**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<br>MW-21-4<br>MW-21-3<br>MW-21-2<br>MW-21-1<br>EB-7-10-30-03<br>MW-3-5<br>MW-3-4<br>MW-3-3<br>EB-8-11-3-03<br>MW-17-5<br>MW-17-4<br>MW-17-3<br>MW-17-2<br>MW-17-1<br>DUPE-5-4-Q03**<br>MW-14-5<br>MW-14-4<br>MW-14-3<br>MW-5 |

| Method Blank ID | Analyte | Maximum Concentration | Associated Samples |
|---|---|---|---|
| PB2 (prep blank) | Chromium | 0.174 ug/L | MW-14-2<br>MW-14-1<br>EB-9-11-4-03<br>MW-10<br>MW-8<br>DUPE-7-4-Q03**<br>MW-13<br>MW-6<br>MW-15<br>DUPE-2-4-Q03**<br>MW-16<br>MW-7<br>MW-1<br>MW-9<br>MW-3-2<br>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<br>(MW-21-5<br>MW-21-4<br>MW-21-3<br>MW-21-2<br>MW-21-1<br>EB-7-10-30-03<br>MW-3-5<br>MW-3-4<br>MW-3-3<br>EB-8-11-3-03<br>MW-17-5<br>MW-17-4<br>MW-17-3<br>MW-17-2<br>MW-17-1<br>DUPE-5-4-Q03**<br>MW-14-5<br>MW-14-4<br>MW-14-3<br>MW-5) | Chromium | 69.5 (80-120) | 69.5 (80-120) | - | J (all detects)<br>UJ (all non-detects) | A |
| MW-5MS/MSD<br>(MW-21-5<br>MW-21-4<br>MW-21-3<br>MW-21-2<br>MW-21-1<br>EB-7-10-30-03<br>MW-3-5<br>MW-3-4<br>MW-3-3<br>EB-8-11-3-03<br>MW-17-5<br>MW-17-4<br>MW-17-3<br>MW-17-2<br>MW-17-1<br>DUPE-5-4-Q03**<br>MW-14-5<br>MW-14-4<br>MW-14-3<br>MW-5) | Chromium | 77.5 (80-120) | 78.6 (80-120) | - | J (all detects)<br>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<br>(MW-14-2<br>MW-14-1<br>EB-9-11-4-03<br>MW-10<br>MW-8<br>DUPE-7-4-Q03**<br>MW-13<br>MW-6<br>MW-15<br>DUPE-2-4-Q03**<br>MW-16<br>MW-7<br>MW-1<br>MW-9<br>MW-3-2<br>MW-3-1) | Chromium | 78.2 (80-120) | 77.5 (80-120) | - | J (all detects)<br>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<br>MW-21-4<br>MW-21-3<br>MW-21-2<br>MW-21-1<br>EB-7-10-30-03<br>MW-3-5<br>MW-3-4<br>MW-3-3<br>EB-8-11-3-03<br>MW-17-5<br>MW-17-4<br>MW-17-3<br>MW-17-2<br>MW-17-1<br>DUPE-5-4-Q03**<br>MW-14-5<br>MW-14-4<br>MW-14-3<br>MW-14-2<br>MW-14-1<br>EB-9-11-4-03<br>MW-10<br>MW-5<br>MW-8<br>DUPE-7-4-Q03**<br>MW-13<br>MW-6<br>MW-15<br>DUPE-2-4-Q03**<br>MW-16<br>MW-7<br>MW-1<br>MW-9<br>MW-3-2<br>MW-3-1 | Chromium | J (all detects)<br>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 |

1/2/02

**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-21-4 |
| **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 | J | 0.11 | 1.0 | µg/L | 1 | 11/14/2003 10:47:53 A |

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

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**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 |

11/21/8

**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-3-4 |
| **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 |

11/21/03

**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



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# 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

**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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**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/2/12

**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



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# 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 | U | 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

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# 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 |

MDL

**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-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



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# 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 | U | 0.11 | 1.0 | µg/L | 1 | 11/14/2003 11:28:16 A |

LOK

**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-14-4 |
| **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 |

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



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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 |

ND

**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



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# 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



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# 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 |

UJ

**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-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



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# 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



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# 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 |

a PW

**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

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# Advanced Technology Laboratories

**Date:** *19-Nov-03*

**CLIENT:** Applied P & Ch Laboratories
**Lab Order:** 065794
**Project:** JPL GW Mon. 4-Q03, 04-4428.10
**Lab ID:** 065794-030A

**Client Sample ID:** Dupe-2-4-Q03
**Collection Date:** 11/7/2003 10:07:00 AM
**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



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# Advanced Technology Laboratories

**Date:** *19-Nov-03*

**CLIENT:** Applied P & Ch Laboratories
**Lab Order:** 065794
**Project:** JPL GW Mon. 4-Q03, 04-4428.10
**Lab ID:** 065794-032A

**Client Sample ID:** MW-7
**Collection Date:** 11/10/2003 9:40:00 AM
**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



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# Advanced Technology Laboratories

**Date:** *19-Nov-03*

**CLIENT:** Applied P & Ch Laboratories
**Lab Order:** 065794
**Project:** JPL GW Mon. 4-Q03, 04-4428.10
**Lab ID:** 065794-034A

**Client Sample ID:** MW-9
**Collection Date:** 11/5/2003 9:52:00 AM
**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



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# 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



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# 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



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LDC #: 11272F4

# VALIDATION COMPLETENESS WORKSHEET

Level III/IV

Date: 12/15/03

SDG #: 03-6063/065794

Page: 1 of 2

Laboratory: Advanced Technology Laboratories / Applied P & Ch Laboratory

Reviewer: MW

2nd Reviewer: A

**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: 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 | | 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; 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:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 41 | MW-13MSD | | | | | | |
| 42 | MW-13DUP | | | | | | |
| 43 | MW-21-4MS | | | | | | |
| 44 | MW-21-4MSD | | ~~EB-7-10-30-03~~ MB | | | | |
| 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 #: 11272F4
SDG #: see cover

# VALIDATION FINDINGS CHECKLIST


Reviewer: MB
2nd Reviewer: [illegible]

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

| 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

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

| 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

Page: 1 of 1
Reviewer: MA
2nd Reviewer: N

**METHOD:** Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 1.25 40ml → 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 |
| 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.

BLNKSMP.4S2

LDC #: 11372F4
SDG #: See cover

# VALIDATION FINDINGS WORKSHEET
## Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: MD
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 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 Lab limit 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 |

Comments:

MSD.4S2

LDC #: 11272 I4
SDG #: see cover

# VALIDATION FINDINGS WORKSHEET
## Field Duplicates

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

METHOD: ~~Inorganics~~ Cr, Method 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 | | |
| Cr | 3.8 | ~~3.4~~ 3.7 | 3 | |
| | | | | |
| | | | | |
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| Analyte | Concentration (ug/L) | | RPD (Limits) | Qualifier |
|---|---|---|---|---|
| | 25 | 26 | | |
| Cr | 1.5 | 1.8 | 18 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| Analyte | Concentration (ug/L) | | RPD (Limits) | Qualifier |
|---|---|---|---|---|
| | 29 | 30 | | |
| Cr | 3.4 | 3.4 | 0 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| Analyte | Concentration ( ) | | RPD (Limits) | Qualifier |
|---|---|---|---|---|
| | | | | |
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| | | | | |

LDC #: 11272F4
SDG #: see cover

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


Reviewer: MW
2nd Reviewer: [illegible]

**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:

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

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 | 9.741 | 10 | 97 | 97 | Y |
| | GFAA (Initial calibration) | | | | | | |
| | CVAA (Initial calibration) | | | | | | |
| CCV | ICP/MW (Continuing calibration) | Cr | 9.863 | 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 #: 11212F4
SDG #: See cover

# VALIDATION FINDINGS WORKSHEET
## Level IV Recalculation Worksheet

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

**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) |
|---|---|---|---|---|---|---|---|
| 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.

TOTCLC.4SW

LDC #: 11272 F4
SDG #: See cover

# VALIDATION FINDINGS WORKSHEET
## Sample Calculation Verification

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

**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 |
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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)<br>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<br>MW-12-4<br>MW-12-3<br>MW-12-2<br>MW-12-1<br>Dupe-4-4-Q03**<br>MW-23-5<br>MW-23-4<br>MW-23-3<br>MW-23-2<br>MW-23-1<br>EB-2-10-23-03 | Chromium | J (all detects)<br>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 |

1/2/02

**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 |

4/12/18

**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:** *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 |

4/10/03

**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*

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# 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 PKB

**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
**Lab Order:** 065631
**Project:** JPL GW Mon-4Q03, 04.4428.10
**Lab ID:** 065631-005A

**Client Sample ID:** MW-12-1
**Collection Date:** 10/23/2003 12:16:00 PM
**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



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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



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# 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



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# 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



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# 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 |

ND

**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*

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# 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 |

n/2/8

**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:** *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



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# 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



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LDC #: 11272G4

# VALIDATION COMPLETENESS WORKSHEET

Level III/IV

SDG #: 03-5802/065631

Laboratory: Advanced Technology Laboratories / Applied P & Ch Laboratory

Date: 12/15/03

Page: 1 of 1

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: MW
2nd Reviewer: N

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

| 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: [illegible]

| 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 #: 1212G4
SDG #: See cover

# VALIDATION FINDINGS WORKSHEET
## PB/ICB/CCB QUALIFIED SAMPLES

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

**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[a] (mg/Kg) | Maximum PB[a] (ug/L) | Maximum ICB/CCB[a] (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 |
| 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.

BLNKSMP.4S2

LDC #: 11272G4
SDG #: See cover

# VALIDATION FINDINGS WORKSHEET
## Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
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 |
| | | | | | | | | |
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Comments:

MSD.4S2

LDC #: 11272G4
SDG #: See cover

# VALIDATION FINDINGS WORKSHEET
## Field Duplicates

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

METHOD: ~~Inorganics~~ Cr, Method ~~X~~ 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 | | |
| Cr | 8.1 | 8.4 | 4 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| Analyte | Concentration ( ) | | RPD (Limits) | Qualifier |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| Analyte | Concentration ( ) | | RPD (Limits) | Qualifier |
|---|---|---|---|---|
| | | | | |
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| | | | | |
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| | | | | |
| | | | | |

| Analyte | Concentration ( ) | | RPD (Limits) | Qualifier |
|---|---|---|---|---|
| | | | | |
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| | | | | |

LDC #: 11272 G1
SDG #: See Cover

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

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

**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:

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

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.

CALCLC.4SW

LDC #: 11272G4
SDG #: See cover

# VALIDATION FINDINGS WORKSHEET
## Level IV Recalculation Worksheet

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

**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 | ~~3.494~~ 5.32 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.

TOTCLC.4SW

LDC #: 11272G4
SDG #: See cover

# VALIDATION FINDINGS WORKSHEET
## Sample Calculation Verification

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

**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 |
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