LDC Report# 11272F4

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NASA JPL

Collection Date: October 30 through November 10, 2003

LDC Report Date: December 15, 2003

Matrix: Water

Parameters: Chromium

Validation Level: EPA Level III & IV

Laboratory: Advanced Technology Laboratories & Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-6063/065794

Sample Identification

MW-21-5	MW-14-1	MW-13MSD
MW-21-4	EB-9-11-4-03	MW-13DUP
MW-21-3	MW-10	MW-21-4MS
MW-21-2	MW-5	MW-21-4MSD
MW-21-1	MW-8	MW-21-4DUP
EB-7-10-30-03	DUPE-7-4-Q03**	MW-3-1MS
MW-3-5	MW-13	MW-3-1MSD
MW-3-4	MW-6	MW-3-1DUP
MW-3-3	MW-15	
EB-8-11-3-03	DUPE-2-4-Q03**	
MW-17-5	MW-16	
MW-17-4	MW-7	
MW-17-3	MW-1	
MW-17-2	MW-9	
MW-17-1	MW-3-2	
DUPE-5-4-Q03**	MW-3-1	
MW-14-5	MW-5MS	
MW-14-4	MW-5MSD	
MW-14-3	MW-5DUP	
MW-14-2	MW-13MS	

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 48 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for 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 method stated above.

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

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

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

The following are definitions of the data qualifiers:

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

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

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

A Indicates the finding is based upon technical validation criteria.

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

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

An initial calibration was performed.

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

CRDL standards for ICP and AA were analyzed and reported as required.

III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB1 (prep blank)	Chromium	0.235 ug/L	MW-21-5 MW-21-4 MW-21-3 MW-21-2 MW-21-1 EB-7-10-30-03 MW-3-5 MW-3-4 MW-3-3 EB-8-11-3-03 MW-17-5 MW-17-4 MW-17-3 MW-17-2 MW-17-1 DUPE-5-4-Q03** MW-14-5 MW-14-4 MW-14-3 MW-5

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB2 (prep blank)	Chromium	0.174 ug/L	MW-14-2 MW-14-1 EB-9-11-4-03 MW-10 MW-8 DUPE-7-4-Q03** MW-13 MW-6 MW-15 DUPE-2-4-Q03** MW-16 MW-7 MW-1 MW-9 MW-3-2 MW-3-1
ICB/CCB	Chromium	0.326 ug/L	All samples in SDG 03-6063/065794

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-3-5	Chromium	0.7 ug/L	0.7U ug/L
MW-3-4	Chromium	1.9 ug/L	1.9U ug/L
MW-3-3	Chromium	2.0 ug/L	2.0U ug/L
MW-17-5	Chromium	1.7 ug/L	1.7U ug/L
MW-17-4	Chromium	1.5 ug/L	1.5U ug/L
MW-14-5	Chromium	1.8 ug/L	1.8U ug/L
MW-8	Chromium	1.5 ug/L	1.5U ug/L
DUPE-7-4-Q03**	Chromium	1.8 ug/L	1.8U ug/L
MW-3-2	Chromium	1.6 ug/L	1.6U ug/L
MW-3-1	Chromium	1.8 ug/L	1.8U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
MW-21-4MS/MSD (MW-21-5 MW-21-4 MW-21-3 MW-21-2 MW-21-1 EB-7-10-30-03 MW-3-5 MW-3-4 MW-3-3 EB-8-11-3-03 MW-17-5 MW-17-4 MW-17-3 MW-17-2 MW-17-1 DUPE-5-4-Q03** MW-14-5 MW-14-4 MW-14-3 MW-5)	Chromium	69.5 (80-120)	69.5 (80-120)	-	J (all detects) UJ (all non-detects)	A
MW-5MS/MSD (MW-21-5 MW-21-4 MW-21-3 MW-21-2 MW-21-1 EB-7-10-30-03 MW-3-5 MW-3-4 MW-3-3 EB-8-11-3-03 MW-17-5 MW-17-4 MW-17-3 MW-17-2 MW-17-1 DUPE-5-4-Q03** MW-14-5 MW-14-4 MW-14-3 MW-5)	Chromium	77.5 (80-120)	78.6 (80-120)	-	J (all detects) UJ (all non-detects)	A

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
MW-3-1MS/MSD (MW-14-2 MW-14-1 EB-9-11-4-03 MW-10 MW-8 DUPE-7-4-Q03** MW-13 MW-6 MW-15 DUPE-2-4-Q03** MW-16 MW-7 MW-1 MW-9 MW-3-2 MW-3-1)	Chromium	78.2 (80-120)	77.5 (80-120)	-	J (all detects) UJ (all non-detects)	A

VI. Duplicate Sample Analysis

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

VII. Laboratory Control Samples (LCS)

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

VIII. Internal Standards

All internal standard percent recoveries (%R) were within QC limits for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution was not required by the method.

XI. Sample Result Verification

All sample result verifications met 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.

XII. Overall Assessment of Data

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

XIII. Field Duplicates

Samples MW-17-3 and DUPE-5-4-Q03**, samples MW-8 and DUPE-7-4-Q03**, and samples MW-15 and DUPE-2-4-Q03** were identified as field duplicates. No chromium was detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	MW-17-3	DUPE-5-4-Q03**	
Chromium	3.8	3.7	3

Analyte	Concentration (ug/L)		RPD
	MW-8	DUPE-7-4-Q03**	
Chromium	1.5	1.8	18

Analyte	Concentration (ug/L)		RPD
	MW-15	DUPE-2-4-Q03**	
Chromium	3.4	3.4	0

XIV. Field Blanks

Samples EB-7-10-30-03, EB-8-11-3-03, and EB-9-11-4-03 were identified as equipment blanks. No chromium was found in these blanks.

NASA JPL
Chromium - Data Qualification Summary - SDG 03-6063/065794

SDG	Sample	Analyte	Flag	A or P	Reason
03-6063/ 065794	MW-21-5 MW-21-4 MW-21-3 MW-21-2 MW-21-1 EB-7-10-30-03 MW-3-5 MW-3-4 MW-3-3 EB-8-11-3-03 MW-17-5 MW-17-4 MW-17-3 MW-17-2 MW-17-1 DUPE-5-4-Q03** MW-14-5 MW-14-4 MW-14-3 MW-14-2 MW-14-1 EB-9-11-4-03 MW-10 MW-5 MW-8 DUPE-7-4-Q03** MW-13 MW-6 MW-15 DUPE-2-4-Q03** MW-16 MW-7 MW-1 MW-9 MW-3-2 MW-3-1	Chromium	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)

NASA JPL
Chromium - Laboratory Blank Data Qualification Summary - SDG 03-6063/065794

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-6063/ 065794	MW-3-5	Chromium	0.7U ug/L	A
03-6063/ 065794	MW-3-4	Chromium	1.9U ug/L	A
03-6063/ 065794	MW-3-3	Chromium	2.0U ug/L	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-6063/ 065794	MW-17-5	Chromium	1.7U ug/L	A
03-6063/ 065794	MW-17-4	Chromium	1.5U ug/L	A
03-6063/ 065794	MW-14-5	Chromium	1.8U ug/L	A
03-6063/ 065794	MW-8	Chromium	1.5U ug/L	A
03-6063/ 065794	DUPE-7-4-Q03**	Chromium	1.8U ug/L	A
03-6063/ 065794	MW-3-2	Chromium	1.6U ug/L	A
03-6063/ 065794	MW-3-1	Chromium	1.8U ug/L	A

NASA JPL
Chromium - Field Blank Data Qualification Summary - SDG 03-6063/065794

No Sample Data Qualified in this SDG

F

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-21-5
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	10/30/2003 8:18:00 AM
Lab ID:	065794-001A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS		**EPA 200.8**					Analyst: **NS**
RunID: ICP4_031114A QC Bach: R32644			PrepDate:				
Chromium	4.0	J	0.11	1.0	µg/L	1	11/14/2003 10:40:24 A

1/28/2

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-21-4
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	10/30/2003 8:43:00 AM
Lab ID:	065794-002A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	4.3	J	0.11	1.0	µg/L	1	11/14/2003 10:42:53 A

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

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Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-21-3
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	10/30/2003 9:24:00 AM
Lab ID:	065794-003A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	4.1		0.11	1.0	µg/L	1	11/14/2003 10:47:53 A

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

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Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	EB-7-10-30-03
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	10/30/2003 10:16:00 AM
Lab ID:	065794-006A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	ND	U	0.11	1.0	µg/L	1	11/14/2003 10:55:26 A

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

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Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-3-5
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/3/2003 8:05:00 AM
Lab ID:	065794-007A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	0.7	J UJ	0.11	1.0	µg/L	1	11/14/2003 10:57:57 A

11/20/18

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-3-4
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/3/2003 8:29:00 AM
Lab ID:	065794-008A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				**Analyst: NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	1.9	UJ	0.11	1.0	µg/L	1	11/14/2003 11:05:39 A

11/20/03

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories
3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-3-3
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/3/2003 8:49:00 AM
Lab ID:	065794-009A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	2.0	UJ	0.11	1.0	µg/L	1	11/14/2003 11:08:12 A

UJ/S

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

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Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	EB-8-11-3-03
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/3/2003 9:33:00 AM
Lab ID:	065794-010A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	ND	U	0.11	1.0	µg/L	1	11/14/2003 11:10:45 A

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

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Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-17-5
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 9:58:00 AM
Lab ID:	065794-011A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	1.7	UJ	0.11	1.0	µg/L	1	11/14/2003 11:13:19 A

a/12/18

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-17-4
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 10:22:00 AM
Lab ID:	065794-012A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	1.5	UJ	0.11	1.0	µg/L	1	11/14/2003 11:15:53 A

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-17-3
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 10:46:00 AM
Lab ID:	065794-013A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	3.8	J	0.11	1.0	µg/L	1	11/14/2003 11:18:24 A

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-17-1
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 11:48:00 AM
Lab ID:	065794-015A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				**Analyst: NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	2.1	J	0.11	1.0	µg/L	1	11/14/2003 11:23:19 A

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	Dupe-5-4-Q03
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 11:07:00 AM
Lab ID:	065794-016A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	3.7	J	0.11	1.0	µg/L	1	11/14/2003 11:25:47 A

11-12-03

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-14-5
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 7:19:00 AM
Lab ID:	065794-017A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	1.8	J	0.11	1.0	µg/L	1	11/14/2003 11:28:16 A

LDK

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-14-4
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 7:39:00 AM
Lab ID:	065794-018A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	3.7	J	0.11	1.0	µg/L	1	11/14/2003 11:35:55 A

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

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Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-14-3
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 8:00:00 AM
Lab ID:	065794-019A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	2.7	J	0.11	1.0	µg/L	1	11/14/2003 11:38:24 A

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

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Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-14-2
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 8:19:00 AM
Lab ID:	065794-020A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645			PrepDate:			
Chromium	2.3	J	0.11	1.0	µg/L	1	11/14/2003 12:20:58 P

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-14-1
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 8:45:00 AM
Lab ID:	065794-021A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645			PrepDate:			
Chromium	ND	U	1.1	10	µg/L	10	11/14/2003 2:19:06 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	EB-9-11-4-03
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/4/2003 8:34:00 AM
Lab ID:	065794-022A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645			PrepDate:			
Chromium	ND	UJ	0.11	1.0	µg/L	1	11/14/2003 12:25:55 P

11/20/03

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-10
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/6/2003 7:28:00 AM
Lab ID:	065794-023A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS		**EPA 200.8**					Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645		PrepDate:				
Chromium	7.6	J	0.11	1.0	µg/L	1	11/14/2003 12:28:23 P

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-5
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/6/2003 8:57:00 AM
Lab ID:	065794-024A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114A	QC Bach: R32644			PrepDate:			
Chromium	2.8	J	0.11	1.0	µg/L	1	11/14/2003 11:40:55 A

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-8
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/6/2003 10:31:00 AM
Lab ID:	065794-025A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645			PrepDate:			
Chromium	1.5	UJ	0.11	1.0	µg/L	1	11/14/2003 12:30:51 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

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Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	Dupe-2-4-Q03
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/7/2003 10:07:00 AM
Lab ID:	065794-030A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645		PrepDate:				
Chromium	3.4	J	0.11	1.0	µg/L	1	11/14/2003 12:50:58 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

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Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-16
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/10/2003 8:04:00 AM
Lab ID:	065794-031A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS		**EPA 200.8**					Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645		PrepDate:				
Chromium	3.3	J	0.11	1.0	µg/L	1	11/14/2003 12:53:30 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-7
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/10/2003 9:40:00 AM
Lab ID:	065794-032A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645			PrepDate:			
Chromium	5.0	J	0.11	1.0	µg/L	1	11/14/2003 12:56:02 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

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Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-1
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/10/2003 11:00:00 AM
Lab ID:	065794-033A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645			PrepDate:			
Chromium	2.4	J	0.11	1.0	µg/L	1	11/14/2003 12:58:34 P

1/28

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-9
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/5/2003 9:52:00 AM
Lab ID:	065794-034A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645			PrepDate:			
Chromium	5.5	J	0.11	1.0	µg/L	1	11/14/2003 1:01:07 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-3-2
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/5/2003 7:29:00 AM
Lab ID:	065794-035A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114B QC Bach: R32645			PrepDate:				
Chromium	1.6	UJ	0.11	1.0	µg/L	1	11/14/2003 1:03:40 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *19-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-3-1
Lab Order:	065794		
Project:	JPL GW Mon. 4-Q03, 04-4428.10	**Collection Date:**	11/5/2003 7:51:00 AM
Lab ID:	065794-036A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031114B	QC Bach: R32645			PrepDate:			
Chromium	1.8	UJ	0.11	1.0	µg/L	1	11/14/2003 1:06:10 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

LDC #: 11272F4 **VALIDATION COMPLETENESS WORKSHEET** Date: 12/15/03
SDG #: 03-6063/065794 Level III/~~IV~~ Page: 1 of 2
Laboratory: Advanced Technology Laboratories / Applied P & Ch Laboratory Reviewer: MR
2nd Reviewer:

METHOD: Chromium (EPA Method 200.8)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/30 - 11/10 /03.
II.	Calibration	A	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	N	Not required
V.	Matrix Spike Analysis	SW	3 MS/MSD/Dup.
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS
VIII.	Internal Standard (ICP-MS)	A	
IX.	Furnace Atomic Absorption QC	N	Not Utilized
X.	ICP Serial Dilution	N	Not required
XI.	Sample Result Verification	A	
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	(13,16), (25,26), (29,30)
XIV.	Field Blanks	ND	EB=6, 10, 22.

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

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

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

Notes:

LDC #: 11272F4 **VALIDATION COMPLETENESS WORKSHEET** Date: 12/15/03
SDG #: 03-6063/065794 Level III Page: 2 of 2
Laboratory: Applied P & Ch Laboratory/Advanced Technology Laboratories Reviewer: MW
2nd Reviewer:

METHOD: Chromium (EPA Method 200.8)

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

	Validation Area		Comments
I.	Technical holding times		Sampling dates:
II.	Calibration		
III.	Blanks		
IV.	ICP Interference Check Sample (ICS) Analysis		
V.	Matrix Spike Analysis		
VI.	Duplicate Sample Analysis		
VII.	Laboratory Control Samples (LCS)		
VIII.	Internal Standard (ICP-MS) See page 1		
IX.	Furnace Atomic Absorption QC		
X.	ICP Serial Dilution		
XI.	Sample Result Verification	N	
XII.	Overall Assessment of Data		
XIII.	Field Duplicates		
XIV.	Field Blanks		

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

Validated Samples:

41	MW-13MSD						
42	MW-13DUP						
43	MW-21-4MS						
44	MW-21-4MSD		~~EB-7-10-30-03~~ MW				
45	MW-21-4DUP		~~EB-8-11-3-03~~				
46	MW-3-1MS		~~EB-9-11-4-03~~				
47	MW-3-1MSD						
48	MW-3-1DUP						
49	PB						
50							

Notes:

LDC #: 11292F4
SDG #: see cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 1
Reviewer: MR
2nd Reviewer:

Method: Metals (EPA SW 846 Method 6010/7000/6020) 4

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury and 85-115% for cyanide) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Was a midrange cyanide standard distilled?			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
IV. ICP Interference Check Sample				
Were ICP interference check samples performed daily?			✓	
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			✓	
IV. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			
VI. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients ≥ 0.995?			✓	
Do all applicable analysies have duplicate injections?			✓	

LDC #: 11272F4
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: MB
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%?			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	
VII. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?			✓	
Were all percent differences (%Ds) ≤ 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
VIII. Internal Standards (EPA SW 846 Method ~~6020~~ 200.8)				
Were all the percent recoveries (%R) within the ~~30-120%~~ 60-125% of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?			✓	
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XIII. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 11272F4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Reviewer: MA
2nd Reviewer: N

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 1.25 (5 gm → 50 ml.)
Sample Concentration units, unless otherwise noted: ug/L Associated Samples: PB1: 1-19, 24. PB2: 20-23, 25-36 ICB/CCB: All

					Sample Identification										
Analyte ug/L	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Blank Action Limit	7	8	9	11	12	17	25	26	35	36	
Al															Al
Sb															Sb
As															As
Ba															Ba
Be															Be
Cd															Cd
Ca															Ca
Cr	0.235	0.174	0.326	2.04	0.7	1.9	2.0	1.7	1.5	1.8	1.5	1.8	1.6	1.8	Cr
Cc															Co
Cu															Cu
Fe															Fe
Pb															Pb
Mg															Mg
Mn															Mn
Hg															Hg
Ni															Ni
K															K
Se															Se
Ag															Ag
Na															Na
Tl															Tl
V															V
Zn															Zn
B															B
Mo															Mo
Sr															Sr

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

LDC #: 11372F4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: MD
2nd Reviewer: A

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

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

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

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

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
1	43/44	AQ	Cr	69.5 (80-120)	69.5 (80-120)		1-19, 24	J/uJ/A
2	37/38	↓	Cr	77.5	78.6		↓	↓
3	46/47	↓	Cr	78.2	77.5		20-23, 25-36	J/uJ/A

80-120
Lab limit

Comments:

LDC #: 11272F4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

METHOD: ~~Inorganics~~, Method CV 200.8

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

Analyte	Concentration (ug/L)		RPD (Limits)	Qualifier
	13	16		
CV	3.8	~~3.4~~ 3.7	3	

Analyte	Concentration (ug/L)		RPD (Limits)	Qualifier
	25	26		
CV	1.5	1.8	18	

Analyte	Concentration (ug/L)		RPD (Limits)	Qualifier
	29	30		
CV	3.4	3.4	0	

Analyte	Concentration ( )		RPD (Limits)	Qualifier

LDC #: 11272F4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

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

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

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

%R = Found x 100 / True

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

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV	ICP/MW (Initial calibration)	Cr	9.74	10	97	97	Y
	GFAA (Initial calibration)						
	CVAA (Initial calibration)						
CCV	ICP/MW (Continuing calibration)	Cr	9.63	10	96	96	Y
	GFAA (Continuing calibration)						
	CVAA (Continuing calibration)						
	Cyanide (Initial calibration)						
	Cyanide (Continuing calibation)						

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

LDC #: 11212T4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

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

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

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recaluculated 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

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

$$\%D = \frac{|I-SDR|}{I} \times 100$$

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

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
MB	ICP interference check						
LCS	Laboratory control sample	CR	9.961	10	99.6	99.6	Y
43	Matrix spike	↓	(SSR-SR) 6.951	↓	69.5	69.5	↓
45	Duplicate	↓	3.930	4.286	8.67	8.67	↓
MB	ICP serial dilution						

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

LDC #: 11272 F4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

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

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

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

Detected analyte results for 16 were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Recalculation:

From the raw data

Cr = 3.670 ug/L

Sample ID	Analyte	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Acceptable (Y/N)
16	Cr	3.7	3.7	Y

RECALC.4S2

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NASA JPL

Collection Date: October 23, 2003

LDC Report Date: December 15, 2003

Matrix: Water

Parameters: Chromium

Validation Level: EPA Level III & IV

Laboratory: Advanced Technology Laboratories & Applied P & Ch Laboratory

Sample Delivery Group (SDG): 03-5802/065631

Sample Identification

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

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 16 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 for 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 method stated above.

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

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

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

The following are definitions of the data qualifiers:

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

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

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

A Indicates the finding is based upon technical validation criteria.

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

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

An initial calibration was performed.

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

CRDL standards for ICP and AA were analyzed and reported as required.

III. Blanks

Method blanks were reviewed for each matrix as applicable.

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Chromium	0.400 ug/L	All samples in SDG 03-5802/065631

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
MW-12-3	Chromium	1.6 ug/L	1.6U ug/L
MW-23-5	Chromium	1.8 ug/L	1.8U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
MW-23-2MS/MSD (All samples in SDG 03-5802/065631)	Chromium	78 (80-120)	77.7 (80-120)	-	J (all detects) UJ (all non-detects)	A

VI. Duplicate Sample Analysis

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

VII. Laboratory Control Samples (LCS)

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

VIII. Internal Standards

All internal standard percent recoveries (%R) were within QC limits for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution was not required by the method.

XI. Sample Result Verification

All sample result verifications met 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.

XII. Overall Assessment of Data

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

XIII. Field Duplicates

Samples MW-12-1 and Dupe-4-4-Q03** were identified as field duplicates. No chromium was detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	MW-12-1	Dupe-4-4-Q03**	
Chromium	8.1	8.4	4

XIV. Field Blanks

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

NASA JPL
Chromium - Data Qualification Summary - SDG 03-5802/065631

SDG	Sample	Analyte	Flag	A or P	Reason
03-5802/ 065631	MW-12-5 MW-12-4 MW-12-3 MW-12-2 MW-12-1 Dupe-4-4-Q03** MW-23-5 MW-23-4 MW-23-3 MW-23-2 MW-23-1 EB-2-10-23-03	Chromium	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)

NASA JPL
Chromium - Laboratory Blank Data Qualification Summary - SDG 03-5802/065631

SDG	Sample	Analyte	Modified Final Concentration	A or P
03-5802/ 065631	MW-12-3	Chromium	1.6U ug/L	A
03-5802/ 065631	MW-23-5	Chromium	1.8U ug/L	A

NASA JPL
Chromium - Field Blank Data Qualification Summary - SDG 03-5802/065631

No Sample Data Qualified in this SDG

G

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-12-5
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 10:49:00 AM
Lab ID:	065631-001A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A QC Bach: R32297			PrepDate:				
Chromium	4.7	J	0.11	1.0	µg/L	1	11/5/2003 12:33:35 P

11/12/03

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-12-4
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 11:13:00 AM
Lab ID:	065631-002A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	2.8	J	0.11	1.0	µg/L	1	11/5/2003 12:36:04 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-12-3
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 11:32:00 AM
Lab ID:	065631-003A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	1.6	U	0.11	1.0	µg/L	1	11/5/2003 12:38:34 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT: Applied P & Ch Laboratories
Client Sample ID: MW-12-2
Lab Order: 065631
Project: JPL GW Mon-4Q03, 04.4428.10
Collection Date: 10/23/2003 11:50:00 AM
Lab ID: 065631-004A
Matrix: WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	2.9	J	0.11	1.0	µg/L	1	11/5/2003 12:41:03 P

a PKR

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-12-1
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 12:16:00 PM
Lab ID:	065631-005A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	8.1	J	0.11	1.0	µg/L	1	11/5/2003 12:43:34 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	Dupe-4-4-Q03
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 12:41:00 PM
Lab ID:	065631-006A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	8.4	J	0.11	1.0	µg/L	1	11/5/2003 12:46:05 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-23-5
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 7:12:00 AM
Lab ID:	065631-007A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS		**EPA 200.8**					**Analyst: NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	1.8	U	0.11	1.0	µg/L	1	11/5/2003 12:48:36 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-23-4
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 7:34:00 AM
Lab ID:	065631-008A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	2.6	J	0.11	1.0	µg/L	1	11/5/2003 12:51:08 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-23-3
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 7:54:00 AM
Lab ID:	065631-009A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	4.2	J	0.11	1.0	µg/L	1	11/5/2003 12:58:49 P

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories *3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040*

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-23-2
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 8:24:00 AM
Lab ID:	065631-010A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	3.5	J	0.11	1.0	µg/L	1	11/5/2003 1:01:22 PM

11/12/03

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	MW-23-1
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 9:01:00 AM
Lab ID:	065631-011A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	4.6	J	0.11	1.0	µg/L	1	11/5/2003 1:06:25 PM

12/30/03

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

Advanced Technology Laboratories

Date: *10-Nov-03*

CLIENT:	Applied P & Ch Laboratories	**Client Sample ID:**	EB-2-10-23-03
Lab Order:	065631		
Project:	JPL GW Mon-4Q03, 04.4428.10	**Collection Date:**	10/23/2003 8:55:00 AM
Lab ID:	065631-012A	**Matrix:**	WATER

Analyte	Result	Qual	MDL	PQL	Units	DF	Date Analyzed
ICP-MS METALS			**EPA 200.8**				Analyst: **NS**
RunID: ICP4_031105A	QC Bach: R32297			PrepDate:			
Chromium	ND	U	0.11	1.0	µg/L	1	11/5/2003 1:08:52 PM

11/12

Qualifiers:

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
- H-Samples exceed holding time

Results are wet unless otherwise specified

Advanced Technology Laboratories 3275 Walnut Avenue Signal Hill, CA 90755 Tel: 562 989-4045 Fax: 562 989-4040

LDC #: 11272G4 **VALIDATION COMPLETENESS WORKSHEET** Date: 12/15/03
SDG #: 03-5802/065631 Level III/IV Page: 1 of 1
Laboratory: Advanced Technology Laboratories / Applied P & Ch Laboratory Reviewer: MB
2nd Reviewer: [illegible]

METHOD: Chromium (EPA Method 200.8)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/23/03
II.	Calibration	A	
III.	Blanks	SW	
IV.	ICP Interference Check Sample (ICS) Analysis	N	Not required
V.	Matrix Spike Analysis	SW	3 MS / MSD / Dup
VI.	Duplicate Sample Analysis	A	
VII.	Laboratory Control Samples (LCS)	A	LCS
VIII.	Internal Standard (ICP-MS)	A	
IX.	Furnace Atomic Absorption QC	N	Not utilized
X.	ICP Serial Dilution	N	Not required
XI.	Sample Result Verification	A	Not reviewed for Level III validation.
XII.	Overall Assessment of Data	A	
XIII.	Field Duplicates	SW	(5,6)
XIV.	Field Blanks	ND	EB=12

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

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

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

Notes: _____

LDC #: 11272-G4
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 1
Reviewer: MD
2nd Reviewer:

Method: Metals (EPA SW 846 Method 6010/7000/6020) 4

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury and 85-115% for cyanide) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Was a midrange cyanide standard distilled?			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
IV. ICP Interference Check Sample				
Were ICP interference check samples performed daily?			✓	
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?			✓	
IV. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			
VI. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients ≥ 0.995?			-	
Do all applicable analysies have duplicate injections?			✓	

LDC #: 11272G4
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 1
Reviewer: MV
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%?			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	
VII. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?			✓	
Were all percent differences (%Ds) ≤ 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
VIII. Internal Standards (EPA SW 846 Method 6020)				
Were all the percent recoveries (%R) within the ~~30-120%~~ 60-125% of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?			✓	
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XIII. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 11212G4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

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

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 1.25x 40ml > 50 ml
Sample Concentration units, unless otherwise noted: ug/L Associated Samples: All

					Sample Identification										
Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	3	7									
Al															Al
Sb															Sb
As															As
Ba															Ba
Be															Be
Cd															Cd
Ca															Ca
Cr			0.400	2.5	1.6	1.8									Cr
Co															Co
Cu															Cu
Fe															Fe
Pb															Pb
Mg															Mg
Mn															Mn
Hg															Hg
Ni															Ni
K															K
Se															Se
Ag															Ag
Na															Na
Tl															Tl
V															V
Zn															Zn
B															B
Mo															Mo
Sr															Sr

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

LDC #: 11272G4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: MD
2nd Reviewer: A

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

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

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~ 80-120? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

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

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
1	13/14	A2	Cr	78 (80-120)	77.7 (80-120)		All	J/UJ/A

Comments: _____

LDC #: 11272G4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

METHOD: ~~Inorganics~~, Method CV & 200.8

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

Analyte	Concentration (ug/L)		RPD (Limits)	Qualifier
	5	6		
CV	8.1	8.4	4	

Analyte	Concentration ( )		RPD (Limits)	Qualifier

Analyte	Concentration ( )		RPD (Limits)	Qualifier

Analyte	Concentration ( )		RPD (Limits)	Qualifier

LDC #: 11272 G4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: MM
2nd Reviewer: A

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

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

%R = Found x 100 / True

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

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV	ICP/MS (Initial calibration)	Cr	10.117	10	101	101	Y
	GFAA (Initial calibration)						
	CVAA (Initial calibration)						
CCV	ICP/MS (Continuing calibration)	Cr	10.357	10	104	104	Y
	GFAA (Continuing calibration)						
	CVAA (Continuing calibration)						
	Cyanide (Initial calibration)						
	Cyanide (Continuing calibation)						

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

LDC #: 11212G4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MM
2nd Reviewer: [signature]

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

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recaluculated using the following formula:

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

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

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

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

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

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

$$\%D = \frac{|I-SDR|}{I} \times 100$$

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

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
	ICP interference check						
LCS	Laboratory control sample	CR	10,396	10	10.4	10.4	Y
13	Matrix spike	↓	(SSR-SR) 7,802	10	78	78	↓
15	Duplicate	↓	3,313	3.494	5.32	5.32 3.494 MM	↓
	ICP serial dilution						

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

LDC #: 11272G4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

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

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

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

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

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Recalculation:

From the raw data

Cr = 8.412 ug/l

Sample ID	Analyte	Reported Concentration (ug/l)	Calculated Concentration (ug/l)	Acceptable (Y/N)
6	Cr	8.4	8.4	Y

RECALC.4S2