03	04/28/03	03W2607	mg/L	10	219	
03W2607-MB-01	03W2607-MB-01	Water	04/28/03	04/28/03	04/28/03	03W2607	mg/L	10	<10	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	7196
Project ID:	JPL	Service ID:	32933	Collected by:	Leo Williamson

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2933-1	EB-6-4/28/03	Water	04/28/03	04/28/03	04/28/03	03W2603	mg/L	0.01	<0.01	U
03-2933-2	MW-17-1	Water	04/28/03	04/28/03	04/28/03	03W2603	mg/L	0.01	<0.01	U
03-2933-3	MW-17-2	Water	04/28/03	04/28/03	04/28/03	03W2603	mg/L	0.01	<0.01	U
03-2933-4	MW-17-3	Water	04/28/03	04/28/03	04/28/03	03W2603	mg/L	0.01	<0.01	U
03-2933-5	MW-17-4	Water	04/28/03	04/28/03	04/28/03	03W2603	mg/L	0.01	<0.01	U
03-2933-6	MW-17-5	Water	04/28/03	04/28/03	04/28/03	03W2603	mg/L	0.01	<0.01	U
03W2603-MB-01	03W2603-MB-01	Water	04/28/03	04/28/03	04/28/03	03W2603	mg/L	0.01	<0.01	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	314.0
Project ID:	JPL	Service ID:	32933	Collected by:	Leo Williamson

Component Name: Perchlorate

CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2933-1	EB-6-4/28/03	Water	04/28/03	04/28/03	04/29/03	03W2612	μg/L	4	<4	U
03-2933-2	MW-17-1	Water	04/28/03	04/28/03	04/29/03	03W2612	μg/L	4	<4	U
03-2933-3	MW-17-2	Water	04/28/03	04/28/03	04/29/03	03W2612	μg/L	4	4.1	
03-2933-4	MW-17-3	Water	04/28/03	04/28/03	04/29/03	03W2612	μg/L	8	126	
03-2933-5	MW-17-4	Water	04/28/03	04/28/03	04/29/03	03W2612	μg/L	4	6.5	
03-2933-6	MW-17-5	Water	04/28/03	04/28/03	04/29/03	03W2612	μg/L	4	3.6	B
03W2612-MB-01	03W2612-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2612	μg/L	4	<4	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 32933 Collected by: Leo Williamson

Component Name: Chloride Cl^-
CAS No: 16887-00-6

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2933-1	EB-6-4/28/03	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.25	0.20	B
03-2933-2	MW-17-1	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.4	13.3	
03-2933-3	MW-17-2	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.4	19.6	
03-2933-4	MW-17-3	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.4	12.5	
03-2933-5	MW-17-4	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.4	11.4	
03-2933-6	MW-17-5	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.4	11.2	
03W2610-MB-01	03W2610-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.2	<0.2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL	Service ID:	32933	Collected by:	Leo Williamson

Component Name: Nitrate as N
CAS No: 14797-55-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2933-1	EB-6-4/28/03	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.05	0.071	
03-2933-2	MW-17-1	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.08	1.3	
03-2933-3	MW-17-2	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.08	2.0	
03-2933-4	MW-17-3	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.08	1.5	
03-2933-5	MW-17-4	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.08	0.70	
03-2933-6	MW-17-5	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.08	0.64	
03W2610-MB-01	03W2610-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.04	<0.04	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL	Service ID:	32933	Collected by:	Leo Williamson

Component Name: Sulfate SO_4^{--}
CAS No: 14808-79-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2933-1	EB-6-4/28/03	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	0.63	<0.63	U
03-2933-2	MW-17-1	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	1	36.5	
03-2933-3	MW-17-2	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	1	34.7	
03-2933-4	MW-17-3	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	1	31.7	
03-2933-5	MW-17-4	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	1	25.5	
03-2933-6	MW-17-5	Water	04/28/03	04/28/03	04/29/03	03W2610	mg/L	1	18.8	
03W2610-MB-01	03W2610-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.5	<0.5	U

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

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

6/18/03

LDC #: 10414G6 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/16/03

SDG #: 03-2933 Level III Page: 1 of 1

Laboratory: Applied P & Ch Laboratory Reviewer: HH

2nd Reviewer: A

METHOD: (Analyte) ~~Alkalinity~~ Carbonate, Bicarbonate (SM2320B), Chloride, Nitrate-N, Sulfate (EPA Method 300.0), Hexavalent Chromium (EPA SW846 Method 7196), Perchlorate (EPA Method 314.0), pH (EPA SW846 Method 9040), TDS (EPA Method 160.1)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/28/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	SW	EB=1

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

Validated Samples: All

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-17-1DUP	17		27		37	
8	MW-17-2MS	18		28		38	
9	MW-17-2MSD	19		29		39	
10	MB	20		30		40	

Notes:

LDC #: 104466
SDG #: 03-2933

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Parameter																	
1-6	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}	Clay	carbonate	bicarbonate	
or 7	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
8, 9	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}	Clay			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				

Comments:

LDC #: 104466
SDG #: 03-2933

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: MB
2nd reviewer: [illegible]

METHOD: Inorganics, EPA Method See cover

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

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

Analyte	Concentration Units (mg/l)
pH (unit)	6.54
Cl	0.20
NO3-N	0.071

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

Analyte	Concentration Units ( )

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: Wet Chemistry

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
DUPE-4-2Q03MS
DUPE-4-2Q03MSD
MW-24-5DUP

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.1 for Total Dissolved Solids, EPA Method 300.0 for Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, EPA SW 846 Method 9040B for pH, and Standard Method 2320B for Carbonate and Bicarbonate.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

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

Analyte	Concentration		RPD
	DUPE-4-2Q03	MW-24-2	
Bicarbonate	112 mg/L	124 mg/L	10
Carbonate	10.2 mg/L	10.2 mg/L	0
pH	8.22 units	8.40 units	2
Total dissolved solids	257 mg/L	257 mg/L	0
Perchlorate	199 ug/L	195 ug/L	2
Chloride	34.3 mg/L	33.8 mg/L	1
Nitrate as N	1.9 mg/L	1.8 mg/L	5
Sulfate	19.9 mg/L	19.3 mg/L	3

X. Field Blanks

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

Equipment Blank ID	Analyte	Concentration
EB-7-4/29/03	pH Total dissolved solids Chloride Nitrate as N Sulfate	5.77 units 8.0 mg/L 0.26 mg/L 0.078 mg/L 0.75 mg/L

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-2964

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-2964

No Sample Data Qualified in this SDG

F

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method SM2320B
Project ID: JPL Service ID: 32964 Collected by:

Component Name: Bicarbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2964-1	DUPE-4-2Q03	Water	04/29/03	04/29/03	05/01/03	03W2665	mg/L	2	112	
03-2964-2	EB-7-4/29/03	Water	04/29/03	04/29/03	05/01/03	03W2665	mg/L	2	<2	U
03-2964-3	MW-24-1	Water	04/29/03	04/29/03	05/01/03	03W2665	mg/L	2	164	
03-2964-4	MW-24-2	Water	04/29/03	04/29/03	05/01/03	03W2665	mg/L	2	124	
03-2964-5	MW-24-3	Water	04/29/03	04/29/03	05/01/03	03W2667	mg/L	2	114	
03-2964-6	MW-24-4	Water	04/29/03	04/29/03	05/01/03	03W2667	mg/L	2	102	
03-2964-7	MW-24-5	Water	04/29/03	04/29/03	05/01/03	03W2667	mg/L	2	166	
03W2665-MB-01	03W2665-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2665	mg/L	2	<2	U
03W2667-MB-01	03W2667-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2667	mg/L	2	<2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	32964	Collected by:	

Component Name: Carbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2964-1	DUPE-4-2Q03	Water	04/29/03	04/29/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	10.2	
03-2964-2	EB-7-4/29/03	Water	04/29/03	04/29/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-2964-3	MW-24-1	Water	04/29/03	04/29/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-2964-4	MW-24-2	Water	04/29/03	04/29/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	10.2	
03-2964-5	MW-24-3	Water	04/29/03	04/29/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	35.8	
03-2964-6	MW-24-4	Water	04/29/03	04/29/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	23.0	
03-2964-7	MW-24-5	Water	04/29/03	04/29/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	<2	U
03W2665-MB-01	03W2665-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03W2667-MB-01	03W2667-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	<2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 9040B

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 9040B
Project ID: JPL Service ID: 32964 Collected by:

Component Name: pH
CAS No: 10-29-7

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2964-1	DUPE-4-2Q03	Water	04/29/03	04/29/03	04/29/03	03W2631	pH unit	0.01	8.22	
03-2964-2	EB-7-4/29/03	Water	04/29/03	04/29/03	04/29/03	03W2631	pH unit	0.01	5.77	
03-2964-3	MW-24-1	Water	04/29/03	04/29/03	04/29/03	03W2631	pH unit	0.01	7.90	
03-2964-4	MW-24-2	Water	04/29/03	04/29/03	04/29/03	03W2631	pH unit	0.01	8.40	
03-2964-5	MW-24-3	Water	04/29/03	04/29/03	04/29/03	03W2631	pH unit	0.01	8.89	
03-2964-6	MW-24-4	Water	04/29/03	04/29/03	04/29/03	03W2631	pH unit	0.01	9.01	
03-2964-7	MW-24-5	Water	04/29/03	04/29/03	04/29/03	03W2631	pH unit	0.01	8.04	
03W2631-MB-01	03W2631-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2631	pH unit	0.01	6.85	

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 160.1

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	160.1
Project ID:	JPL	Service ID:	32964	Collected by:	

Component Name: Solids, Total Dissolved (TDS)
CAS No: 10-33-3

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2964-1	DUPE-4-2Q03	Water	04/29/03	04/29/03	05/01/03	03W2666	mg/L	10	257	
03-2964-2	EB-7-4/29/03	Water	04/29/03	04/29/03	05/01/03	03W2666	mg/L	10	8.0	B
03-2964-3	MW-24-1	Water	04/29/03	04/29/03	05/01/03	03W2666	mg/L	10	365	
03-2964-4	MW-24-2	Water	04/29/03	04/29/03	05/01/03	03W2666	mg/L	10	257	
03-2964-5	MW-24-3	Water	04/29/03	04/29/03	05/01/03	03W2666	mg/L	10	216	
03-2964-6	MW-24-4	Water	04/29/03	04/29/03	05/01/03	03W2666	mg/L	10	175	
03-2964-7	MW-24-5	Water	04/29/03	04/29/03	05/01/03	03W2666	mg/L	10	227	
03W2666-MB-01	03W2666-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2666	mg/L	10	<10	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	7196
Project ID:	JPL	Service ID:	32964	Collected by:	

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2964-1	DUPE-4-2Q03	Water	04/29/03	04/29/03	04/29/03	03W2629	mg/L	0.01	<0.01	U
03-2964-2	EB-7-4/29/03	Water	04/29/03	04/29/03	04/29/03	03W2629	mg/L	0.01	<0.01	U
03-2964-3	MW-24-1	Water	04/29/03	04/29/03	04/29/03	03W2629	mg/L	0.01	<0.01	U
03-2964-4	MW-24-2	Water	04/29/03	04/29/03	04/29/03	03W2629	mg/L	0.01	<0.01	U
03-2964-5	MW-24-3	Water	04/29/03	04/29/03	04/29/03	03W2629	mg/L	0.01	<0.01	U
03-2964-6	MW-24-4	Water	04/29/03	04/29/03	04/29/03	03W2629	mg/L	0.01	<0.01	U
03-2964-7	MW-24-5	Water	04/29/03	04/29/03	04/29/03	03W2629	mg/L	0.01	<0.01	U
03W2629-MB-01	03W2629-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2629	mg/L	0.01	<0.01	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 314.0
Project ID: JPL Service ID: 32964 Collected by:

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2964-1	DUPE-4-2Q03	Water	04/29/03	04/29/03	04/30/03	03W2612	μg/L	16	199	
03-2964-2	EB-7-4/29/03	Water	04/29/03	04/29/03	04/29/03	03W2612	μg/L	4	<4	U
03-2964-3	MW-24-1	Water	04/29/03	04/29/03	04/30/03	03W2612	μg/L	80	854	
03-2964-4	MW-24-2	Water	04/29/03	04/29/03	04/30/03	03W2612	μg/L	16	195	
03-2964-5	MW-24-3	Water	04/29/03	04/29/03	04/29/03	03W2612	μg/L	4	<4	U
03-2964-6	MW-24-4	Water	04/29/03	04/29/03	05/05/03	03W2719	μg/L	4	<4	U
03-2964-7	MW-24-5	Water	04/29/03	04/29/03	05/05/03	03W2719	μg/L	4	<4	U
03W2612-MB-01	03W2612-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2612	μg/L	4	<4	U
03W2719-MB-01	03W2719-MB-01	Water	05/05/03	05/05/03	05/05/03	03W2719	μg/L	4	<4	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc.
Project ID: JPL

Project No: 04-4428.10
Service ID: 32964

Anal. Method 300.0
Collected by:

Component Name: Chloride Cl^-
CAS No: 16887-00-6

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2964-1	DUPE-4-2Q03	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	1.6	34.3	
03-2964-2	EB-7-4/29/03	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.25	0.26	
03-2964-3	MW-24-1	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	1	37.9	
03-2964-4	MW-24-2	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	1.6	33.8	
03-2964-5	MW-24-3	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.8	19.1	
03-2964-6	MW-24-4	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.4	14.0	
03-2964-7	MW-24-5	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.4	10.3	
03W2610-MB-01	03W2610-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.2	<0.2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 32964 Collected by:

Component Name: Nitrate as N
CAS No: 14797-55-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2964-1	DUPE-4-2Q03	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.32	1.9	
03-2964-2	EB-7-4/29/03	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.05	0.078	
03-2964-3	MW-24-1	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.2	6.2	
03-2964-4	MW-24-2	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.32	1.8	
03-2964-5	MW-24-3	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.16	0.36	
03-2964-6	MW-24-4	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.08	0.14	
03-2964-7	MW-24-5	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.08	1.3	
03W2610-MB-01	03W2610-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.04	<0.04	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 32964 Collected by:

Component Name: Sulfate SO_4^{--}
CAS No: 14808-79-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2964-1	DUPE-4-2Q03	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	4	19.9	
03-2964-2	EB-7-4/29/03	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.63	0.75	
03-2964-3	MW-24-1	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	2.5	42.2	
03-2964-4	MW-24-2	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	4	19.3	
03-2964-5	MW-24-3	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	2	15.8	
03-2964-6	MW-24-4	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	1	7.1	
03-2964-7	MW-24-5	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	1	19.2	
03W2610-MB-01	03W2610-MB-01	Water	04/29/03	04/29/03	04/29/03	03W2610	mg/L	0.5	<0.5	U

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

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

6/18/03

LDC #: 10414I6

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 6/16/03

SDG #: 03-2964

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: MH

2nd Reviewer: [illegible]

METHOD: (Analyte) ~~Alkalinity~~ Carbonate, Bicarbonate (SM2320B), Chloride, Nitrate-N, Sulfate (EPA Method 300.0), Hexavalent Chromium (EPA SW846 Method 7196), Perchlorate (EPA Method 314.0), pH (EPA SW846 Method 9040) B, TDS (EPA Method 160.1)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/29/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD/DUP from SDG 03-2933, 03-2987,
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	(1,4)
X	Field blanks	SW	EB22

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

Validated Samples:

1	DUPE-4-2Q03	11	MB	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	DUPE-4-2Q03MS	18		28		38	
9	DUPE-4-2Q03MSD	19		29		39	
10	MW-24-5DUP	20		30		40	

Notes:

LDC #: 104416
SDG #: 03-2964

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Parameter				
1-7	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}	ClO_4	carbonate	bicarbonate	
or 8, 9	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
↓ 10	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				

Comments:

LDC #: 10414I6
SDG #: 03-2964

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

METHOD: Inorganics, Method See cover

(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 (mg/l)		RPD (Limit)	Difference (Limit)	Qualifier
	1	4			
Bicarbonate	112	124	10		
Carbonate	10.2	10.2	0		
pH (unit)	8.22	8.40 ~~7.90~~ MB	2		
TDS	257	257	0		
ClO4 (ug/l)	199	195	2		

Analyte	Concentration (mg/l)		RPD (Limit)	Difference (Limit)	Qualifier
	1	4			
Cl	34.3	33.8	1		
NO3-N	1.9	1.8	5		
SO4	19.9	19.3	3		

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

LDC #: 10414I6
SDG #: 03-2964

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

METHOD: Inorganics, EPA Method See cover

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

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

Analyte	Concentration Units (mg/l)
pH (unit)	5.77
TDS	8.0
Cl	0.26
NO3-N	0.078
SO4	0.75

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

Analyte	Concentration Units ( )

LDC Report# 10414K6

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: Wet Chemistry

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-23-1DUP
MW-23-5MS
MW-23-5MSD

Introduction

This data review covers 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.1 for Total Dissolved Solids, EPA Method 300.0 for Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, EPA SW 846 Method 9040B for pH, and Standard Method 2320B for Carbonate and Bicarbonate.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

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

Equipment Blank ID	Analyte	Concentration
EB-8-4/30/03	pH Total dissolved solids Chloride Nitrate as N	6.48 units 6.0 mg/L 0.20 mg/L 0.067 mg/L

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-2987

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-2987

No Sample Data Qualified in this SDG

K6

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	32987	Collected by:	

Component Name: Bicarbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2987-1	EB-8-4/30/03	Water	04/30/03	04/30/03	05/01/03	03W2667	mg/L	2	<2	U
03-2987-2	MW-23-1	Water	04/30/03	04/30/03	05/01/03	03W2667	mg/L	2	243	
03-2987-3	MW-23-2	Water	04/30/03	04/30/03	05/01/03	03W2667	mg/L	2	215	
03-2987-4	MW-23-3	Water	04/30/03	04/30/03	05/01/03	03W2667	mg/L	2	146	
03-2987-5	MW-23-4	Water	04/30/03	04/30/03	05/01/03	03W2667	mg/L	2	125	
03-2987-6	MW-23-5	Water	04/30/03	04/30/03	05/01/03	03W2667	mg/L	2	95.8	
03W2667-MB-01	03W2667-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2667	mg/L	2	<2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	32987	Collected by:	

Component Name: Carbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2987-1	EB-8-4/30/03	Water	04/30/03	04/30/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	<2	U
03-2987-2	MW-23-1	Water	04/30/03	04/30/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	<2	U
03-2987-3	MW-23-2	Water	04/30/03	04/30/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	<2	U
03-2987-4	MW-23-3	Water	04/30/03	04/30/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	<2	U
03-2987-5	MW-23-4	Water	04/30/03	04/30/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	5.2	
03-2987-6	MW-23-5	Water	04/30/03	04/30/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	92.0	
03W2667-MB-01	03W2667-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2667	mg-$CaCO_3$/L	2	<2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 9040B

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 9040B
Project ID: JPL Service ID: 32987 Collected by:

Component Name: pH
CAS No: 10-29-7

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2987-1	EB-8-4/30/03	Water	04/30/03	04/30/03	04/30/03	03W2651	pH unit	0.01	6.48	
03-2987-2	MW-23-1	Water	04/30/03	04/30/03	04/30/03	03W2651	pH unit	0.01	7.00	
03-2987-3	MW-23-2	Water	04/30/03	04/30/03	04/30/03	03W2651	pH unit	0.01	7.70	
03-2987-4	MW-23-3	Water	04/30/03	04/30/03	04/30/03	03W2651	pH unit	0.01	7.88	
03-2987-5	MW-23-4	Water	04/30/03	04/30/03	04/30/03	03W2651	pH unit	0.01	8.28	
03-2987-6	MW-23-5	Water	04/30/03	04/30/03	04/30/03	03W2651	pH unit	0.01	9.55	
03W2651-MB-01	03W2651-MB-01	Water	04/30/03	04/30/03	04/30/03	03W2651	pH unit	0.01	6.85	

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 160.1

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	160.1
Project ID:	JPL	Service ID:	32987	Collected by:	

Component Name: Solids, Total Dissolved (TDS)
CAS No: 10-33-3

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2987-1	EB-8-4/30/03	Water	04/30/03	04/30/03	05/01/03	03W2666	mg/L	10	6.0	B
03-2987-2	MW-23-1	Water	04/30/03	04/30/03	05/01/03	03W2666	mg/L	10	765	
03-2987-3	MW-23-2	Water	04/30/03	04/30/03	05/01/03	03W2666	mg/L	10	606	
03-2987-4	MW-23-3	Water	04/30/03	04/30/03	05/01/03	03W2666	mg/L	10	284	
03-2987-5	MW-23-4	Water	04/30/03	04/30/03	05/01/03	03W2666	mg/L	10	220	
03-2987-6	MW-23-5	Water	04/30/03	04/30/03	05/01/03	03W2666	mg/L	10	263	
03W2666-MB-01	03W2666-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2666	mg/L	10	<10	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	7196
Project ID:	JPL	Service ID:	32987	Collected by:	

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2987-1	EB-8-4/30/03	Water	04/30/03	04/30/03	04/30/03	03W2647	mg/L	0.01	<0.01	U
03-2987-2	MW-23-1	Water	04/30/03	04/30/03	04/30/03	03W2647	mg/L	0.01	<0.01	U
03-2987-3	MW-23-2	Water	04/30/03	04/30/03	04/30/03	03W2647	mg/L	0.01	<0.01	U
03-2987-4	MW-23-3	Water	04/30/03	04/30/03	04/30/03	03W2647	mg/L	0.01	<0.01	U
03-2987-5	MW-23-4	Water	04/30/03	04/30/03	04/30/03	03W2647	mg/L	0.01	<0.01	U
03-2987-6	MW-23-5	Water	04/30/03	04/30/03	04/30/03	03W2647	mg/L	0.01	<0.01	U
03W2647-MB-01	03W2647-MB-01	Water	04/30/03	04/30/03	04/30/03	03W2647	mg/L	0.01	<0.01	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 314.0
Project ID: JPL Service ID: 32987 Collected by:

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2987-1	EB-8-4/30/03	Water	04/30/03	04/30/03	05/05/03	03W2719	μg/L	4	<4	U
03-2987-2	MW-23-1	Water	04/30/03	04/30/03	05/05/03	03W2719	μg/L	4	2.9	B
03-2987-3	MW-23-2	Water	04/30/03	04/30/03	05/05/03	03W2719	μg/L	4	3.8	B
03-2987-4	MW-23-3	Water	04/30/03	04/30/03	05/05/03	03W2719	μg/L	4	<4	U
03-2987-5	MW-23-4	Water	04/30/03	04/30/03	05/05/03	03W2719	μg/L	4	<4	U
03-2987-6	MW-23-5	Water	04/30/03	04/30/03	05/05/03	03W2719	μg/L	4	<4	U
03W2719-MB-01	03W2719-MB-01	Water	05/05/03	05/05/03	05/05/03	03W2719	μg/L	4	<4	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 32987 Collected by:

Component Name: Chloride Cl^-
CAS No: 16887-00-6

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2987-1	EB-8-4/30/03	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.25	0.20	B
03-2987-2	MW-23-1	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	4	118	
03-2987-3	MW-23-2	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	2	96.5	
03-2987-4	MW-23-3	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.8	20.0	
03-2987-5	MW-23-4	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.4	17.7	
03-2987-6	MW-23-5	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.5	14.5	
03W2658-MB-01	03W2658-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.2	<0.2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 32987 Collected by:

Component Name: Nitrate as N
CAS No: 14797-55-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2987-1	EB-8-4/30/03	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.05	0.067	
03-2987-2	MW-23-1	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.8	13.8	
03-2987-3	MW-23-2	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.4	12.5	
03-2987-4	MW-23-3	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.16	7.2	
03-2987-5	MW-23-4	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.08	6.5	
03-2987-6	MW-23-5	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.1	0.14	
03W2658-MB-01	03W2658-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.04	<0.04	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 32987 Collected by:

Component Name: Sulfate SO_4^{--}
CAS No: 14808-79-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-2987-1	EB-8-4/30/03	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	0.63	<0.63	U
03-2987-2	MW-23-1	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	10	183	
03-2987-3	MW-23-2	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	5	124	
03-2987-4	MW-23-3	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	2	14.4	
03-2987-5	MW-23-4	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	1	8.5	
03-2987-6	MW-23-5	Water	04/30/03	04/30/03	05/01/03	03W2658	mg/L	1.3	2.2	
03W2658-MB-01	03W2658-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.5	<0.5	U

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

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

6/18/03

LDC #: 10414K6

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 6/19/03

SDG #: 03-2987

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: MB

2nd Reviewer: [illegible]

METHOD: (Analyte) ~~Alkalinity~~ Carbonate, Bicarbonate (SM2320B), Chloride, Nitrate-N, Sulfate (EPA Method 300.0), Hexavalent Chromium (EPA SW846 Method 7196), Perchlorate (EPA Method 314.0), pH (EPA SW846 Method 9040B), TDS (EPA Method 160.1)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/30/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	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-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-23-1DUP	17		27		37	
8	MW-23-5MS	18		28		38	
9	MW-23-5MSD	19		29		39	
10	MB	20		30		40	

Notes:

LDC #: 104146
SDG #: 03-2987

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Parameter																	
1-6	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}	Clay	carbonate	bicarbonate	
or 7	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
8, 9	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}	Clay			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				

Comments:

LDC #: 104146
SDG #: 03-2987

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

METHOD: Inorganics, EPA Method See cover

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

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

Analyte	Concentration Units (mg/l)
pH (unit)	6.48
TDS	6.0
Cl	0.20
NO3-N	0.067

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

Analyte	Concentration Units ( )

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: Wet Chemistry

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
DUPE-5-2Q03MS
DUPE-5-2Q03MSD
DUPE-5-2Q03DUP

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.1 for Total Dissolved Solids, EPA Method 300.0 for Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, EPA SW 846 Method 9040B for pH, and Standard Method 2320B for Carbonate and Bicarbonate.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

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

Analyte	Concentration		RPD
	DUPE-5-2Q03	MW-3-2	
Bicarbonate	181 mg/L	187 mg/L	3
pH	7.55 units	8.05 units	6
Total dissolved solids	249 mg/L	278 mg/L	11
Perchlorate	5.8 ug/L	4.2 ug/L	32
Chloride	14.9 mg/L	14.2 mg/L	5
Nitrate as N	1.2 mg/L	1.2 mg/L	0
Sulfate	37.5 mg/L	35.7 mg/L	5

X. Field Blanks

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

Equipment Blank ID	Analyte	Concentration
EB-9-5/1/03	pH Total dissolved solids Chloride Nitrate as N	6.98 units 9.0 mg/L 0.19 mg/L 0.068 mg/L

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-3015

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-3015

No Sample Data Qualified in this SDG

L

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	33015	Collected by:	

Component Name: Bicarbonate

CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3015-1	DUPE-5-2Q03	Water	05/01/03	05/01/03	05/01/03	03W2665	mg/L	2	181	
03-3015-2	EB-9-5/1/03	Water	05/01/03	05/01/03	05/01/03	03W2665	mg/L	2	<2	U
03-3015-3	MW-3-1	Water	05/01/03	05/01/03	05/01/03	03W2665	mg/L	2	202	
03-3015-4	MW-3-2	Water	05/01/03	05/01/03	05/01/03	03W2665	mg/L	2	187	
03-3015-5	MW-3-3	Water	05/01/03	05/01/03	05/01/03	03W2665	mg/L	2	143	
03-3015-6	MW-3-4	Water	05/01/03	05/01/03	05/01/03	03W2665	mg/L	2	128	
03-3015-7	MW-3-5	Water	05/01/03	05/01/03	05/01/03	03W2665	mg/L	2	88.3	
03W2665-MB-01	03W2665-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2665	mg/L	2	<2	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method SM2320B
Project ID: JPL Service ID: 33015 Collected by:

Component Name: Carbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3015-1	DUPE-5-2Q03	Water	05/01/03	05/01/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-3015-2	EB-9-5/1/03	Water	05/01/03	05/01/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-3015-3	MW-3-1	Water	05/01/03	05/01/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-3015-4	MW-3-2	Water	05/01/03	05/01/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-3015-5	MW-3-3	Water	05/01/03	05/01/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U
03-3015-6	MW-3-4	Water	05/01/03	05/01/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	5.2	
03-3015-7	MW-3-5	Water	05/01/03	05/01/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	40.8	
03W2665-MB-01	03W2665-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2665	mg-$CaCO_3$/L	2	<2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 9040

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 9040
Project ID: JPL Service ID: 33015 Collected by:

Component Name: pH
CAS No: 10-29-7

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3015-1	DUPE-5-2Q03	Water	05/01/03	05/01/03	05/01/03	03W2661	pH unit	0.01	7.55	
03-3015-2	EB-9-5/1/03	Water	05/01/03	05/01/03	05/01/03	03W2661	pH unit	0.01	6.98	
03-3015-3	MW-3-1	Water	05/01/03	05/01/03	05/01/03	03W2661	pH unit	0.01	7.72	
03-3015-4	MW-3-2	Water	05/01/03	05/01/03	05/01/03	03W2661	pH unit	0.01	8.05	
03-3015-5	MW-3-3	Water	05/01/03	05/01/03	05/01/03	03W2661	pH unit	0.01	8.00	
03-3015-6	MW-3-4	Water	05/01/03	05/01/03	05/01/03	03W2661	pH unit	0.01	8.66	
03-3015-7	MW-3-5	Water	05/01/03	05/01/03	05/01/03	03W2661	pH unit	0.01	9.64	
03W2661-MB-01	03W2661-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2661	pH unit	0.01	6.89	

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 160.1

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	160.1
Project ID:	JPL	Service ID:	33015	Collected by:	

Component Name: Solids, Total Dissolved (TDS)
CAS No: 10-33-3

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3015-1	DUPE-5-2Q03	Water	05/01/03	05/01/03	05/05/03	03W2722	mg/L	10	249	
03-3015-2	EB-9-5/1/03	Water	05/01/03	05/01/03	05/05/03	03W2722	mg/L	10	9.0	B
03-3015-3	MW-3-1	Water	05/01/03	05/01/03	05/05/03	03W2722	mg/L	10	350	
03-3015-4	MW-3-2	Water	05/01/03	05/01/03	05/05/03	03W2722	mg/L	10	278	
03-3015-5	MW-3-3	Water	05/01/03	05/01/03	05/05/03	03W2722	mg/L	10	249	
03-3015-6	MW-3-4	Water	05/01/03	05/01/03	05/05/03	03W2722	mg/L	10	200	
03-3015-7	MW-3-5	Water	05/01/03	05/01/03	05/05/03	03W2722	mg/L	10	259	
03W2722-MB-01	03W2722-MB-01	Water	05/05/03	05/05/03	05/05/03	03W2722	mg/L	10	<10	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 7196
Project ID: JPL Service ID: 33015 Collected by:

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3015-1	DUPE-5-2Q03	Water	05/01/03	05/01/03	05/01/03	03W2664	mg/L	0.01	<0.01	U
03-3015-2	EB-9-5/1/03	Water	05/01/03	05/01/03	05/01/03	03W2664	mg/L	0.01	<0.01	U
03-3015-3	MW-3-1	Water	05/01/03	05/01/03	05/01/03	03W2664	mg/L	0.01	<0.01	U
03-3015-4	MW-3-2	Water	05/01/03	05/01/03	05/01/03	03W2664	mg/L	0.01	<0.01	U
03-3015-5	MW-3-3	Water	05/01/03	05/01/03	05/01/03	03W2664	mg/L	0.01	<0.01	U
03-3015-6	MW-3-4	Water	05/01/03	05/01/03	05/01/03	03W2664	mg/L	0.01	<0.01	U
03-3015-7	MW-3-5	Water	05/01/03	05/01/03	05/01/03	03W2664	mg/L	0.01	<0.01	U
03W2664-MB-01	03W2664-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2664	mg/L	0.01	<0.01	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	314.0
Project ID:	JPL	Service ID:	33015	Collected by:	

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3015-1	DUPE-5-2Q03	Water	05/01/03	05/01/03	05/05/03	03W2719	μg/L	4	5.8	
03-3015-2	EB-9-5/1/03	Water	05/01/03	05/01/03	05/05/03	03W2719	μg/L	4	<4	U
03-3015-3	MW-3-1	Water	05/01/03	05/01/03	05/05/03	03W2719	μg/L	4	<4	U
03-3015-4	MW-3-2	Water	05/01/03	05/01/03	05/05/03	03W2719	μg/L	4	4.2	
03-3015-5	MW-3-3	Water	05/01/03	05/01/03	05/05/03	03W2719	μg/L	4	<4	U
03-3015-6	MW-3-4	Water	05/01/03	05/01/03	05/05/03	03W2719	μg/L	4	<4	U
03-3015-7	MW-3-5	Water	05/01/03	05/01/03	05/05/03	03W2719	μg/L	4	<4	U
03W2719-MB-01	03W2719-MB-01	Water	05/05/03	05/05/03	05/05/03	03W2719	μg/L	4	<4	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 33015 Collected by:

Component Name: Chloride Cl^-
CAS No: 16887-00-6

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3015-1	DUPE-5-2Q03	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.8	14.9	
03-3015-2	EB-9-5/1/03	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.25	0.19	B
03-3015-3	MW-3-1	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.8	19.4	
03-3015-4	MW-3-2	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.8	14.2	
03-3015-5	MW-3-3	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	1.6	36.8	
03-3015-6	MW-3-4	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.4	11.5	
03-3015-7	MW-3-5	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.4	9.1	
03W2658-MB-01	03W2658-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.2	<0.2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 33015 Collected by:

Component Name: Nitrate as N
CAS No: 14797-55-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3015-1	DUPE-5-2Q03	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.16	1.2	
03-3015-2	EB-9-5/1/03	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.05	0.068	
03-3015-3	MW-3-1	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.16	1.6	
03-3015-4	MW-3-2	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.16	1.2	
03-3015-5	MW-3-3	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.32	<0.32	U
03-3015-6	MW-3-4	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.08	0.17	
03-3015-7	MW-3-5	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.08	0.11	
03W2658-MB-01	03W2658-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.04	<0.04	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL	Service ID:	33015	Collected by:	

Component Name: Sulfate SO_4^{--}
CAS No: 14808-79-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3015-1	DUPE-5-2Q03	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	2	37.5	
03-3015-2	EB-9-5/1/03	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.63	<0.63	U
03-3015-3	MW-3-1	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	2	49.9	
03-3015-4	MW-3-2	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	2	35.7	
03-3015-5	MW-3-3	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	4	40.9	
03-3015-6	MW-3-4	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	1	11.0	
03-3015-7	MW-3-5	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	1	9.5	
03W2658-MB-01	03W2658-MB-01	Water	05/01/03	05/01/03	05/01/03	03W2658	mg/L	0.5	<0.5	U

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

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

6/18/03

LDC #: 10414L6

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 6/17/03

SDG #: 03-3015

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: MB

2nd Reviewer: [illegible]

METHOD: (Analyte) ~~Alkalinity~~ Carbonate, Bicarbonate (SM2320B), Chloride, Nitrate-N, Sulfate (EPA Method 300.0), Hexavalent Chromium (EPA SW846 Method 7196), Perchlorate (EPA Method 314.0), pH (EPA SW846 Method 9040B), TDS (EPA Method 160.1)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/1/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD from SDG 03-2987.
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	(1,4)
X	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	MB	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	DUPE-5-2Q03MS	18		28		38	
9	DUPE-5-2Q03MSD	19		29		39	
10	DUPE-5-2Q03DUP	20		30		40	

Notes:

LDC #: 104146
SDG #: 03-3015

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Parameter																	
1-7	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}	Cl2	carbonate	bicarbonate	
Dc 8,9	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
10	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				

Comments:

LDC #: 104426
SDG #: 03-3015

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

METHOD: Inorganics, Method See cover

(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 (mg/l)		RPD (Limit)	Difference (Limit)	Qualifier
	1	4			
Bicarbonate	181	187	3		
pH (unit)	7.55	8.05	6		
TDS	249	278	11		
ClO_4 (ug/l)	5.8	4.2	32		
Cl	14.9	14.2	5		

Analyte	Concentration (mg/l)		RPD (Limit)	Difference (Limit)	Qualifier
	1	4			
NO_3-N	1.2	1.2	0		
SO_4	37.5	35.7	5		

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

LDC #: 10414L6
SDG #: 03-3015

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: MH
2nd reviewer: [illegible]

METHOD: Inorganics, EPA Method See cover

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

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

Analyte	Concentration Units (mg/l)
MH ~~Bicarbonate~~	MH +
pH (unit)	6.98
TDS	9.0
Cl	0.19
NO_3-N	0.068

Sample: _____ Field Blank / Trip Blank / Rinsate (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: Wet Chemistry

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-11-1DUP
MW-11-3MS
MW-11-3MSD

Introduction

This data review covers 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.1 for Total Dissolved Solids, EPA Method 300.0 for Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, EPA SW 846 Method 9040B for pH, and Standard Method 2320B for Carbonate and Bicarbonate.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

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

Equipment Blank ID	Analyte	Concentration
EB-10-5/6/03	pH Chloride Nitrate as N Sulfate	6.95 units 0.33 mg/L 0.16 mg/L 0.62 mg/L

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-3082

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-3082

No Sample Data Qualified in this SDG

MC

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method SM2320B
Project ID: JPL Service ID: 33082 Collected by:

Component Name: Bicarbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3082-1	EB-10-5/6/03	Water	05/06/03	05/06/03	05/10/03	03W2817	mg/L	2	<2	U
03-3082-2	MW-11-1	Water	05/06/03	05/06/03	05/10/03	03W2817	mg/L	2	208	
03-3082-3	MW-11-2	Water	05/06/03	05/06/03	05/10/03	03W2817	mg/L	2	171	
03-3082-4	MW-11-3	Water	05/06/03	05/06/03	05/10/03	03W2817	mg/L	2	176	
03-3082-5	MW-11-4	Water	05/06/03	05/06/03	05/10/03	03W2817	mg/L	2	80.5	
03-3082-6	MW-11-5	Water	05/06/03	05/06/03	05/10/03	03W2817	mg/L	2	114	
03W2817-MB-01	03W2817-MB-01	Water	05/10/03	05/10/03	05/10/03	03W2817	mg/L	2	<2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	33082	Collected by:	

Component Name: Carbonate

CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3082-1	EB-10-5/6/03	Water	05/06/03	05/06/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	<2	U
03-3082-2	MW-11-1	Water	05/06/03	05/06/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	<2	U
03-3082-3	MW-11-2	Water	05/06/03	05/06/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	2.6	
03-3082-4	MW-11-3	Water	05/06/03	05/06/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	<2	U
03-3082-5	MW-11-4	Water	05/06/03	05/06/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	20.4	
03-3082-6	MW-11-5	Water	05/06/03	05/06/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	5.2	
03W2817-MB-01	03W2817-MB-01	Water	05/10/03	05/10/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	<2	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 9040B

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 9040B
Project ID: JPL Service ID: 33082 Collected by:

Component Name: pH
CAS No: 10-29-7

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3082-1	EB-10-5/6/03	Water	05/06/03	05/06/03	05/06/03	03W2740	pH unit	0.01	6.95	
03-3082-2	MW-11-1	Water	05/06/03	05/06/03	05/06/03	03W2740	pH unit	0.01	7.85	
03-3082-3	MW-11-2	Water	05/06/03	05/06/03	05/06/03	03W2740	pH unit	0.01	8.08	
03-3082-4	MW-11-3	Water	05/06/03	05/06/03	05/06/03	03W2740	pH unit	0.01	7.95	
03-3082-5	MW-11-4	Water	05/06/03	05/06/03	05/06/03	03W2740	pH unit	0.01	8.77	
03-3082-6	MW-11-5	Water	05/06/03	05/06/03	05/06/03	03W2740	pH unit	0.01	8.43	
03W2740-MB-01	03W2740-MB-01	Water	05/06/03	05/06/03	05/06/03	03W2740	pH unit	0.01	6.84	

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 160.1

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	160.1
Project ID:	JPL	Service ID:	33082	Collected by:	

Component Name: Solids, Total Dissolved (TDS)
CAS No: 10-33-3

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3082-1	EB-10-5/6/03	Water	05/06/03	05/06/03	05/08/03	03W2783	mg/L	10	<10	U
03-3082-2	MW-11-1	Water	05/06/03	05/06/03	05/08/03	03W2783	mg/L	10	323	
03-3082-3	MW-11-2	Water	05/06/03	05/06/03	05/08/03	03W2783	mg/L	10	215	
03-3082-4	MW-11-3	Water	05/06/03	05/06/03	05/08/03	03W2783	mg/L	10	222	
03-3082-5	MW-11-4	Water	05/06/03	05/06/03	05/08/03	03W2783	mg/L	10	120	
03-3082-6	MW-11-5	Water	05/06/03	05/06/03	05/08/03	03W2783	mg/L	10	156	
03W2783-MB-01	03W2783-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2783	mg/L	10	<10	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	7196
Project ID:	JPL	Service ID:	33082	Collected by:	

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3082-1	EB-10-5/6/03	Water	05/06/03	05/06/03	05/06/03	03W2737	mg/L	0.01	<0.01	U
03-3082-2	MW-11-1	Water	05/06/03	05/06/03	05/06/03	03W2737	mg/L	0.01	<0.01	U
03-3082-3	MW-11-2	Water	05/06/03	05/06/03	05/06/03	03W2737	mg/L	0.01	<0.01	U
03-3082-4	MW-11-3	Water	05/06/03	05/06/03	05/06/03	03W2737	mg/L	0.01	<0.01	U
03-3082-5	MW-11-4	Water	05/06/03	05/06/03	05/06/03	03W2737	mg/L	0.01	<0.01	U
03-3082-6	MW-11-5	Water	05/06/03	05/06/03	05/06/03	03W2737	mg/L	0.01	<0.01	U
03W2737-MB-01	03W2737-MB-01	Water	05/06/03	05/06/03	05/06/03	03W2737	mg/L	0.01	<0.01	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 314.0
Project ID: JPL Service ID: 33082 Collected by:

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3082-1	EB-10-5/6/03	Water	05/06/03	05/06/03	05/09/03	03W2804	μg/L	4	<4	U
03-3082-2	MW-11-1	Water	05/06/03	05/06/03	05/09/03	03W2804	μg/L	4	<4	U
03-3082-3	MW-11-2	Water	05/06/03	05/06/03	05/09/03	03W2804	μg/L	4	<4	U
03-3082-4	MW-11-3	Water	05/06/03	05/06/03	05/09/03	03W2804	μg/L	4	<4	U
03-3082-5	MW-11-4	Water	05/06/03	05/06/03	05/09/03	03W2804	μg/L	4	<4	U
03-3082-6	MW-11-5	Water	05/06/03	05/06/03	05/09/03	03W2804	μg/L	4	<4	U
03W2804-MB-01	03W2804-MB-01	Water	05/09/03	05/09/03	05/09/03	03W2804	μg/L	4	<4	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 33082 Collected by:

Component Name: Chloride Cl^-
CAS No: 16887-00-6

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3082-1	EB-10-5/6/03	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.25	0.33	
03-3082-2	MW-11-1	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.5	20.0	
03-3082-3	MW-11-2	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.5	15.4	
03-3082-4	MW-11-3	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.5	11.8	
03-3082-5	MW-11-4	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.4	11.6	
03-3082-6	MW-11-5	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.4	12.2	
03W2750-MB-01	03W2750-MB-01	Water	05/07/03	05/07/03	05/07/03	03W2750	mg/L	0.2	<0.2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 33082 Collected by:

Component Name: Nitrate as N
CAS No: 14797-55-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3082-1	EB-10-5/6/03	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.05	0.16	
03-3082-2	MW-11-1	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.1	0.97	
03-3082-3	MW-11-2	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.1	0.15	
03-3082-4	MW-11-3	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.1	0.15	
03-3082-5	MW-11-4	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.08	0.11	
03-3082-6	MW-11-5	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.08	0.11	
03W2750-MB-01	03W2750-MB-01	Water	05/07/03	05/07/03	05/07/03	03W2750	mg/L	0.04	<0.04	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 33082 Collected by:

Component Name: Sulfate SO_4^{--}
CAS No: 14808-79-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3082-1	EB-10-5/6/03	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	0.63	0.82	
03-3082-2	MW-11-1	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	1.3	43.9	
03-3082-3	MW-11-2	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	1.3	33.6	
03-3082-4	MW-11-3	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	1.3	22.5	
03-3082-5	MW-11-4	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	1	2.2	
03-3082-6	MW-11-5	Water	05/06/03	05/06/03	05/07/03	03W2750	mg/L	1	9.7	
03W2750-MB-01	03W2750-MB-01	Water	05/07/03	05/07/03	05/07/03	03W2750	mg/L	0.5	<0.5	U

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

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

6/18/03

LDC #: 10414M6

SDG #: 03-3082

Laboratory: Applied P & Ch Laboratory

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 6/17/03

Page: 1 of 1

Reviewer: MB

2nd Reviewer: A

Carbonate, Bicarbonate.

METHOD: (Analyte) ~~Alkalinity~~ (SM2320B), Chloride, Nitrate-N, Sulfate (EPA Method 300.0), Hexavalent Chromium (EPA SW846 Method 7196), Perchlorate (EPA Method 314.0), pH (EPA SW846 Method 9040), TDS (EPA Method 160.1)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/6/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	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:

AA

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-11-1DUP	17		27		37	
8	MW-11-3MS	18		28		38	
9	MW-11-3MSD	19		29		39	
10	MB	20		30		40	

Notes:

LDC #: 10414M6
SDG #: 03-3082

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Parameter																
1-6	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}	Clay	carbonate	bicarbonate
or 7	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}		↓	↓
↓ 8, 9	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}	Clay		
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}			

Comments:

LDC #: 10414M6
SDG #: 03-3082

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

METHOD: Inorganics, EPA Method See cover

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

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

Analyte	Concentration Units (mg/l)
PH (unit)	6.95
Cl	0.33
NO_3-N	0.16
SO_4	0.82

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

Analyte	Concentration Units ( )

LDC Report# 10414N6

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: Wet Chemistry

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
DUPE-6-2Q03MS
DUPE-6-2Q03MSD
DUPE-6-2Q03DUP

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.1 for Total Dissolved Solids, EPA Method 300.0 for Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, EPA SW 846 Method 9040B for pH, and Standard Method 2320B for Carbonate and Bicarbonate.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

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

Analyte	Concentration		RPD
	DUPE-6-2Q03	MW-12-3	
Bicarbonate	185 mg/L	180 mg/L	3
pH	7.89 units	8.03 units	2
Total dissolved solids	266 mg/L	248 mg/L	7
Perchlorate	3.4 ug/L	2.8 ug/L	19
Chloride	16.8 mg/L	15.7 mg/L	7
Nitrate as N	1U mg/L	0.53 mg/L	200
Sulfate	32.6 mg/L	29.8 mg/L	9

X. Field Blanks

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

Equipment Blank ID	Analyte	Concentration
EB-11-5/7/03	pH Chloride Nitrate as N Sulfate	7.73 units 0.21 mg/L 0.098 mg/L 0.71 mg/L

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-3102

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-3102

No Sample Data Qualified in this SDG

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	33102	Collected by:	

Component Name: Bicarbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3102-1	DUPE-6-2Q03	Water	05/07/03	05/07/03	05/08/03	03W2784	mg/L	2	185	
03-3102-2	EB-11-5/7/03	Water	05/07/03	05/07/03	05/08/03	03W2784	mg/L	2	<2	U
03-3102-3	MW-12-1	Water	05/07/03	05/07/03	05/08/03	03W2784	mg/L	2	199	
03-3102-4	MW-12-2	Water	05/07/03	05/07/03	05/08/03	03W2784	mg/L	2	198	
03-3102-5	MW-12-3	Water	05/07/03	05/07/03	05/08/03	03W2784	mg/L	2	180	
03-3102-6	MW-12-4	Water	05/07/03	05/07/03	05/08/03	03W2784	mg/L	2	204	
03-3102-7	MW-12-5	Water	05/07/03	05/07/03	05/08/03	03W2784	mg/L	2	181	
03W2784-MB-01	03W2784-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2784	mg/L	2	<2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL	Service ID:	33102	Collected by:	

Component Name: Carbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3102-1	DUPE-6-2Q03	Water	05/07/03	05/07/03	05/08/03	03W2784	mg-$CaCO_3$/L	2	<2	U
03-3102-2	EB-11-5/7/03	Water	05/07/03	05/07/03	05/08/03	03W2784	mg-$CaCO_3$/L	2	<2	U
03-3102-3	MW-12-1	Water	05/07/03	05/07/03	05/08/03	03W2784	mg-$CaCO_3$/L	2	<2	U
03-3102-4	MW-12-2	Water	05/07/03	05/07/03	05/08/03	03W2784	mg-$CaCO_3$/L	2	<2	U
03-3102-5	MW-12-3	Water	05/07/03	05/07/03	05/08/03	03W2784	mg-$CaCO_3$/L	2	<2	U
03-3102-6	MW-12-4	Water	05/07/03	05/07/03	05/08/03	03W2784	mg-$CaCO_3$/L	2	<2	U
03-3102-7	MW-12-5	Water	05/07/03	05/07/03	05/08/03	03W2784	mg-$CaCO_3$/L	2	<2	U
03W2784-MB-01	03W2784-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2784	mg-$CaCO_3$/L	2	<2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 9040B

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 9040B
Project ID: JPL Service ID: 33102 Collected by:

Component Name: pH
CAS No: 10-29-7

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3102-1	DUPE-6-2Q03	Water	05/07/03	05/07/03	05/07/03	03W2755	pH unit	0.01	7.89	
03-3102-2	EB-11-5/7/03	Water	05/07/03	05/07/03	05/07/03	03W2755	pH unit	0.01	7.73	
03-3102-3	MW-12-1	Water	05/07/03	05/07/03	05/07/03	03W2755	pH unit	0.01	7.56	
03-3102-4	MW-12-2	Water	05/07/03	05/07/03	05/07/03	03W2755	pH unit	0.01	7.56	
03-3102-5	MW-12-3	Water	05/07/03	05/07/03	05/07/03	03W2755	pH unit	0.01	8.03	
03-3102-6	MW-12-4	Water	05/07/03	05/07/03	05/07/03	03W2755	pH unit	0.01	7.88	
03-3102-7	MW-12-5	Water	05/07/03	05/07/03	05/07/03	03W2755	pH unit	0.01	8.00	
03W2755-MB-01	03W2755-MB-01	Water	05/07/03	05/07/03	05/07/03	03W2755	pH unit	0.01	6.83	

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 160.1

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	160.1
Project ID:	JPL	Service ID:	33102	Collected by:	

Component Name: Solids, Total Dissolved (TDS)
CAS No: 10-33-3

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3102-1	DUPE-6-2Q03	Water	05/07/03	05/07/03	05/08/03	03W2783	mg/L	10	266	
03-3102-2	EB-11-5/7/03	Water	05/07/03	05/07/03	05/08/03	03W2783	mg/L	10	<10	U
03-3102-3	MW-12-1	Water	05/07/03	05/07/03	05/08/03	03W2783	mg/L	10	368	
03-3102-4	MW-12-2	Water	05/07/03	05/07/03	05/08/03	03W2783	mg/L	10	316	
03-3102-5	MW-12-3	Water	05/07/03	05/07/03	05/08/03	03W2783	mg/L	10	248	
03-3102-6	MW-12-4	Water	05/07/03	05/07/03	05/08/03	03W2783	mg/L	10	277	
03-3102-7	MW-12-5	Water	05/07/03	05/07/03	05/08/03	03W2783	mg/L	10	252	
03W2783-MB-01	03W2783-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2783	mg/L	10	<10	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 314.0
Project ID: JPL Service ID: 33102 Collected by:

Component Name: Perchlorate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3102-1	DUPE-6-2Q03	Water	05/07/03	05/07/03	05/09/03	03W2804	μg/L	4	3.4	B
03-3102-2	EB-11-5/7/03	Water	05/07/03	05/07/03	05/09/03	03W2804	μg/L	4	<4	U
03-3102-3	MW-12-1	Water	05/07/03	05/07/03	05/09/03	03W2804	μg/L	4	<4	U
03-3102-4	MW-12-2	Water	05/07/03	05/07/03	05/09/03	03W2804	μg/L	4	2.0	B
03-3102-5	MW-12-3	Water	05/07/03	05/07/03	05/09/03	03W2804	μg/L	4	2.8	B
03-3102-6	MW-12-4	Water	05/07/03	05/07/03	05/09/03	03W2804	μg/L	4	3.6	B
03-3102-7	MW-12-5	Water	05/07/03	05/07/03	05/09/03	03W2804	μg/L	4	2.2	B
03W2804-MB-01	03W2804-MB-01	Water	05/09/03	05/09/03	05/09/03	03W2804	μg/L	4	<4	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 7196
Project ID: JPL Service ID: 33102 Collected by:

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3102-1	DUPE-6-2Q03	Water	05/07/03	05/07/03	05/07/03	03W2757	mg/L	0.01	<0.01	U
03-3102-2	EB-11-5/7/03	Water	05/07/03	05/07/03	05/07/03	03W2757	mg/L	0.01	<0.01	U
03-3102-3	MW-12-1	Water	05/07/03	05/07/03	05/07/03	03W2757	mg/L	0.01	<0.01	U
03-3102-4	MW-12-2	Water	05/07/03	05/07/03	05/07/03	03W2757	mg/L	0.01	<0.01	U
03-3102-5	MW-12-3	Water	05/07/03	05/07/03	05/07/03	03W2757	mg/L	0.01	<0.01	U
03-3102-6	MW-12-4	Water	05/07/03	05/07/03	05/07/03	03W2757	mg/L	0.01	<0.01	U
03-3102-7	MW-12-5	Water	05/07/03	05/07/03	05/07/03	03W2757	mg/L	0.01	<0.01	U
03W2757-MB-01	03W2757-MB-01	Water	05/07/03	05/07/03	05/07/03	03W2757	mg/L	0.01	<0.01	U

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

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

Pa 6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 33102 Collected by:

Component Name: Chloride Cl^-
CAS No: 16887-00-6

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3102-1	DUPE-6-2Q03	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	5	16.8	
03-3102-2	EB-11-5/7/03	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.25	0.21	B
03-3102-3	MW-12-1	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.8	30.9	
03-3102-4	MW-12-2	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.5	17.3	
03-3102-5	MW-12-3	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.5	15.7	
03-3102-6	MW-12-4	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.5	14.9	
03-3102-7	MW-12-5	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.5	15.6	
03W2777-MB-01	03W2777-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.2	<0.2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 33102 Collected by:

Component Name: Nitrate as N
CAS No: 14797-55-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3102-1	DUPE-6-2Q03	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	1	<1	U
03-3102-2	EB-11-5/7/03	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.05	0.098	
03-3102-3	MW-12-1	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.16	1.5	
03-3102-4	MW-12-2	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.1	1.5	
03-3102-5	MW-12-3	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.1	0.53	
03-3102-6	MW-12-4	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.1	1.1	
03-3102-7	MW-12-5	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.1	1.1	
03W2777-MB-01	03W2777-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.04	<0.04	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL Service ID: 33102 Collected by:

Component Name: Sulfate SO_4^{--}
CAS No: 14808-79-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3102-1	DUPE-6-2Q03	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	13	32.6	
03-3102-2	EB-11-5/7/03	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	0.63	0.71	
03-3102-3	MW-12-1	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	2	62.4	
03-3102-4	MW-12-2	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	1.3	39.0	
03-3102-5	MW-12-3	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	1.3	29.8	
03-3102-6	MW-12-4	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	1.3	30.3	
03-3102-7	MW-12-5	Water	05/07/03	05/07/03	05/08/03	03W2777	mg/L	1.3	22.0	
03W2777-MB-01	03W2777-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.5	<0.5	U

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

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

LDC #: 10414N6

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 6/17/03

SDG #: 03-3102

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: MH

2nd Reviewer: A

METHOD: (Analyte) ~~Alkalinity~~ Carbonate, Bicarbonate (SM2320B), Chloride, Nitrate-N, Sulfate (EPA Method 300.0), Hexavalent Chromium (EPA SW846 Method 7196), Perchlorate (EPA Method 314.0), pH (EPA SW846 Method 9040) B, TDS (EPA Method 160.1)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/7/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD from SDG 03-3130, 03-3082,
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	(1, 5)
X	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	MB	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	DUPE-6-2Q03MS	18		28		38	
9	DUPE-6-2Q03MSD	19		29		39	
10	DUPE-6-2Q03DUP	20		30		40	

Notes:

LDC #: 10414N6
SDG #: 03-3102

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Parameter				
1-7	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}	ClO_4	carbonate	bicarbonate	
08,9	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
10	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}		carbonate	bicarbonate	
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				
	pH TDS Cl F NO_3 NO_2 SO_4 PO_4 ALK CN^- NH_3 TKN TOC CR^{6+}				

Comments:

LDC #: 10414N6
SDG #: 03-3102

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MW
2nd reviewer: [illegible]

METHOD: Inorganics, Method See cover

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 (mg/l)		RPD (Limit)	Difference (Limit)	Qualifier
	1	5			
Bicarbonate	185	180	3		
pH (unit)	7.89	8.03	2		
TDS	266	248	7		
ClO4 (ug/l)	3.4	2.8	19		
Cl	16.8	15.7	7		

Analyte	Concentration (mg/l)		RPD (Limit)	Difference (Limit)	Qualifier
	1	5			
NO3-N	14	0.53	200		
SO4	32.6	29.8	9		

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

LDC #: 10414N6
SDG #: 03-3102

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: MH
2nd reviewer: [illegible]

METHOD: Inorganics, EPA Method See cover

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

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

Analyte	Concentration Units (mg/L)
pH (unit)	7.73
Cl	0.21
NO3-N	0.098
SO4	0.71

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

Analyte	Concentration Units ( )

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NASA JPL

Collection Date: May 8, 2003

LDC Report Date: June 17, 2003

Matrix: Water

Parameters: Wet Chemistry

Validation Level: EPA Level III

Laboratory: Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-3130

Sample Identification

EB-12-5/8/03
MW-22-1
MW-22-2
MW-22-3
MW-22-4
MW-22-5
EB-12-5/8/03DUP
MW-22-1MS
MW-22-1MSD

Introduction

This data review covers 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.1 for Total Dissolved Solids, EPA Method 300.0 for Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 314.0 for Perchlorate, EPA SW 846 Method 7196 for Hexavalent Chromium, EPA SW 846 Method 9040B for pH, and Standard Method 2320B for Carbonate and Bicarbonate.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

Sample EB-12-5/8/03 was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Analyte	Concentration
EB-12-5/8/03	pH Chloride Nitrate as N Sulfate	7.31 units 0.27 mg/L 0.087 mg/L 0.69 mg/L

NASA JPL
Wet Chemistry - Data Qualification Summary - SDG 03-3130

No Sample Data Qualified in this SDG

NASA JPL
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-3130

No Sample Data Qualified in this SDG

06

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL GW Mon-2Q03	Service ID:	33130	Collected by:	

Component Name: Bicarbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3130-1	EB-12-5/8/03	Water	05/08/03	05/08/03	05/10/03	03W2817	mg/L	2	<2	U
03-3130-2	MW-22-1	Water	05/08/03	05/08/03	05/10/03	03W2817	mg/L	2	271	
03-3130-3	MW-22-2	Water	05/08/03	05/08/03	05/10/03	03W2817	mg/L	2	148	
03-3130-4	MW-22-3	Water	05/08/03	05/08/03	05/10/03	03W2817	mg/L	2	130	
03-3130-5	MW-22-4	Water	05/08/03	05/08/03	05/10/03	03W2817	mg/L	2	114	
03-3130-6	MW-22-5	Water	05/08/03	05/08/03	05/10/03	03W2817	mg/L	2	49.9	
03W2817-MB-01	03W2817-MB-01	Water	05/10/03	05/10/03	05/10/03	03W2817	mg/L	2	<2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method SM2320B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	SM2320B
Project ID:	JPL GW Mon-2Q03	Service ID:	33130	Collected by:	

Component Name: Carbonate
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3130-1	EB-12-5/8/03	Water	05/08/03	05/08/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	<2	U
03-3130-2	MW-22-1	Water	05/08/03	05/08/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	<2	U
03-3130-3	MW-22-2	Water	05/08/03	05/08/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	2.6	
03-3130-4	MW-22-3	Water	05/08/03	05/08/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	5.2	
03-3130-5	MW-22-4	Water	05/08/03	05/08/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	2.6	
03-3130-6	MW-22-5	Water	05/08/03	05/08/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	76.6	
03W2817-MB-01	03W2817-MB-01	Water	05/10/03	05/10/03	05/10/03	03W2817	mg-$CaCO_3$/L	2	<2	U

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

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

Falston 6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 9040B

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	9040B
Project ID:	JPL GW Mon-2Q03	Service ID:	33130	Collected by:	

Component Name: pH
CAS No: 10-29-7

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3130-1	EB-12-5/8/03	Water	05/08/03	05/08/03	05/08/03	03W2790	pH unit	0.01	7.31	
03-3130-2	MW-22-1	Water	05/08/03	05/08/03	05/08/03	03W2790	pH unit	0.01	7.64	
03-3130-3	MW-22-2	Water	05/08/03	05/08/03	05/08/03	03W2790	pH unit	0.01	8.21	
03-3130-4	MW-22-3	Water	05/08/03	05/08/03	05/08/03	03W2790	pH unit	0.01	8.18	
03-3130-5	MW-22-4	Water	05/08/03	05/08/03	05/08/03	03W2790	pH unit	0.01	8.07	
03-3130-6	MW-22-5	Water	05/08/03	05/08/03	05/08/03	03W2790	pH unit	0.01	9.23	
03W2790-MB-01	03W2790-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2790	pH unit	0.01	6.89	

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 160.1

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	160.1
Project ID:	JPL GW Mon-2Q03	Service ID:	33130	Collected by:	

Component Name: Solids, Total Dissolved (TDS)

CAS No: 10-33-3

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3130-1	EB-12-5/8/03	Water	05/08/03	05/08/03	05/09/03	03W2800	mg/L	10	<10	U
03-3130-2	MW-22-1	Water	05/08/03	05/08/03	05/09/03	03W2800	mg/L	10	646	
03-3130-3	MW-22-2	Water	05/08/03	05/08/03	05/09/03	03W2800	mg/L	10	287	
03-3130-4	MW-22-3	Water	05/08/03	05/08/03	05/09/03	03W2800	mg/L	10	287	
03-3130-5	MW-22-4	Water	05/08/03	05/08/03	05/09/03	03W2800	mg/L	10	213	
03-3130-6	MW-22-5	Water	05/08/03	05/08/03	05/09/03	03W2800	mg/L	10	208	
03W2800-MB-01	03W2800-MB-01	Water	05/09/03	05/09/03	05/09/03	03W2800	mg/L	10	<10	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 7196

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	7196
Project ID:	JPL GW Mon-2Q03	Service ID:	33130	Collected by:	

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3130-1	EB-12-5/8/03	Water	05/08/03	05/08/03	05/08/03	03W2788	mg/L	0.01	<0.01	U
03-3130-2	MW-22-1	Water	05/08/03	05/08/03	05/08/03	03W2788	mg/L	0.01	<0.01	U
03-3130-3	MW-22-2	Water	05/08/03	05/08/03	05/08/03	03W2788	mg/L	0.01	<0.01	U
03-3130-4	MW-22-3	Water	05/08/03	05/08/03	05/08/03	03W2788	mg/L	0.01	<0.01	U
03-3130-5	MW-22-4	Water	05/08/03	05/08/03	05/08/03	03W2788	mg/L	0.01	<0.01	U
03-3130-6	MW-22-5	Water	05/08/03	05/08/03	05/08/03	03W2788	mg/L	0.01	<0.01	U
03W2788-MB-01	03W2788-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2788	mg/L	0.01	<0.01	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 314.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	314.0
Project ID:	JPL GW Mon-2Q03	Service ID:	33130	Collected by:	

Component Name: Perchlorate

CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3130-1	EB-12-5/8/03	Water	05/08/03	05/08/03	05/14/03	03W2866	μg/L	4	<4	U
03-3130-2	MW-22-1	Water	05/08/03	05/08/03	05/14/03	03W2866	μg/L	4	3.2	B
03-3130-3	MW-22-2	Water	05/08/03	05/08/03	05/14/03	03W2866	μg/L	4	1.6	B
03-3130-4	MW-22-3	Water	05/08/03	05/08/03	05/14/03	03W2866	μg/L	4	1.8	B
03-3130-5	MW-22-4	Water	05/08/03	05/08/03	05/14/03	03W2866	μg/L	4	<4	U
03-3130-6	MW-22-5	Water	05/08/03	05/08/03	05/14/03	03W2866	μg/L	4	<4	U
03W2866-MB-01	03W2866-MB-01	Water	05/14/03	05/14/03	05/14/03	03W2866	μg/L	4	<4	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL GW Mon-2Q03	Service ID:	33130	Collected by:	

Component Name: Chloride Cl^-
CAS No: 16887-00-6

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3130-1	EB-12-5/8/03	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.25	0.27	
03-3130-2	MW-22-1	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	2.5	107	
03-3130-3	MW-22-2	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	1	34.7	
03-3130-4	MW-22-3	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	1	33.9	
03-3130-5	MW-22-4	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.4	11.8	
03-3130-6	MW-22-5	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.4	8.1	
03W2777-MB-01	03W2777-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.2	<0.2	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name: GEOFON, Inc. Project No: 04-4428.10 Anal. Method 300.0
Project ID: JPL GW Mon-2Q03 Service ID: 33130 Collected by:

Component Name: Nitrate as N
CAS No: 14797-55-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3130-1	EB-12-5/8/03	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.05	0.087	
03-3130-2	MW-22-1	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.5	9.1	
03-3130-3	MW-22-2	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.2	6.8	
03-3130-4	MW-22-3	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.2	6.9	
03-3130-5	MW-22-4	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.08	4.1	
03-3130-6	MW-22-5	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.08	0.11	
03W2777-MB-01	03W2777-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.04	<0.04	U

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

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

6/18/03

Applied P & Ch Laboratory

Wet Analysis Results for Method 300.0

Client Name:	GEOFON, Inc.	Project No:	04-4428.10	Anal. Method	300.0
Project ID:	JPL GW Mon-2Q03	Service ID:	33130	Collected by:	

Component Name: Sulfate SO_4^{--}
CAS No: 14808-79-8

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-3130-1	EB-12-5/8/03	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.63	0.69	
03-3130-2	MW-22-1	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	6.3	138	
03-3130-3	MW-22-2	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	2.5	29.7	
03-3130-4	MW-22-3	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	2.5	34.6	
03-3130-5	MW-22-4	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	1	7.6	
03-3130-6	MW-22-5	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	1	22.0	
03W2777-MB-01	03W2777-MB-01	Water	05/08/03	05/08/03	05/08/03	03W2777	mg/L	0.5	<0.5	U

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

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

6/18/03

LDC #: 10414O6

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 6/17/03

SDG #: 03-3130

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: MY

2nd Reviewer: [illegible]

METHOD: (Analyte) ~~Alkalinity~~ Carbonate, Bicarbonate (SM2320B), Chloride, Nitrate-N, Sulfate (EPA Method 300.0), Hexavalent Chromium (EPA SW846 Method 7196), Perchlorate (EPA Method 314.0), pH (EPA SW846 Method 9040), TDS (EPA Method 160.1)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/8/03
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	SW	EB=1

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

Validated Samples: All

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

Notes:

LDC #: 104406
SDG #: 03-3130

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID	Parameter																	
1-6	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}	CO_3	carbonate	bicarbonate	
or 7	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
↓ 8,9	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}	CO_3			
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				
	pH	TDS	Cl	F	NO_3	NO_2	SO_4	PO_4	ALK	CN^-	NH_3	TKN	TOC	CR^{6+}				

Comments:

LDC #: 104406
SDG #: 03-3130

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: MH
2nd reviewer: [illegible]

METHOD: Inorganics, EPA Method See cover

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

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

Analyte	Concentration Units (ug/l)
pH (unit)	7.31
Cl	0.27
NO_3-N	0.087
SO_4	0.69

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

Analyte	Concentration Units ( )

NASA JPL
Data Validation Reports
LDC# 10414

N-Nitrosodimethylamine

LDC

LDC Report# 110414C87

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NASA JPL

Collection Date: April 21, 2003

LDC Report Date: June 13, 2003

Matrix: Water

Parameters: N-Nitrosodimethylamine

Validation Level: EPA Level III

Laboratory: Maxxam Analytics, Inc.

Sample Delivery Group (SDG): 03-2811

Sample Identification

MW-4-1

Introduction

This data review covers one water sample listed on the cover sheet including dilutions and reanalysis, as applicable. The analyses were per SOP TO.1021.08 for N-Nitrosodimethylamine.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

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. GC/MS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 25.0% for all compounds.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 25.0% .

V. Blanks

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

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Laboratory Control Samples (LCS)

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

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

NASA JPL
N-Nitrosodimethylamine - Data Qualification Summary - SDG 03-2811

No Sample Data Qualified in this SDG

NASA JPL
N-Nitrosodimethylamine - Laboratory Blank Data Qualification Summary - SDG 03-2811

No Sample Data Qualified in this SDG

10414C .

MW-4-1

Lab Name	Maxxam Analytics Inc.				
Matrix (soil/water):	water			Lab Sample ID:	A314211-997113
				Project Name:	JPL
Sample wt/vol:	980	(g/mL)	mL	Lab File ID:	KR23450042
Level (low/med)	low			Date Received:	April 25, 2003
% Moisture	Not applicable	Decanted (Y/N):	N	Date Extracted:	April 28, 2003
				Lab Batch:	470707
Concentrated Extract Volume	1000	(uL)		Date Analyzed:	May 1, 2003
				Calib. Ref.:	20030430
Injection Volume	2	(uL)		Time Analyzed:	18:52:12
				Dilution Factor:	1
Acid Wash Cleanup (Y/N):	N	pH	Not analyzed		

CAS No.	Compound	Conc. (ug/L)	Qualifier	EDL (ug/L)	RL (ug/L)
62-75-9	NDMA	0.00200	U	0.000370	0.00200
	Surrogate	Recovery (%)	Acceptance Criteria (%)		
000	D6-NDMA	11	10-85		

6/19/03

LDC #: 10414C87

SDG #: 03-2811

Laboratory: Maxxam Analytics, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level III

Date: 6/11/03

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: HRGC/HRMS NDMA (~~Method~~ SOP # TO.1021.08)

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: 4/21/03
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 25 / 1
IV.	Routine calibration	A	%D ≤ 25 / 1
V.	Blanks	A	
VI.	Matrix spike/Matrix spike duplicates	N	client specified
VII.	Laboratory control samples	A	LCS/D
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	N	
XII.	System performance	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

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

Validated Samples:

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

Notes: