

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

**Project/Site Name:** NASA JPL  
**Collection Date:** November 10, 2003  
**LDC Report Date:** December 22, 2003  
**Matrix:** Water  
**Parameters:** Volatiles  
**Validation Level:** EPA Level III  
**Laboratory:** Applied P & Ch Laboratory  
**Sample Delivery Group (SDG):** 03-6047

**Sample Identification**

MW-1  
MW-7  
MW-16  
TB-13-11-10-03

## Introduction

This data review covers 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 524.2 for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for 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 XVI.

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 12 hour intervals.

All ion abundance requirements were met.

## III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination ( $r^2$ ) was greater than or equal to 0.990 .

## IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 30.0% with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
11/11/03	Chloromethane Bromomethane	39.69 37.19	All samples in SDG 03-6047	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P

## V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
03G4771MB	11/12/03	Methylene chloride	0.4 ug/L	All samples in SDG 03-6047

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
TB-13-11-10-03	Methylene chloride	0.6 ug/L	0.6U ug/L

## VI. Surrogate Spikes

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

## VII. Matrix Spike/Matrix Spike Duplicates

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

## VIII. Laboratory Control Samples (LCS)

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

## IX. Regional Quality Assurance and Quality Control

Not applicable.

## X. Internal Standards

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

## XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

## XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

## XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

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

Raw data were not reviewed for this SDG.

#### **XV. Overall Assessment of Data**

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

#### **XVI. Field Duplicates**

No field duplicates were identified in this SDG.

#### **XVII. Field Blanks**

Sample TB-13-11-10-03 was identified as a trip blank. No volatile contaminants were found in this blank with the following exceptions:

<b>Trip Blank ID</b>	<b>Compound</b>	<b>Concentration (ug/L)</b>
TB-13-11-10-03	Methylene chloride	0.6

**NASA JPL  
Volatiles - Data Qualification Summary - SDG 03-6047**

SDG	Sample	Compound	Flag	A or P	Reason
03-6047	MW-1 MW-7 MW-16 TB-13-11-10-03	Chloromethane  Bromomethane	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)

**NASA JPL  
Volatiles - Laboratory Blank Data Qualification Summary - SDG 03-6047**

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
03-6047	TB-13-11-10-03	Methylene chloride	0.6U ug/L	A

Applied P & Ch Laboratory  
**Organic Analysis Results for Method 524.2**

Client Name: GEOFON, Inc.	Project No: 04-4428.10	Collection Date: 11/10/2003
Project ID: JPL	Service ID: 36047	Collected by: JR
Sample ID: MW-1	Lab Sample ID: 03-6047-1	Received Date: 11/10/2003
Sample Type: Field Sample	Sample Matrix: Water	Moisture %: -
Anal. Method: 524.2	Prep. Method: 5030	Instrument ID: GC/MS: A
Batch No: 03G4771	Prep. Date: 11/12/03	Anal. Date: 11/12/03
Data File Name: 6047-01	Prep. No: -	Anal. Time: 06:36
Methanol Vol: -	Sample Amount: 25.0 mL	Dilution Factor: 1
Test Level: Low	Sparge Size: 25 mL	Heated Purge: (Y/N) N

#	Component Name	CAS No	Unit	RL	Result	Qualifier
1	BENZENE	71-43-2	µg/L	0.5	<0.5	U
2	BROMOBENZENE	108-86-1	µg/L	0.5	<0.5	U
3	BROMOCHLOROMETHANE	74-97-5	µg/L	0.5	<0.5	U
4	BROMODICHLOROMETHANE	75-27-4	µg/L	0.5	<0.5	U
5	BROMOFORM	75-25-2	µg/L	0.5	<0.5	U
6	BROMOMETHANE	74-83-9	µg/L	0.5	<0.5	U <i>UJ</i>
7	N-BUTYLBENZENE	104-51-8	µg/L	0.5	<0.5	U
8	SEC-BUTYLBENZENE	135-98-8	µg/L	0.5	<0.5	U
9	TERT-BUTYLBENZENE	98-06-6	µg/L	0.5	<0.5	U
10	2-BUTANONE	78-93-3	µg/L	10	<10	U
11	CARBON TETRACHLORIDE	56-23-5	µg/L	0.5	<0.5	U
12	CHLOROBENZENE	108-90-7	µg/L	0.5	<0.5	U
13	CHLORODIBROMOMETHANE	124-48-1	µg/L	0.5	<0.5	U
14	CHLOROETHANE	75-00-3	µg/L	0.5	<0.5	U
15	CHLOROFORM	67-66-3	µg/L	0.5	<0.5	U
16	CHLOROMETHANE	74-87-3	µg/L	0.5	<0.5	U <i>UJ</i>
17	2-CHLOROTOLUENE	95-49-8	µg/L	0.5	<0.5	U
18	4-CHLOROTOLUENE	106-43-4	µg/L	0.5	<0.5	U
19	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	µg/L	0.5	<0.5	U
20	1,2-DIBROMOETHANE (EDB)	106-93-4	µg/L	0.5	<0.5	U
21	DIBROMOMETHANE	74-95-3	µg/L	0.5	<0.5	U
22	1,2-DICHLOROBENZENE	95-50-1	µg/L	0.5	<0.5	U
23	1,3-DICHLOROBENZENE	541-73-1	µg/L	0.5	<0.5	U
24	1,4-DICHLOROBENZENE	106-46-7	µg/L	0.5	<0.5	U
25	DICHLORODIFLUOROMETHANE	75-71-8	µg/L	0.5	<0.5	U
26	1,1-DICHLOROETHANE	75-34-3	µg/L	0.5	<0.5	U
27	1,2-DICHLOROETHANE	107-06-2	µg/L	0.5	<0.5	U
28	1,1-DICHLOROETHENE	75-35-4	µg/L	0.5	<0.5	U
29	CIS-1,2-DICHLOROETHENE	156-59-2	µg/L	0.5	<0.5	U
30	TRANS-1,2-DICHLOROETHENE	156-60-5	µg/L	0.5	<0.5	U
31	1,2-DICHLOROPROPANE	78-87-5	µg/L	0.5	<0.5	U
32	1,3-DICHLOROPROPANE	142-28-9	µg/L	0.5	<0.5	U
33	2,2-DICHLOROPROPANE	594-20-7	µg/L	0.5	<0.5	U
34	1,1-DICHLOROPROPENE	563-58-6	µg/L	0.5	<0.5	U
35	CIS-1,3-DICHLOROPROPENE	10061-01-5	µg/L	0.5	<0.5	U
36	TRANS-1,3-DICHLOROPROPENE	10061-02-6	µg/L	0.5	<0.5	U
37	ETHYLBENZENE	100-41-4	µg/L	0.5	<0.5	U
38	HEXACHLOROBUTADIENE	87-68-3	µg/L	0.5	<0.5	U
39	ISOPROPYLBENZENE (CUMENE)	98-82-8	µg/L	0.5	<0.5	U

#	Component Name	CAS No	Unit	RL	Result	Qualifier
40	P-ISOPROPYLTOLUENE	99-87-6	µg/L	0.5	<0.5	U
41	METHYLENE CHLORIDE	75-09-2	µg/L	0.5	<0.5	U
42	METHYL-T-BUTYL ETHER (MTBE)	1634-04-4	µg/L	1	<1	U
43	4-METHYL-2-PENTANONE (MIBK)	108-10-1	µg/L	10	<10	U
44	NAPHTHALENE	91-20-3	µg/L	0.5	<0.5	U
45	N-PROPYLBENZENE	103-65-1	µg/L	0.5	<0.5	U
46	STYRENE	100-42-5	µg/L	0.5	<0.5	U
47	1,1,1,2-TETRACHLOROETHANE	630-20-6	µg/L	0.5	<0.5	U
48	1,1,2,2-TETRACHLOROETHANE	79-34-5	µg/L	0.5	<0.5	U
49	TETRACHLOROETHENE	127-18-4	µg/L	0.5	<0.5	U
50	TOLUENE	108-88-3	µg/L	0.5	<0.5	U
51	1,2,3-TRICHLOROBENZENE	87-61-6	µg/L	0.5	<0.5	U
52	1,2,4-TRICHLOROBENZENE	120-82-1	µg/L	0.5	<0.5	U
53	1,1,1-TRICHLOROETHANE	71-55-6	µg/L	0.5	<0.5	U
54	1,1,2-TRICHLOROETHANE	79-00-5	µg/L	0.5	<0.5	U
55	TRICHLOROETHENE	79-01-6	µg/L	0.5	<0.5	U
56	TRICHLOROFLUOROMETHANE	75-69-4	µg/L	0.5	<0.5	U
57	1,2,3-TRICHLOROPROPANE	96-18-4	µg/L	0.5	<0.5	U
58	1,1,2,2-TRICHLORO-1,1,2,2-TRIFLUOROETHANE	76-13-1	µg/L	0.5	<0.5	U
59	1,2,4-TRIMETHYLBENZENE	95-63-6	µg/L	0.5	<0.5	U
60	1,3,5-TRIMETHYLBENZENE	108-67-8	µg/L	0.5	<0.5	U
61	VINYL CHLORIDE	75-01-4	µg/L	0.5	<0.5	U
62	O-XYLENE	95-47-6	µg/L	0.5	<0.5	U
63	M/P-XYLENE	108-38-3	µg/L	0.5	<0.5	U

Surrogates			Control Limit, %	Surro. Rec.%
1	1-BROMO-4-FLUOROBENZENE (4-BROMOFL)	460-00-4	70-129	109
2	1,2-DICHLOROETHANE-D4	17060-07-0	70-129	114
3	DIBROMOFLUOROMETHANE	1868-53-7	70-122	113
4	TOLUENE-D8	2037-26-5	73-129	105
# of out-of-control				0

Internal Standard			Control Limit, %	IS Rec.%
1	CHLOROENZENE-D5	3114-55-4	50-200	100
2	1,4-DICHLOROENZENE-D4	3855-82-1	50-200	99
3	FLUOROENZENE	462-06-6	50-200	97
# of out-of-control				0

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

Qualifier: U - Not Detected or less than MDL

E - Exceed calibration range

J - Less than RL (PQL, EQL or CRDL), but greater than MDL, or an estimated result (e.g. for TIC)

B - A positive value was found in the method blank

D - Diluted



Applied P & Ch Laboratory  
**Organic Analysis Results for Method 524.2**

Client Name: GEOFON, Inc.	Project No: 04-4428.10	Collection Date: 11/10/2003
Project ID: JPL	Service ID: 36047	Collected by: JR
Sample ID: MW-7	Lab Sample ID: 03-6047-2	Received Date: 11/10/2003
Sample Type: Field Sample	Sample Matrix: Water	Moisture %: -
Anal. Method: 524.2	Prep. Method: 5030	Instrument ID: GC/MS: A
Batch No: 03G4771	Prep. Date: 11/12/03	Anal. Date: 11/12/03
Data File Name: 6047-02	Prep. No: -	Anal. Time: 07:02
Methanol Vol: -	Sample Amount: 25.0 mL	Dilution Factor: 1
Test Level: Low	Sparge Size: 25 mL	Heated Purge: (Y/N) N

#	Component Name	CAS No	Unit	RL	Result	Qualifier
1	BENZENE	71-43-2	µg/L	0.5	<0.5	U
2	BROMOBENZENE	108-86-1	µg/L	0.5	<0.5	U
3	BROMOCHLOROMETHANE	74-97-5	µg/L	0.5	<0.5	U
4	BROMODICHLOROMETHANE	75-27-4	µg/L	0.5	<0.5	U
5	BROMOFORM	75-25-2	µg/L	0.5	<0.5	U
6	BROMOMETHANE	74-83-9	µg/L	0.5	<0.5	U <i>W</i>
7	N-BUTYLBENZENE	104-51-8	µg/L	0.5	<0.5	U
8	SEC-BUTYLBENZENE	135-98-8	µg/L	0.5	<0.5	U
9	TERT-BUTYLBENZENE	98-06-6	µg/L	0.5	<0.5	U
10	2-BUTANONE	78-93-3	µg/L	10	<10	U
11	CARBON TETRACHLORIDE	56-23-5	µg/L	0.5	42.0	
12	CHLOROBENZENE	108-90-7	µg/L	0.5	<0.5	U
13	CHLORODIBROMOMETHANE	124-48-1	µg/L	0.5	<0.5	U
14	CHLOROETHANE	75-00-3	µg/L	0.5	<0.5	U
15	CHLOROFORM	67-66-3	µg/L	0.5	9.9	
16	CHLOROMETHANE	74-87-3	µg/L	0.5	<0.5	U <i>W</i>
17	2-CHLOROTOLUENE	95-49-8	µg/L	0.5	<0.5	U
18	4-CHLOROTOLUENE	106-43-4	µg/L	0.5	<0.5	U
19	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	µg/L	0.5	<0.5	U
20	1,2-DIBROMOETHANE (EDB)	106-93-4	µg/L	0.5	<0.5	U
21	DIBROMOMETHANE	74-95-3	µg/L	0.5	<0.5	U
22	1,2-DICHLOROBENZENE	95-50-1	µg/L	0.5	<0.5	U
23	1,3-DICHLOROBENZENE	541-73-1	µg/L	0.5	<0.5	U
24	1,4-DICHLOROBENZENE	106-46-7	µg/L	0.5	<0.5	U
25	DICHLORODIFLUOROMETHANE	75-71-8	µg/L	0.5	<0.5	U
26	1,1-DICHLOROETHANE	75-34-3	µg/L	0.5	<0.5	U
27	1,2-DICHLOROETHANE	107-06-2	µg/L	0.5	<0.5	U
28	1,1-DICHLOROETHENE	75-35-4	µg/L	0.5	3.2	
29	CIS-1,2-DICHLOROETHENE	156-59-2	µg/L	0.5	<0.5	U
30	TRANS-1,2-DICHLOROETHENE	156-60-5	µg/L	0.5	<0.5	U
31	1,2-DICHLOROPROPANE	78-87-5	µg/L	0.5	<0.5	U
32	1,3-DICHLOROPROPANE	142-28-9	µg/L	0.5	<0.5	U
33	2,2-DICHLOROPROPANE	594-20-7	µg/L	0.5	<0.5	U
34	1,1-DICHLOROPROPENE	563-58-6	µg/L	0.5	<0.5	U
35	CIS-1,3-DICHLOROPROPENE	10061-01-5	µg/L	0.5	<0.5	U
36	TRANS-1,3-DICHLOROPROPENE	10061-02-6	µg/L	0.5	<0.5	U
37	ETHYLBENZENE	100-41-4	µg/L	0.5	<0.5	U
38	HEXACHLOROBUTADIENE	87-68-3	µg/L	0.5	<0.5	U
39	ISOPROPYLBENZENE (CUMENE)	98-82-8	µg/L	0.5	<0.5	U

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#	Component Name	CAS No	Unit	RL	Result	Qualifier
40	P-ISOPROPYLTOLUENE	99-87-6	µg/L	0.5	<0.5	U
41	METHYLENE CHLORIDE	75-09-2	µg/L	0.5	<0.5	U
42	METHYL-T-BUTYL ETHER (MTBE)	1634-04-4	µg/L	1	<1	U
43	4-METHYL-2-PENTANONE (MIBK)	108-10-1	µg/L	10	<10	U
44	NAPHTHALENE	91-20-3	µg/L	0.5	<0.5	U
45	N-PROPYLBENZENE	103-65-1	µg/L	0.5	<0.5	U
46	STYRENE	100-42-5	µg/L	0.5	<0.5	U
47	1,1,1,2-TETRACHLOROETHANE	630-20-6	µg/L	0.5	<0.5	U
48	1,1,2,2-TETRACHLOROETHANE	79-34-5	µg/L	0.5	<0.5	U
49	TETRACHLOROETHENE	127-18-4	µg/L	0.5	7.2	
50	TOLUENE	108-88-3	µg/L	0.5	<0.5	U
51	1,2,3-TRICHLOROBENZENE	87-61-6	µg/L	0.5	<0.5	U
52	1,2,4-TRICHLOROBENZENE	120-82-1	µg/L	0.5	<0.5	U
53	1,1,1-TRICHLOROETHANE	71-55-6	µg/L	0.5	<0.5	U
54	1,1,2-TRICHLOROETHANE	79-00-5	µg/L	0.5	<0.5	U
55	TRICHLOROETHENE	79-01-6	µg/L	0.5	5.0	
56	TRICHLOROFLUOROMETHANE	75-69-4	µg/L	0.5	<0.5	U
57	1,2,3-TRICHLOROPROPANE	96-18-4	µg/L	0.5	<0.5	U
58	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	µg/L	0.5	2.4	
59	1,2,4-TRIMETHYLBENZENE	95-63-6	µg/L	0.5	<0.5	U
60	1,3,5-TRIMETHYLBENZENE	108-67-8	µg/L	0.5	<0.5	U
61	VINYL CHLORIDE	75-01-4	µg/L	0.5	<0.5	U
62	O-XYLENE	95-47-6	µg/L	0.5	<0.5	U
63	M/P-XYLENE	108-38-3	µg/L	0.5	<0.5	U

## Surrogates

		Control Limit, %	Surro. Rec.%	
1	1-BROMO-4-FLUOROBENZENE (4-BROMOFL)	460-00-4	70-129	107
2	1,2-DICHLOROETHANE-D4	17060-07-0	70-129	115
3	DIBROMOFLUOROMETHANE	1868-53-7	70-122	114
4	TOLUENE-D8	2037-26-5	73-129	101
#	of out-of-control			0

## Internal Standard

		Control Limit, %	IS Rec.%	
1	CHLOROBENZENE-D5	3114-55-4	50-200	103
2	1,4-DICHLOROETHANE-D4	3855-82-1	50-200	101
3	FLUOROBENZENE	462-06-6	50-200	96
#	of out-of-control			0

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

Qualifier: U - Not Detected or less than MDL

J - Less than RL (PQL, EQL or CRDL), but greater than MDL, or an estimated result (e.g. for TIC)

E - Exceed calibration range

B - A positive value was found in the method blank

D - Diluted

Applied P & Ch Laboratory  
**Organic Analysis Results for Method 524.2**

Client Name: GEOFON, Inc.	Project No: 04-4428.10	Collection Date: 11/10/2003
Project ID: JPL	Service ID: 36047	Collected by: JR
Sample ID: MW-16	Lab Sample ID: 03-6047-3	Received Date: 11/10/2003
Sample Type: Field Sample	Sample Matrix: Water	Moisture %: -
Anal. Method: 524.2	Prep. Method: 5030	Instrument ID: GC/MS: A
Batch No: 03G4771	Prep. Date: 11/12/03	Anal. Date: 11/12/03
Data File Name: 6047-03	Prep. No: -	Anal. Time: 07:28
Methanol Vol: -	Sample Amount: 25.0 mL	Dilution Factor: 1
Test Level: Low	Sparge Size: 25 mL	Heated Purge: (Y/N) N

#	Component Name	CAS No	Unit	RL	Result	Qualifier
1	BENZENE	71-43-2	µg/L	0.5	<0.5	U
2	BROMOBENZENE	108-86-1	µg/L	0.5	<0.5	U
3	BROMOCHLOROMETHANE	74-97-5	µg/L	0.5	<0.5	U
4	BROMODICHLOROMETHANE	75-27-4	µg/L	0.5	<0.5	U
5	BROMOFORM	75-25-2	µg/L	0.5	<0.5	U
6	BROMOMETHANE	74-83-9	µg/L	0.5	<0.5	U <i>W</i>
7	N-BUTYLBENZENE	104-51-8	µg/L	0.5	<0.5	U
8	SEC-BUTYLBENZENE	135-98-8	µg/L	0.5	<0.5	U
9	TERT-BUTYLBENZENE	98-06-6	µg/L	0.5	<0.5	U
10	2-BUTANONE	78-93-3	µg/L	10	<10	U
11	CARBON TETRACHLORIDE	56-23-5	µg/L	0.5	3.1	
12	CHLOROBENZENE	108-90-7	µg/L	0.5	<0.5	U
13	CHLORODIBROMOMETHANE	124-48-1	µg/L	0.5	<0.5	U
14	CHLOROETHANE	75-00-3	µg/L	0.5	<0.5	U
15	CHLOROFORM	67-66-3	µg/L	0.5	4.6	
16	CHLROMETHANE	74-87-3	µg/L	0.5	<0.5	U <i>W</i>
17	2-CHLOROTOLUENE	95-49-8	µg/L	0.5	<0.5	U
18	4-CHLOROTOLUENE	106-43-4	µg/L	0.5	<0.5	U
19	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	µg/L	0.5	<0.5	U
20	1,2-DIBROMOETHANE (EDB)	106-93-4	µg/L	0.5	<0.5	U
21	DIBROMOMETHANE	74-95-3	µg/L	0.5	<0.5	U
22	1,2-DICHLOROBENZENE	95-50-1	µg/L	0.5	<0.5	U
23	1,3-DICHLOROBENZENE	541-73-1	µg/L	0.5	<0.5	U
24	1,4-DICHLOROBENZENE	106-46-7	µg/L	0.5	<0.5	U
25	DICHLORODIFLUOROMETHANE	75-71-8	µg/L	0.5	<0.5	U
26	1,1-DICHLOROETHANE	75-34-3	µg/L	0.5	<0.5	U
27	1,2-DICHLOROETHANE	107-06-2	µg/L	0.5	<0.5	U
28	1,1-DICHLOROETHENE	75-35-4	µg/L	0.5	<0.5	U
29	CIS-1,2-DICHLOROETHENE	156-59-2	µg/L	0.5	<0.5	U
30	TRANS-1,2-DICHLOROETHENE	156-60-5	µg/L	0.5	<0.5	U
31	1,2-DICHLOROPROPANE	78-87-5	µg/L	0.5	<0.5	U
32	1,3-DICHLOROPROPANE	142-28-9	µg/L	0.5	<0.5	U
33	2,2-DICHLOROPROPANE	594-20-7	µg/L	0.5	<0.5	U
34	1,1-DICHLOROPROPENE	563-58-6	µg/L	0.5	<0.5	U
35	CIS-1,3-DICHLOROPROPENE	10061-01-5	µg/L	0.5	<0.5	U
36	TRANS-1,3-DICHLOROPROPENE	10061-02-6	µg/L	0.5	<0.5	U
37	ETHYLBENZENE	100-41-4	µg/L	0.5	<0.5	U
38	HEXACHLOROBUTADIENE	87-68-3	µg/L	0.5	<0.5	U
39	ISOPROPYLBENZENE (CUMENE)	98-82-8	µg/L	0.5	<0.5	U

#	Component Name	CAS No	Unit	RL	Result	Qualifier
40	P-ISOPROPYLTOLUENE	99-87-6	µg/L	0.5	<0.5	U
41	METHYLENE CHLORIDE	75-09-2	µg/L	0.5	<0.5	U
42	METHYL-T-BUTYL ETHER (MTBE)	1634-04-4	µg/L	1	<1	U
43	4-METHYL-2-PENTANONE (MIBK)	108-10-1	µg/L	10	<10	U
44	NAPHTHALENE	91-20-3	µg/L	0.5	<0.5	U
45	N-PROPYLBENZENE	103-65-1	µg/L	0.5	<0.5	U
46	STYRENE	100-42-5	µg/L	0.5	<0.5	U
47	1,1,1,2-TETRACHLOROETHANE	630-20-6	µg/L	0.5	<0.5	U
48	1,1,2,2-TETRACHLOROETHANE	79-34-5	µg/L	0.5	<0.5	U
49	TETRACHLOROETHENE	127-18-4	µg/L	0.5	<0.5	U
50	TOLUENE	108-88-3	µg/L	0.5	<0.5	U
51	1,2,3-TRICHLOROBENZENE	87-61-6	µg/L	0.5	<0.5	U
52	1,2,4-TRICHLOROBENZENE	120-82-1	µg/L	0.5	<0.5	U
53	1,1,1-TRICHLOROETHANE	71-55-6	µg/L	0.5	<0.5	U
54	1,1,2-TRICHLOROETHANE	79-00-5	µg/L	0.5	<0.5	U
55	TRICHLOROETHENE	79-01-6	µg/L	0.5	1.9	
56	TRICHLOROFLUOROMETHANE	75-69-4	µg/L	0.5	<0.5	U
57	1,2,3-TRICHLOROPROPANE	96-18-4	µg/L	0.5	<0.5	U
58	1,1,2,2-TRICHLORO-1,2-DIFLUOROETHANE	76-13-1	µg/L	0.5	<0.5	U
59	1,2,4-TRIMETHYLBENZENE	95-63-6	µg/L	0.5	<0.5	U
60	1,3,5-TRIMETHYLBENZENE	108-67-8	µg/L	0.5	<0.5	U
61	VINYL CHLORIDE	75-01-4	µg/L	0.5	<0.5	U
62	O-XYLENE	95-47-6	µg/L	0.5	<0.5	U
63	M/P-XYLENE	108-38-3	µg/L	0.5	<0.5	U

## Surrogates

		Control Limit, %	Surro. Rec.%	
1	1-BROMO-4-FLUOROBENZENE (4-BROMOFL)	460-00-4	70-129	110
2	1,2-DICHLOROETHANE-D4	17060-07-0	70-129	115
3	DIBROMOFLUOROMETHANE	1868-53-7	70-122	114
4	TOLUENE-D8	2037-26-5	73-129	104
#	of out-of-control			0

## Internal Standard

		Control Limit, %	IS Rec.%	
1	CHLOROBENZENE-D5	3114-55-4	50-200	101
2	1,4-DICHLOROETHANE-D4	3855-82-1	50-200	98
3	FLUOROBENZENE	462-06-6	50-200	97
#	of out-of-control			0

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

Qualifier: U - Not Detected or less than MDL

E - Exceed calibration range

J - Less than RL (PQL, EQL or CRDL), but greater than MDL, or an estimated result (e.g. for TIC)

B - A positive value was found in the method blank

D - Diluted

Applied P & Ch Laboratory  
**Organic Analysis Results for Method 524.2**

Client Name: GEOFON, Inc.	Project No: 04-4428.10	Collection Date: 11/10/2003
Project ID: JPL	Service ID: 36047	Collected by: JR
Sample ID: <b>TB-13-11-10-03</b>	Lab Sample ID: 03-6047-4	Received Date: 11/10/2003
Sample Type: Field Sample	Sample Matrix: Water	Moisture %: -
Anal. Method: 524.2	Prep. Method: 5030	Instrument ID: GC/MS: A
Batch No: 03G4771	Prep. Date: 11/12/03	Anal. Date: 11/12/03
Data File Name: 6047-04	Prep. No: -	Anal. Time: 01:49
Methanol Vol. -	Sample Amount: 25.0 mL	Dilution Factor: 1
Test Level: Low	Sparge Size: 25 mL	Heated Purge: (Y/N) N

#	Component Name	CAS No	Unit	RL	Result	Qualifier
1	BENZENE	71-43-2	µg/L	0.5	<0.5	U
2	BROMOBENZENE	108-86-1	µg/L	0.5	<0.5	U
3	BROMOCHLOROMETHANE	74-97-5	µg/L	0.5	<0.5	U
4	BROMODICHLOROMETHANE	75-27-4	µg/L	0.5	<0.5	U
5	BROMOFORM	75-25-2	µg/L	0.5	<0.5	U
6	BROMOMETHANE	74-83-9	µg/L	0.5	<0.5	U <i>W</i>
7	N-BUTYLBENZENE	104-51-8	µg/L	0.5	<0.5	U
8	SEC-BUTYLBENZENE	135-98-8	µg/L	0.5	<0.5	U
9	TERT-BUTYLBENZENE	98-06-6	µg/L	0.5	<0.5	U
10	2-BUTANONE	78-93-3	µg/L	10	<10	U
11	CARBON TETRACHLORIDE	56-23-5	µg/L	0.5	<0.5	U
12	CHLOROBENZENE	108-90-7	µg/L	0.5	<0.5	U
13	CHLORODIBROMOMETHANE	124-48-1	µg/L	0.5	<0.5	U
14	CHLOROETHANE	75-00-3	µg/L	0.5	<0.5	U
15	CHLOROFORM	67-66-3	µg/L	0.5	<0.5	U
16	CHLOROMETHANE	74-87-3	µg/L	0.5	<0.5	U <i>W</i>
17	2-CHLOROTOLUENE	95-49-8	µg/L	0.5	<0.5	U
18	4-CHLOROTOLUENE	106-43-4	µg/L	0.5	<0.5	U
19	1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	µg/L	0.5	<0.5	U
20	1,2-DIBROMOETHANE (EDB)	106-93-4	µg/L	0.5	<0.5	U
21	DIBROMOMETHANE	74-95-3	µg/L	0.5	<0.5	U
22	1,2-DICHLOROBENZENE	95-50-1	µg/L	0.5	<0.5	U
23	1,3-DICHLOROBENZENE	541-73-1	µg/L	0.5	<0.5	U
24	1,4-DICHLOROBENZENE	106-46-7	µg/L	0.5	<0.5	U
25	DICHLORODIFLUOROMETHANE	75-71-8	µg/L	0.5	<0.5	U
26	1,1-DICHLOROETHANE	75-34-3	µg/L	0.5	<0.5	U
27	1,2-DICHLOROETHANE	107-06-2	µg/L	0.5	<0.5	U
28	1,1-DICHLOROETHENE	75-35-4	µg/L	0.5	<0.5	U
29	CIS-1,2-DICHLOROETHENE	156-59-2	µg/L	0.5	<0.5	U
30	TRANS-1,2-DICHLOROETHENE	156-60-5	µg/L	0.5	<0.5	U
31	1,2-DICHLOROPROPANE	78-87-5	µg/L	0.5	<0.5	U
32	1,3-DICHLOROPROPANE	142-28-9	µg/L	0.5	<0.5	U
33	2,2-DICHLOROPROPANE	594-20-7	µg/L	0.5	<0.5	U
34	1,1-DICHLOROPROPENE	563-58-6	µg/L	0.5	<0.5	U
35	CIS-1,3-DICHLOROPROPENE	10061-01-5	µg/L	0.5	<0.5	U
36	TRANS-1,3-DICHLOROPROPENE	10061-02-6	µg/L	0.5	<0.5	U
37	ETHYLBENZENE	100-41-4	µg/L	0.5	<0.5	U
38	HEXACHLOROBUTADIENE	87-68-3	µg/L	0.5	<0.5	U
39	ISOPROPYLBENZENE (CUMENE)	98-82-8	µg/L	0.5	<0.5	U

#	Component Name	CAS No	Unit	RL	Result	Qualifier
40	P-ISOPROPYLTOLUENE	99-87-6	µg/L	0.5	<0.5	U
41	METHYLENE CHLORIDE	75-09-2	µg/L	0.5	0.6	U
42	METHYL-T-BUTYL ETHER (MTBE)	1634-04-4	µg/L	1	<1	U
43	4-METHYL-2-PENTANONE (MIBK)	108-10-1	µg/L	10	<10	U
44	NAPHTHALENE	91-20-3	µg/L	0.5	<0.5	U
45	N-PROPYLBENZENE	103-65-1	µg/L	0.5	<0.5	U
46	STYRENE	100-42-5	µg/L	0.5	<0.5	U
47	1,1,1,2-TETRACHLOROETHANE	630-20-6	µg/L	0.5	<0.5	U
48	1,1,2,2-TETRACHLOROETHANE	79-34-5	µg/L	0.5	<0.5	U
49	TETRACHLOROETHENE	127-18-4	µg/L	0.5	<0.5	U
50	TOLUENE	108-88-3	µg/L	0.5	<0.5	U
51	1,2,3-TRICHLOROBENZENE	87-61-6	µg/L	0.5	<0.5	U
52	1,2,4-TRICHLOROBENZENE	120-82-1	µg/L	0.5	<0.5	U
53	1,1,1-TRICHLOROETHANE	71-55-6	µg/L	0.5	<0.5	U
54	1,1,2-TRICHLOROETHANE	79-00-5	µg/L	0.5	<0.5	U
55	TRICHLOROETHENE	79-01-6	µg/L	0.5	<0.5	U
56	TRICHLOROFLUOROMETHANE	75-69-4	µg/L	0.5	<0.5	U
57	1,2,3-TRICHLOROPROPANE	96-18-4	µg/L	0.5	<0.5	U
58	1,1,2,2-TETRACHLOROETHANE	76-13-1	µg/L	0.5	<0.5	U
59	1,2,4-TRIMETHYLBENZENE	95-63-6	µg/L	0.5	<0.5	U
60	1,3,5-TRIMETHYLBENZENE	108-67-8	µg/L	0.5	<0.5	U
61	VINYL CHLORIDE	75-01-4	µg/L	0.5	<0.5	U
62	O-XYLENE	95-47-6	µg/L	0.5	<0.5	U
63	M/P-XYLENE	108-38-3	µg/L	0.5	<0.5	U

## Surrogates

			Control Limit, %	Surro. Rec.%
1	1-BROMO-4-FLUOROBENZENE (4-BROMOFL)	460-00-4	70-129	107
2	1,2-DICHLOROETHANE-D4	17060-07-0	70-129	115
3	DIBROMOFLUOROMETHANE	1868-53-7	70-122	112
4	TOLUENE-D8	2037-26-5	73-129	102
# of out-of-control				0

## Internal Standard

			Control Limit, %	IS Rec.%
1	CHLOROBENZENE-D5	3114-55-4	50-200	107
2	1,4-DICHLOROETHANE-D4	3855-82-1	50-200	108
3	FLUOROBENZENE	462-06-6	50-200	101
# of out-of-control				0

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

Qualifier: U - Not Detected or less than MDL

J - Less than RL (PQL, EQL or CRDL), but greater than MDL, or an estimated result (e.g. for TIC)

E - Exceed calibration range

B - A positive value was found in the method blank

D - Diluted

*Handwritten signature*

LDC #: 11280E1**VALIDATION COMPLETENESS WORKSHEET**Date: 12-16-03SDG #: 03-6047

Level III

Page: 1 of 1Laboratory: Applied P & Ch LaboratoryReviewer: Z. Pan2nd Reviewer: [Signature]**METHOD:** GC/MS Volatiles (EPA Method 524.2)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: <u>11-10-03</u>
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	<u>%RSD OR <math>r^2 &gt; 0.990</math></u>
IV.	Continuing calibration	SW	<u>ID</u>
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	<u>MW-13</u>
VIII.	Laboratory control samples	A	<u>LCS</u>
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	<u>TB = 4</u>

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

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

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples:

All Water

1	MW-1	11	<u>03G 4771-MB</u>	21		31	
2	MW-7	12		22		32	
3	MW-16	13		23		33	
4	TB-13-11-10-03	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	

# TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA Method 524.2)

A. Chloromethane	G. 1,2-Dichloropropane	GG. Xylenes, total	WW. Bromobenzene	MMM. Naphthalene
B. Bromomethane	R. cis-1,3-Dichloropropene	HH. Vinyl acetate	XX. 1,2,3-Trichloropropane	NNN. 1,2,3-Trichlorobenzene
C. Vinyl chloride	S. Trichloroethene	II. 2-Chloroethylvinyl ether	YY. n-Propylbenzene	OOO. 1,3,5-Trichlorobenzene
D. Chloroethane	T. Dibromochloromethane	JJ. Dichlorodifluoromethane	ZZ. 2-Chlorotoluene	PPP. trans-1,2-Dichloroethene
E. Methylene chloride	U. 1,1,2-Trichloroethane	KK. Trichlorofluoromethane	AAA. 1,3,5-Trimethylbenzene	QQQ. cis-1,2-Dichloroethene
F. Acetone	V. Benzene	LL. Methyl-tert-butyl ether	BBB. 4-Chlorotoluene	RRR. m,p-Xylenes
G. Carbon disulfide	W. trans-1,3-Dichloropropene	MM. 1,2-Dibromo-3-chloropropane	CCC. tert-Butylbenzene	SSS. o-Xylene
H. 1,1-Dichloroethene	X. Bromoform	NN. Diethyl ether	DDD. 1,2,4-Trimethylbenzene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane
I. 1,1-Dichloroethane	Y. 4-Methyl-2-pentanone	OO. 2,2-Dichloropropane	EEE. sec-Butylbenzene	UUU. Benzyl chloride
J. 1,2-Dichloroethene, total	Z. 2-Hexanone	PP. Bromochloromethane	FFF. 1,3-Dichlorobenzene	VVV. 4-Ethyltoluene
K. Chloroform	AA. Tetrachloroethene	QQ. 1,1-Dichloropropene	GGG. p-isopropyltoluene	WWW. Ethanol
L. 1,2-Dichloroethane	BB. 1,1,2,2-Tetrachloroethane	RR. Dibromomethane	HHH. 1,4-Dichlorobenzene	XXX. Ethyl ether
M. 2-Butanone	CC. Toluene	SS. 1,3-Dichloropropane	III. n-Butylbenzene	
N. 1,1,1-Trichloroethane	DD. Chlorobenzene	TT. 1,2-Dibromomethane	JJJ. 1,2-Dichlorobenzene	
O. Carbon tetrachloride	EE. Ethylbenzene	UU. 1,1,1,2-Tetrachloroethane	KKK. 1,2,4-Trichlorobenzene	
P. Bromodichloromethane	FF. Styrene	VV. Isopropylbenzene	LLL. Hexachlorobutadiene	

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





**VALIDATION FINDINGS WORKSHEET**  
**Blanks**

METHOD: GC/MS VOA (EPA Method 524.2)

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

- N N/A Was a method blank associated with every sample in this SDG?
- N N/A Was a method blank analyzed at least once every 12 hours for each matrix and concentration?
- N N/A Was there contamination in the method blanks? If yes, please see the qualifications below.

Blank analysis date: 11-12-03  
 Conc. units: ug/L Associated Samples: [Signature]

Compound	Blank ID	Sample Identification
	03G 4771-MB	# 4
Methylene chloride	0.4	0.6 / U
Acetone		
CRQL		

Blank analysis date: \_\_\_\_\_  
 Conc. units: \_\_\_\_\_ Associated Samples: \_\_\_\_\_

Compound	Blank ID	Sample Identification
Methylene chloride		
Acetone		
CRQL		

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:

Note: Common contaminants such as Methylene chloride, Acetone, 2-Butanone, Carbon disulfide and TICs that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

LDC #: 11280 E1  
SDG #: 03-6047

**VALIDATION FINDINGS WORKSHEET**  
**Field Blanks**

Page: 1 of 1  
Reviewer: Z. Par  
2nd reviewer: FF

METHOD: GC/MS VOA (EPA Method 524.2)

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

Sample: # 4 Field Blank /  Trip Blank / Rinsate (circle one)

Compound	Concentration Units (ug/L)
<u>E</u>	<u>0.6</u>

Sample: \_\_\_\_\_ Field Blank / Trip Blank / Rinsate (circle one)

Compound	Concentration Units ( )

Sample: \_\_\_\_\_ Field Blank / Trip Blank / Rinsate (circle one)

Compound	Concentration Units ( )

**NASA JPL  
Data Validation Reports  
LDC# 11280**

Wet Chemistry

DDC

## Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** NASA JPL  
**Collection Date:** November 4, 2003  
**LDC Report Date:** December 22, 2003  
**Matrix:** Water  
**Parameters:** Wet Chemistry  
**Validation Level:** EPA Level III & IV  
**Laboratory:** Applied P & Ch Laboratory

**Sample Delivery Group (SDG):** 03-5951

### Sample Identification

DUPE-5-4-Q03\*\*  
EB-9-11-4-03  
MW-14-1  
MW-14-2  
MW-14-3  
MW-14-4  
MW-14-5  
MW-17-1  
MW-17-2  
MW-17-3  
MW-17-4  
MW-17-5  
DUPE-5-4-Q03MS  
DUPE-5-4-Q03MSD

\*\*Indicates sample underwent EPA Level IV review

## Introduction

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

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

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

## I. Technical Holding Times

All technical holding time requirements were met.

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

## II. Calibration

### a. Initial Calibration

All criteria for the initial calibration were met.

### b. Calibration Verification

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

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
11/10/03	CCV1	Perchlorate	114 (90-110)	EB-9-11-4-03 MW-14-1 MW-14-2	J (all detects)	P
11/4/03	CCV3	Perchlorate	114 (90-110)	MW-14-3 MW-14-4 MW-14-5 MW-17-1 MW-17-2 MW-17-4 MW-17-5	J (all detects)	P

## III. Blanks

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

## IV. Matrix Spike/Matrix Spike Duplicates

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

## V. Duplicates

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

## VI. Laboratory Control Samples

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

## VII. Sample Result Verification

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

## VIII. Overall Assessment of Data

Data flags are summarized at the end of this report.

## IX. Field Duplicates

Samples DUPE-5-4-Q03\*\* and MW-17-3 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	DUPE-5-4-Q03**	MW-17-3	
Perchlorate	193	199	3

## X. Field Blanks

Sample EB-9-11-4-03 was identified as an equipment blank. No contaminant concentrations were found in this blank.



**NASA JPL**

**Wet Chemistry - Data Qualification Summary - SDG 03-5951**

<b>SDG</b>	<b>Sample</b>	<b>Analyte</b>	<b>Flag</b>	<b>A or P</b>	<b>Reason</b>
03-5951	EB-9-11-4-03 MW-14-1 MW-14-2 MW-14-3 MW-14-4 MW-14-5 MW-17-1 MW-17-2 MW-17-4 MW-17-5	Perchlorate	J (all detects)	P	Calibration verification (%R)

**NASA JPL**

**Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-5951**

No Sample Data Qualified in this SDG

A

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: 35951 Collected by: JR

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5951-1	DUPE-5-4-Q03	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-2	EB-9-11-4-03	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-3	MW-14-1	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-4	MW-14-2	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-5	MW-14-3	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-6	MW-14-4	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-7	MW-14-5	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-8	MW-17-1	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-9	MW-17-2	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-10	MW-17-3	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-11	MW-17-4	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03-5951-12	MW-17-5	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U
03W5055-MB-01	03W5055-MB-01	Water	11/04/03	11/04/03	11/04/03	03W5055	mg/L	0.01	<0.01	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

Applied P & Ch Laboratory  
**Wet Analysis Results for Method 314.0**

Client Name: GEOFON, Inc.  
 Project ID: JPL

Project No: 04-4428.10  
 Service ID: 35951

Anal. Method 314.0  
 Collected by: JR

Component Name: Perchlorate  
 CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5951-1	DUPE-5-4-Q03	Water	11/04/03	11/04/03	11/04/03	03W5052	µg/L	4	193	J
03-5951-2	EB-9-11-4-03	Water	11/04/03	11/04/03	11/10/03	03W5108	µg/L	4	<4	U
03-5951-3	MW-14-1	Water	11/04/03	11/04/03	11/10/03	03W5108	µg/L	4	6.6	J
03-5951-4	MW-14-2	Water	11/04/03	11/04/03	11/10/03	03W5108	µg/L	4	4.7	J
03-5951-5	MW-14-3	Water	11/04/03	11/04/03	11/04/03	03W5052	µg/L	4	7.2	J
03-5951-6	MW-14-4	Water	11/04/03	11/04/03	11/04/03	03W5052	µg/L	4	4.4	J
03-5951-7	MW-14-5	Water	11/04/03	11/04/03	11/04/03	03W5052	µg/L	4	<4	U
03-5951-8	MW-17-1	Water	11/04/03	11/04/03	11/04/03	03W5052	µg/L	4	<4	U
03-5951-9	MW-17-2	Water	11/04/03	11/04/03	11/04/03	03W5052	µg/L	4	15.7	J
03-5951-10	MW-17-3	Water	11/04/03	11/04/03	11/04/03	03W5052	µg/L	4	199	J
03-5951-11	MW-17-4	Water	11/04/03	11/04/03	11/04/03	03W5052	µg/L	4	<4	U
03-5951-12	MW-17-5	Water	11/04/03	11/04/03	11/04/03	03W5052	µg/L	4	<4	U
03W5052-MB-01	03W5052-MB-01	Water	11/04/03	11/04/03	11/04/03	03W5052	µg/L	4	<4	U
03W5108-MB-01	03W5108-MB-01	Water	11/10/03	11/10/03	11/10/03	03W5108	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.

*Handwritten signature*

LDC #: 11280A6

## VALIDATION COMPLETENESS WORKSHEET

Date: 12-18-03

SDG #: 03-5951

Level III/IV

Page: 1 of 1

Laboratory: Applied P &amp; Ch Laboratory

Reviewer: MG

2nd Reviewer: *ky***METHOD: (Analyte) Perchlorate (EPA Method 314.0), Hexavalent Chromium (EPA SW846 Method 7196A)**

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 11-4-03
IIa.	Initial calibration	A	
IIb.	Calibration verification	SW	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	} MS/MSD (SDG: 03-5892, 03-5973)
V	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	A	Not reviewed for Level III validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	D = 1+10
X	Field blanks	ND	EB = 2

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

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

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

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

*all water*

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

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

LDC #: 11280A6  
 SDG #: 03-5951

VALIDATION FINDINGS CHECKLIST

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

Method: Inorganics (EPA Method See cover)

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

LDC #: 11280A6  
 SDG #: 03-5951

VALIDATION FINDINGS CHECKLIST

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

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







LDC #: 11280A6  
 SDG #: 03-5951

**VALIDATION FINDINGS WORKSHEET**  
**Field Duplicates**

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

METHOD: Inorganics, Method see cover

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

Analyte	Concentration ( <u>mg/L</u> )		RPD (Limits)	Qualifier
	1	10		
<u>ClO<sub>4</sub></u>	<u>193</u>	<u>199</u>	<u>3</u>	

Analyte	Concentration ( )		RPD (Limits)	Qualifier

Analyte	Concentration ( )		RPD (Limits)	Qualifier

Analyte	Concentration ( )		RPD (Limits)	Qualifier

LDC #: 11280A6  
 SDG #: 03-5951

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

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

METHOD: Inorganics, Method see cover  
 The correlation coefficient (r) for the calibration of Cr VI was recalculated. Calibration date: 7-28-03

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

$\%R = \frac{\text{Found}}{\text{True}} \times 100$  Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution  
 True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Conc. (units)	Abs. (units)	Recalculated		Reported		Acceptable (Y/N)
				r or %R	r or %R	r or %R	r or %R	
Initial calibration Calibration verification	Blank	0.0 (mg/L)	0.000					
	Standard 1	0.0125 ( )	0.007					
	Standard 2	0.025 ( )	0.017					
	Standard 3	0.125 ( )	0.107					
	Standard 4	0.250 ( )	0.212					
	Standard 5	0.50 ( )	0.420					
Calibration verification	0902 CCV 5	55.17 (ug/L)	50 (ug/L)	110	110			
	Cr VI CCV 1	0.248 (mg/L)	0.25 (mg/L)	99	99			
Calibration verification	-	-	-	-	-			

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

**VALIDATION FINDINGS WORKSHEET**  
**Level IV Recalculation Worksheet**

LDC #: 11280A6  
 SDG #: 03-5951

METHOD: Inorganics, Method see cover

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

$$\%R = \frac{\text{Found}}{\text{True}} \times 100$$
 Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).  
 True = concentration of each analyte in the source.

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

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

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated		Reported		Acceptable (Y/N)
					%R / RPD	%R / RPD			
LCS	Laboratory control sample	ClO <sub>4</sub>	27.78 (μg/L)	25 (μg/L)	111	111	111		Y
13	Matrix spike sample	Cr VI	(SSR-SR) 0.230 (mg/L)	0.25 (mg/L)	92	92	92		↓
13/14	Duplicate sample	Cr VI	0.230 (mg/L)	0.236 (mg/L)	(3)		2		* N

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. \* Both values in limits; No Qual.

LDC #: 11280A6  
SDG #: 03-5951

**VALIDATION FINDINGS WORKSHEET**  
Sample Calculation Verification

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

METHOD: Inorganics, Method see cover

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

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

Compound (analyte) results for # 1, C104 reported with a positive detect were recalculated and verified using the following equation:

Concentration =

Recalculation:

$$y = mx + b$$

where  $m = 0.0005893$   
 $x = \text{area}$

$$C104 = [0.0005893(65620.35) + 0] \times 5 = 193.35 \text{ } \mu\text{g/l}$$

$$b = 0$$

d:l factor = 5

#	Sample ID	Analyte	Reported Concentration ( $\mu\text{g/L}$ )	Calculated Concentration ( $\mu\text{g/L}$ )	Acceptable (Y/N)
1	1	C104	193	193	Y

Note: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

**Project/Site Name:** NASA JPL  
**Collection Date:** November 5, 2003  
**LDC Report Date:** December 22, 2003  
**Matrix:** Water  
**Parameters:** Wet Chemistry  
**Validation Level:** EPA Level III  
**Laboratory:** Applied P & Ch Laboratory

**Sample Delivery Group (SDG):** 03-5973

**Sample Identification**

MW-9  
MW-3-1  
MW-3-2  
MW-3-1MS  
MW-3-1MSD

## Introduction

This data review covers 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 314.0 for Perchlorate and EPA SW 846 Method 7196A for Hexavalent Chromium.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

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

## I. Technical Holding Times

All technical holding time requirements were met.

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

## II. Calibration

### a. Initial Calibration

All criteria for the initial calibration were met.

### b. Calibration Verification

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

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
11/10/03	CCV1	Perchlorate	114 (90-110)	MW-9 MW-3-1	J (all detects)	P
11/10/03	CCV2	Perchlorate	115 (90-110)	MW-3-2 MW-3-1MS MW-3-1MSD	J (all detects)	P

## III. Blanks

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

## IV. Matrix Spike/Matrix Spike Duplicates

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

## V. Duplicates

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

## VI. Laboratory Control Samples

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

## **VII. Sample Result Verification**

Raw data were not reviewed for this SDG.

## **VIII. Overall Assessment of Data**

Data flags are summarized at the end of this report.

## **IX. Field Duplicates**

No field duplicates were identified in this SDG.

## **X. Field Blanks**

No field blanks were identified in this SDG.



**NASA JPL  
Wet Chemistry - Data Qualification Summary - SDG 03-5973**

<b>SDG</b>	<b>Sample</b>	<b>Analyte</b>	<b>Flag</b>	<b>A or P</b>	<b>Reason</b>
03-5973	MW-9 MW-3-1 MW-3-2	Perchlorate	J (all detects)	P	Calibration verification (%R)

**NASA JPL  
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 03-5973**

No Sample Data Qualified in this SDG

B

Applied P & Ch Laboratory  
Wet Analysis Results for Method 7196

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 35973

Anal. Method: 7196  
Collected by: JR

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

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5973-1	MW-9	Water	11/05/03	11/05/03	11/05/03	03W5069	mg/L	0.01	<0.01	U
03-5973-2	MW-3-1	Water	11/05/03	11/05/03	11/05/03	03W5069	mg/L	0.01	<0.01	U
03-5973-3	MW-3-2	Water	11/05/03	11/05/03	11/05/03	03W5069	mg/L	0.01	<0.01	U
03W5069-MB-01	03W5069-MB-01	Water	11/05/03	11/05/03	11/05/03	03W5069	mg/L	0.01	<0.01	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

Applied P & Ch Laboratory

### Wet Analysis Results for Method 314.0

Client Name: GEOFON, Inc.  
Project ID: JPL

Project No: 04-4428.10  
Service ID: 35973

Anal. Method: 314.0  
Collected by: JR

Component Name: Perchlorate  
CAS No:

Lab ID	Sample ID	Matrix	Coll. Date	Rcv Date	Anal. Date	Batch	Unit	RL	Result	Q
03-5973-1	MW-9	Water	11/05/03	11/05/03	11/10/03	03W5108	µg/L	4	3.0	B J
03-5973-2	MW-3-1	Water	11/05/03	11/05/03	11/10/03	03W5108	µg/L	4	<4	U J
03-5973-3	MW-3-2	Water	11/05/03	11/05/03	11/10/03	03W5108	µg/L	4	5.6	U J
03W5108-MB-01	03W5108-MB-01	Water	11/10/03	11/10/03	11/10/03	03W5108	µg/L	4	<4	U

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

Note: Q - Qualifier.

Qualifier: U - Not Detected or less than MDL

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

LDC #: 11280B6

### VALIDATION COMPLETENESS WORKSHEET

Date: 12-22-03

SDG #: 03-5973

Level III

Page: 1 of 1

Laboratory: Applied P & Ch Laboratory

Reviewer: MG

2nd Reviewer: PJ

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 11-5-03
IIa.	Initial calibration	A	
IIb.	Calibration verification	SW	
III.	Blanks	A	
IV.	Matrix Spike/Matrix Spike Duplicates	A	} MS/MSD
V.	Duplicates	A	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	N	

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

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

Validated Samples: all water

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

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

LDC #: 1128036  
 SDG #: 03-5973

**VALIDATION FINDINGS WORKSHEET**  
**Sample Specific Analysis Reference**

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

All circled methods are applicable to each sample.

Sample ID	Parameter
1 → 3	pH TDS Cl F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>9+</sup> C104
QC 4, 5	pH TDS Cl F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>9+</sup> C104
	pH TDS Cl F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>9+</sup>
	pH TDS Cl F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>9+</sup>
	pH TDS Cl F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>9+</sup>
	pH TDS Cl F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>9+</sup>
	pH TDS Cl F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>9+</sup>
	pH TDS Cl F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>9+</sup>
	pH TDS Cl F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>9+</sup>
	pH TDS Cl F NO <sub>3</sub> NO <sub>2</sub> SO <sub>4</sub> PO <sub>4</sub> ALK CN' NH <sub>3</sub> TKN TOC CR <sup>9+</sup>
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