10/6/10 SL

524-10061001 2513.33 ppb Stock for O3

0.05 ml Pyridine-4-carboxaldehyde Alfa Aesar
10146598 ;Exp: 8/11/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

10/6/10 SL

524-10061002 2513.33 ppb ICAL/CCV for O3

0.05 ml Pyridine-4-carboxaldehyde TCI
(IGFINC ;Exp: 8/10/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

524-10061003 MBTH SL/17

10/6/10 SL

0.5000 g MBTH (Aldrich 54606GEK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 44254; EXP 11/2

EXP: 10/7/10

10/15/10 SL

524-10151001 Cr6+ ICAL/CCV Stock
Purchased 100 PPM Cr6+
RICCA Chemical Co Cat No 2095-16
500 ml Plastic
LOT # 101017
EXP: 3/30/12

10/15/10 SL

524-10151002 500 PPM NO_2 Stock
Purchased
RICCA Chemical Co Cat No: 5444-4
LOT # 101037 1 120 ml amber glass
EXP: 4/2011

10/28/10 JV — S24-10781002 — 1000 PPM SO_3 ICV/CCV

0.1607 Na_2SO_3 (Mallinckrodt Lot #H25469; Exp: 8/11/14) up to 100 ml w/ DI Water.

~~Exp: 11/11/10~~

11/1/10 JV — S24-11011001 — ICV/CCV Cr^{6+} T.V = 0.579 PPM

0.5 ml S19-04090904 (T.V = 115.8 mg/L ; EXP: 12/2010) ↑ 100 ml w/ DI

EXP: 11/15/10

11/1/10 JV — S24-11011002 — Cr^{6+} Coloring Reagent

0.2500g 1,5-Diphenylcarbohydrazide (EMD 47703731; EXP: 11/30/13) ↑ 50 ml w/ Acetone (EMD 47154D; EXP: 9/24/12).

EXP: 11/15/10

11/4/10 JV — S24-11041001 A→E — pH Filling Sol'n

PURCHASED (3M KCl)

Thermo Scientific

P/N 702613-402

LOT Code: 0R1

EXP: 11/4/11

11/4/10 JV — S24-11041002 — pH 2.000 Buffer

Purchased

BDH CAT NO: 5010-500ml

LOT # 1002199

EXP: 1/2012

11/4/10 524-11041003 pH 4.000 Buffer
Purchased
JT Baker Cat No: 5657-01 500ml
LOT # J30507
EXP: 8/31/12

11/4/10 524-11041004 pH 7.000 Buffer
Purchased
J.T. Baker Cat No: 5656-01 500ml
LOT # J35515
EXP: 9/30/12

11/5/10 524-11051001 MBTH Sol'n

0.5000 g MBTH (Aldrich 52696EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 49884 EXP: 11/20/14

EXP: 11/6/10

11/8/10 524-11081001 1000 PPM NH_3
0.3141g NH4Cl (EMD 4919893; EXP: 10/19/14) 9/100ml
W/ 524-10221006 EXP: 10/22/11
EXP: 10/22/11

11/12/10 524-11121001 1000 PPM SO_3 STOCK

0.1591 Na2SO3 (JT Baker Lot #H10627; Exp: 8/31/14) up to 100 ml w/ DI Water.

EXP: 11/26/10

524-0221/1101 1:1 H_2SO_4

2/21/11 SR 250 mL H_2SO_4 (EMD 49284; EXP: 11/20/1
ADDED SLOWLY TO 250 mL DI. COOL
COMPLETELY
EXP: 2/21/12

2/21/11 SR 524-0221/1102 Cr6+ Coloring Reagen
0.2500 g 1,5-Diphenylcarbohydrazide (EMD LOT 47103
EXP: 1/30/13) ↑ 50 mL W/ Acetone (EMD
LOT# 47154D; EXP: 9/24/12).
EXP: 3/21/11

2/28/11 SR 524-0228/1101 0.1 H_2SO_4
5.6 mL Conc H_2SO_4 (EMD 49284 EXP: 11/20/14) ↑ 2
W/ DI H_2O
EXP: 2/28/12

2/28/11 SR 524-0228/1102 1001 mg/L Cr6+
Purchased
Inorganic Ventures CGCR(6)1-1
125 mL Clear Glass
LOT# D2-CR03040
EXP: 3/1/2012

2/28/11 S24 - 02281103 10PPM Cr6+ Soln
1.0ml S24-02281102 (1000PPM Cr6+; EXP: 3/1/12) ↑
100ml w/ DI H2O
EXP: 2/28/12

3/7/11 S24- 03071101 Cr6+ Coloring Reagent
0.2500g 1,5-Diphenylcarbohydrazide
(EMD Lot 47103721, EXP: 1/30/13) ↑ 50ml w/
Acetone (EMD 47154, EXP: 9/24/12).
EXP: 4/7/11

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LABORATORY REPORT

March 11, 2011

David Conner
Battelle
4800 Oak Grove Dr. M/S 180-801
Pasadena, CA 91109

RE: JPL GW Mon 1Q11 / G486090

Dear David:

Enclosed are the results of the samples submitted to our laboratory on March 9, 2011. For your reference, these analyses have been assigned our service request number P1100889.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L10-3; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA; Washington State Department of Ecology, ELAP Lab ID: C946. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

Columbia Analytical Services, Inc.

Digitally signed by Sue Anderson
Date: 2011.03.11 15:49:53 -08'00'

Sue Anderson
Project Manager

Client: Battelle
Project: JPL GW Mon 1Q11 / G486090

CAS Project No: P1100889

CASE NARRATIVE

The samples were received intact under chain of custody on March 9, 2011 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hexavalent Chromium by EPA Method 7196A

No anomalies were encountered during this analysis.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for utilization of less than the complete report.

DETAIL SUMMARY REPORT

Client: Battelle
Project ID: JPL GW Mon 1Q11 / G486090
Service Request: P1100889

Date Received: 3/9/2011
Time Received: 13:45

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	7196A - Cr6
MW-26-2	P1100889-001	Water	3/9/2011	08:13	X
MW-26-1	P1100889-002	Water	3/9/2011	08:37	X
EB-12-03/09/11	P1100889-003	Water	3/9/2011	08:29	X
SB-02-3/09/11	P1100889-004	Water	3/9/2011	08:47	X
MW-25-5	P1100889-005	Water	3/9/2011	09:56	X
MW-25-4	P1100889-006	Water	3/9/2011	10:23	X
MW-25-3	P1100889-007	Water	3/9/2011	10:50	X
MW-25-2	P1100889-008	Water	3/9/2011	11:12	X
MW-25-1	P1100889-009	Water	3/9/2011	11:32	X

Columbia Analytical Services, Inc.

Acronyms

CA LUFT	California DHS LUFT Method
ASTM	American Society for Testing and Materials
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAS Number	Chemical Abstract Service Registry Number
CFC	Chlorofluorocarbon
CRDL	Contract Required Detection Limit
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOH or DHS	Department of Health Services
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified Method
MDL	Method Detection Limit
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl *tert* -Butyl Ether
NA	Not Applicable
NC	Not Calculated
ND	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	*Standard Methods for the Examination of Water and Wastewater*, 19th Ed., 1995.
SW	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)
VOC	Volatile Organic Compound(s)

Qualifiers

U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
J	The result is an estimated concentration that is less than the MRL (PQL), but greater than or equal to the MDL.
B	Analyte detected in the method blank above MRL (PQL).
E	Estimated; result based on response which exceeded the instrument calibration range.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
D	The reported result is from a dilution.
X	See case narrative.

Water & Soil - Chain of Custody Record & Analytical Service Request

Columbia Analytical Services INC.
An Employee - Owned Company

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day - Standard

CAS Project No.: P1100889

CAS Contact:

Company Name & Address (Reporting Information)
BATTELLE
3990 OLD TOWN AVE. C-205
SAN DIEGO, CA 92110

Project Name: JPL GW. MON. 1Q11

Project Number: 64866090

Project Manager: DAVID CONNER

P.O. # / Billing Information: 21439/BATTELLE ATTN: GERALD TOMPKINS 505 KING AVE. COLUMBUS, OH 43201

Phone: (614) 726-7311 **Fax**: (614) 458-6614

Email Address for Result Reporting

Sampler (Print & Sign): CINDY BRADDOCK

Analysis Method and/or Analytes

Preservative Code

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Matrix	Number of Containers	Volatile Organics GC/MS 624 ☐ 8260B ☐ Oxygenates ☐ TPH Gas ☐	TPH Gas 8015B ☐ BTEX 8021B ☐ MTBE 8021B ☐	TPH Diesel 8015B ☐ (Subcontracted)	TPH Diesel Low Level 8015B ☐ (Subcontracted)	TPH FC ☐ 8015M (Subcontracted)	Semi-Volatile Organics GC/MS 625 ☐ 8270C ☐ (Subcontracted)	0 Cr III (Zr96)	Remarks
MW-26-2	1	3/9/11	0813	W	1							X	
MW-26-1	2	3/9/11	0837	W	1							X	
EB-12-03/09/11	3	3/9/11	0829	W	1							X	EQUIP BLANK
SB-02-3/9/11	4	3/9/11	0847	W	1							X	SOURCE BLANK
MW-25-5	5	3/9/11	0956	W	1							X	
MW-25-4	6		1023									X	
MW-25-3	7		1050									X	
MW-25-2	8		1112									X	
MW-25-1	9	3/9/11	1132	W	1							X	QC LEVEL IV

Preservative Key
0 None
1 HCL
2 HNO3
3 H2SO4
4 NaOH
5 Zn Acetate
6 Asc Acid
7 Other

Report Tier Levels - please select
Tier I - (Results/Default if not specified) ____
Tier II - (Results + QC) ____
Tier III - (Data Validation Package) 10% Surcharge ____
Tier V - (client specified) ____

MRL required Yes / No
MDL / PQL / J required Yes / No

EDD required Yes / No
Type: ____

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
	03/09/11	1300		3/9/11	1305
	3/9/11	1545		3/9/11	1545

Cooler / Blank / Ice / No Ice
Temperature 3.0 °C

Client: Battelle **Service Request:** P1100889
Project: JPL GW Mon 1Q11/G486090

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P1100889-001.01					
	7196A				
		3/9/11	1350	SMO / MZAMORA	
		3/9/11	1351	P-37 / MZAMORA	
		3/9/11	1521	In Lab / SANDERSON	
		3/9/11	1632	P-37 / SANDERSON	
P1100889-002.01					
	7196A				
		3/9/11	1350	SMO / MZAMORA	
		3/9/11	1351	P-37 / MZAMORA	
		3/9/11	1521	In Lab / SANDERSON	
		3/9/11	1632	P-37 / SANDERSON	
P1100889-003.01					
	7196A				
		3/9/11	1350	SMO / MZAMORA	
		3/9/11	1351	P-37 / MZAMORA	
		3/9/11	1521	In Lab / SANDERSON	
		3/9/11	1632	P-37 / SANDERSON	
P1100889-004.01					
	7196A				
		3/9/11	1350	SMO / MZAMORA	
		3/9/11	1351	P-37 / MZAMORA	
		3/9/11	1521	In Lab / SANDERSON	
		3/9/11	1632	P-37 / SANDERSON	
P1100889-005.01					
	7196A				
		3/9/11	1350	SMO / MZAMORA	
		3/9/11	1351	P-37 / MZAMORA	
		3/9/11	1521	In Lab / SANDERSON	
		3/9/11	1632	P-37 / SANDERSON	
P1100889-006.01					
	7196A				
		3/9/11	1350	SMO / MZAMORA	
		3/9/11	1351	P-37 / MZAMORA	
		3/9/11	1521	In Lab / SANDERSON	
		3/9/11	1632	P-37 / SANDERSON	
P1100889-007.01					
	7196A				
		3/9/11	1350	SMO / MZAMORA	
		3/9/11	1351	P-37 / MZAMORA	
		3/9/11	1521	In Lab / SANDERSON	
		3/9/11	1632	P-37 / SANDERSON	
P1100889-008.01					

Client: Battelle **Service Request:** P1100889
Project: JPL GW Mon 1Q11/G486090

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
	7196A				
		3/9/11	1350	SMO / MZAMORA	
		3/9/11	1351	P-37 / MZAMORA	
		3/9/11	1521	In Lab / SANDERSON	
		3/9/11	1632	P-37 / SANDERSON	
P1100889-009.01					
	7196A				
		3/9/11	1350	SMO / MZAMORA	
		3/9/11	1351	P-37 / MZAMORA	
		3/9/11	1521	In Lab / SANDERSON	
		3/9/11	1632	P-37 / SANDERSON	

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Sample Acceptance Check Form

Client: Battelle Work order: P1100889

Project: JPL GW. Mon. 1Q11 / G486090

Sample(s) received on: 3/9/11 Date opened: 3/9/11 by: MZAMORA

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Container(s) **supplied by CAS**?	☒	☐	☐
3	Did **sample containers** arrive in good condition?	☒	☐	☐
4	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
5	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
6	Was **sample volume** received adequate for analysis?	☒	☐	☐
7	Are samples within specified holding times?	☒	☐	☐
8	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
9	Was a **trip blank** received?	☐	☒	☐
10	Were **custody seals** on outside of cooler/Box?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
	Were custody seals on outside of sample container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
11	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☐	☐	☒
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
12	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
13	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1100889-001.01	125mL Plastic NP					
P1100889-002.01	125mL Plastic NP					
P1100889-003.01	125mL Plastic NP					
P1100889-004.01	125mL Plastic NP					
P1100889-005.01	125mL Plastic NP					
P1100889-006.01	125mL Plastic NP					
P1100889-007.01	125mL Plastic NP					
P1100889-008.01	125mL Plastic NP					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

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Sample Acceptance Check Form

Client: Battelle Work order: P1100889

Project: JPL GW. Mon. 1Q11 / G486090

Sample(s) received on: 3/9/11 Date opened: 3/9/11 by: MZAMORA

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1100889-009.01	125mL Plastic NP					

Explain any discrepancies: (include lab sample ID numbers):

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

Analytical Report

Client : Battelle
Project Name : JPL GW Mon 1Q11
Project Number : G486090
Sample Matrix : WATER

Service Request : P1100889
Date Collected : 03/09/11
Date Received : 03/09/11

Chromium, Hexavalent

Prep Method : None
Analysis Method : 7196A
Test Notes :

Units : mg/L (ppm)
Basis : NA

Sample Name	Lab Code	PQL	MDL	Dilution Factor	Date Extracted	Date/Time Analyzed	Result	Result Notes
MW-26-2	P1100889-001	0.010	0.004	1	NA	03/09/11 16:00	ND	
MW-26-1	P1100889-002	0.010	0.004	1	NA	03/09/11 16:00	ND	
EB-12-03/09/11	P1100889-003	0.010	0.004	1	NA	03/09/11 16:00	ND	
SB-02-3/09/11	P1100889-004	0.010	0.004	1	NA	03/09/11 16:00	ND	
MW-25-5	P1100889-005	0.010	0.004	1	NA	03/09/11 16:00	ND	
MW-25-4	P1100889-006	0.010	0.004	1	NA	03/09/11 16:00	ND	
MW-25-3	P1100889-007	0.010	0.004	1	NA	03/09/11 16:00	ND	
MW-25-2	P1100889-008	0.010	0.004	1	NA	03/09/11 16:00	ND	
MW-25-1	P1100889-009	0.010	0.004	1	NA	03/09/11 16:00	ND	
Method Blank	P1100889-MB	0.010	0.004	1	NA	03/09/11 16:00	ND	

Approved By Karen Ryan Date : 3/11/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P1100889
Project:	JPL GW Mon. 1Q11 / G486090	**Date Analyzed:**	03/09/11

Title: Initial and Continuing Calibration Blank (ICB and CCB) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	PQL	MDL	Result
ICB	0.010	0.004	ND
CCB1	0.010	0.004	ND
CCB2	0.010	0.004	ND

Approved By: Karen Rya Date: 3/11/11

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P1100889
Project:	JPL GW Mon. 1Q11 / G486090	**Date Analyzed:**	03/09/11

Title: Initial and Continuing Calibration Verification (ICV and CCV) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	True Value	Result	Percent Recovery	Acceptance Criteria
ICV	0.0500	0.0503	101	90-110
CCV1	0.0500	0.0494	99	90-110
CCV2	0.0500	0.0503	101	90-110

Approved By: Karen Rya Date: 3/11/11

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100889
Project Name :	JPL GW Mon 1Q11	**Date Collected :**	NA
Project Number :	G486090	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/09/11

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P1100889-LCS	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Chromium, Hexavalent	None	7196A	0.0400	0.0398	100	90-109	

Approved By Karen Ryan Date : 3/11/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100889
Project Name :	JPL GW Mon 1Q11	**Date Collected :**	03/09/11
Project Number :	G486090	**Date Received :**	03/09/11
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/09/11

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name :	MW-26-2		Units :	mg/L (ppm)
Lab Code :	P1100889-001MS	P1100889-001DMS	Basis :	NA
Test Notes :				

Analyte	Prep Method	Analysis Method	PQL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Spike Recovery MS	Spike Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Chromium, Hexavalent	None	7196A	0.010	0.0500	0.0500	ND	0.0521	0.0538	104	108	78-112	3	

Approved By Karen Ryan Date : 3/11/11

Report By:SAnderson

Columbia Analytical Services

pH Run Log

Service Request #(s): 889

Time: 0845

Sample	VWR lot #	Exp.
pH 2 Buffer	524-11041002	1/2012
pH 4 Buffer	524-11041003	8/31/12
pH 7 Buffer	524-11041004	9/30/12
pH 10 Buffer	524-0362/001	9/30/11

Slope	Prep.Run #
98.2%	—
	Run#
	—

pH in liquid: (1) 9040B, (2) 9040C **pH in solid:** (3) 9045C, (4) 9045D (*Note method number in column labeled # below*)

pH adjustment:(5) 7196A,(6) 7199 (Note method # In column labeled #)

Sample	#	pH	Temp. °C
pH 2.000	5	1.995	22.6°
pH 4.000		4.009	22.3°
pH 7.000		7.000	22.4°
pH 10.000		9.990	22.5°
Ref#: 514-1123/903D T.V=6.46 EXP: 1/2012		6.366	22.5°
DI		2.023	21.9°
pH 2.000		2.001	22.5°
TIME: 1527			
pH2.000	5	2.012	23.8°
889-1.01		2.083	17.7°
-2.01		1.936	14.5°
-3.01		2.108	15.1°
-4.01		1.955	16.5°
-5.01		2.019	16.9°
-6.01		2.045	17.5°
-7.01		1.876	16.7°
-8.01		2.069	16.9°

Sample	#	pH	Temp. °C
889-9.01	5	1.892	17.5°
pH2.000	5	1.990	23.5°

spill not related

pH Adjustments: ☒ **7196A**: Diluted/Conc H_2SO_4 EMD 49284 EXP: 11/20/14

☐ **7199A**: Diluted NaOH _____ EXP: _____

Comments: _____

* Soil or Solid prep: 1:1(wt:vol) with DI water: ** Samples received past recommended hold time.

Date buffers and filling solution changed: 3/7/11

Note: ATC probe used, therefore, temperature correction calculation is not necessary.

Analyst: _____ Date: 3/9/11

Reviewer: KL Date: 3/9/11

pH.XLS

Columbia Analytical Services™

Hexavalent Chromium (Liquids)

Method EPA 7196A

Service Request#(s): 889 Run#: 238525

Stock#: 524-0228/1103 T.V=10ppm EXP: 2/28/12 Prep Run#: —

ICV/CCV#: 524-10151001 T.V=100ppm EXP: 3/2012 Conc. H_2SO_4 Lot#: EMD 149284 EXP: 11/20/14

Coloring Reagent Ref#: 524-0307/1101 EXP: 4/7/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	0.999558
Absorbance @ 540 nm	0.000	0.011	0.056	0.114	

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	ICB	10 ml	—	✓	0.000	0.000	0.000	0.000318	<0.004
2	ICV 0.05PPM		~	✓	0.000	0.057	0.057	0.0503	101%
3	MB		—	✓	0.000	0.000	0.000	0.000318	<0.004
4	LCS 0.04PPM		~	✓	0.000	0.045	0.045	0.0398	100%
5	889-1.01		~	✓	0.000	0.002	0.002	0.00207	<0.004
6	-1.01 MS 0.05PPM		~	✓	0.000	0.059	0.059	0.0521	104% 3%
7	-1.01 MSD		~	✓	0.000	0.061	0.061	0.0538	108% RPD
8	-2.01		~	✓	0.000	0.002	0.002	0.00207	<0.004
9	-2.01 LS 0.03PPM		~	✓	0.000	0.033	0.033	0.0293	98%
10	-3.01		~	✓	0.000	0.000	0.000	0.000318	<0.004
11	-4.01		~	✓	0.000	0.000	0.000	"	"
12	-5.01		~	✓	0.000	0.000	0.000	"	"
13	CCV1 0.050PPM		~	✓	0.000	0.056	0.056	0.0494	99%
14	CCB1		~	✓	0.000	0.000	0.000	0.000318	<0.004
15	889-6.01		~	✓	0.000	0.002	0.002	0.00207	"
16	-7.01		~	✓	0.000	0.003	0.003	0.00295	"
17	-8.01		~	✓	0.000	0.003	0.003	0.00295	"

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of 524-10151001 @ 1/N ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of 524-0228/1103 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of — ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of ↓ @ 1/10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments: —

Prepared By: [signature] Date/Time: 3/9/11 @ 1545

Analyzed By: [signature] Date/Time: 3/9/11 @ 1600

Reviewed By: TCK Date: 3/9/11

Cr6LIQ.xls

Hexavalent Chromium (Liquids)

Columbia Analytical Services™

Method EPA 7196A

Service Request#(s): 889 Run#: 238525

Stock#: S24-0228110 3 T.V=10PPM EXP: 2/28/12 Prep Run#: —

ICV/CCV#: S24-1015001 T.V=100PPM EXP: 3/2012 Conc. H_2SO_4 Lot#: EMD 49284 EXP: 11/20/14

Coloring Reagent Ref#: S24-0307110 1 EXP: 4/7/11

Working Curve:

Prep Dilution		*NA*	*0.05/50*	*0.25/50*	*0.5/50*	*Corr. Coeff.*
Concentration mg/L		*0.00*	*0.01*	*0.05*	*0.1*	
Absorbance @ 540 nm		*0.000*	*0.011*	*0.050*	*0.114*	*0.9999584 9*

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	889-9.01	10ml	—	✓	0.008	0.011	0.003	0.00395	<0.004
2	CCV2 0.050PPM	↓	—	✓	0.000	0.057	0.057	0.0503	101%
3	CCB2	↓	—	✓	0.000	0.000	0.000	0.000318	<0.004
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									

space not used

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of S24-1015001 @ 10 ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of S24-0228110 3 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of ↓ ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of ↓ @ 10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments:

Prepared By: [signature] Date/Time: 3/9/11 @ 1545

Analyzed By: [signature] Date/Time: 3/9/11 @ 1600

Reviewed By: [signature] Date: 3/9/11

Cr6LIQ.xls

11/23/09 SIG-1123090Z 1000 ppm SO_3 (ICV/CCV)
SR 0.1607g Na_2SO_3 (Mallinckrodt; H25469; EXP 8/11/14
↑ 100ml w/ DI
EXP: 5/23/10

11/23/09 SIG-1123090 3 A,B,C,D pH REFERENCE
SR PURCHASED
ERA CAT # 977
LOT # 129934
EXP: 1/2012

11/24/09 SIG-1124090 1 1000 ppm SO_4 Standard
SR PURCHASED CAT # ICC-006
LOT # K60794
EXP: 9/30/13
SR 11/25/09

11/25/09 SIG-~~H25~~ 1125090 1 0.1N H_2SO_4
SR ~~50~~ ml conc H_2SO_4 (EMD 4705D EXP: 9/13/10)
EXP: ~~11/25~~ 9/13/10
SR 11/25/09

11/30/09 SIG-1130090 1 Cr^{6+} Coloring Reagent
SR 0.2500g diphenylcarbonohydrazide (EMD) 4710 3ED; EXP: 1/30/13) ↑ 50ml w/ Acetone (EMD 4715 4D; EXP: 9/24/12
EXP: 12/30/09

11/30/09 SIG-1130090 2 25133 ppb Stock for O_3 in Air
SR 0.05ml Pyridine-4-Carboxaldehyde (Alfa Aesar LOT 10144 0598; EXP 8/11/12)
↑ 500ml deionized H_2O
EXP: 12/14/09

11/30/09 SIG-1130090 3 25133 ppb ICV/CCV for O_3 in Air
SR 0.05ml Pyridine-4-carboxaldehyde (TCI LOT # IG INC; EXP: 8/10/12)
↑ 500ml w/ DI H_2O
EXP: 12/14/09

Reviewed And Approved By:
Initial: VL Date: 12/22/09

3/1/10 SV
524-03011001 pH 4.000 Buffer
Purchased 500 ml CAT # 5657-01
JT BAKER LOT # H31526
EXP 8/31/11

3/1/10 SV
524-03011002 pH 7.000 Buffer
Purchased 500 ml CAT # 5656-01
JT BAKER LOT # H47531
EXP: 1/31/12

3/1/10 SV
524-03011003 1000 PPM Cl (LCS)
Purchased 120 ml Cat # 1955-4
RICA CHEM CO LOT # 1001395
EXP: 7/2011

3/1/10 SV
524-03011004 NH3 Filling Soln
Purchased 60 ml Orion 951202
Thermo Scientific LOT # MT1
P/N. 726613-A04
EXP: 3/1/11

3/2/10 SV
524-03021001 pH 10.000 buffer
Purchased 500 ml Cat # 5655-01
JT Baker LOT H34508
EXP: 9/30/11

10/6/10 SL — 524-10061001 — 25133 ppb Stock for O3

0.05 ml Pyridine-4-carboxaldehyde Alfa Aesar 10140598 ;Exp: 8/11/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

10/6/10 SL — 524-10061002 — 25133 ppb ICAL/CCV for O3

0.05 ml Pyridine-4-carboxaldehyde TCI (IGINC ;Exp: 8/10/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

524-10061003 MBTH 8/17

10/6/10 SL

0.5000 g MBTH (Aldrich 54666EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 49284; EXP 11/2

EXP: 10/7/10

10/15/10 SL — 524-10151001 — Cr6+ ICAL/CCV Stock 100PPM Cr6+

Purchased RICCA Chemical Co Cat No 2095-16

500ml Plastic

LOT # 101077

EXP: 3/20/12

10/15/10 SL — 524-10151002 — 500PPM NO_2 Stock

Purchased RICCA Chemical Co Cat No: 5444-54

LOT # 101027 1 120ml amber glass

EXP: 4/2011

10/28/10 S24-10281002 1000 PPM SO3 ICV/CCV

0.1607 Na2SO3 (Mallinckrodt Lot #H25469; Exp: 8/11/14) up to 100 ml w/ DI Water.

~~EXP: 11/11/10~~

11/1/10 S24-11011001 ICV/CCV Cr^{6+} T.V = 0.579 PPM
0.5ml S19-04090904 (T.V=115.8mg/L ; EXP: 12/2010)
↑ 100ml w/ DI
EXP: 11/15/10

11/1/10 S24-11011002 Cr^{6+} Coloring Reagent
0.2500g 1,5-Diphenylcarbohydrazide (EMD 47103721; EXP: 1/30/13) ↑ 50ml w/ Acetone (EMD 47154D; EXP: 9/24/12).
EXP: 11/15/10

11/4/10 S24-11041001 A→E pH Filling Sol'n
PURCHASED (3M KCl)
Thermo Scientific P/N 702613-A02
LOT Code: OR1
EXP: 11/4/11

11/4/10 S24-11041002 pH 2.000 Buffer
Purchased
BDH CAT NO: 5010-500ml
LOT # 1002199
EXP: 1/2012

524-11041003 pH 4.000 Buffer

11/4/10 Purchased

JT Baker Cat No: 5657-01 500 ml

LOT # J30507

EXP: 8/31/12

11/4/10 524-11041004 pH 7.000 Buffer

Purchased

J.T. Baker Cat No: 5656-01 500 ml

LOT # J35515

EXP: 9/30/12

11/5/10 524-11051001 MBTH 50/6

0.5000 g MBTH (Aldrich 521696EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 4984 84 EXP: 11/20/14

EXP: 11/6/10

11/8/10 524-11081001 1000 PPM NH3

0.3141/g NH_4Cl (EMD 4919893; EXP: 10/19/14) 9 100 ml

W/ 524-10221006 EXP: 10/22/11

EXP: 10/22/11

11/12/10 524-11121001 1000 PPM SO3 STOCK

0.1591 Na2SO3 (JT Baker Lot #H10627; Exp: 8/31/14) up to 100 ml w/ DI Water.

EXP: 11/26/10

524-022111101 1:1 H_2SO_4

2/21/11 SR 250ml H_2SO_4 (EMD 49284; EXP: 11/20/1
ADDED SLOWLY TO 250ml D.I. COOL
COMPLETELY
EXP: 2/21/12

2/21/11 SR 524-022111102 Cr6+ Coloring Reagen
0.2500g 1,5-diphenylcarbohydrazide (EMD LOT 47103
EXP: 1/30/13) ↑ 50ml W/ Acetone (EMD
LOT# 47154D; EXP: 9/24/12).
EXP: 3/21/11

2/28/11 SR 524-022811101 0.1 H_2SO_4
5.6ml Conc H_2SO_4 (EMD 49284 EXP: 11/20/14) ↑ 2
W/ DI H_2O
EXP: 2/28/12

2/28/11 SR 524-022811102 1001 mg/L Cr6+
Purchased
Inorganic Ventures CGCR(6)1-1
125mL Clear Glass
LOT# D2-CR03040
EXP: 3/1/2012

2/28/11 S24-02281103 10PPM Cr^{6+} Sol'n
1.0ml S24-02281102 (1000PPM Cr^{6+}; EXP: 3/1/12) ↑
100ml w/ DI H_2O
EXP: 2/28/12

3/7/11 S24-03071101 Cr^{6+} Coloring Reagent
0.2500g 1,5-Diphenylcarbohydrazide
(EMD Lot 47103721, EXP: 1/30/13) ↑ 50ml w/
Acetone (EMD 47154; EXP: 9/24/12).
EXP: 4/7/11

11/4/10 JR — 524-1104I003 pH 4.000 Buffer
Purchased
JT Baker Cat No: 5657-01 500 ml
Lot # J30507
Exp: 8/31/12

11/4/10 JR — 524-1104I004 pH 7.000 Buffer
Purchased
J.T. Baker Cat No: 5656-01 500 ml
Lot # J35515
Exp: 9/30/12

11/5/10 JR — 524-1105I001 MBTH Std

0.5000 g MBTH (Aldrich 521696EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 4948 EXP: 11/20/14

Exp: 11/6/10

11/8/10 JR — 524-1108I001 1000 ppm NH_3
0.3141g NH_4Cl (EMD 4419831; Exp: 10/19/14) @ 100 ml
W/ 524-1022I006 Exp: 10/22/11
Exp: 10/22/11

11/12/10 JR — 524-1112I001 1000 ppm SO_3 Stock

0.1591 Na_2SO_3 (JT Baker Lot #H10627; Exp: 8/31/14) up to 100 ml w/ DI Water.

Exp: 11/26/10

524-0221101 1:1 H_2SO_4

2/21/11 SR 250 mL H_2SO_4 (EMD 49284; EXP: 11/20/1
ADDED SLOWLY TO 250 mL DI. COOL
COMPLETELY
EXP: 2/21/12

2/21/11 SR 524-0221102 Cr6+ Coloring Reagent
0.2500 g 1,5-Diphenylcarbohydrazide (EMD LOT 471037
EXP: 1/30/13) + 50 mL w/ Acetone (EMD
LOT# 47154D; EXP: 9/24/12).
EXP: 3/21/11

2/28/11 SR 524-0228/101 0.1 H_2SO_4
5.6 mL conc H_2SO_4 (EMD 49284 EXP: 11/20/14) + 2
w/ DI H_2O
EXP: 2/28/12

2/28/11 SR 524-0228/102 10 ppb Cr6+
Purchased
Inorganic Ventures CGCR(6)1-1
125 mL Clear Glass
LOT# D2-CR03040
EXP: 3/1/2012

55

2/28/11 SL

524-02281103 100ppm Cr6+ Soln
1.0 mL 524-02281102 (100ppm Cr6+; Exp: 3/1/12) ↑
100 mL w/ DI H2O
Exp: 2/28/12

Columbia Analytical Services™ 2655 Park Center Drive, Suite A, Simi Valley, CA 93065 | 805.526.7161 | www.caslab.com

LABORATORY REPORT

March 7, 2011

David Conner
Battelle
4800 Oak Grove Dr. M/S 180-801
Pasadena, CA 91109

RE: JPL-GW-1Q11 / G005862 / JPL GWM

Dear David:

Enclosed are the results of the samples submitted to our laboratory on March 2, 2011. For your reference, these analyses have been assigned our service request number P1100798.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L10-3; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA; Washington State Department of Ecology, ELAP Lab ID: C946. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

Columbia Analytical Services, Inc.

Digitally signed by Sue Anderson
Date: 2011.03.07 16:12:46 -08'00'

Sue Anderson
Project Manager

Client: Battelle CAS Project No: P1100798
Project: JPL-GW-1Q11 / G005862 / JPL GWM

CASE NARRATIVE

The samples were received intact under chain of custody on March 2, 2011 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hexavalent Chromium by EPA Method 7196A

No anomalies were encountered during this analysis.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for utilization of less than the complete report.

DETAIL SUMMARY REPORT

Client: Battelle
Service Request: P1100798
Project ID: JPL-GW-1Q11 / G005862 / JPL GWM

Date Received: 3/2/2011
Time Received: 15:35

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	7196A - Cr6
MW-6	P1100798-001	Water	3/2/2011	09:40	X
MW-13	P1100798-002	Water	3/2/2011	12:01	X

Acronyms

CA LUFT	California DHS LUFT Metho
ASTM	American Society for Testing and Materials
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAS Number	Chemical Abstract Service Registry Number
CFC	Chlorofluorocarbon
CRDL	Contract Required Detection Limit
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOH or DHS	Department of Health Services
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified Method
MDL	Method Detection Limit
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl *tert* -Butyl Ether
NA	Not Applicable
NC	Not Calculated
ND	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	*Standard Methods for the Examination of Water and Wastewater* , 19th Ed., 1995.
SW	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* , SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)
VOC	Volatile Organic Compound(s)

Qualifiers

U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
J	The result is an estimated concentration that is less than the MRL (PQL), but greater than or equal to the MDL.
B	Analyte detected in the method blank above MRL (PQL).
E	Estimated; result based on response which exceeded the instrument calibration range.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
D	The reported result is from a dilution.
X	See case narrative.

Water & Soil - Chain of Custody Record & Analytical Service Request

Columbia Analytical Services INC.
An Employee - Owned Company

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) (10 Day - Standard)

CAS Project No.: P1100798

CAS Contact:

Company Name & Address (Reporting Information)	Project Name	Project Number
Battelle 505 King Ave Columbus, OH. 43201	JPL-GW-1Q11	G005862/JPL GWM

Project Manager	P.O. # / Billing Information
David Conner	214375/BATTELLE 505 King Ave Columbus OH. 43207

Phone	Fax
619-726-7311	614-458-6641

Email Address for Result Reporting	Sampler (Print & Sign)
Connerd@battelle.org	DAVID LOERA

Analysis Method and/or Analytes

Preservative Code

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Matrix	Number of Containers	Volatile Organics GC/MS 624 ☐ 8260B ☐ Oxygenates ☐ TPH Gas ☐	TPH Gas 8015B ☐ BTEX 8021B ☐ MTBE 8021B ☐	TPH Diesel 8015B ☐ (Subcontracted)	TPH Diesel Low Level 8015B ☐ (Subcontracted)	TPH FC ☐ 8015M (Subcontracted)	Semi-Volatile Organics GC/MS 625 ☐ 8270C ☐ (Subcontracted)	0 Hexa Valent Cr (7196)	Remarks
MW-6	(1)	3/2/11	0940	AQ	1P							X	
MW-6-MS/MSD	~~2~~	3/2/11	0945	AQ	1P							X	
MW-13	(2)	3/2/11	1201	AQ	1P							X	
MW-13-MS/MSD		3/2/11	1205	AQ	1P							X	

Preservative Key

0	None
1	HCL
2	HNO3
3	H2SO4
4	NaOH
5	Zn Acetate
6	Asc Acid
7	Other

Report Tier Levels - please select

Tier I - (Results/Default if not specified) ____
Tier II - (Results + QC) ____
Tier III - (Data Validation Package) 10% Surcharge X
Tier V - (client specified) ____

MRL required Yes / No
MDL / PQL / J required Yes / No

EDD required Yes / No
Type: ____

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
	3-2-11	1315		3/2/11	1315
	3/2/11	1500		3/2/11	1500
	3/2/11	1535		3/2/11	1535

Cooler / Blank / Ice / No Ice
Temperature 3 °C °C

Client: Battelle **Service Request:** P1100798
Project: JPL-GW-1Q11/G005862 / JPL GWM

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P1100798-001.01					
	7196A				
		3/2/11	1558	SMO / MZAMORA	
		3/2/11	1558	P-37 / MZAMORA	
		3/2/11	1606	In Lab / SANDERSON	
		3/2/11	1702	P-37 / SANDERSON	
P1100798-001.02					
		3/2/11	1558	SMO / MZAMORA	
		3/2/11	1558	P-37 / MZAMORA	
		3/2/11	1606	In Lab / SANDERSON	
		3/2/11	1702	P-37 / SANDERSON	
P1100798-002.01					
	7196A				
		3/2/11	1558	SMO / MZAMORA	
		3/2/11	1558	P-37 / MZAMORA	
		3/2/11	1605	In Lab / SANDERSON	
		3/2/11	1702	P-37 / SANDERSON	
P1100798-002.02					
		3/2/11	1558	SMO / MZAMORA	
		3/2/11	1558	P-37 / MZAMORA	
		3/2/11	1606	In Lab / SANDERSON	
		3/2/11	1702	P-37 / SANDERSON	

Columbia Analytical Services™ 2655 Park Center Drive, Suite A, Simi Valley, CA 93065 | 805.526.7161 | www.caslab.com

Sample Acceptance Check Form

Client: Battelle Work order: P1100798

Project: JPL-GW-1Q11 / G005862 / JPL GWM

Sample(s) received on: 3/2/11 Date opened: 3/2/11 by: MZAMORA

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Container(s) **supplied by CAS**?	☒	☐	☐
3	Did **sample containers** arrive in good condition?	☒	☐	☐
4	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
5	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
6	Was **sample volume** received adequate for analysis?	☒	☐	☐
7	Are samples within specified holding times?	☒	☐	☐
8	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
9	Was a **trip blank** received?	☐	☒	☐
10	Were **custody seals** on outside of cooler/Box?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
	Were custody seals on outside of sample container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
11	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☒	☐	☐
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
12	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
13	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1100798-001.01	125mL Plastic NP					Time sampled = 0940
P1100798-001.02	125mL Plastic NP					Time sampled = 0945
P1100798-002.01	125mL Plastic NP					Time sampled = 1201
P1100798-002.02	125mL Plastic NP					Time sampled = 1205

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL-GW-1Q11
Project Number : G005862 / JPL GWM
Sample Matrix : WATER

Service Request : P1100798
Date Collected : 03/02/11
Date Received : 03/02/11

Chromium, Hexavalent

Prep Method : None
Analysis Method : 7196A
Test Notes :

Units : mg/L (ppm)
Basis : NA

Sample Name	Lab Code	PQL	MDL	Dilution Factor	Date Extracted	Date/Time Analyzed	Result	Result Notes
MW-6	P1100798-001	0.010	0.004	1	NA	03/02/11 16:45	ND	
MW-13	P1100798-002	0.010	0.004	1	NA	03/02/11 16:45	0.008	J
Method Blank	P1100798-MB	0.010	0.004	1	NA	03/02/11 16:45	ND	

J Estimated concentration. The result is less than the PQL but greater than the MDL.

Approved By Karen Rya Date : 3/3/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-1Q11 / G005862 / JPL GWM

Service Request: P1100798
Date Analyzed: 03/02/11

Title: Initial and Continuing Calibration Blank (ICB and CCB) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	PQL	MDL	Result
ICB	0.010	0.004	ND
CCB1	0.010	0.004	ND
CCB2	0.010	0.004	ND
CCB3	0.010	0.004	ND

Approved By: Karen Ryan Date: 3/3/11

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-1Q11 / G005862 / JPL GWM

Service Request: P1100798
Date Analyzed: 03/02/11

Title: Initial and Continuing Calibration Verification (ICV and CCV) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	True Value	Result	Percent Recovery	Acceptance Criteria
ICV	0.0500	0.0509	102	90-110
CCV1	0.0500	0.0491	98	90-110
CCV2	0.0500	0.0509	102	90-110
CCV3	0.0500	0.0509	102	90-110

Approved By: Karen Rya Date: 3/3/11

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100798
Project Name :	JPL-GW-1Q11	**Date Collected :**	NA
Project Number :	G005862 / JPL GWM	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/02/11

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P1100798-LCS	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Chromium, Hexavalent	None	7196A	0.0400	0.0391	98	90-109	

Approved By Karen Ryan Date : 3/2/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100798
Project Name :	JPL-GW-1Q11	**Date Collected :**	03/02/11
Project Number :	G005862 / JPL GWM	**Date Received :**	03/02/11
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/02/11

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-6
Lab Code : P1100798-001MS P1100798-001DMS
Test Notes :

Units : mg/L (ppm)
Basis : NA

Analyte	Prep Method	Analysis Method	PQL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Spike Recovery MS	Spike Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Chromium, Hexavalent	None	7196A	0.010	0.0500	0.0500	ND	0.0500	0.0509	100	102	78-112	2	

Approved By Karen Ryan Date : 3/3/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100798
Project Name :	JPL-GW-1Q11	**Date Collected :**	03/02/11
Project Number :	G005862 / JPL GWM	**Date Received :**	03/02/11
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/02/11

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name :	MW-13		Units :	mg/L (ppm)
Lab Code :	P1100798-002MS	P1100798-002DMS	Basis :	NA
Test Notes :				

Analyte	Prep Method	Analysis Method	PQL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Spike Recovery MS	Spike Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Chromium, Hexavalent	None	7196A	0.010	0.0500	0.0500	0.0082	0.0582	0.0582	100	100	78-112	<1	J

J Estimated concentration. The result is less than the PQL but greater than the MDL.

Approved By Karen Ryan Date : 3/3/11

Report By:SAnderson

Columbia Analytical Services

pH Run Log

Service Request #(s): 790 797 798

Time: 0920

Sample	VWR lot #	Exp.	Slope	Prep.Run #
pH 2 Buffer	524-11041002	1/2012	99.0%	—
pH 4 Buffer	524-11041003	8/31/12		Run#
pH 7 Buffer	524-11041004	9/30/12		—
pH 10 Buffer	524-03021001	9/30/11		

pH in liquid: (1) 9040B, (2) 9040C **pH in solid:** (3) 9045C, (4) 9045D (*Note method number in column labeled # below*)

pH adjustment:(5) 7196A,(6) 7199 (Note method # in column labeled #)

Sample	#	pH	Temp. °C	Sample	#	pH	Temp. °C
pH 2.000	5	1.996	21.5°	797-8.01	5	1.990	11.7°
pH 4.000	↓	3.953	21.5°	798-1.01	↓	2.062	12.1°
pH 7.000		6.991	21.5°	pH 2.000		2.008	22.3°
pH 10.000		9.999	21.6°	798-2.01		1.883	12.6°
Ref#: 519-1128090310 10-646 exp. 11/2012		6.364	21.7°	pH 2.000	↓	2.013	22.5°
DI		2.061	19.1°				
pH 2.000	↓	1.992	21.3°				
TIME: 1615		[initials]					
pH 2.000	5	2.012	22.6°			space not used	
790-1.01	↓	2.026	22.1°				
797-1.01		1.960	10.1°				
-2.01		1.867	9.7°				
-3.01		1.800	10.4°				
-4.01		1.996	9.5°				
-5.01		1.866	10.6°				
-6.01		2.183	11.4°				
-7.01	↓	2.093	11.5°				

pH Adjustments: ☒ **7196A**: Diluted/Conc H_2SO_4 EMD 49284 EXP: 11/20/14

☐ **7199A**: Diluted NaOH ________ EXP: ________

Comments: ________

* Soil or Solid prep: 1:1(wt:vol) with DI water: ** Samples received past recommended hold time.

Date buffers and filling solution changed: 2/28/11

Note: ATC probe used; therefore, temperature correction calculation is not necessary.

Analyst: [signature] Date: 3/2/11

Reviewer: KR Date: 3/3/11

pH.XLS

Hexavalent Chromium (Liquids)

Columbia Analytical Services 790-3/2/11

Method EPA 7196A

page 1 of 2 59

Service Request#(s): 790 793 798

Stock#: 524-02281103 T.V=10PPM EXP: 2/28/12

ICV/CCV#: 524-10151001 T.V=100PPM EXP: 3/12

Run#: 237770

Prep Run#: —

Conc. H_2SO_4 Lot#: EMD 49284 EXP: 11/20/14

Coloring Reagent Ref#: 524-02211102 EXP: 3/21/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	1.000
Absorbance @ 540 nm	0.000	0.011	0.055	0.110	

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	ICB	10ml	—	✓	0.000	0.000	0.000	0	<0.004
2	ICV 0.0500PPM		—	✓	0.000	0.056	0.056	0.0509	102%
3	MB		—	✓	0.000	0.043	0.043	0.0391	98%
4	LCS 0.040PPM		—	✓	0.000	0.000	0.000	0	<0.004
5	790-1.01		—	✓	0.000	0.030	0.030	0.0273	
6	-1.01 MS 0.050PPM ~~VS 0.03PPM~~		—	✓	0.000	0.083	0.083	0.0755	96%
7	-1.01 MSD 0.050PPM		—	✓	0.000	0.083	0.083	0.0755	96% <1% RPD
8	-1.01 ~~MSD~~ VS 0.03PPM		—	✓	0.000	0.062	0.062	0.0564	97%
9	793-1.01		—	✓	0.003	0.004	0.001	0.000909	<0.004
10	-1.01 VS 0.03PPM		—	✓	0.003	0.036	0.033	0.030	100%
11	-2.01		—	✓	0.000	0.001	0.001	0.000909	<0.004
12	-3.01		—	✓	0.000	0.000	0.000	0	<0.004
13	CCV1 0.0500 PPM		—	✓	0.000	0.054	0.054	0.0491	98%
14	CCB1		—	✓	0.000	0.000	0.000	0	<0.004
15	793-4.01		—	✓	0.000	0.001	0.001	0.000909	
16	-5.01		—	✓	0.000	0.000	0.000	0	
17	-6.01		—	✓	0.000	0.001	0.001	0.000909	

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of 524-10151001 @1/10 ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of 524-02281103 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of ↓ ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of ↓ @1/10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments:

Prepared By: [signature] Date/Time: 3/2/11 @ 1630

Analyzed By: [signature] Date/Time: 3/2/11 @ 1645

Reviewed By: KR Date: 3/3/11

Cr6LIQ.xls

Hexavalent Chromium (Liquids)

Columbia Analytical Services

Method EPA 7196A

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Page 2 of 2

Service Request#(s): 798 798 798 8/2/11

Run#: 237770

Stock#: 524-0228/103 TV=10ppm EXP: 2/28/12

Prep Run#: —

CCV/CCV#: 524-1015/001 TV=100ppm EXP: 3/12

Conc. H_2SO_4 Lot#: [illegible] EXP: 11/10/11

Coloring Reagent Ref#: 524-0221/102 EXP: 3/21/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	
Absorbance @ 540 nm	0.000	0.011	0.055	0.110	1.000

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	798-7.01	10ml	—	✓	0.000	0.002	0.002	0.00182	20.004
2	J -8.01		—	✓	0.000	0.000	0.000	0	20.004
3	798-1.01		—	✓	0.000	0.000	0.000	0	20.004
4	-1.01 MS 0.05ppm		—	✓	0.000	0.055	0.055	0.0500	100% 2.0%
5	-1.01 MSD J		—	✓	0.000	0.056	0.056	0.089	102% RPD
6	-2.01		—	✓	0.000	0.009	0.009	0.00818	
7	-2.01 MS 0.05ppm		—	✓	0.000	0.064	0064	0.0582	100%
8	CCV2 0.0500ppm		—	✓	0.000	0.056	0.056	0.0509	102%
9	CCB2		—	✓	0.000	0.000	0.000	0	
10	798-2.01 MSD 0.05ppm		—	✓	0.000	0.064	0.064	0.0582	100% 4.0% RPD
11	CCV3 0.0500ppm		—	✓	0.000	0.056	0.056	0.0509	102%
12	CCB3		—	✓	0.000	0.000	0.000	0	
13									
14									
15	Spare not used								
16									
17									

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of 524-1015/001 @ tc ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of 524-0228/103 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of _____ ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of @ tc ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments: _____

Prepared By: _____ Date/Time: 3/2/11 @ 1650

Analyzed By: _____ Date/Time: 3/2/11 @ 1645

Reviewed By: RR Date: 3/3/11

Cr6LIQ.xls

11/23/09 SIG-1123090B 1000 ppm SO_3 (ICV/CCV)
SR 0.1607g Na_2SO_3 (Mallinckrodt; H25469; EXP 8/11/14
↑ 100ml w/ DI
EXP: 5/23/10

11/23/09 SIG-1123090B A,B,C,D pH REFERENCE
SR PURCHASED
ERA CAT # 977
LOT # 129934
EXP: 1/2012

11/24/09 SIG-1124090I 1000 ppm SO_4 Standard
SR PURCHASED CAT # ICC-006
LOT # K60794
EXP: 9/30/13
SR 11/25/09

11/25/09 SIG-~~H25~~ 1125090I 0.1N H_2SO_4
SR 5.6ml conc H_2SO_4 (EMD 4705D EXP: 9/13/10)
EXP: ~~9/25~~ 9/13/10
SR 11/25/09

11/30/09 SIG-1130090I Cr^{6+} Coloring Reagent
SR 0.2500g diphenylcarbohydrazide (EMD) 4710ED; EXP: 1/30/13) ↑ 50ml w/ Acetone (EMD 4715ED; EXP: 9/24/12
EXP: 12/30/09

11/30/09 SIG-1130090B 25133 ppb Stock for O_3 in Air
SR 0.05ml Pyridine-4-Carboxaldehyde (Alfa Aesar LOT 10140558; EXP 8/11/12)
↑ 500ml deionized H_2O
EXP: 12/14/09

11/30/09 SIG-1130090B 25133ppb ICV/CCV for O_3 in Air
SR 0.05ml Pyridine-4-carboxaldehyde (TCI LOT # IGINC; EXP: 8/10/12)
↑ 500ml w/ DI H_2O
EXP: 12/14/09

Reviewed And Approved By:
Initial: VL Date: 12/22/09

3/1/10 SV — 524-03011001 pH 4.000 Buffer
Purchased 500 ml CAT # 5657-01
JT BAKER LOT # H31526
EXP 8/31/11

3/1/10 SV — 524-03011002 pH 7.000 Buffer
Purchased 500ml CAT # 5656-01
JT BAKER LOT # H47531
EXP: 1/31/12

3/1/10 SV — 524-03011003 1000 PPM Cl (ICS)
Purchased 120ml Cat # 1955-4
RICA CHEM CO LOT # 1001395
EXP: 7/2011

3/1/10 SV — 524-03011004 NH3 Filling Sol'n
Purchased 60ml Orion 951202
Thermo Scientific LOT # MT1
P/N: 703613-A04
EXP: 3/1/11

3/2/10 SV — 524-03021001 pH 10.000 buffer
Purchased 500ml Cat # 5655-01
JT Baker LOT H34508
EXP: 9/30/11

10/6/10 524-10061001 25133 ppb Stock for O3

0.05 ml Pyridine-4-carboxaldehyde Alfa Aesar
10140598 ;Exp: 8/11/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

10/6/10 524-10061002 25133ppb ICV/CCV for O3

0.05 ml Pyridine-4-carboxaldehyde TCI
(IGINC ;Exp: 8/10/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

524-10061003 MBTH SD/17

10/6/10

0.5000 g MBTH (Aldrich 54696EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 49284; EXP 11/2

EXP: 10/7/10

10/15/10 524-10151001 Cr6+ ICV/CCV Stock
Purchased 100PPM Cr6+
RICCA Chemical Co Cat No 2095-16
500ml Plastic
LOT# 101077
EXP: 3/2013

10/15/10 524-10151002 500PPM NO_2 Stock
Purchased
RICCA Chemical Co Cat No: 5444-4
LOT# 101027 1 120ml amber glass
EXP: 4/2011

10/28/10 S24-10281002 1000 PPM SO3 ICV/CCV

0.1607 Na2SO3 (Mallinckrodt Lot #H25469; Exp: 8/11/14) up to 100 ml w/ DI Water.

EXP: 11/11/10

11/1/10 S24-11011001 ICV/CCV Cr^{6+} T.V = 0.579 PPM

0.5 ml S19-04090904 (T.V=115.8 mg/L ; EXP: 12/2010)

↑ 100 ml w/ DI

EXP: 11/15/10

11/1/10 S24-11011002 Cr^{6+} Coloring Reagent

0.2500 g 1,5-Diphenylcarbohydrazide (EMD 47103721; EXP: 1/30/13) ↑ 50 ml w/ Acetone (EMD 47154D; EXP: 9/24/12).

EXP: 11/15/10

11/4/10 S24-11041001 A→E pH Filling Soln

PURCHASED (3M KCl)

Thermo Scientific P/N 702613-A02

LOT Code: OR1

EXP: 11/4/11

11/4/10 S24-11041002 pH 2.000 Buffer

Purchased

BDH CAT NO: 5010-500 ml

LOT # 1002199

EXP: 1/2012

11/4/10 SZ

524-1104003 pH 4.000 Buffer
Purchased
JT Baker Cat No: 5657-01 500 ml
Lot # J30507
Exp: 8/31/12

11/4/10 SZ

524-1104004 pH 7.000 Buffer
Purchased
J.T. Baker Cat No: 5656-01 500 ml
Lot # J35515
Exp: 9/30/12

11/5/10 SZ

524-1105001 MBTH 50 g

0.5000 g MBTH (Aldrich 521696EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 4988 Exp: 11/20/14

Exp: 11/6/10

11/8/10 SZ

524-1108001 1000 ppm NH_3
0.3141 g NH_4Cl (EMD 4499893; Exp: 10/19/14) 9 100 ml
W/ 524-1022006 Exp: 10/22/11
Exp: 10/22/11

11/12/10 SZ

524-1112001 1000 ppm SO_3 STOCK

0.1591 Na2SO3 (JT Baker Lot #H10627; Exp: 8/31/14) up to 100 ml w/ DI Water.

Exp: 11/26/10

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524-022111101 1:1 H_2SO_4

2/21/11 SR 250ml H_2SO_4 (EMD 49284; EXP: 11/20/1
ADDED SLOWLY TO 250ml D.I. COOL
COMPLETELY
EXP: 2/21/12

2/21/11 SR 524-022111102 Cr6+ Coloring Reagen
0.2500g 1,5-Diphenylcarbohydrazide (EMD LOT 47103
EXP: 1/30/13) ↑ 50ml W/ Acetone (EMD
LOT# 47154D; EXP: 9/24/12).
EXP: 3/21/11

2/28/11 SR 524-022811101 0.1 H_2SO_4
5.6ml conc H_2SO_4 (EMD 49284 EXP: 11/20/14) ↑ 2
W/ DI H_2O
EXP: 2/28/12

2/28/11 SR 524-022811102 1001 mg/L Cr6+
Purchased
Inorganic Ventures CGCR(6)1-1
125mL Clear Glass
LOT# D2-CR03040
EXP: 3/1/2012

2/28/11 SL

524-02281103 10ppm Cr^{6+} Soln

1.0 mL 524-02281102 (1000 ppm Cr^{6+}; Exp: 3/1/12) ↑

100 mL w/ DI H_2O

Exp: 2/28/12

Columbia Analytical Services, Inc. 2655 Park Center Drive, Suite A, Simi Valley, CA 93065 | 805.526.7161 | www.caslab.com

LABORATORY REPORT

March 8, 2011

David Conner
Battelle
4800 Oak Grove Dr. M/S 180-801
Pasadena, CA 91109

RE: JPL-GW-1Q11 / G005862 / JPL GWM

Dear David:

Enclosed are the results of the samples submitted to our laboratory on March 3, 2011. For your reference, these analyses have been assigned our service request number P1100806.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L10-3; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA; Washington State Department of Ecology, ELAP Lab ID: C946. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

Columbia Analytical Services, Inc.

Digitally signed by Sue Anderson
Date: 2011.03.08 10:12:46 -08'00'

Sue Anderson
Project Manager

Client: Battelle CAS Project No: P1100806
Project: JPL-GW-1Q11 / G005862 / JPL GWM

CASE NARRATIVE

The samples were received intact under chain of custody on March 3, 2011 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hexavalent Chromium by EPA Method 7196A

No anomalies were encountered during this analysis.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for utilization of less than the complete report.

DETAIL SUMMARY REPORT

Client: Battelle
Service Request: P1100806
Project ID: JPL-GW-1Q11 / G005862 / JPL GWM

Date Received: 3/3/2011
Time Received: 09:35

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	7196A - Cr6
MW-8	P1100806-001	Water	3/2/2011	14:28	X
MW-15	P1100806-002	Water	3/2/2011	15:30	X
MW-10	P1100806-003	Water	3/2/2011	17:05	X
DUPE-7-1Q11	P1100806-004	Water	3/2/2011	17:10	X

Acronyms

CA LUFT	California DHS LUFT Metho
ASTM	American Society for Testing and Materials
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAS Number	Chemical Abstract Service Registry Number
CFC	Chlorofluorocarbon
CRDL	Contract Required Detection Limit
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOH or DHS	Department of Health Services
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified Method
MDL	Method Detection Limit
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl *tert* -Butyl Ether
NA	Not Applicable
NC	Not Calculated
ND	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	*Standard Methods for the Examination of Water and Wastewater* , 19th Ed., 1995.
SW	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* , SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)
VOC	Volatile Organic Compound(s)

Qualifiers

U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
J	The result is an estimated concentration that is less than the MRL (PQL), but greater than or equal to the MDL.
B	Analyte detected in the method blank above MRL (PQL).
E	Estimated; result based on response which exceeded the instrument calibration range.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
D	The reported result is from a dilution.
X	See case narrative.

Water & Soil - Chain of Custody Record & Analytical Service Request

Columbia Analytical Services INC.
An Employee - Owned Company

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) (10 Day - Standard)

CAS Project No. P1100806

CAS Contact:

Company Name & Address (Reporting Information)
Battelle
505 King Ave
Columbus, OH. 43201

Project Name
JPL-GW-1Q11

Project Number
G005862/JPL GWM

Project Manager
David Conner

P.O. # / Billing Information
214375/Battelle
505 King Ave
Columbus OH 43201

Phone
614.726-7311

Fax
614.458-6641

Email Address for Result Reporting
connerd@battelle.org

Sampler (Print & Sign)
DAVID LOEVA / Dave L

Analysis Method and/or Analytes

Preservative Code

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Matrix	Number of Containers	Volatile Organics GC/MS 624 ☐ 8260B ☐ Oxygenates ☐ TPH Gas ☐	TPH Gas 8015B ☐ BTEX 8021B ☐ MTBE 8021B ☐	TPH Diesel 8015B ☐ (Subcontracted) TPH Diesel Low Level 8015B ☐ (Subcontracted)	TPH FC ☐ 8015M (Subcontracted)	Semi-Volatile Organics GC/MS 625 ☐ 8270C ☐ (Subcontracted)	0 HEXAVALENT Cr (7196)												Remarks
MW-8	(1)	3/2/11	1428	AQ	1P						X												
MW-15	(2)	3/2/11	1530	AQ	1P						X												
MW-10	(3)	3/2/11	1705	AQ	1P						X												
DUPE-7-1Q11	(4)	3/2/11	1710	AQ	1P						X												

Preservative Key

0	None
1	HCL
2	HNO3
3	H2SO4
4	NaOH
5	Zn Acetate
6	Asc Acid
7	Other

5 of 22

Report Tier Levels - please select

Tier I - (Results/Default if not specified) ____
Tier II - (Results + QC) ____
Tier III - (Data Validation Package) 10% Surcharge X
Tier V - (client specified) ____

MRL required Yes / No
MDL / PQL / J required Yes / No

EDD required (Yes) / No
Type: _____

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Dave L	3-2-11	1830		3/3/11	0935
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Cooler / Blank / Ice / No Ice
Temperature 2°C °C

Client: Battelle **Service Request:** P1100806
Project: JPL-GW-1Q11/G005862 / JPL GWM

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P1100806-001.01					
	7196A				
		3/3/11	1037	SMO / MZAMORA	
		3/3/11	1038	P-37 / MZAMORA	
		3/3/11	1209	In Lab / SANDERSON	
		3/3/11	1244	In Lab / SANDERSON	
		3/3/11	1641	P-37 / SANDERSON	
P1100806-002.01					
	7196A				
		3/3/11	1037	SMO / MZAMORA	
		3/3/11	1038	P-37 / MZAMORA	
		3/3/11	1209	In Lab / SANDERSON	
		3/3/11	1244	In Lab / SANDERSON	
		3/3/11	1641	P-37 / SANDERSON	
P1100806-003.01					
	7196A				
		3/3/11	1037	SMO / MZAMORA	
		3/3/11	1038	P-37 / MZAMORA	
		3/3/11	1209	In Lab / SANDERSON	
		3/3/11	1244	In Lab / SANDERSON	
		3/3/11	1641	P-37 / SANDERSON	
P1100806-004.01					
	7196A				
		3/3/11	1037	SMO / MZAMORA	
		3/3/11	1038	P-37 / MZAMORA	
		3/3/11	1209	In Lab / SANDERSON	
		3/3/11	1244	In Lab / SANDERSON	
		3/3/11	1641	P-37 / SANDERSON	

Columbia Analytical Services™ 2655 Park Center Drive, Suite A, Simi Valley, CA 93065 | 805.526.7161 | www.caslab.com

Sample Acceptance Check Form

Client: Battelle Work order: P1100806

Project: JPL-GW-1Q11 / G005862 / JPL GWM

Sample(s) received on: 3/3/11 Date opened: 3/3/11 by: MZAMORA

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Container(s) **supplied by CAS**?	☒	☐	☐
3	Did **sample containers** arrive in good condition?	☒	☐	☐
4	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
5	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
6	Was **sample volume** received adequate for analysis?	☒	☐	☐
7	Are samples within specified holding times?	☒	☐	☐
8	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 2 °C			
9	Was a **trip blank** received?	☐	☒	☐
10	Were **custody seals** on outside of cooler/Box?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
	Were custody seals on outside of sample container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
11	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☒	☐	☐
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
12	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
13	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1100806-001.01	125mL Plastic NP					
P1100806-002.01	125mL Plastic NP					
P1100806-003.01	125mL Plastic NP					
P1100806-004.01	125mL Plastic NP					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL-GW-1Q11
Project Number : G005862 / JPL GWM
Sample Matrix : WATER

Service Request : P1100806
Date Collected : 03/02/11
Date Received : 03/03/11

Chromium, Hexavalent

Prep Method : None
Analysis Method : 7196A
Test Notes :

Units : mg/L (ppm)
Basis : NA

Sample Name	Lab Code	PQL	MDL	Dilution Factor	Date Extracted	Date/Time Analyzed	Result	Result Notes
MW-8	P1100806-001	0.010	0.004	1	NA	03/03/11 13:25	ND	
MW-15	P1100806-002	0.010	0.004	1	NA	03/03/11 13:25	ND	
MW-10	P1100806-003	0.010	0.004	1	NA	03/03/11 13:25	ND	
DUPE-7-1Q11	P1100806-004	0.010	0.004	1	NA	03/03/11 13:25	ND	
Method Blank	P1100806-MB	0.010	0.004	1	NA	03/03/11 13:25	ND	

Approved By Karen Ryan Date : 3/4/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P1100806
Project:	JPL-GW-1Q11 / G005862 / JPL GWM	**Date Analyzed:**	03/03/11

Title: Initial and Continuing Calibration Blank (ICB and CCB) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	PQL	MDL	Result
ICB	0.010	0.004	ND
CCB1	0.010	0.004	ND

Approved By: Karen Rya Date: 3/4/11

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-1Q11 / G005862 / JPL GWM

Service Request: P1100806
Date Analyzed: 03/03/11

Title: Initial and Continuing Calibration Verification (ICV and CCV) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	True Value	Result	Percent Recovery	Acceptance Criteria
ICV	0.0500	0.0471	94	90-110
CCV1	0.0500	0.0479	96	90-110

Approved By: Karen Ryan Date: 3/4/11

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100806
Project Name :	JPL-GW-1Q11	**Date Collected :**	NA
Project Number :	G005862 / JPL GWM	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/03/11

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P1100806-LCS	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Chromium, Hexavalent	None	7196A	0.0400	0.0419	105	90-109	

Approved By Karen Ryan Date : 3/4/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100806
Project Name :	JPL-GW-1Q11	**Date Collected :**	03/02/11
Project Number :	G005862 / JPL GWM	**Date Received :**	03/03/11
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/03/11

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name :	MW-8		Units :	mg/L (ppm)
Lab Code :	P1100806-001MS	P1100806-001DMS	Basis :	NA
Test Notes :				

Analyte	Prep Method	Analysis Method	PQL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Spike Recovery MS	Spike Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Chromium, Hexavalent	None	7196A	0.010	0.0500	0.0500	ND	0.0522	0.0513	104	103	78-112	2	

Approved By Karen Rya Date : 3/4/11

Report By:SAnderson

Columbia Analytical Services

pH Run Log

Service Request #(s): 806 818 819

Time: 1020

Sample	VWR lot #	Exp.
pH 2 Buffer	524-11041002	1/2012
pH 4 Buffer	524-11041003	8/31/12
pH 7 Buffer	524-11041004	9/30/12
pH 10 Buffer	524-0302/1001	9/30/11

Slope	Prep.Run #
98.4%	—
	Run#
	—

pH in liquid: (1) 9040B, (2) 9040C pH in solid: (3) 9045C, (4) 9045D (*Note method number in column labeled # below*)

pH adjustment:(5) 7196A,(6) 7199 (Note method # in column labeled #)

Sample	#	pH	Temp. °C	Sample	#	pH	Temp. °C
pH 2.000	5	2.003	22.1°	819-1.01	5	2.104	5.5°
pH 4.000	↓	3.986	21.9°	-2.01	↓	1.932	6.0°
pH 7.000		6.991	21.9°	-3.01		1.871	7.3°
pH 10.000		10.003	22.1°	-4.01		1.945	7.2°
Ref#: S-9-11230903D EXP: 1/2012 ~~524-112~~ 7.1V 6.46		6.372	22.1°	-5.01		2.031	7.5°
DI		2.043	20.4°	-6.01		2.041	8.1°
pH 2.000	↓	1.995	22.0°	↓ -7.01		2.036	8.1°
TIME: 1250	[initials]			pH 2.000	↓	2.013	23.2°
pH 2.000	5	2.007	22.6°				
806-1.01	↓	2.066	20.1°				
-2.01		2.019	19.4°				
-3.01		1.824	19.5°				
↓ -4.01		1.915	20.0°	space not used			
pH 2.000	↓	2.015	22.6°				
TIME: 1705	[initials]						
pH 2.000	5	2.018	23.9°				
818-1.01		1.971	5.6°				

pH Adjustments: ☒ **7196A**: Diluted/Conc H_2SO_4 EMD 49284 EXP: 11/20/14

☐ **7199A**: Diluted NaOH __________ EXP: ________

Comments: __________

* Soil or Solid prep: 1:1(wt:vol) with DI water: ** Samples received past recommended hold time.

Date buffers and filling solution changed: 2/28/11

Note: ATC probe used; therefore, temperature correction calculation is not necessary.

Analyst: [signature] Date: 3/3/11

Reviewer: KR Date: 3/4/11

pH.XLS

Hexavalent Chromium (Liquids)

Columbia Analytical Services™

Method EPA 7196A

Service Request#(s): 806 818 819 Run#: 237934

Stock#: S24-0228/103 T.V=10PPM EXP: 2/28/12 Prep Run#: —

ICV/CCV#: S24-1015/001 T.V=100PPM EXP: 3/12 Conc. H_2SO_4 Lot#: EMD 49284 EXP: 11/20/14

Coloring Reagent Ref#: S24-0221110 2 EXP: 3/21/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	0.999982353
Absorbance @ 540 nm	0.000	0.012	0.058	0.117	

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	ICB	10ml	—	✓	0.000	0.000	0.000	-0.0000345	<0.004
2	ICV 0.050 PPM		—	✓	0.000	0.055	0.055	0.0471	94%
3	MB		—	✓	0.000	0.001	0.001	0.000822	<0.004
4	LCS 0.040 PPM		—	✓	0.000	0.049	0.049	0.0419	105%
5	806-1.01		—	✓	0.000	0.001	0.001	0.000822	<0.004
6	-1.01 MS 0.050PPM		—	✓	0.000	0.061	0.061	0.0522	104% 2%
7	-1.01 MSD ↓		—	✓	0.000	0.060	0.060	0.0513	103% RPD
8	-2.01		—	✓	0.000	0.002	0.002	0.00168	<0.004
9	-2.01 MS 0.03PPM		—	✓	0.000	0.037	0.037	0.0317	106%
10	-3.01		—	✓	0.000	0.002	0.002	0.00168	<0.004
11	↓ -4.01		—	✓	0.000	0.002	0.002	0.00168	<0.004
12	CCV1 0.0500PPM		—	✓	0.000	0.056	0.056	0.0479	96%
13	CCB1 1720 Sc		—	✓	0.000	0.000	0.000	-0.0000345	<0.004
14	CCV2 0.0500PPM		—	✓	0.000	0.057	0.057	0.0488	98%
15	CCB2		—	✓	0.000	0.000	0.000	-0.0000345	<0.004
16	818-1.01		—	✓	0.000	0.002	0.002	0.00168	↓
17	819-1.01	↓	—	✓	0.001	0.003	0.002	0.00168	

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of S24-1015/001 @ 1/2 ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of S24-0228/103 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of — ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of ↓ @ 1/10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments: —

Prepared By: [signature] Date/Time: 2/3/11 @ 1310 ; 1720

Analyzed By: [signature] Date/Time: 3/3/11 @ 1329 ; 1735

Reviewed By: KR Date: 3/4/11

Cr6LIQ.xls

Hexavalent Chromium (Liquids)

Columbia Analytical Services™

Method EPA 7196A

Service Request#(s): 819 (contd) Run#: 377934

Stock#: 524-0228 1103 T.V=10ppm EXP: 2/28/12 Prep Run#:

ICV/CCV#: 524-1015100 T.V=100ppm EXP: 3/12 Conc. H_2SO_4 Lot#: EMD 49284 EXP. 11/20/14

Coloring Reagent Ref#: 524-0221102 EXP: 3/21/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	
Absorbance @ 540 nm	0.000	0.012	0.058	0.117	0.99998235

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	819-1.01 VS 0.03ppm	10ml	—	✓	0.001	0.038	0.037	0.0317	106%
2	-2.01		—	✓	0.002	0.004	0.002	0.00168	<0.004
3	-3.01		—	✓	0.002	0.004	0.002	0.00168	
4	-4.01		—	✓	0.000	0.000	0.000	-0.0000345	
5	-5.01		—	✓	0.002	0.004	0.002	0.00168	
6	-6.01		—	✓	0.005	0.005	0.000	-0.0000345	
7	-7.01		—	✓	0.000	0.002	0.002	0.00168	
8	-7.01MS 0.05ppm		—	✓	0.000	0.056	0.056	0.0479	96%
9	CCV3		—	✓	0.000	0.055	0.055	0.0471	94%
10	CCB3		—	✓	0.000	0.000	0.000	-0.0000345	<0.004
11	819-7.01MSD 0.05ppm		—	✓	0.000	0.056	0.056	0.0479	96% 0% RPD
12	CCV4		—	✓	0.000	0.056	0.056	0.0479	96%
13	CCB4		—	✓	0.000	0.000	0.000	-0.0000345	<0.004
14									
15									
16	space not used								
17									

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of 524-1015100 @ 10 ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of 524-0228 1103 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of @ 10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments:

Prepared By: Date/Time: 3/3/11 @ 1720

Analyzed By: Date/Time: 3/3/11 @ 1735

Reviewed By: Date: 3/4/11

Cr6LIQ.xls

11/23/09 S19 - 11230902 1000 PPM SO_3 (ICV/CCV)
0.1607g Na_2SO_3 (Mallinckrodt; H25469; EXP 8/11/14
↑ 100ml w/ DI
EXP: 5/23/10

11/23/09 S19 - 11230903 A, B, C, D pH REFERENCE
PURCHASED
ERA CAT # 977
LOT # 129934
EXP: 1/2012

11/24/09 S19 - 11240901 1000 PPM SO_4 Standard
PURCHASED CAT # ICC-006
LOT # K00794
EXP: 9/30/13

11/25/09 S19 - ~~11/25~~ 11250901 0.1N H_2SO_4
5ml Conc H_2SO_4 (EMD 47050 EXP: 9/13/10)
EXP: ~~11/25~~ 9/13/10

11/30/09 S19 - 11300901 Cr^{6+} Coloring Reagent
0.2500g Diphenylcarbohydrazide (EMD) 47103EDI; EXP: 1/30/13) ↑ 50ml w/ Acetone (EMD 47154D; EXP: 9/24/12
EXP: 12/30/09

11/30/09 S19 - 11300902 25133 ppb Stock for O_3 in AIR
0.05ml Pyridine-4-Carboxaldehyde (Alfa Aesar LOT 10140598; EXP 8/11/12)
↑ 500ml deionized H_2O
EXP: 12/14/09

11/30/09 S19 - 11300903 25133 ppb ICV/CCV FOR O_3 in AIR
0.05ml Pyridine-4-carboxaldehyde (TCI LOT # IGINC; EXP: 8/10/12)
↑ 500ml W/ DI H_2O
EXP: 12/14/09

Reviewed And Approved By:
Initial: VL Date: 12/22/09

3/1/10 SV
524-03011001 pH 4.000 Buffer
Purchased 500 ml CAT # 5657-01
JT BAKER LOT # H31526
EXP 8/31/11

3/1/10 SV
524-03011002 pH 7.000 Buffer
Purchased 500ml CAT # 5656-01
JT BAKER LOT # H47531
EXP: 1/31/12

3/1/10 SV
524-03011003 1000 ppm Cl (LCS)
Purchased 120ml Cat # 1955-4
RICA CHEM CO LOT # 1001395
EXP: 7/2011

3/1/10 SV
524-03011004 NH3 Filling Sol'n
Purchased 60ml Orion 95-20-2
Thermo Scientific LOT # MT1
P/N. 708613-A04
EXP: 3/1/11

3/2/10 SV
524-03021001 pH 10.000 buffer
Purchased 500ml Cat # 5655-01
JT Baker LOT H34508
EXP: 9/30/11

10/6/10 SL

524-10061001 25133 ppb Stock for O3

0.05 ml Pyridine-4-carboxaldehyde Alfa Aesar
10146598 :Exp: 8/11/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

10/6/10 SL

524-10061002 25133 ppb ICAL/CCV for O3

0.05 ml Pyridine-4-carboxaldehyde T&I
(IG1NC :Exp: 8/10/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

524-10061003 MBTH SD/17

10/6/10 SL

0.5000 g MBTH (Aldrich 54666EK :Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 4G284; EXP 11/2

EXP: 10/7/10

10/15/10 SL

524-10151001 Cr6+ ICAL/CCV Stock
Purchased 100 PPM Cr6+
RICCA Chemical Co Cat No 2095-16
500 mL Plastic
LOT # 101077
EXP: 3/20/12

10/15/10 SL

524-10151002 500 PPM NO_2 Stock
Purchased
RICCA Chemical Co Cat No: 5444-54
LOT # 101077 120 ml amber glass
EXP: 4/2011

10/28/10 S24-10281002 1000 PPM SO_3 ICV/CCV

0.1607 Na_2SO_3 (Mallinckrodt Lot #H25469; Exp: 8/11/14) up to 100 ml w/ DI Water.

EXP: 11/11/10

11/1/10 S24-11011001 ICV/CCV Cr^{6+} T.V = 0.579 PPM

0.5ml S19-04090404 (T.V = 115.8 mg/L ; EXP: 12/2010)

↑ 100ml w/ DI

EXP: 11/15/10

11/1/10 S24-11011002 Cr^{6+} Coloring Reagent

0.2500g 1,5-Diphenylcarbohydrazide (EMD 47103731; EXP: 1/30/13) ↑ 50ml w/ Acetone (EMD 47154D; EXP: 9/24/12).

EXP: 11/15/10

11/4/10 S24-11041001 A→E pH Filling Sol'n

PURCHASED (3M KCl)

Thermo Scientific P/N 702613-A02

LOT Code: QR1

EXP: 11/4/11

11/4/10 S24-11041002 pH 2.000 Buffer

Purchased

BDH CAT NO: 5010-500ml

LOT # 1002199

EXP: 1/2012

11/4/10 SA

524-1104A003 pH 4.000 Buffer
Purchased
JT Baker Cat No: 5657-01 500 ml
Lot # J30507
Exp: 8/31/12

11/4/10 SA

524-1104A004 pH 7.000 Buffer
Purchased
J.T. Baker Cat No: 5656-01 500 ml
Lot # J3515
Exp: 9/30/12

11/5/10 SA

524-1105A001 MBTH Std

0.5000 g MBTH (Aldrich 521696EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 4488 Exp: 11/20/14

Exp: 11/6/10

11/8/10 SA

524-1108A001 1000 ppm NH_3

0.3141 g NH_4Cl (EMD 4498931; Exp: 10/19/14) 100 ml
W/ 524-0221006 Exp: 10/22/11

Exp: 10/22/11

11/12/10 SA

524-1112A001 1000 ppm SO_3 Stock

0.1591 Na_2SO_3 (JT Baker Lot #H10627; Exp: 8/31/14) up to 100 ml w/ DI Water.

Exp: 11/26/10

524-0221101 1:1 H_2SO_4

2/21/11 SR
250 mL H_2SO_4 (EMD 49284; EXP: 11/20/1
ADDED SLOWLY TO 250 mL DI. COOL
COMPLETELY
EXP: 2/21/12

2/21/11 SR
524-0221102 Cr6+ Coloring Reagen
0.2500 g 1,5-Diphenylcarbohydrazide (EMD LOT 47103
EXP: 1/30/13) ↑ 50 mL w/ Acetone (EMD
LOT# 47154D; EXP: 9/24/12).
EXP: 3/21/11

2/28/11 SR
524-0228101 0.1 H_2SO_4
5.6 mL Conc H_2SO_4 (EMD 49284 EXP: 11/20/14) ↑
w/ DI H_2O
EXP: 2/28/12

2/28/11 SR
524-0228102 1001 mg/L Cr6+
Purchased
Inorganic Ventures CGCR(6)1-1
125 mL Clear Glass
LOT# D2-CR03040
EXP: 3/1/2012

2/28/11 524-02281103 10ppm Cr6+ Soln

1.0 mL 524-02281102 (1000 ppm Cr6+; Exp. 3/1/12) ↑

100 mL w/ DI H2O

Exp: 2/28/12

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LABORATORY REPORT

March 8, 2011

David Conner
Battelle
4800 Oak Grove Dr. M/S 180-801
Pasadena, CA 91109

RE: JPL-GW-1Q11 / G005862 / JPL GWM

Dear David:

Enclosed are the results of the sample submitted to our laboratory on March 3, 2011. For your reference, this analysis has been assigned our service request number P1100818.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L10-3; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA; Washington State Department of Ecology, ELAP Lab ID: C946. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

Columbia Analytical Services, Inc.

Digitally signed by Sue Anderson
Date: 2011.03.08 16:21:20 -08'00'

Sue Anderson
Project Manager

Client: Battelle CAS Project No: P1100818
Project: JPL-GW-1Q11 / G005862 / JPL GWM

CASE NARRATIVE

The sample was received intact under chain of custody on March 3, 2011 and was stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the sample at the time of sample receipt.

Hexavalent Chromium by EPA Method 7196A

No anomalies were encountered during this analysis.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for utilization of less than the complete report.

DETAIL SUMMARY REPORT

Client: Battelle
Service Request: P1100818
Project ID: JPL-GW-1Q11 / G005862 / JPL GWM

Date Received: 3/3/2011
Time Received: 16:55

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	7196A - Cr6
MW-5	P1100818-001	Water	3/3/2011	10:26	X

Acronyms

CA LUFT	California DHS LUFT Metho
ASTM	American Society for Testing and Materials
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAS Number	Chemical Abstract Service Registry Number
CFC	Chlorofluorocarbon
CRDL	Contract Required Detection Limit
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOH or DHS	Department of Health Services
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified Method
MDL	Method Detection Limit
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl *tert* -Butyl Ether
NA	Not Applicable
NC	Not Calculated
ND	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	*Standard Methods for the Examination of Water and Wastewater* , 19th Ed., 1995.
SW	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* , SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)
VOC	Volatile Organic Compound(s)

Qualifiers

U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
J	The result is an estimated concentration that is less than the MRL (PQL), but greater than or equal to the MDL.
B	Analyte detected in the method blank above MRL (PQL).
E	Estimated; result based on response which exceeded the instrument calibration range.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
D	The reported result is from a dilution.
X	See case narrative.

Water & Soil - Chain of Custody Record & Analytical Service Request

Page 1 of 1

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An Employee - Owned Company

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Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day - Standard

CAS Project No: 11102518

CAS Contact:

Company Name & Address (Reporting Information)	Project Name	Project Number
Battelle 505 King Ave Columbus, OH. 43201	JPL-GW-1Q11	G005862/JPLGWM

Project Manager	P.O. # / Billing Information
David Conner	214375/Battelle 505 King Ave Columbus, OH. 43201

Phone	Fax
614-726-7311	614.458.6641

Email Address for Result Reporting	Sampler (Print & Sign)
Connerd@battelle.org	David Loera

Analysis Method and/or Analytes

Preservative Code

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Matrix	Number of Containers	Volatile Organics GC/MS 624 ☐ 8260B ☐ Oxygenates ☐ TPH Gas ☐	TPH Gas 8015B ☐ BTEX 8021B ☐ MTBE 8021B ☐	TPH Diesel 8015B ☐ (Subcontracted) TPH Diesel Low Level 8015B ☐ (Subcontracted)	TPH FC ☐ 8015M (Subcontracted)	Semi-Volatile Organics GC/MS 625 ☐ 8270C ☐ (Subcontracted)	0	Remarks
MW-5	(	3/3/11	1026	AQ	1P						X Hexavalent Cr (7196)	

Preservative Key

0	None
1	HCL
2	HNO3
3	H2SO4
4	NaOH
5	Zn Acetate
6	Asc Acid
7	Other

5/6/22

Report Tier Levels - please select

Tier I - (Results/Default if not specified) ____
Tier II - (Results + QC) ____
Tier III - (Data Validation Package) 10% Surcharge X
Tier V - (client specified) ____

MRL required Yes / No
MDL / PQL / J required Yes / No

EDD required Yes / No
Type: ____

Project Requirements (MRLs, QAPP)

	Date	Time		Date	Time
Relinquished by: (Signature) David Loera	3-3-11	1100	Received by: (Signature)	3/3/11	1100
Relinquished by: (Signature)	3/3/11	1400	Received by: (Signature)	3/3/11	1400
Relinquished by: (Signature)	3/3/11	1655	Received by: (Signature)	3/3/11	1655

Cooler / Blank / Ice / No Ice
Temperature 4 °C

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Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle **Service Request:** P1100818

Project: JPL-GW-1Q11/G005862 / JPL GWM

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P1100818-001.01					
	7196A				
		3/3/11	1701	SMO / SSTAPLES	
		3/3/11	1704	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	

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Sample Acceptance Check Form

Client: Battelle Work order: P1100818

Project: JPL-GW-1Q11 / G005862 / JPL GWM

Sample(s) received on: 3/3/11 Date opened: 3/3/11 by: SSTAPLES

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Container(s) **supplied by CAS**?	☒	☐	☐
3	Did **sample containers** arrive in good condition?	☒	☐	☐
4	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
5	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
6	Was **sample volume** received adequate for analysis?	☒	☐	☐
7	Are samples within specified holding times?	☒	☐	☐
8	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 4 °C			
9	Was a **trip blank** received?	☐	☒	☐
10	Were **custody seals** on outside of cooler/Box?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
	Were custody seals on outside of sample container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
11	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☒	☐	☐
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
12	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
13	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1100818-001.01	125mL Plastic NP					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL-GW-1Q11
Project Number : G005862 / JPL GWM
Sample Matrix : WATER

Service Request : P1100818
Date Collected : 03/03/11
Date Received : 03/03/11

Chromium, Hexavalent

Prep Method : None
Analysis Method : 7196A
Test Notes :

Units : mg/L (ppm)
Basis : NA

Sample Name	Lab Code	PQL	MDL	Dilution Factor	Date Extracted	Date/Time Analyzed	Result	Result Notes
MW-5	P1100818-001	0.01	0.004	1	NA	03/03/11 17:35	ND	
Batch QC	P1100819-007	0.01	0.004	1	NA	03/03/11 17:35	ND	
Method Blank	P1100818-MB	0.01	0.004	1	NA	03/03/11 13:25	ND	

Approved By Karen Ryan Date : 3/4/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P1100818
Project:	JPL-GW-1Q11 / G005862 / JPL GWM	**Date Analyzed:**	03/03/11

Title: Initial and Continuing Calibration Blank (ICB and CCB) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	PQL	MDL	Result
ICB	0.010	0.004	ND
CCB1	0.010	0.004	ND
CCB2	0.010	0.004	ND
CCB3	0.010	0.004	ND
CCB4	0.010	0.004	ND

Approved By: Karen Ryan Date: 3/4/11

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-1Q11 / G005862 / JPL GWM

Service Request: P1100818
Date Analyzed: 03/03/11

Title: Initial and Continuing Calibration Verification (ICV and CCV) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	True Value	Result	Percent Recovery	Acceptance Criteria
ICV	0.0500	0.0471	94	90-110
CCV1	0.0500	0.0479	96	90-110
CCV2	0.0500	0.0488	98	90-110
CCV3	0.0500	0.0471	94	90-110
CCV4	0.0500	0.0479	96	90-110

Approved By: Karen Rya Date: 3/4/11

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100818
Project Name :	JPL-GW-1Q11	**Date Collected :**	NA
Project Number :	G005862 / JPL GWM	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/03/11

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P1100818-LCS	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Chromium, Hexavalent	None	7196A	0.0400	0.0419	105	90-109	

Approved By Karen Ryan Date : 3/4/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100818
Project Name :	JPL-GW-1Q11	**Date Collected :**	03/03/11
Project Number :	G005862 / JPL GWM	**Date Received :**	03/03/11
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/03/11

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name :	Batch QC		Units :	mg/L (ppm)
Lab Code :	P1100819-007MS	P1100819-007DMS	Basis :	NA
Test Notes :				

Analyte	Prep Method	Analysis Method	PQL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Spike Recovery MS	Spike Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Chromium, Hexavalent	None	7196A	0.01	0.0500	0.0500	ND	0.0479	0.0479	96	96	78-112	<1	

Approved By Karen Rya Date : 3/4/11

Report By:SAnderson

Columbia Analytical Services™

pH Run Log

Service Request #(s): 806 818 819

Time: 1020

Sample	VWR lot #	Exp.
pH 2 Buffer	S24-1104100 2	1/2012
pH 4 Buffer	S24-1104100 3	8/31/12
pH 7 Buffer	S24-1104100 4	9/20/12
pH 10 Buffer	S24-0302/001	9/30/11

Slope	Prep.Run #
98.4%	—
	Run#
	—

pH in liquid: (1) 9040B, (2) 9040C **pH in solid:** (3) 9045C, (4) 9045D (*Note method number in column labeled # below*)

pH adjustment:(5) 7196A,(6) 7199 (Note method # In column labeled #)

Sample	#	pH	Temp. °C
pH 2.000	5	2.003	22.1°
pH 4.000	|	3.986	21.9°
pH 7.000	|	6.991	21.9°
pH 10.000	|	10.003	22.1°
Ref#: ~~S24-442~~ S.G.- 1123090 3D EXP: 1/2012 ~~7.V=6.46~~ 3/3/11	|	6.372	22.1°
DI	|	2.043	20.4°
pH 2.000	↓	1.995	22.0°
TIME: 1250			
pH 2.000	5	2.007	22.6°
806-1.01	|	2.066	20.1°
-2.01	|	2.019	19.4°
-3.01	|	1.824	19.5°
-4.01	|	1.915	20.0°
pH 2.000	↓	2.015	22.6°
TIME: 1705			
pH 2.000	5	2.018	23.9°
818-1.01		1.971	5.6°

Sample	#	pH	Temp. °C
819-1.01	5	2.104	5.5°
-2.01	|	1.932	6.0°
-3.01	|	1.871	7.3°
-4.01	|	1.945	7.2°
-5.01	|	2.031	7.5°
-6.01	|	2.041	8.1°
-7.01	↓	2.036	8.1°
pH 2.000	↓	2.013	23.2°
spare not used			

pH Adjustments: ☒ **7196A**: Diluted/Conc H_2SO_4 EMD 49284 EXP: 11/20/14

☐ **7199A**: Diluted NaOH _____ EXP: _____

Comments: _____

* Soil or Solid prep: 1:1(wt:vol) with DI water: ** Samples received past recommended hold time.

Date buffers and filling solution changed: 2/28/11

Note: ATC probe used; therefore, temperature correction calculation is not necessary.

Analyst: _____ Date: 3/3/11

Reviewer: KR Date: 3/4/11

pH.XLS

Hexavalent Chromium (Liquids)

Columbia Analytical Services™

Method EPA 7196A

Service Request#(s): 806 818 819 Run#: 237934

Stock#: S24-0228110 3 T.V=10PPM EXP: 2/28/12 Prep Run#: —

ICV/CCV#: S24-1015100 1 T.V=100PPM EXP: 3/12 Conc. H_2SO_4 Lot#: EMD 49284 EXP: 11/20/14

Coloring Reagent Ref#: S24-0221110 2 EXP: 3/21/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	0.999982355
Absorbance @ 540 nm	0.000	0.012	0.058	0.117	

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	ICB	10ml	—	✓	0.000	0.000	0.000	-0.0000345	<0.004
2	ICV 0.050 PPM		—	✓	0.000	0.055	0.055	0.0471	94%
3	MB		—	✓	0.000	0.001	0.001	0.000822	<0.004
4	LCS 0.040 PPM		—	✓	0.000	0.049	0.049	0.0419	105%
5	806-1.01		—	✓	0.000	0.001	0.001	0.000822	<0.004
6	-1.01 MS 0.050 PPM		—	✓	0.000	0.061	0.061	0.0522	104% 2%
7	-1.01 MSD ↓		—	✓	0.000	0.060	0.060	0.0513	103% 5 RPD
8	-2.01		—	✓	0.000	0.002	0.002	0.00168	<0.004
9	-2.01 MS 0.03 PPM		—	✓	0.000	0.037	0.037	0.0317	106%
10	-3.01		—	✓	0.000	0.002	0.002	0.00168	<0.004
11	-4.01		—	✓	0.000	0.002	0.002	0.00168	<0.004
12	CCV1 0.0500 PPM		—	✓	0.000	0.056	0.056	0.0479	96%
13	CCB1 1720 Sc		—	✓	0.000	0.000	0.000	-0.0000345	<0.004
14	CCV2 0.0500 PPM		—	✓	0.000	0.057	0.057	0.0488	98%
15	CCB2		—	✓	0.000	0.000	0.000	-0.0000345	<0.004
16	818-1.01		—	✓	0.000	0.002	0.002	0.00168	↓
17	819-1.01	↓	—	✓	0.001	0.003	0.002	0.00168	↓

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of S24-1015100 @ 1/10 ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of S24-0228110 3 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of — ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of ↓ @ 1/10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments: —

Prepared By: [signature] Date/Time: 2/3/11 @ 1310 ; 1720

Analyzed By: [signature] Date/Time: 3/3/11 @ 1329 ; 1736

Reviewed By: KR Date: 3/4/11

Hexavalent Chromium (Liquids)

Columbia Analytical Services™

Method EPA 7196A

Service Request#(s): 819 (cont'd) Run#: 377934

Stock#: 524-0228 1103 T.V=10ppm EXP: 2/28/12 Prep Run#:

ICV/CCV#: 524-1015100 1 T.V=100PPM EXP: 3/12 Conc. H_2SO_4 Lot#: EMD 49284 EXP: 11/20/14

Coloring Reagent Ref#: 524-0221102 EXP: 3/31/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	
Absorbance @ 540 nm	0.000	0.012	0.058	0.117	0.99998353

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	819-1.01 VS 0.03PPM	10ml	—	✓	0.001	0.038	0.037	0.0317	106%
2	-2.01		—	✓	0.002	0.004	0.002	0.00168	<0.004
3	-3.01		—	✓	0.002	0.004	0.002	0.00168	
4	-4.01		—	✓	0.000	0.000	0.000	-0.0000345	
5	-5.01		—	✓	0.002	0.004	0.002	0.00168	
6	-6.01		—	✓	0.005	0.005	0.000	-0.0000345	
7	-7.01		—	✓	0.000	0.002	0.002	0.00168	
8	-7.01 MS 0.05PPM		—	✓	0.000	0.056	0.056	0.0479	96%
9	CCV3		—	✓	0.000	0.055	0.055	0.0471	94%
10	CCB3		—	✓	0.000	0.000	0.000	-0.0000345	<0.004
11	819-7.01 MSD 0.05PPM		—	✓	0.000	0.056	0.056	0.0479	96% 0% RPD
12	CCV4		—	✓	0.000	0.056	0.056	0.0479	96%
13	CCB4		—	✓	0.000	0.000	0.000	-0.0000345	<0.004
14									
15									
16	spike not used								
17									

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of 524-1015100 @ 10 ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of 524-0228 1103 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of ↓ ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of ↓ @ 10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments:

Prepared By: Date/Time: 3/3/11 @ 1720

Analyzed By: Date/Time: 3/3/11 @ 1735

Reviewed By: Date: 3/4/11

Cr6LIQ.xls

11/23/09 SIG-1123090Z 1000 PPM SO_3 (ICV/CCV)
SV 0.1607g Na_2SO_4 (Mallinckrodt; H25469; EXP 8/11/14
↑100ml w/ DI
EXP: 5/23/10

11/23/09 SIG-1123090 3 A, B, C, D pH REFERENCE
SV PURCHASED
ERA CAT # 977
LOT # 129934
EXP: 1/2012

11/24/09 SIG-1124090 1 1000 PPM SO_4 Standard
SV PURCHASED CAT # ICC-006
LOT # K007494
EXP: 9/30/13
SV 11/25/09

11/25/09 SIG-~~H25~~ 1125090 1 0.1N H_2SO_4
SV ~~50~~ml conc H_2SO_4 (EMD 4705D EXP: 9/13/10)
EXP: ~~H25~~ 9/13/10
SV 11/25/09

11/30/09 SIG-1130090 1 Cr-6+ Coloring Reagent
SV 0.2500g Diphenylcarbonylhydrazide (EMD) 4710ED; EXP: 1/30/13) ↑ 50ml w/ Acetone (EMD 4715D; EXP: 5/24/12
EXP: 12/20/09

11/30/09 SIG-1130090 2 25133 ppb Stock for O_3 in Air
SV 0.05ml Pyridine-4-Carboxaldehyde (Alfa Aesar LOT 10144 0598; EXP 8/11/12)
↑ 500ml deionized H_2O
EXP: 12/14/09

11/30/09 SIG-1130090 3 25133ppb ICV/CCV for O_3 in Air
SV 0.05ml Pyridine-4-carboxaldehyde (TCI LOT # IOTINC: EXP: 8/10/12
↑ 500ml w/ DI H_2O
EXP: 12/14/09

Reviewed And Approved By:
Initial: LL Date: 12/22/09

3/1/10 SV
524-03011001 pH 4.000 Buffer
Purchased 500 ml CAT # 5657-01
JT BAKER LOT # H31526
EXP 8/31/11

3/1/10 SV
524-03011002 pH 7.000 Buffer
Purchased 500 ml CAT # 5656-01
JT BAKER LOT # H47531
EXP: 1/31/12

3/1/10 SV
524-03011003 1000 ppm Cl (LCS)
Purchased 120 ml Cat # 1955-4
RICA CHEM CO LOT # 1001395
EXP: 7/2011

3/1/10 SV
524-03011004 NH3 Filling Soln
Purchased 60 ml Orion 95-30-2
Thermo Scientific LOT # MT1
P/N. 720613-A04
EXP: 3/1/11

3/2/10 SV
524-03021001 pH 10.000 buffer
Purchased 500 ml Cat # 5655-01
JT Baker LOT H34508
EXP: 9/30/11

10/6/10 SZ

524-10061001 2533 ppb Stock for O3

0.05 ml Pyridine-4-carboxaldehyde Alfa Aesar
10146598 ;Exp: 8/11/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

10/6/10 SZ

524-10061002 2533ppb ICAL/CCV for O3

0.05 ml Pyridine-4-carboxaldehyde TCI
(IG INC ;Exp: 8/10/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

524-10061003 MBTH SD/17

10/6/10 SZ

0.5000 g MBTH (Aldrich 54666EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 49284; EXP 11/2

EXP: 10/7/10

10/15/10 SZ

524-10151001 Cr6+ ICAL/CCV Stock
Purchased 100PPM Cr6+
RICCA Chemical Co Cat No 2095-16
500ml Plastic
LOT # 101017
EXP: 3/30/12

10/15/10 SZ

524-10151002 500PPM NO_2 Stock
Purchased
RICCA Chemical Co Cat No: 5444-4
LOT# 101027 120ml amber glass
EXP: 4/2011

10/28/10 S24-10281002 1000 PPM SO_3 ICV/CCV

0.1607 Na_2SO_3 (Mallinckrodt Lot #H25469; Exp: 8/11/14) up to 100 ml w/ DI Water.

EXP: 11/11/10

11/1/10 S24-11011001 ICV/CCV Cr^{6+} T.V = 0.574 ppm

0.5ml S19-04090404 (T.V = 115.8 mg/L ; EXP: 12/2010)

↑ 100ml W/ DI

EXP: 11/15/10

11/1/10 S24-11011002 Cr^{6+} Coloring Reagent

0.2500g 1,5-Diphenylcarbohydrazide (EMD 47703731; EXP: 1/30/13) ↑ 50ml W/ Acetone (EMD 47154D; EXP: 9/24/12).

EXP: 11/15/10

11/4/10 S24-11041001 A→E pH Filling Sol'n

PURCHASED (3M KCl)

P/N 702613-402

Thermo Scientific

LOT Code: 0R1

EXP: 11/4/11

11/4/10 S24-11041002 pH 2.000 Buffer

Purchased

BDH CAT NO: 5010-500ml

LOT # 100219G

EXP: 1/2012

11/4/10 S24-1104I003 pH 4.000 Buffer
Purchased
JT Baker Cat No: 5657-01 500 ml
LOT # J30507
EXP: 8/31/13

11/4/10 S24-1104I004 pH 7.000 Buffer
Purchased
J.T. Baker Cat No: 5656-01 500 ml
LOT # J35515
EXP: 9/30/12

11/5/10 S24-1105I001 MBTH Std

0.5000 g MBTH (Aldrich 521696EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 49848 EXP: 11/20/14

EXP: 11/6/10

11/8/10 S24-1108I001 1000 ppm NH_3
0.3141g NH_4Cl (EMD 49498931; EXP: 10/29/14) to 100 ml
W/ S24-0221006 EXP: 10/22/11
EXP: 10/22/11

11/12/10 S24-1112I001 1000 ppm SO_3 STOCK

0.1591 Na2SO3 (JT Baker Lot #H10627; Exp: 8/31/14) up to 100 ml w/ DI Water.

EXP: 11/26/10

524-0221101 1:1 H_2SO_4

2/21/11 SR
250 ml H_2SO_4 (EMD 49284; EXP: 11/20/1
ADDED SLOWLY TO 250 ml DI. Cool
COMPLETELY
EXP: 2/21/12

2/21/11 SR
524-0221102 Cr6+ Coloring Reagen
0.2500 g 1,5-Diphenylcarbohydrazide (EMD LOT 47103
EXP: 1/30/13) ↑ 50 ml W/ Acetone (EMD
LOT # 47154D; EXP: 9/24/12).
EXP: 3/21/11

2/28/11 SR
524-0228101 0.1 H_2SO_4
5.6 ml Conc H_2SO_4 (EMD 49284 EXP: 11/20/14) ↑ 2
W/ DI H_2O
EXP: 2/28/12

2/28/11 SR
524-0228102 1001 mg/L Cr6+
Purchased
Inorganic Ventures CGCR(6)1-1
125 mL Clear Glass
LOT # D2-CR03040
EXP: 3/1/2012

2/28/11 S24-022811 03 10PPM Cr^{6+} Soln

[initials] 1.0 mL S24-022811 02 (1000 PPM Cr^{6+}; EXP: 3/1/12) ↑

100 mL w/ DI H_2O

EXP: 2/28/12

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LABORATORY REPORT

March 8, 2011

David Conner
Battelle
4800 Oak Grove Dr. M/S 180-801
Pasadena, CA 91109

RE: JPL GW Mon 1Q11 / G486090

Dear David:

Enclosed are the results of the samples submitted to our laboratory on March 3, 2011. For your reference, these analyses have been assigned our service request number P1100819.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L10-3; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA; Washington State Department of Ecology, ELAP Lab ID: C946. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

Columbia Analytical Services, Inc.

Digitally signed by Sue Anderson
Date: 2011.03.08 10:16:11 -08'00'

Sue Anderson
Project Manager

Client: Battelle
Project: JPL GW Mon 1Q11 / G486090

CAS Project No: P1100819

CASE NARRATIVE

The samples were received intact under chain of custody on March 3, 2011 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hexavalent Chromium by EPA Method 7196A

No anomalies were encountered during this analysis.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for utilization of less than the complete report.

DETAIL SUMMARY REPORT

Client: Battelle
Project ID: JPL GW Mon 1Q11 / G486090
Service Request: P1100819

Date Received: 3/3/2011
Time Received: 16:55

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	7196A - Cr6
MW-22-3	P1100819-001	Water	3/3/2011	08:25	X
MW-22-2	P1100819-002	Water	3/3/2011	09:09	X
MW-22-1	P1100819-003	Water	3/3/2011	09:39	X
EB-08-03/03/11	P1100819-004	Water	3/3/2011	09:30	X
MW-11-3	P1100819-005	Water	3/3/2011	11:25	X
MW-11-2	P1100819-006	Water	3/3/2011	11:49	X
MW-11-1	P1100819-007	Water	3/3/2011	12:17	X

Acronyms

CA LUFT	California DHS LUFT Metho
ASTM	American Society for Testing and Materials
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAS Number	Chemical Abstract Service Registry Number
CFC	Chlorofluorocarbon
CRDL	Contract Required Detection Limit
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOH or DHS	Department of Health Services
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified Method
MDL	Method Detection Limit
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl *tert* -Butyl Ether
NA	Not Applicable
NC	Not Calculated
ND	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	*Standard Methods for the Examination of Water and Wastewater* , 19th Ed., 1995.
SW	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* , SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)
VOC	Volatile Organic Compound(s)

Qualifiers

U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
J	The result is an estimated concentration that is less than the MRL (PQL), but greater than or equal to the MDL.
B	Analyte detected in the method blank above MRL (PQL).
E	Estimated; result based on response which exceeded the instrument calibration range.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
D	The reported result is from a dilution.
X	See case narrative.

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An Employee - Owned Company

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Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Water & Soil - Chain of Custody Record & Analytical Service Request

Page 1 of 1

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day - Standard

CAS Project No: P1100819

CAS Contact:

Company Name & Address (Reporting Information): BATTELLE, 3990 OLD TOWN AVE. C-205, SAN DIEGO, CA 92110

Project Name: JPL GW. MON 1Q11

Project Number: G486090

Project Manager: DAVID CANNER

P.O. # / Billing Information: 214319 / BATTELLE ATTN: GERALD TOMPKINS 505 KING AVE. COLUMBUS, OH 43201

Phone: (619) 726-7311

Fax: (614) 458-6614

Email Address for Result Reporting:

Sampler (Print & Sign): CHASE BRAGDON

Analysis Method and/or Analytes

Preservative Code: 0 (Cr VI (7196))

Analysis columns: Volatile Organics GC/MS 624 ☐ 8260B ☐ Oxygenates ☐ TPH Gas ☐; TPH Gas 8015B ☐ BTEX 8021B ☐ MTBE 8021B ☐; TPH Diesel 8015B ☐ (Subcontracted) TPH Diesel Low Level 8015B ☐ (Subcontracted); TPH FC ☐ 8015M (Subcontracted); Semi-Volatile Organics GC/MS 625 ☐ 8270C ☐ (Subcontracted); Cr VI (7196)

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Matrix	Number of Containers	Cr VI (7196)	Remarks
MW-22-3	1	3/3/11	0825	W	1	X	
MW-22-2	2	↓	0909	↓	1	X	
MW-22-1	3	↓	0939	↓	1	X	
EB-08-03/03/11	4	3/3/11	0930	W	1	X	Equip Blank
MW-11-3	5	3/3/11	1125	W	1	X	
MW-11-2	6	3/3/11	1149	W	1	X	
MW-11-1	7	3/3/11	1217	W	2	X	MS/MSD

Preservative Key
- 0 None
- 1 HCL
- 2 HNO3
- 3 H2SO4
- 4 NaOH
- 5 Zn Acetate
- 6 Asc Acid
- 7 Other

Report Tier Levels - please select
Tier I - (Results/Default if not specified) ____
Tier II - (Results + QC) ____
Tier III - (Data Validation Package) 10% Surcharge ____
Tier V - (client specified) ____

MRL required Yes / No
MDL / PQL / J required Yes / No

EDD required Yes / No
Type: ____

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	3/3/11	1400	[signature]	3/3/11	1400
[signature]	3/8/11	1055	[signature]	3/8/11	1055

Cooler / Blank / Ice / No Ice

Temperature 4 °C

Client: Battelle **Service Request:** P1100819
Project: JPL GW Mon 1Q11/G486090

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P1100819-001.01					
	7196A				
		3/3/11	1708	SMO / SSTAPLES	
		3/3/11	1709	P-37 / SSTAPLES	
		3/3/11	1710	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100819-002.01					
	7196A				
		3/3/11	1708	SMO / SSTAPLES	
		3/3/11	1709	P-37 / SSTAPLES	
		3/3/11	1710	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100819-003.01					
	7196A				
		3/3/11	1708	SMO / SSTAPLES	
		3/3/11	1709	P-37 / SSTAPLES	
		3/3/11	1710	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100819-004.01					
	7196A				
		3/3/11	1708	SMO / SSTAPLES	
		3/3/11	1709	P-37 / SSTAPLES	
		3/3/11	1710	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100819-005.01					
	7196A				
		3/3/11	1708	SMO / SSTAPLES	
		3/3/11	1709	P-37 / SSTAPLES	
		3/3/11	1710	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100819-006.01					
	7196A				
		3/3/11	1708	SMO / SSTAPLES	
		3/3/11	1709	P-37 / SSTAPLES	
		3/3/11	1710	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100819-007.01					
	7196A				
		3/3/11	1708	SMO / SSTAPLES	
		3/3/11	1709	P-37 / SSTAPLES	
		3/3/11	1710	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100819-007.02					

Client: Battelle **Service Request:** P1100819
Project: JPL GW Mon 1Q11/G486090

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
		3/3/11	1709	SMO / SSTAPLES	
		3/3/11	1709	P-37 / SSTAPLES	
		3/3/11	1711	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	

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Sample Acceptance Check Form

Client: Battelle Work order: P1100819

Project: JPL GW Mon 1Q11 / G486090

Sample(s) received on: 3/3/11 Date opened: 3/3/11 by: SSTAPLES

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Container(s) **supplied by CAS**?	☒	☐	☐
3	Did **sample containers** arrive in good condition?	☒	☐	☐
4	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
5	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
6	Was **sample volume** received adequate for analysis?	☒	☐	☐
7	Are samples within specified holding times?	☒	☐	☐
8	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 4 °C			
9	Was a **trip blank** received?	☐	☒	☐
10	Were **custody seals** on outside of cooler/Box?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
	Were custody seals on outside of sample container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
11	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☒	☐	☐
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
12	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
13	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1100819-001.01	125mL Plastic NP					
P1100819-002.01	125mL Plastic NP					
P1100819-003.01	125mL Plastic NP					
P1100819-004.01	125mL Plastic NP					
P1100819-005.01	125mL Plastic NP					
P1100819-006.01	125mL Plastic NP					
P1100819-007.01	125mL Plastic NP					
P1100819-007.02	125mL Plastic NP					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL GW Mon 1Q11
Project Number : G486090
Sample Matrix : WATER

Service Request : P1100819
Date Collected : 03/03/11
Date Received : 03/03/11

Chromium, Hexavalent

Prep Method : None
Analysis Method : 7196A
Test Notes :

Units : mg/L (ppm)
Basis : NA

Sample Name	Lab Code	PQL	MDL	Dilution Factor	Date Extracted	Date/Time Analyzed	Result	Result Notes
MW-22-3	P1100819-001	0.01	0.004	1	NA	03/03/11 17:35	ND	
MW-22-2	P1100819-002	0.01	0.004	1	NA	03/03/11 17:35	ND	
MW-22-1	P1100819-003	0.01	0.004	1	NA	03/03/11 17:35	ND	
EB-08-03/03/11	P1100819-004	0.01	0.004	1	NA	03/03/11 17:35	ND	
MW-11-3	P1100819-005	0.01	0.004	1	NA	03/03/11 17:35	ND	
MW-11-2	P1100819-006	0.01	0.004	1	NA	03/03/11 17:35	ND	
MW-11-1	P1100819-007	0.01	0.004	1	NA	03/03/11 17:35	ND	
Method Blank	P1100819-MB	0.01	0.004	1	NA	03/03/11 13:25	ND	

Approved By Karen Ryan Date : 3/4/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL GW Mon. 1Q11 / G486090

Service Request: P1100819
Date Analyzed: 03/03/11

Title: Initial and Continuing Calibration Blank (ICB and CCB) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	PQL	MDL	Result
ICB	0.010	0.004	ND
CCB1	0.010	0.004	ND
CCB2	0.010	0.004	ND
CCB3	0.010	0.004	ND
CCB4	0.010	0.004	ND

Approved By: Karen Rya Date: 3/4/11

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P1100819
Project:	JPL GW Mon. 1Q11 / G486090	**Date Analyzed:**	03/03/11

Title: Initial and Continuing Calibration Verification (ICV and CCV) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	True Value	Result	Percent Recovery	Acceptance Criteria
ICV	0.0500	0.0471	94	90-110
CCV1	0.0500	0.0479	96	90-110
CCV2	0.0500	0.0488	98	90-110
CCV3	0.0500	0.0471	94	90-110
CCV4	0.0500	0.0479	96	90-110

Approved By: Karen Ryza Date: 3/4/11

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100819
Project Name :	JPL GW Mon 1Q11	**Date Collected :**	NA
Project Number :	G486090	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/03/11

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P1100819-LCS	Basis :	NA

Test Notes :

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Chromium, Hexavalent	None	7196A	0.0400	0.0419	105	90-109	

Approved By Karen Ryan Date : 3/4/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100819
Project Name :	JPL GW Mon 1Q11	**Date Collected :**	03/03/11
Project Number :	G486090	**Date Received :**	03/03/11
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/03/11

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-11-1
Lab Code : P1100819-007MS P1100819-007DMS
Test Notes :

Units : mg/L (ppm)
Basis : NA

Analyte	Prep Method	Analysis Method	PQL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Spike Recovery MS	Spike Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Chromium, Hexavalent	None	7196A	0.01	0.0500	0.0500	ND	0.0479	0.0479	96	96	78-112	<1	

Approved By Karen Ryan Date : 3/4/11

Report By:SAnderson

Columbia Analytical Services

pH Run Log

Service Request #(s): 806 818 819

Time: 1020

Sample	VWR lot #	Exp.
pH 2 Buffer	S24-11041002	1/2012
pH 4 Buffer	S24-11041003	8/31/12
pH 7 Buffer	S24-11041004	9/30/12
pH 10 Buffer	S24-0302/001	9/30/11

Slope	Prep.Run #
98.4%	—
	Run#
	—

pH in liquid: (1) 9040B, (2) 9040C pH in solid: (3) 9045C, (4) 9045D (*Note method number in column labeled # below*)

pH adjustment:(5) 7196A,(6) 7199 (Note method # in column labeled #)

Sample	#	pH	Temp. °C
pH 2.000	5	2.003	22.1°
pH 4.000	↓	3.986	21.9°
pH 7.000	↓	6.991	21.9°
pH 10.000	↓	10.003	22.1°
Ref#: S.9-11230903D Exp: 1/2012 ~~S24-112~~ TJV-6.46	↓	6.372	22.1°
DI	↓	2.043	20.4°
pH 2.000	↓	1.995	22.0°
TIME: 1250			
pH 2.000	5	2.007	22.6°
806-1.01	↓	2.066	20.1°
-2.01	↓	2.019	19.4°
-3.01	↓	1.824	19.5°
-4.01	↓	1.915	20.0°
pH 2.000	↓	2.015	22.6°
TIME: 1705			
pH 2.000	5	2.018	23.9°
818-1.01		1.971	5.6°

Sample	#	pH	Temp. °C
819-1.01	5	2.104	5.5°
-2.01	↓	1.932	6.0°
-3.01	↓	1.871	7.3°
-4.01	↓	1.945	7.2°
-5.01	↓	2.031	7.5°
-6.01	↓	2.041	8.1°
-7.01	↓	2.036	8.1°
pH 2.000	↓	2.013	23.2°

space not used

pH Adjustments: ☒ **7196A**: Diluted/Conc H_2SO_4 EMD 49284 EXP: 11/20/14

☐ **7199A**: Diluted NaOH ________ EXP: ________

Comments: ____________________

* Soil or Solid prep: 1:1(wt:vol) with DI water: ** Samples received past recommended hold time.

Date buffers and filling solution changed: 2/28/11

Note: ATC probe used; therefore, temperature correction calculation is not necessary.

Analyst: [signature] Date: 3/3/11

Reviewer: KR Date: 3/4/11

pH.XLS

Hexavalent Chromium (Liquids)

Columbia Analytical Services™

Method EPA 7196A

Service Request#(s): 806 818 819 Run#: 237934

Stock#: S24-02281103 T.V=10PPM EXP: 2/28/12 Prep Run#: —

ICV/CCV#: S24-1015/001 T.V=100PPM EXP: 3/12 Conc. H_2SO_4 Lot#: EMD 49284 EXP: 11/20/14

Coloring Reagent Ref#: S24-02211102 EXP: 3/21/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	0.999982353
Absorbance @ 540 nm	0.000	0.012	0.058	0.117	

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	ICB	10ml	—	✓	0.000	0.000	0.000	-0.0000345	<0.004
2	ICV 0.050 PPM		—	✓	0.000	0.055	0.055	0.0471	94%
3	MB		—	✓	0.000	0.001	0.001	0.000822	<0.004
4	LCS 0.040 PPM		—	✓	0.000	0.049	0.049	0.0419	105%
5	806-1.01		—	✓	0.000	0.001	0.001	0.000822	<0.004
6	-1.01 MS 0.050 PPM		—	✓	0.000	0.061	0.061	0.0522	104% 2.2%
7	-1.01 MSD ↓		—	✓	0.000	0.060	0.060	0.0513	103% RPD
8	-2.01		—	✓	0.000	0.002	0.002	0.00168	<0.004
9	-2.01 MS 0.03 PPM		—	✓	0.000	0.037	0.037	0.0317	106%
10	-3.01		—	✓	0.000	0.002	0.002	0.00168	<0.004
11	-4.01		—	✓	0.000	0.002	0.002	0.00168	<0.004
12	CCV1 0.0500 PPM		—	✓	0.000	0.056	0.056	0.0479	96%
13	CCB1 1720 Sa		—	✓	0.000	0.000	0.000	-0.0000345	<0.004
14	CCV2 0.0500 PPM		—	✓	0.000	0.057	0.057	0.0488	98%
15	CCB2		—	✓	0.000	0.000	0.000	-0.0000345	<0.004
16	818-1.01		—	✓	0.000	0.002	0.002	0.00168	
17	819-1.01	↓	—	✓	0.001	0.003	0.002	0.00168	↓

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of S24-1015100 @ 1/10 ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of S24-02281103 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of — ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of ↓ @ 1/10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments: —

Prepared By: [signature] Date/Time: 2/3/11 @ 1310 ; 1720

Analyzed By: [signature] Date/Time: 3/3/11 @ 1325 ; 1735

Reviewed By: [signature] Date: 3/4/11

Hexavalent Chromium (Liquids)

Columbia Analytical Services™

Method EPA 7196A

Service Request#(s): 819 (contd)

Run#: 377934

Stock#: 524-0228 1103 T.V=10ppm EXP: 2/28/12

Prep Run#: —

ICV/CCV#: 524-1015100 1 T.V=100PPM EXP: 3/12

Conc. H_2SO_4 Lot#: EMD 49284 EXP: 11/20/14

Coloring Reagent Ref#: 524-0221102 EXP: 3/21/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	
Absorbance @ 540 nm	0.000	0.012	0.058	0.117	0.99998235

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	819-1.01 VS 0.03PPM	10ml	—	✓	0.001	0.038	0.037	0.0317	106%
2	-2.01	—	—	✓	0.002	0.004	0.002	0.00168	20.004
3	-3.01		—	✓	0.002	0.004	0.002	0.00168	
4	-4.01		—	✓	0.000	0.000	0.000	-0.0000345	
5	-5.01		—	✓	0.002	0.004	0.002	0.00168	
6	-6.01		—	✓	0.005	0.005	0.000	-0.0000345	
7	-7.01		—	✓	0.000	0.002	0.002	0.00168	
8	-7.01 MS 0.05PPM		—	✓	0.000	0.056	0.056	0.0479	96%
9	CCV3		—	✓	0.000	0.055	0.055	0.0471	94%
10	CCB3		—	✓	0.000	0.000	0.000	-0.0000345	20.004
11	819-7.01 MSD 0.05PPM		—	✓	0.000	0.056	0.056	0.0479	96% 0% RPD
12	CCV4		—	✓	0.000	0.056	0.056	0.0479	96%
13	CCB4		—	✓	0.000	0.000	0.000	-0.0000345	20.004
14									
15									
16	space not used								
17									

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of 524-1015100 @ 10 ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of 524-0228 1103 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of — ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of ↓ @ 10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments: —

Prepared By: [signature] Date/Time: 3/3/11 @ 1720

Analyzed By: [signature] Date/Time: 3/3/11 @ 1735

Reviewed By: [signature] Date: 3/4/11

Cr6LIQ.xls

11/23/09 S19-11230902 1000 PPM SO_3 (ICV/CCV)
[initials] 0.1607g Na_2SO_3 (Mallinckrodt; H25469; EXP 8/11/14
↑100ml w/ DI
EXP: 5/23/10

11/23/09 S19-11230903 A,B,C,D pH REFERENCE
[initials] PURCHASED
ERA CAT # 977
LOT # 129934
EXP: 1/2012

11/24/09 S19-11240901 1000 PPM SO_4 Standard
[initials] PURCHASED CAT # ICC-006
LOT # K00794
EXP: 9/30/13

11/25/09 S19- ~~11/25~~ 11250901 (initialed 11/25/09) 0.1N H_2SO_4
[initials] 5.0 ml Conc H_2SO_4 (EMD 47050 EXP: 9/13/10)
EXP: ~~11/25~~ 9/13/10 (initialed 11/25/09)

11/30/09 S19-11300901 Cr^{6+} Coloring Reagent
[initials] 0.2500g Diphenylcarbohydrazide (EMD) 47103ED; EXP: 1/30/13) ↑50ml w/ Acetone (EMD 47154D; EXP 9/24/12
EXP: 12/30/09

11/30/09 S19-11300902 25133 ppb Stock for O_3 in Air
[initials] 0.05ml Pyridine-4-Carboxaldehyde (Alfa Aesar LOT 10140598; EXP 8/11/12)
↑500ml deionized H_2O
EXP: 12/14/09

11/30/09 S19-11300903 25133 ppb ICV/CCV FOR O_3 in AIR
[initials] 0.05ml Pyridine-4-carboxaldehyde (TCI LOT # IGINC; EXP: 8/10/12)
↑500ml w/ DI H_2O
EXP: 12/14/09

Reviewed And Approved By:
Initial: [initials] Date: 12/22/09

3/1/10 SV
524-03011001 pH 4.000 Buffer
Purchased 500 ml CAT # 5657-01
JT BAKER LOT # H31526
EXP 8/31/11

3/1/10 SV
524-03011002 pH 7.000 Buffer
Purchased 500ml CAT # 5656-01
JT BAKER LOT # H47531
EXP: 1/31/12

3/1/10 SV
524-03011003 1000 PPM Cl (LCS)
Purchased 120ml Cat # 1955-4
RICA CHEM CO LOT # 1001395
EXP: 7/2011

3/1/10 SV
524-03011004 NH3 Filling Sol'n
Purchased 60ml Orion 951202
Thermo Scientific LOT # MT1
P/N. 720613-A04
EXP: 3/1/11

3/2/10 SV
524-03021001 pH 10.000 buffer
Purchased 500ml Cat # 5655-01
JT Baker LOT H34508
EXP: 9/30/11

10/6/10 SL — 524-10061001 — 25133 ppb Stock for O3

0.05 ml Pyridine-4-carboxaldehyde Alfa Aesar 10140598 :Exp: 8/11/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

10/6/10 SL — 524-10061002 — 25133 ppb ICV/CCV for O3

0.05 ml Pyridine-4-carboxaldehyde TCI (ICV/CCV :Exp: 8/10/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

524-10061003 MBTH Std

10/6/10 SL — 0.5000 g MBTH (Aldrich 54696EK :Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 4928-4; EXP 11/2

EXP: 10/7/10

10/15/10 SL — 524-10151001 — Cr6+ ICV/CCV Stock

Purchased
RICCA Chemical Co
500ml Plastic
LOT # 101077
EXP: 3/20/12

100PPM Cr6+
Cat No 2095-16

10/15/10 SL — 524-10151002 — 500PPM NO_2 Stock

Purchased
RICCA Chemical Co
LOT# 101071
EXP: 4/2011

Cat No: 5444-54
120ml amber glass

10/28/10 S24-10281002 1000 PPM SO3 ICV/CCV

0.1607 Na2SO3 (Mallinckrodt Lot #H25469; Exp: 8/11/14) up to 100 ml w/ DI Water.

EXP: 11/11/10

11/1/10 S24-11011001 ICV/CCV Cr^{6+} T.V = 0.579 PPM

0.5ml SIG-04090404 (T.V = 115.8 mg/L ; EXP: 12/2010)

↑ 100ml W/ DI

EXP: 11/15/10

11/1/10 S24-11011002 Cr^{6+} Coloring Reagent

0.2500g 1,5-Diphenylcarbohydrazide (EMD 47103731; EXP: 1/30/13) ↑ 50ml W/ Acetone (EMD 47154D; EXP: 9/24/12).

EXP: 11/15/10

11/4/10 S24-11041001 A→E pH Filling Sol'n

PURCHASED (3M KCl) P/N 702613-A02

Thermo Scientific

LOT Code: 0R1

EXP: 11/4/11

11/4/10 S24-11041002 pH 2.000 Buffer

Purchased

BDH CAT NO: 5010-500ml

LOT # 100219

EXP: 1/2012

11/4/10 524-11041003 pH 4.000 Buffer

Purchased

JT Baker Cat No: 5657-01 500 ml

LOT # J30507

EXP: 8/31/12

11/4/10 524-11041004 pH 7.000 Buffer

Purchased

J.T. Baker Cat No: 5656-01 500 ml

LOT # J35515

EXP: 9/30/12

11/5/10 524-11051001 MBTH Soln

0.5000 g MBTH (Aldrich 52496EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 49884 EXP: 11/20/14

EXP: 11/6/10

11/8/10 524-11081001 1000 PPM NH_3

0.3141g NH_4Cl (EMD 4919893l; EXP: 10/19/14) 9 100ml

W/ 524-10221006 EXP: 10/22/11

EXP: 10/22/11

11/12/10 524-11121001 1000 PPM SO_3 STOCK

0.1591 Na2SO3 (JT Baker Lot #H10627; Exp: 8/31/14) up to 100 ml w/ DI Water.

EXP: 11/26/10

524-022/1101 1:1 H_2SO_4

2/21/11 SR 250ml H_2SO_4 (EMD 49284; EXP: 11/20/1
ADDED SLOWLY TO 250ml D.I. COOL
COMPLETELY
EXP: 2/21/12

2/21/11 SR 524-022/1102 Cr6+ Coloring Reagen
0.2500g 1,5-Diphenylcarbohydrazide (EMD LOT 47103
EXP: 1/30/13) ↑ 50ml W/ Acetone (EMD
LOT# 47154D; EXP: 9/24/12).
EXP: 3/21/11

2/28/11 SR 524-0228/1101 0.1 H_2SO_4
5.6ml Conc H_2SO_4 (EMD 49284 EXP: 11/20/14) ↑ 2
W/ DI H_2O
EXP: 2/28/12

2/28/11 SR 524-0228/1102 1001 mg/L Cr6+
Purchased
Inorganic Ventures CGCR(6)1-1
125mL Clear Glass
LOT# D2-CR03040
EXP: 3/1/2012

2/28/11 SL

524-02281103 10ppm Cr6+ Soln

1.0 mL 524-02281102 (1000ppm Cr6+; Exp: 3/1/12) ↑

100 mL w/ DI H2O

Exp: 2/28/12

Columbia Analytical Services, Inc. 2655 Park Center Drive, Suite A, Simi Valley, CA 93065 | 805.526.7161 | www.caslab.com

LABORATORY REPORT

March 8, 2011

David Conner
Battelle
4800 Oak Grove Dr. M/S 180-801
Pasadena, CA 91109

RE: JPL GW Mon 1Q11 / G486090

Dear David:

Enclosed are the results of the samples submitted to our laboratory on March 4, 2011. For your reference, these analyses have been assigned our service request number P1100830.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L10-3; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA; Washington State Department of Ecology, ELAP Lab ID: C946. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

Columbia Analytical Services, Inc.

Digitally signed by Sue Anderson
Date: 2011.03.08 16:25:39 -08'00'

Sue Anderson
Project Manager

Client: Battelle
Project: JPL GW Mon 1Q11 / G486090

CAS Project No: P1100830

CASE NARRATIVE

The samples were received intact under chain of custody on March 4, 2011 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hexavalent Chromium by EPA Method 7196A

No anomalies were encountered during this analysis.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for utilization of less than the complete report.

DETAIL SUMMARY REPORT

Client: Battelle
Project ID: JPL GW Mon 1Q11 / G486090
Service Request: P1100830

Date Received: 3/4/2011
Time Received: 11:40

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	7196A - Cr6
MW-23-4	P1100830-001	Water	3/4/2011	08:13	X
MW-23-3	P1100830-002	Water	3/4/2011	08:39	X
MW-23-2	P1100830-003	Water	3/4/2011	09:05	X
MW-23-1	P1100830-004	Water	3/4/2011	09:38	X
DUPE-05-1Q11	P1100830-005	Water	3/4/2011	00:00	X
EB-09-03/04/11	P1100830-006	Water	3/4/2011	09:26	X

Acronyms

CA LUFT	California DHS LUFT Metho
ASTM	American Society for Testing and Materials
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAS Number	Chemical Abstract Service Registry Number
CFC	Chlorofluorocarbon
CRDL	Contract Required Detection Limit
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOH or DHS	Department of Health Services
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified Method
MDL	Method Detection Limit
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl *tert* -Butyl Ether
NA	Not Applicable
NC	Not Calculated
ND	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	*Standard Methods for the Examination of Water and Wastewater* , 19th Ed., 1995.
SW	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* , SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)
VOC	Volatile Organic Compound(s)

Qualifiers

U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
J	The result is an estimated concentration that is less than the MRL (PQL), but greater than or equal to the MDL.
B	Analyte detected in the method blank above MRL (PQL).
E	Estimated; result based on response which exceeded the instrument calibration range.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
D	The reported result is from a dilution.
X	See case narrative.

Water & Soil - Chain of Custody Record & Analytical Service Request

Columbia Analytical Services INC.
An Employee - Owned Company

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day - Standard

CAS Project No.: P1102530

CAS Contact:

Company Name & Address (Reporting Information)
BATTELLE
3990 OLD TOWN AVE. C-205
SAN DIEGO, CA 92110

Project Name: JPL GW-MON. 10/11

Project Number: 64866090

Project Manager: DAVID CONNEW

P.O. # / Billing Information: 214319/BATTELLE
ATTN: GERALD TOMPKINS
505 KING AVE.
COLUMBUS, OH 43201

Phone: (619) 726-7311

Fax: (614) 458-6614

Email Address for Result Reporting

Sampler (Print & Sign): JESSE ISHOBDON

Analysis Method and/or Analytes

Preservative Code

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Matrix	Number of Containers	Volatile Organics GC/MS 624 ☐ 8260B ☐ Oxygenates ☐ TPH Gas ☐	TPH Gas 8015B ☐ BTEX 8021B ☐ MTBE 8021B ☐	TPH Diesel 8015B ☐ (Subcontracted)	TPH Diesel Low Level 8015B ☐ (Subcontracted)	TPH FC ☐ 8015M (Subcontracted)	Semi-Volatile Organics GC/MS 625 ☐ 8270C ☐ (Subcontracted)	0 CAM (7196)	Remarks
MW-23-4	1	3/4/11	0813	W	1							X	
MW-23-3	2	"	0839	"	1							X	
MW-23-2	3	"	0905	"	1							X	QC LEVEL IV
MW-23-1	4	"	0938	"	1							X	
DUPE-05-1011	5	"	—	"	1							X	DUPLICATE
EB-09-03/04/11	6	3/4/11	0926	W	1							X	EQUIP. BLANK

Preservative Key

0	None
1	HCL
2	HNO3
3	H2SO4
4	NaOH
5	Zn Acetate
6	Asc Acid
7	Other

Report Tier Levels - please select

Tier I - (Results/Default if not specified) ____
Tier II - (Results + QC) ____
Tier III - (Data Validation Package) 10% Surcharge ____
Tier V - (client specified) ____

MRL required Yes / No
MDL / PQL / J required Yes / No

EDD required Yes / No
Type: ____

Project Requirements (MRLs, QAPP)

	Date	Time		Date	Time
Relinquished by: (Signature)	3/4/11	1400	Received by: (Signature)	3/4/11	1400
Relinquished by: (Signature)	3/4/11	1740	Received by: (Signature)	3/4/11	1740
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Cooler / Blank / Ice / No Ice
Temperature 3°C °C

5 of 21

Client: Battelle **Service Request:** P1100830

Project: JPL GW Mon 1Q11/G486090

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P1100830-001.01					
	7196A				
		3/4/11	1144	SMO / MZAMORA	
		3/4/11	1144	P-37 / MZAMORA	
		3/4/11	1230	In Lab / SANDERSON	
		3/4/11	1506	P-37 / SANDERSON	
P1100830-002.01					
	7196A				
		3/4/11	1144	SMO / MZAMORA	
		3/4/11	1144	P-37 / MZAMORA	
		3/4/11	1230	In Lab / SANDERSON	
		3/4/11	1506	P-37 / SANDERSON	
P1100830-003.01					
	7196A				
		3/4/11	1144	SMO / MZAMORA	
		3/4/11	1144	P-37 / MZAMORA	
		3/4/11	1230	In Lab / SANDERSON	
		3/4/11	1506	P-37 / SANDERSON	
P1100830-004.01					
	7196A				
		3/4/11	1144	SMO / MZAMORA	
		3/4/11	1144	P-37 / MZAMORA	
		3/4/11	1230	In Lab / SANDERSON	
		3/4/11	1506	P-37 / SANDERSON	
P1100830-005.01					
	7196A				
		3/4/11	1144	SMO / MZAMORA	
		3/4/11	1144	P-37 / MZAMORA	
		3/4/11	1230	In Lab / SANDERSON	
		3/4/11	1506	P-37 / SANDERSON	
P1100830-006.01					
	7196A				
		3/4/11	1144	SMO / MZAMORA	
		3/4/11	1144	P-37 / MZAMORA	
		3/4/11	1230	In Lab / SANDERSON	
		3/4/11	1506	P-37 / SANDERSON	

Columbia Analytical Services™ 2655 Park Center Drive, Suite A, Simi Valley, CA 93065 | 805.526.7161 | www.caslab.com

Sample Acceptance Check Form

Client: Battelle Work order: P1100830

Project: JPL GW Mon 1Q11 / G486090

Sample(s) received on: 3/4/11 Date opened: 3/4/11 by: MZAMORA

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Container(s) **supplied by CAS**?	☒	☐	☐
3	Did **sample containers** arrive in good condition?	☒	☐	☐
4	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
5	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
6	Was **sample volume** received adequate for analysis?	☒	☐	☐
7	Are samples within specified holding times?	☒	☐	☐
8	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
9	Was a **trip blank** received?	☐	☒	☐
10	Were **custody seals** on outside of cooler/Box?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
	Were custody seals on outside of sample container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
11	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☒	☐	☐
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
12	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
13	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1100830-001.01	125mL Plastic NP					
P1100830-002.01	125mL Plastic NP					
P1100830-003.01	125mL Plastic NP					
P1100830-004.01	125mL Plastic NP					
P1100830-005.01	125mL Plastic NP					
P1100830-006.01	125mL Plastic NP					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL GW Mon 1Q11
Project Number : G486090
Sample Matrix : WATER

Service Request : P1100830
Date Collected : 03/04/11
Date Received : 03/04/11

Chromium, Hexavalent

Prep Method : None
Analysis Method : 7196A
Test Notes :

Units : mg/L (ppm)
Basis : NA

Sample Name	Lab Code	PQL	MDL	Dilution Factor	Date Extracted	Date/Time Analyzed	Result	Result Notes
MW-23-4	P1100830-001	0.010	0.004	1	NA	03/04/11 14:20	ND	
MW-23-3	P1100830-002	0.010	0.004	1	NA	03/04/11 14:20	ND	
MW-23-2	P1100830-003	0.010	0.004	1	NA	03/04/11 14:20	ND	
MW-23-1	P1100830-004	0.010	0.004	1	NA	03/04/11 14:20	ND	
DUPE-05-1Q11	P1100830-005	0.010	0.004	1	NA	03/04/11 14:20	ND	
EB-09-03/04/11	P1100830-006	0.010	0.004	1	NA	03/04/11 14:20	ND	
Method Blank	P1100830-MB	0.010	0.004	1	NA	03/04/11 14:20	ND	

Approved By Karen Rya Date : 3/4/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P1100830
Project:	JPL GW Mon. 1Q11 / G486090	**Date Analyzed:**	03/04/11

Title: Initial and Continuing Calibration Blank (ICB and CCB) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	PQL	MDL	Result
ICB	0.010	0.004	ND
CCB1	0.010	0.004	ND
CCB2	0.010	0.004	ND

Approved By: Karen Rya Date: 3/4/11

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL GW Mon. 1Q11 / G486090

Service Request: P1100830
Date Analyzed: 03/04/11

Title: Initial and Continuing Calibration Verification (ICV and CCV) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	True Value	Result	Percent Recovery	Acceptance Criteria
ICV	0.0500	0.0488	98	90-110
CCV1	0.0500	0.0497	99	90-110
CCV2	0.0500	0.0497	99	90-110

Approved By: Karen Rya Date: 3/4/11

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100830
Project Name :	JPL GW Mon 1Q11	**Date Collected :**	NA
Project Number :	G486090	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/04/11

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P1100830-LCS	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Chromium, Hexavalent	None	7196A	0.0400	0.0391	98	90-109	

Approved By Karen Ryan Date : 3/4/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100830
Project Name :	JPL GW Mon 1Q11	**Date Collected :**	03/04/11
Project Number :	G486090	**Date Received :**	03/04/11
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/04/11

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-23-4
Lab Code : P1100830-001MS P1100830-001DMS
Test Notes :

Units : mg/L (ppm)
Basis : NA

Analyte	Prep Method	Analysis Method	PQL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Spike Recovery MS	Spike Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Chromium, Hexavalent	None	7196A	0.010	0.0500	0.0500	ND	0.0470	0.0488	94	98	78-112	4	

Approved By Karen Ryan Date : 3/4/11

Report By:SAnderson

Columbia Analytical Services™

pH Run Log

Service Request #(s): 830

Time: 0840

Sample	VWR lot #	Exp.
pH 2 Buffer	S24-1102/1002	1/2012
pH 4 Buffer	S24-1104/1003	8/31/12
pH 7 Buffer	S24-1104/1004	9/30/12
pH 10 Buffer	S24-0221001	9/30/11

Slope	Prep.Run #
97.8 %	
	Run#

pH in liquid: (1) 9040B, (2) 9040C **pH in solid:** (3) 9045C, (4) 9045D (*Note method number in column labeled # below*)

pH adjustment:(5) 7196A,(6) 7199 (Note method # In column labeled #)

Sample	#	pH	Temp. °C
pH 2.000	5	1.995	22.2°
pH 4.000	T	4.005	21.9°
pH 7.000		7.009	21.9°
pH 10.000		10.022	22.0°
Ref#: S24-1123/003D T.V= 6.46 EXP: 1/2012		6.381	22.1°
DI		2.007	19.2°
pH 2.000	↓	1.997	22.0
TIME: 1340			
pH 2.000	5	2.012	23.4°
830-1.01	T	2.072	17.2°
-2.01		1.864	18.3°
-3.01		1.955	17.4°
-4.01		2.014	18.4°
-5.01		1.834	18.0°
-6.01		1.901	18.4°
pH 2.000	↓	2.014	23.2°

Sample	#	pH	Temp. °C

Space not used

pH Adjustments: ☒ **7196A**: Diluted/Conc H_2SO_4 EMD 49284 EXP: 11/20/14

☐ **7199A**: Diluted NaOH _____ EXP: _____

Comments: _____

* Soil or Solid prep: 1:1(wt:vol) with DI water: ** Samples received past recommended hold time.

Date buffers and filling solution changed: 2/28/11

Note: ATC probe used; therefore, temperature correction calculation is not necessary.

Analyst: _____ Date: 3/4/11

Reviewer: KR Date: 3/4/11

pH.XLS

Columbia Analytical Services

Hexavalent Chromium (Liquids)

Method EPA 7196A

Service Request#(s): 830
Run#: 238023
Stock#: S24-02281103 T.V.=10PPM EXP: 2/28/12
Prep Run#:
ICV/CCV#: S24-10151001 T.V.=100PPM EXP: 3/2012
Conc. H_2SO_4 Lot#: EMD 49284 EXP: 11/30/14
Coloring Reagent Ref#: S24-12211102 EXP: 3/21/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	0.999955864
Absorbance @ 540 nm	0.000	0.012	0.058	0.114	

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	ICB	10ml	—	✓	0.000	0.000	0.000	-0.000397	<0.004
2	ICV 0.050PPM	↓	—	✓	0.000	0.056	0.056	0.0488	98%
3	MB		—	✓	0.000	0.000	0.000	-0.000397	<0.004
4	LCS 0.050PPM		—	✓	0.000	0.045	0.045	0.0391	98%
5	830-1.01		—	✓	0.002	0.004	0.002	0.00136	<0.004
6	-1.01 MS 0.050PPM		—	✓	0.002	0.056	0.054	0.0470	94% } 4% RPD
7	-1.01 MSD ↓		—	✓	0.002	0.058	0.056	0.0488	98%
8	-2.01		—	✓	0.000	0.002	0.002	0.00136	<0.004
9	-2.01 VS 0.030PPM		—	✓	0.000	0.035	0.035	0.0303	101%
10	-3.01		—	✓	0.000	0.002	0.002	0.00136	<0.004
11	-4.01		—	✓	0.000	0.002	0.002	↓	↓
12	↓ -5.01		—	✓	0.000	0.002	0.002	↓	↓
13	CCV1 0.050PPM		—	✓	0.000	0.057	0.057	0.0497	99%
14	CCB1		—	✓	0.000	0.000	0.000	-0.000397	<0.004
15	830-6.01		—	✓	0.000	0.000	0.000	↓	↓
16	CCV2 0.050PPM		—	✓	0.000	0.057	0.057	0.0497	99%
17	CCB2	↓	—	✓	0.000	0.000	0.000	-0.000397	<0.004

pH Requirement: Method 7196A (2 ± 0.5) * Samples filtered prior to pH adjustment

ICV/CCV spiked with ~~S24-101~~ 0.25 ml of S24-10151001 @1/10 ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm) SK 3/4/11

MS/MSD spiked with 0.05 ml of S24-02281103 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of ________ ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of ↓ @1/10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments:

Prepared By: [signature] Date/Time: 3/4/11 @ 1405

Analyzed By: [signature] Date/Time: 3/4/11 @ 1430

Reviewed By: [signature] Date: 3/4/11

Cr6LIQ.xls

11/23/09 SIG-1123090B 1000 PPM SO_3 (ICV/CCV)
SV 0.1607g Na_2SO_4 (Mallinckrodt; H25469; EXP 8/11/14
↑100mL w/ DI
EXP: 5/23/10

11/23/09 SIG-1123090B A,B,C,D PH REFERENCE
SV PURCHASED
ERA CAT # 977
LOT # 129934
EXP: 1/2012

11/24/09 SIG-1124090I 1000 PPM SO_4 Standard
SV PURCHASED CAT # ICC-006
LOT # K00794
EXP: 9/30/13
SV 11/25/09

11/25/09 SIG-~~H25~~ 1125090I 0.1N H_2SO_4
SV ~~5~~0mL Conc H_2SO_4 (EMD 4705D EXP: 9/13/10)
EXP: ~~9/13~~ 9/13/10
SV 11/25/09

11/30/09 SIG-1130090I Cr+6 Coloring Reagent
SV 0.2500g diphenylcarbohydrazide (EMD) 4710ED; EXP: 1/30/13) ↑50mL w/ Acetone (EMD 4715D; EXP: 5/24/12
EXP: 12/30/09

11/30/09 SIG-1130090B 25133 ppb Stock for O_3 in Air
SV 0.05mL Pyridine-4-Carboxaldehyde (Alfa Aesar LOT 10144058; EXP 5/11/12)
↑500mL deionized H_2O
EXP: 12/14/09

11/30/09 SIG-1130090B 25133ppb ICV/CCV for O_3 in Air
SV 0.05mL Pyridine-4-carboxaldehyde (TCI LOT # IEOINC; EXP: 5/10/12)
↑500mL w/ DI H_2O
EXP: 12/14/09

Reviewed And Approved By:
Initial: VL Date: 12/30/09

14

3/1/10 SV
524-0301001 pH 4.000 Buffer
Purchased 500 ml CAT # 5657-01
JT BAKER LOT # H31526
EXP 8/31/11

3/1/10 SV
524-0301002 pH 7.000 Buffer
Purchased 500 ml CAT # 5656-01
JT BAKER LOT # H47531
EXP: 1/31/12

3/1/10 SV
524-0301003 1000 PPM Cl (LCS)
Purchased 120 ml Cat # 1955-4
RICA CHEM CO LOT # 1001395
EXP: 7/2011

3/1/10 SV
524-0301004 NH3 Filling Sol'n
Purchased 60 ml Orion 951202
Thermo Scientific LOT # MT1
P/N. 708613-A04
EXP: 3/1/11

3/2/10 SV
524-0302001 pH 10.000 buffer
Purchased 500 ml Cat # 5655-01
JT Baker LOT H34508
EXP: 9/30/11

10/6/10 SL — 524-10061001 — 25133 ppb Stock for O3

0.05 ml Pyridine-4-carboxaldehyde Alfa Aesar
10146598 ;Exp: 8/11/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

10/6/10 SL — 524-10061002 — 25133 ppb ICV/CCV for O3

0.05 ml Pyridine-4-carboxaldehyde TCI
(IGIINC ;Exp: 8/10/12) up to 500 ml w/ DI Water.

EXP: 10/20/10

524-10061003 MBTH SD/17

10/6/10 SL — 0.5000 g MBTH (Aldrich 54666EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 49284; EXP 11/2

EXP: 10/7/10

10/15/10 SL — 524-10151001 — Cr6+ ICV/CCV Stock

Purchased
RICCA Chemical Co
500ml Plastic
LOT # 101077
EXP: 3/20/12

100PPM Cr6+
Cat No 2995-16

10/15/10 SL — 524-10151002 — 500PPM NO_2 Stock

Purchased
RICCA Chemical Co
LOT# 101027!
EXP: 4/2011

Cat No: 5444-54
120ml amber glass

10/28/10 S24-10281002 1000 PPM SO3 ICV/CCV

0.1607 Na2SO3 (Mallinckrodt Lot #H25469; Exp: 8/11/14) up to 100 ml w/ DI Water.

EXP: 11/11/10

11/1/10 S24-11011001 ICV/CCV Cr^{6+} T.V = 0.576 PPM

0.5ml S19-04090404 (T.V = 115.8 mg/L ; EXP: 12/2010)

↑ 100ml W/ DI

EXP: 11/15/10

11/1/10 S24-11011002 Cr^{6+} Coloring Reagent

0.2500g 1,5-Diphenylcarbohydrazide (EMD 47703731; EXP: 1/30/13) ↑ 50ml W/ Acetone (EMD 47154D; EXP: 9/24/12).

EXP: 11/15/10

11/4/10 S24-11041001 A→E pH Filling Sol'n

PURCHASED (3M KCl) P/N 702613-402

Thermo Scientific

LOT Code: 0R1

EXP: 11/4/11

11/4/10 S24-11041002 pH 2.000 Buffer

Purchased

BDH CAT NO: 5010-500ml

LOT # 1002199

EXP: 1/2012

11/4/10 S24-11041003 pH 4.000 Buffer
Purchased
JT Baker Cat No: 5657-01 500 ml
LOT # J30507
EXP: 8/31/12

11/4/10 S24-11041004 pH 7.000 Buffer
Purchased
J.T. Baker Cat No: 5656-01 500 ml
LOT # J35515
EXP: 9/30/12

11/5/10 S24-11051001 MBTH Sol'n
0.5000 g MBTH (Aldrich 52469EK ;Exp: 8/7/14) up to 100 ml w/ DI Water. Plus 0.5 ml Conc. H_2SO_4 EMD 49884 EXP: 11/20/14

EXP: 11/6/10

11/8/10 S24-11081001 1000 PPM NH_3
0.3141g NH_4Cl (EMD 49198931; EXP: 10/19/14) q/100ml
w/ S24-10221006 EXP: 10/22/11
EXP: 10/22/11

11/12/10 S24-11121001 1000 PPM SO_3 STOCK
0.1591 Na2SO3 (JT Baker Lot #H10627; Exp: 8/31/14) up to 100 ml w/ DI Water.

EXP: 11/26/10

524-0221/1101 1:1 H_2SO_4

2/21/11 SR
250 ml H_2SO_4 (EMD 49284; EXP: 11/20/14) ADDED SLOWLY TO 250 ml DI. COOL COMPLETELY
EXP: 2/21/12

2/21/11 SR
524-0221/1102 Cr6+ Coloring Reagent
0.2500 g 1,5-diphenylcarbohydrazide (EMD LOT 471037 EXP: 1/30/13) + 50 ml w/ Acetone (EMD LOT # 471540; EXP: 9/24/12).
EXP: 3/31/11

2/28/11 SR
524-0228/1101 0.1 H_2SO_4
5.6 ml conc H_2SO_4 (EMD 49284 EXP: 11/20/14) + 2 w/ DI H_2O
EXP: 2/28/12

2/28/11 SR
524-0228/1102 1001 mg/L Cr6+
Purchased
Inorganic Ventures CGCR(6)1-1
125 mL Clear Glass
LOT # D2-CR03040
EXP: 3/1/2012

2/28/11 S24-02281103 10PPM Cr6+ Soln
1.0 ml S24-02281102 (1000 PPM Cr6+; EXP: 3/1/12) ↑
100ml w/ DI H2O
Exp: 2/28/12

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LABORATORY REPORT

March 8, 2011

David Conner
Battelle
4800 Oak Grove Dr. M/S 180-801
Pasadena, CA 91109

RE: JPL GW Mon 1Q11 / G486090

Dear David:

Enclosed are the results of the samples submitted to our laboratory on March 7, 2011. For your reference, these analyses have been assigned our service request number P1100845.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L10-3; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA; Washington State Department of Ecology, ELAP Lab ID: C946. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

Columbia Analytical Services, Inc.

Digitally signed by Sue Anderson
Date: 2011.03.08 16:28:32 -08'00'

Sue Anderson
Project Manager

Client: Battelle
Project: JPL GW Mon 1Q11 / G486090

CAS Project No: P1100845

CASE NARRATIVE

The samples were received intact under chain of custody on March 7, 2011 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hexavalent Chromium by EPA Method 7196A

No anomalies were encountered during this analysis.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for utilization of less than the complete report.

DETAIL SUMMARY REPORT

Client: Battelle
Project ID: JPL GW Mon 1Q11 / G486090
Service Request: P1100845

Date Received: 3/7/2011
Time Received: 13:55

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	7196A - Cr6
MW-12-3	P1100845-001	Water	3/7/2011	09:49	X
MW-12-2	P1100845-002	Water	3/7/2011	10:17	X
MW-12-1	P1100845-003	Water	3/7/2011	10:42	X
EB-10-03/07/11	P1100845-004	Water	3/7/2011	10:31	X

Acronyms

CA LUFT	California DHS LUFT Metho
ASTM	American Society for Testing and Materials
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAS Number	Chemical Abstract Service Registry Number
CFC	Chlorofluorocarbon
CRDL	Contract Required Detection Limit
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOH or DHS	Department of Health Services
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank
ICV	Initial Calibration Verification
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified Method
MDL	Method Detection Limit
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl *tert* -Butyl Ether
NA	Not Applicable
NC	Not Calculated
ND	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	*Standard Methods for the Examination of Water and Wastewater* , 19th Ed., 1995.
SW	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* , SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)
VOC	Volatile Organic Compound(s)

Qualifiers

U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
J	The result is an estimated concentration that is less than the MRL (PQL), but greater than or equal to the MDL.
B	Analyte detected in the method blank above MRL (PQL).
E	Estimated; result based on response which exceeded the instrument calibration range.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
D	The reported result is from a dilution.
X	See case narrative.

Water & Soil - Chain of Custody Record & Analytical Service Request

Columbia Analytical Services INC.
An Employee - Owned Company

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day - Standard

CAS Project No. P1100845

CAS Contact:

Analysis Method and/or Analytes

Company Name & Address (Reporting Information)	BATTELLE 3990 OLD TOWN AVE. C-205 SAN DIEGO, CA 92110
Project Name	JPL GW. MON. 1011
Project Number	G486090
Project Manager	DAVID CONNEW
P.O. # / Billing Information	21[illegible]3.19 / BATTELLE ATTN: GERALD TOMPKINS 505 KING AVE. COLUMBUS, OH 43201
Phone	(619) 726-7311
Fax	(614) 458-6614
Email Address for Result Reporting	
Sampler (Print & Sign)	CHRIS BRADDON

Preservative Key

0	None
1	HCL
2	HNO3
3	H2SO4
4	NaOH
5	Zn Acetate
6	Asc Acid
7	Other

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Matrix	Number of Containers	Preservative Code	Remarks
MW-12-3	1	3/7/11	0949	W	2	X	MS/MSD
MW-12-2	2	"	1017	"	1	X	
MW-12-1	3	"	1042	"	1	X	
EB-10-03/07/11	4	3/7/11	1031	W	1	X	EQUIP. BLANK

Volatile Organics GC/MS 624 ☐ 8260B ☐ Oxygenates ☐ TPH Gas ☐
TPH Gas 8015B ☐ BTEX 8021B ☐ MTBE 8021B ☐
TPH Diesel 8015B ☐ (Subcontracted)
TPH Diesel Low Level 8015B ☐ (Subcontracted)
TPH FC ☐ 8015M (Subcontracted)
Semi-Volatile Organics GC/MS 625 ☐ 8270C ☐ (Subcontracted)
0
C-II (2196)

Report Tier Levels - please select

Tier I - (Results/Default if not specified) ____
Tier II - (Results + QC) ____
Tier III - (Data Validation Package) 10% Surcharge ____
Tier V - (client specified) ____

MRL required Yes / No
MDL / PQL / J required Yes / No

EDD required Yes / No
Type: ____

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date: 3/7/11	Time: 1130	Received by: (Signature)	Date: 3/8/11	Time: 1130
Relinquished by: (Signature)	Date: 3/7/11	Time: 1355	Received by: (Signature)	Date: 03/07/11	Time: 1355
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Cooler / Blank / Ice / No Ice
Temperature 3.0 °C

Client: Battelle **Service Request:** P1100845

Project: JPL GW Mon 1Q11/G486090

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P1100845-001.01					
	7196A				
		3/7/11	1421	SMO / MZAMORA	
		3/7/11	1422	P-37 / MZAMORA	
		3/7/11	1436	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100845-001.02					
		3/7/11	1421	SMO / MZAMORA	
		3/7/11	1422	P-37 / MZAMORA	
		3/7/11	1436	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100845-002.01					
	7196A				
		3/7/11	1421	SMO / MZAMORA	
		3/7/11	1422	P-37 / MZAMORA	
		3/7/11	1436	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100845-003.01					
	7196A				
		3/7/11	1421	SMO / MZAMORA	
		3/7/11	1422	P-37 / MZAMORA	
		3/7/11	1436	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	
P1100845-004.01					
	7196A				
		3/7/11	1421	SMO / MZAMORA	
		3/7/11	1422	P-37 / MZAMORA	
		3/7/11	1436	In Lab / SANDERSON	
		3/8/11	0846	P-37 / SANDERSON	

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Sample Acceptance Check Form

Client: Battelle Work order: P1100845

Project: JPL GW Mon 1Q11 / G486090

Sample(s) received on: 3/7/11 Date opened: 3/7/11 by: MZAMORA

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Container(s) **supplied by CAS**?	☒	☐	☐
3	Did **sample containers** arrive in good condition?	☒	☐	☐
4	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
5	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
6	Was **sample volume** received adequate for analysis?	☒	☐	☐
7	Are samples within specified holding times?	☒	☐	☐
8	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature ____ °C Blank Temperature 3 °C			
9	Was a **trip blank** received?	☐	☒	☐
10	Were **custody seals** on outside of cooler/Box?	☐	☒	☐
	Location of seal(s)? ____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
	Were custody seals on outside of sample container?	☐	☒	☐
	Location of seal(s)? ____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
11	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☒	☐	☐
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
12	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
13	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1100845-001.01	125mL Plastic NP					
P1100845-001.02	125mL Plastic NP					
P1100845-002.01	125mL Plastic NP					
P1100845-003.01	125mL Plastic NP					
P1100845-004.01	125mL Plastic NP					

Explain any discrepancies: (include lab sample ID numbers): ____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL GW Mon 1Q11
Project Number : G486090
Sample Matrix : WATER

Service Request : P1100845
Date Collected : 03/07/11
Date Received : 03/07/11

Chromium, Hexavalent

Prep Method : None
Analysis Method : 7196A
Test Notes :

Units : mg/L (ppm)
Basis : NA

Sample Name	Lab Code	PQL	MDL	Dilution Factor	Date Extracted	Date/Time Analyzed	Result	Result Notes
MW-12-3	P1100845-001	0.010	0.004	1	NA	03/07/11 15:25	ND	
MW-12-2	P1100845-002	0.010	0.004	1	NA	03/07/11 15:25	ND	
MW-12-1	P1100845-003	0.010	0.004	1	NA	03/07/11 15:25	ND	
EB-10-03/07/11	P1100845-004	0.010	0.004	1	NA	03/07/11 15:25	ND	
Method Blank	P1100845-MB	0.010	0.004	1	NA	03/07/11 15:25	ND	

Approved By Karen Ryan Date : 3/7/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P1100845
Project:	JPL GW Mon. 1Q11 / G486090	**Date Analyzed:**	03/07/11

Title: Initial and Continuing Calibration Blank (ICB and CCB) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	PQL	MDL	Result
ICB	0.010	0.004	ND
CCB1	0.010	0.004	ND

Approved By: Karen Rya Date: 3/7/11

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P1100845
Project:	JPL GW Mon. 1Q11 / G486090	**Date Analyzed:**	03/07/11

Title: Initial and Continuing Calibration Verification (ICV and CCV) Summary
Analyte: Chromium, Hexavalent
Method: 7196A
Units: mg/L (ppm)

Sample Name	True Value	Result	Percent Recovery	Acceptance Criteria
ICV	0.0500	0.0510	102	90-110
CCV1	0.0500	0.0510	102	90-110

Approved By: Karen Rya Date: 3/7/11

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100845
Project Name :	JPL GW Mon 1Q11	**Date Collected :**	NA
Project Number :	G486090	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/07/11

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P1100845-LCS	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Chromium, Hexavalent	None	7196A	0.0400	0.0422	106	90-109	

Approved By Karen Rya Date : 3/7/11

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P1100845
Project Name :	JPL GW Mon 1Q11	**Date Collected :**	03/07/11
Project Number :	G486090	**Date Received :**	03/07/11
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	03/07/11

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-12-3
Lab Code : P1100845-001MS P1100845-001DMS
Test Notes :

Units : mg/L (ppm)
Basis : NA

Analyte	Prep Method	Analysis Method	PQL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Spike Recovery MS	Spike Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Chromium, Hexavalent	None	7196A	0.010	0.0500	0.0500	ND	0.0492	0.0492	98	98	78-112	<1	

Approved By Karen Ryan Date : 3/7/11

Report By:SAnderson

Columbia Analytical Services

pH Run Log

Service Request #(s): 845

Time: 0835

Sample	VWR lot #	Exp.
pH 2 Buffer	524-11041002	1/2012
pH 4 Buffer	524-11041003	8/31/12
pH 7 Buffer	524-11041004	9/30/12
pH 10 Buffer	524-03021001	9/30/11

Slope	Prep.Run #
99.4%	—
	Run#
	—

pH in liquid: (1) 9040B, (2) 9040C **pH in solid:** (3) 9045C, (4) 9045D (*Note method number in column labeled # below*)

pH adjustment:(5) 7196A,(6) 7199 (Note method # In column labeled #)

Sample	#	pH	Temp. °C
pH 2.000	5	2.009	22.1°
pH 4.000	↓	4.065	22.3°
pH 7.000	↓	7.002	22.3°
pH 10.000	↓	9.997	22.3°
Ref#: T.V.=6.46 EXP: 1/2012 519-11230403D	↓	6.376	22.5°
DI	↓	2.097	21.1°
pH 2.000	↓	2.003	22.0°
TIME: 1456			
pH 2.000	5	2.012	23.1°
845-1.01	↓	1.822	14.1°
-2.01	↓	1.835	14.4°
-3.01	↓	2.023	16.4°
-4.01	↓	1.898	15.5°
pH 2.000	↓	1.999	23.1°

Sample	#	pH	Temp. °C
		space not used	

pH Adjustments: ☑ **7196A**: Diluted/Conc H_2SO_4 EMD 49284 EXP: 11/20/14

☐ **7199A**: Diluted NaOH ________ EXP: ________

Comments: ____________________

* Soil or Solid prep: 1:1(wt:vol) with DI water: ** Samples received past recommended hold time.

Date buffers and filling solution changed: 3/7/11

Note: ATC probe used; therefore, temperature correction calculation is not necessary.

Analyst: [signature] Date: 3/7/11

Reviewer: KR Date: 3/7/11

pH.XLS

Hexavalent Chromium (Liquids)

Columbia Analytical Services™

Method EPA 7196A

Service Request#(s): 845 Run#: 238187

Stock#: 524-0228/103 T.V=10PPM EXP: 2/28/12 Prep Run#: —

ICV/CCV#: 524-1015/001 T.V=100PPM EXP: 3/12 Conc. H_2SO_4 Lot#: EMD 49284 EXP: 11/20/14

Coloring Reagent Ref#: 524-0307/101 EXP: 4/7/11

Working Curve:

Prep Dilution	NA	0.05/50	0.25/50	0.5/50	Corr. Coeff.
Concentration mg/L	0.00	0.01	0.05	0.1	0.999925353
Absorbance @ 540 nm	0.000	0.012	0.056	0.114	

	Sample #	Sample Vol.(mL)	Dilution	pH ✓	Bkg.	Absorbance @ 540nm	Corrected Abs. (minus bkg.)	Results - mg/L	QA/QC - %R / RPD
1	IIB	10ml	—	✓	0.000	0.000	0.000	-0.0000710	<0.004
2	ICV 0.050PPM		—	✓	0.000	0.058	0.058	0.0510	102%
3	MB		—	✓	0.000	0.001	0.001	0.000810	<0.004
4	LCS 0.040PPM		—	✓	0.000	0.048	0.048	0.0422	106%
5	845-1.01		—	✓	0.002	0.005	0.003	0.00257	<0.004
6	-1.01 MS 0.05PPM		—	✓	0.002	0.058	0.056	0.0492	98%
7	-1.01 MSD		—	✓	0.002	0.058	0.056	0.0492	98% 0 RPD
8	-2.01		—	✓	0.001	0.004	0.003	0.00257	<0.004
9	-2.01 MS 0.03PPM		—	✓	0.001	0.037	0.036	0.0316	105%
10	-3.01		—	✓	0.000	0.004	0.004	0.00345	<0.004
11	-4.01		—	✓	0.000	0.000	0.000	-0.0000710	<0.004
12	CCV1 0.050PPM		—	✓	0.000	0.058	0.058	0.0570	102%
13	CCB1		—	✓	0.000	0.000	0.000	-0.0000710	<0.004
14									
15									
16		Space not used							
17									

pH Requirement: Method 7196A *(2 ± 0.5)* * Samples filtered prior to pH adjustment

ICV/CCV spiked with 0.25 ml of 524-1015/001 @ 1/10 ↑ 50 ml of pH adjusted DI WATER (T.V.= 0.05 ppm)

MS/MSD spiked with 0.05 ml of 524-0228/103 ↑ 10 ml of pH adjusted sample (T.V.= 0.05 ppm)

LCS spiked with 0.2 ml of ____ ↑ 50 ml of pH adjusted DI Water (T.V.= 0.04 ppm)

Verification Standard Spiked 0.3 ml of @ 1/10 ↑ 10 ml of sample (T.V.= 0.03 ppm)

Comments: ____

Prepared By: ____ Date/Time: 3/7/11 @1510

Analyzed By: ____ Date/Time: 3/7/11 @1505

Reviewed By: ____ Date: 3/7/11

Cr6LIQ.xls

11/23/09 SIG-1123090Z 1000 ppm SO_3 (ICV/CCV)
SV 0.1607g Na_2SO_3 (Mallinckrodt; H25469; EXP 8/11/14
↑ 100ml w/ DI
EXP: 5/23/10

11/23/09 SIG-1123090 3 A,B,C,D pH REFERENCE
SV PURCHASED
ERA CAT # 977
LOT # 129934
EXP: 1/2012

11/24/09 SIG-1124090 1 1000 ppm SO_4 Standard
SV PURCHASED CAT # ICC-006
LOT # K007494
EXP: 9/30/13

SV 11/25/09

11/25/09 SIG-~~H25~~ 1125090 1 0.1N H_2SO_4
SV ~~50~~ml conc H_2SO_4 (EMD 4705D EXP: 9/13/10)
EXP: ~~9/13~~ 9/13/10
SV 11/25/09

11/30/09 SIG-1130090 1 Cr^{6+} Coloring Reagent
SV 0.2500g diphenylcarbonylhydrazide (EMD) 4710ED; EXP: 1/30/13) ↑ 50ml w/ Acetone (EMD 4715ED; EXP: 5/24/12
EXP: 12/30/09

11/30/09 SIG-1130090 2 25133 ppb Stock for O_3 in Air
SV 0.05ml Pyridine-4-Carboxaldehyde (Alfa Aesar LOT 10144059 98; EXP 8/11/12)
↑ 500ml deionized H_2O
EXP: 12/14/09

11/30/09 SIG-1130090 3 25133 ppb ICV/CCV for O_3 in Air
SV 0.05ml Pyridine-4-carboxaldehyde (TCI LOT # ZGINC; EXP: 8/10/12)
↑ 500ml w/ DI H_2O
EXP: 12/14/09

Reviewed And Approved By:
Initial: VG Date: 12/22/09

3/1/10 SV — 524-03011001 pH 4.000 Buffer
Purchased 500 ml CAT # 5657-01
JT BAKER LOT # H31526
EXP 8/31/11

3/1/10 SV — 524-03011002 pH 7.000 Buffer
Purchased 500 ml CAT # 5656-01
JT BAKER LOT # H47531
EXP: 1/31/12

3/1/10 SV — 524-03011003 1000 ppm Cl (LCS)
Purchased 120 ml Cat # 1955-4
RICCA CHEM CO LOT # 1001395
EXP: 7/2011

3/1/10 SV — 524-03011004 NH3 Filling Sol'n
Purchased 60 ml Orion 951202
Thermo Scientific LOT # MT1
P/N. 720613-A04
EXP: 3/1/11

3/2/10 SV — 524-03021001 pH 10.000 buffer
Purchased 500 ml Cat # 5655-01
JT Baker LOT H34508
EXP: 9/30/11