COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0903942
Date Analyzed: 11/16/09

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	0.0579	0.0590	102	90-110
CCV1	0.0579	0.0580	100	90-110
CCV2	0.0579	0.0580	100	90-110

Approved By: Karen Ryan Date: 11/17/09

CCV1A:120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0903942
Project Name :	JPL-GW-4Q09	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/16/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P0903942-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	0.0400	100	86-114	

Approved By Karen Ryan Date : 11/17/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0903942
Project Name :	JPL-GW-4Q09	**Date Collected :**	11/16/09
Project Number :	NA	**Date Received :**	11/16/09
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/16/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-15
Lab Code : P0903942-001MS P0903942-001DMS
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	0.0527	0.0537	105	107	80-120	2	

Approved By Karen Ryan Date : 11/17/09

Report By:SAnderson

CAS SR #P0903952

Table of Contents

Cover Letter..... 1

Case Narrative..... 2

Sample Cross-Reference..... 3

Acronym List..... 4

Chain of Custody..... 5

Internal Chain of Custody..... 6-7

Sample Acceptance Check Form..... 8-9

Hexavalent Chromium Analytical Data 10-15

Hexavalent Chromium Raw Data..... 16-28

Columbia Analytical Services, Inc. 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

LABORATORY REPORT

November 18, 2009

David Conner
Battelle
3990 Old Town Ave., Suite C-205
San Diego, CA 92110

RE: JPL GW Mon 4Q09 / G486090

Dear David:

Enclosed are the results of the samples submitted to our laboratory on November 17, 2009. For your reference, these analyses have been assigned our service request number P0903952.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-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. Your report contains 28 pages.

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; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. 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.

Sue Anderson
Project Manager

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

CAS Project No: P0903952

CASE NARRATIVE

The samples were received intact under chain of custody on November 17, 2009 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 Cheromium by EPA 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.

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0903952

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P0903952-001	MW-20-5	11/17/09	08:15
P0903952-002	MW-20-4	11/17/09	08:59
P0903952-003	MW-20-3	11/17/09	09:32
P0903952-004	MW-20-2	11/17/09	09:58
P0903952-005	MW-20-1	11/17/09	10:48
P0903952-006	DUPE-01-4Q09	11/17/09	00:00
P0903952-007	EB-03-11/17/09	11/17/09	10:20

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. P0903452

CAS Contact:

Company Name & Address (Reporting Information)	Project Name
BATTELLE 3990 OLD TOWN AVE., C-205 SAN DIEGO CA 92110	JPL GW MON 4Q09
Project Manager	**Project Number**
DAVID CONNER	64860 90
Phone / **Fax**	**P.O. # / Billing Information**
(619) 726-7311	21439/BATTELLE ATTN: GERALD TOMPKINS 505 KING AVE. COLUMBUS OH 43201
Email Address for Result Reporting	**Sampler (Print & Sign)**

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 (7196)	Remarks
MW-20-5	1	11/17/09	0815	W	1							X		
MW-20-4	2	↓	0859	↓	2							X		MS/MSD
MW-20-3	3		0932		1							X		
MW-20-2	4		0958		1							X		LEVEL III QC
MW-20-1	5		1048		1							X		
DUPE-01-4Q09	6		—		1							X		DUPLICATE
EB-03-11/17/09	7		1020	↓	1							X		EQUIPMENT 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)

Relinquished by: (Signature)	Date: 11/17/09	Time: 1430	Received by: (Signature)	Date: 11/17/09	Time: 1430
Relinquished by: (Signature)	Date: 11/17/09	Time: 1433	Received by: (Signature)	Date: 11/17/09	Time: 1433
Relinquished by: (Signature)	Date: 11/17/09	Time: 1515	Received by: (Signature)	Date: 11/17/09	Time: 1515

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

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0903952

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P0903952-001.01					
	7196A				
		11/17/09	1521	SMO / MZAMORA	
		11/17/09	1521	P-37 / MZAMORA	
		11/17/09	1530	In Lab / SANDERSON	
		11/17/09	2014	P-37 / SANDERSON	
P0903952-002.01					
	7196A				
		11/17/09	1521	SMO / MZAMORA	
		11/17/09	1521	P-37 / MZAMORA	
		11/17/09	1530	In Lab / SANDERSON	
		11/17/09	2014	P-37 / SANDERSON	
P0903952-002.02					
		11/17/09	1521	SMO / MZAMORA	
		11/17/09	1521	P-37 / MZAMORA	
		11/17/09	1531	In Lab / SANDERSON	
		11/17/09	2014	P-37 / SANDERSON	
P0903952-003.01					
	7196A				
		11/17/09	1521	SMO / MZAMORA	
		11/17/09	1521	P-37 / MZAMORA	
		11/17/09	1531	In Lab / SANDERSON	
		11/17/09	2014	P-37 / SANDERSON	
P0903952-004.01					
	7196A				
		11/17/09	1521	SMO / MZAMORA	
		11/17/09	1521	P-37 / MZAMORA	
		11/17/09	1531	In Lab / SANDERSON	
		11/17/09	2014	P-37 / SANDERSON	
P0903952-005.01					
	7196A				
		11/17/09	1521	SMO / MZAMORA	
		11/17/09	1521	P-37 / MZAMORA	
		11/17/09	1531	In Lab / SANDERSON	
		11/17/09	2014	P-37 / SANDERSON	
P0903952-006.01					
	7196A				
		11/17/09	1521	SMO / MZAMORA	
		11/17/09	1521	P-37 / MZAMORA	
		11/17/09	1530	In Lab / SANDERSON	
		11/17/09	2014	P-37 / SANDERSON	
P0903952-007.01					
	7196A				

6

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0903952

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
		11/17/09	1521	SMO / MZAMORA	
		11/17/09	1521	P-37 / MZAMORA	
		11/17/09	1530	In Lab / SANDERSON	
		11/17/09	2014	P-37 / SANDERSON	

7

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0903952

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/17/09 Date opened: 11/17/09 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	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: _____			
11	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?	☐	☐	☒
12	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?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**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
P0903952-001.01	125mL Plastic NP					
P0903952-002.01	125mL Plastic NP					
P0903952-002.02	125mL Plastic NP					
P0903952-003.01	125mL Plastic NP					
P0903952-004.01	125mL Plastic NP					
P0903952-005.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0903952

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/17/09 Date opened: 11/17/09 by: MZAMORA

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P0903952-006.01	125mL Plastic NP					
P0903952-007.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12);
Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

DIVIDER SHEET

ANALYTICAL DATA FOR

Hexavalent Chromium

ANALYSIS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL GW Mon 4Q09
Project Number : G486090
Sample Matrix : WATER

Service Request : P0903952
Date Collected : 11/17/09
Date Received : 11/17/09

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-20-5	P0903952-001	0.010	0.003	1	NA	11/17/09 16:20	ND	
MW-20-4	P0903952-002	0.010	0.003	1	NA	11/17/09 16:20	ND	
MW-20-3	P0903952-003	0.010	0.003	1	NA	11/17/09 16:20	ND	
MW-20-2	P0903952-004	0.010	0.003	1	NA	11/17/09 16:20	ND	
MW-20-1	P0903952-005	0.010	0.003	1	NA	11/17/09 16:20	ND	
DUPE-01-4Q09	P0903952-006	0.010	0.003	1	NA	11/17/09 16:20	ND	
EB-03-11/17/09	P0903952-007	0.010	0.003	1	NA	11/17/09 16:20	ND	
Method Blank	P0903952-MB	0.010	0.003	1	NA	11/17/09 16:20	ND	

Approved By Karen Rya Date : 11/18/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

Service Request: P0903952
Date Analyzed: 11/17/09

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	0.003	ND
CCB1	0.010	0.003	ND
CCB2	0.010	0.003	ND

Approved By: Karen Rya Date: 11/18/09

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

Service Request: P0903952
Date Analyzed: 11/17/09

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	0.0579	0.0571	99	90-110
CCV1	0.0579	0.0581	100	90-110
CCV2	0.0579	0.0581	100	90-110

Approved By: Karen Ryan Date: 11/18/09

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0903952
Project Name :	JPL GW Mon 4Q09	**Date Collected :**	NA
Project Number :	G486090	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/17/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P0903952-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	0.0405	101	86-114	

Approved By Karen Ryan Date : 11/18/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0903952
Project Name :	JPL GW Mon 4Q09	**Date Collected :**	11/17/09
Project Number :	G486090	**Date Received :**	11/17/09
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/17/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-20-4
Lab Code : P0903952-002MS P0903952-002DMS
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	0.0416	0.0436	83	87	80-120	5	

Approved By Karen Ryan Date : 11/18/09

Report By:SAnderson

CAS SR #P0903953

Table of Contents

Cover Letter..... 1

Case Narrative..... 2

Sample Cross-Reference..... 3

Acronym List..... 4

Chain of Custody..... 5

Internal Chain of Custody..... 6

Sample Acceptance Check Form..... 7

Hexavalent Chromium Analytical Data 8-13

Hexavalent Chromium Raw Data..... 14-26

Columbia Analytical Services™ 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

LABORATORY REPORT

November 18, 2009

David Conner
Battelle
3990 Old Town Ave., Suite C-205
San Diego, CA 92110

RE: JPL-GW-4Q09

Dear David:

Enclosed are the results of the samples submitted to our laboratory on November 17, 2009. For your reference, these analyses have been assigned our service request number P0903953.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-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. Your report contains 26 pages.

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; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. 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.

Sue Anderson
Project Manager

Client: Battelle
Project: JPL-GW-4Q09

CAS Project No: P0903953

CASE NARRATIVE

The samples were received intact under chain of custody on November 17, 2009 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 Cheromium by EPA 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.

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0903953

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P0903953-001	MW-5	11/17/09	09:30
P0903953-002	MW-6	11/17/09	12:00

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.

P0903953

Billing Information:
Name Gerald Tompkins
Address 505 King Avenue
City, State, Zip Columbus, OH 43201
Phone Number 614-424-4849 Fax 614-424-3667

LABORATORY

Name Columbia Analytical
Address 2655 Park Center Drive, Suite A
Simi Valley, CA 93065
Phone 805 526-7161

Client Name **Battelle Memorial Institute**
Address **505 King Avenue**
City, State, Zip **Columbus, OH 43201**

P.O. # 214375
D.O. JPL-GW-4Q09
PWS # emails conner d @
DWR # battelle.org
Phone # ~~818 393-2865~~ GH
Fax # 614 458-6641
Sampled by GH/DBL
Report Attention DAVID CONNER

Analyses Required (1/1/96)

DATA REPORT: NEDTS FORMAT ☐ EDD/EDF FORMAT ☒

Time Sampled	Date Sampled	Matrix* See Key Below	Office Use Only Lab ID Number	Sample Description	Total and type of containers **See below	TPH/E	TPH/P	NO_2, NO_3, SO_4	Pb, Mn^{+2}, Fe^{+2}	TDS, AIK	TOC	VOC* see below	Other: C4 VI	Other:	REMARKS
0930	17NOV	AQ		MW-5	1P								X		QC level III
1200	17NOV	AQ		MW-6	1P								X		QC level III
															3°C

ADDITIONAL INSTRUCTIONS: **Specific VOC Requirements (please specify)**

D. CONNER PHONE # 619-726-7311

	Signature	Print Name	Company	Date	Time
Relinquished by	[signature]	GREG HEADINGTON	BATTELLE	17NOV09	1320
Received by	[signature]	MARCO MENDOZA	INSIGHT	11/17/09	1402
Relinquished by	[signature]	MARCO MENDOZA	INSIGHT	11/17/09	1433
Received by	[signature]	[illegible]	CAS	11/17/09	1433
Relinquished by	[signature]	[illegible]	CAS	11/17/09	1515
Received by	[signature]	KAREN RYAN	CAS	11/17/09	1515

*Key: AQ - Aqueous SO - Soil WA - Waste OT - Other **: L- Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0903953

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P0903953-001.01					
	7196A				
		11/17/09	1531	SMO / MZAMORA	
		11/17/09	1531	P-37 / MZAMORA	
		11/17/09	1534	In Lab / SANDERSON	
		11/17/09	2014	P-37 / SANDERSON	
P0903953-002.01					
	7196A				
		11/17/09	1531	SMO / MZAMORA	
		11/17/09	1531	P-37 / MZAMORA	
		11/17/09	1534	In Lab / SANDERSON	
		11/17/09	2014	P-37 / SANDERSON	

6

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0903953

Project: JPL- GW-4Q09

Sample(s) received on: 11/17/09 Date opened: 11/17/09 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	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: _____			
11	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?	☐	☐	☒
12	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?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**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
P0903953-001.01	125mL Plastic NP					
P0903953-002.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

DIVIDER SHEET

ANALYTICAL DATA FOR

Hexavalent Chromium

ANALYSIS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL-GW-4Q09
Project Number : NA
Sample Matrix : WATER

Service Request : P0903953
Date Collected : 11/17/09
Date Received : 11/17/09

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	P0903953-001	0.010	0.003	1	NA	11/17/09 16:20	ND	
MW-6	P0903953-002	0.010	0.003	1	NA	11/17/09 16:20	ND	
Method Blank	P0903953-MB	0.010	0.003	1	NA	11/17/09 16:20	ND	

Approved By Karen Ryan Date : 11/18/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0903953
Date Analyzed: 11/17/09

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	0.003	ND
CCB1	0.010	0.003	ND
CCB2	0.010	0.003	ND

Approved By: Karen Ryan Date: 11/18/09

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0903953
Date Analyzed: 11/17/09

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	0.0579	0.0571	99	90-110
CCV1	0.0579	0.0581	100	90-110
CCV2	0.0579	0.0581	100	90-110

Approved By: Karen Ryan Date: 11/18/09

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0903953
Project Name :	JPL-GW-4Q09	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/17/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P0903953-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	0.0405	101	86-114	

Approved By Karen Ryan Date : 11/18/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0903953
Project Name :	JPL-GW-4Q09	**Date Collected :**	11/17/09
Project Number :	NA	**Date Received :**	11/17/09
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/17/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-5 Units : mg/L (ppm)
Lab Code : P0903953-001MS P0903953-001DMS 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	0.0540	0.0540	108	108	80-120	<1	

Approved By Karen Rya Date : 11/18/09

Report By:SAnderson

CAS SR #P0903983

Table of Contents

Cover Letter..... 1

Case Narrative..... 2

Sample Cross-Reference..... 3

Acronym List..... 4

Blank By Design Page..... 5

Chain of Custody..... 6

Internal Chain of Custody..... 7-8

Sample Acceptance Check Form..... 9-10

Hexavalent Chromium Analytical Data 11-16

Hexavalent Chromium Raw Data..... 17-29

Columbia Analytical Services™ 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

LABORATORY REPORT

November 20, 2009

David Conner
Battelle
3990 Old Town Ave., Suite C-205
San Diego, CA 92110

RE: JPL GW Mon 4Q09 / G486090

Dear David:

Enclosed are the results of the samples submitted to our laboratory on November 18, 2009. For your reference, these analyses have been assigned our service request number P0903983.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-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. Your report contains 29 pages.

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; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. 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.

Sue Anderson
Project Manager

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

CAS Project No: P0903983

CASE NARRATIVE

The samples were received intact under chain of custody on November 18, 2009 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 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.

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P0903983-001	MW-3-5	11/18/09	08:34
P0903983-002	MW-3-4	11/18/09	09:02
P0903983-003	MW-3-3	11/18/09	09:29
P0903983-004	MW-3-2	11/18/09	10:13
P0903983-005	MW-3-1	11/18/09	11:10
P0903983-006	DUPE-02-4Q09	11/18/09	00:00
P0903983-007	EB-04-11/18/09	11/18/09	10:50

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. P0903983

CAS Contact:

Company Name & Address (Reporting Information)	Project Name
BATTELLE 3990 OLD TOWN AVE., C-205 SAN DIEGO CA 92110	JPL GW MON 4Q09
Project Manager DAVID CONNER	**Project Number** 54860900
Phone (619) 726-7311	**Fax**
Email Address for Result Reporting	**Sampler (Print & Sign)**
	P.O. # / Billing Information 21439/BATTELLE ATTN: GERALD TOMPKINS 505 KING AVE. COLUMBUS OH 43201

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 VI (7196)	Remarks
MW-3-5	1	11/18/09	0834	W	1							X		
MW-3-4	2		0902		1							X		
MW-3-3	3		0929		1							X		
MW-3-2	4		1013		1							X		
MW-3-1	5		1110		2							X		MS/MSD
DUPE-02-4Q09	6	11/18/09	"		1							X		DUPLICATE
EB-04-11/18/09	7	11/18/09	1050		1							X		EQUIPMENT 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)	11/18/09	1506	Received by: (Signature)	11/18/09	15:06
Relinquished by: (Signature)	11/18/09	1745	Received by: (Signature)	11/18/09	1745
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

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

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0903983

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P0903983-001.01					
	7196A				
		11/18/09	1556	SMO / MZAMORA	
		11/18/09	1556	P-37 / MZAMORA	
		11/18/09	1609	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	
P0903983-002.01					
	7196A				
		11/18/09	1556	SMO / MZAMORA	
		11/18/09	1556	P-37 / MZAMORA	
		11/18/09	1609	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	
P0903983-003.01					
	7196A				
		11/18/09	1556	SMO / MZAMORA	
		11/18/09	1556	P-37 / MZAMORA	
		11/18/09	1609	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	
P0903983-004.01					
	7196A				
		11/18/09	1556	SMO / MZAMORA	
		11/18/09	1556	P-37 / MZAMORA	
		11/18/09	1609	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	
P0903983-005.01					
	7196A				
		11/18/09	1556	SMO / MZAMORA	
		11/18/09	1556	P-37 / MZAMORA	
		11/18/09	1609	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	
P0903983-005.02					
		11/18/09	1556	SMO / MZAMORA	
		11/18/09	1556	P-37 / MZAMORA	
		11/18/09	1609	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	
P0903983-006.01					
	7196A				
		11/18/09	1556	SMO / MZAMORA	
		11/18/09	1556	P-37 / MZAMORA	
		11/18/09	1609	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	
P0903983-007.01					
	7196A				

7

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0903983

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
		11/18/09	1556	SMO / MZAMORA	
		11/18/09	1556	P-37 / MZAMORA	
		11/18/09	1609	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	

8

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0903983

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/18/09 Date opened: 11/18/09 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	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: _____			
11	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?	☐	☐	☒
12	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?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**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
P0903983-001.01	125mL Plastic NP					
P0903983-002.01	125mL Plastic NP					
P0903983-003.01	125mL Plastic NP					
P0903983-004.01	125mL Plastic NP					
P0903983-005.01	125mL Plastic NP					
P0903983-005.02	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0903983

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/18/09 Date opened: 11/18/09 by: MZAMORA

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P0903983-006.01	125mL Plastic NP					
P0903983-007.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12);
Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

DIVIDER SHEET

ANALYTICAL DATA FOR

Hexavalent Chromium

ANALYSIS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL GW Mon 4Q09
Project Number : G486090
Sample Matrix : WATER

Service Request : P0903983
Date Collected : 11/18/09
Date Received : 11/18/09

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-3-5	P0903983-001	0.010	0.003	1	NA	11/18/09 16:55	ND	
MW-3-4	P0903983-002	0.010	0.003	1	NA	11/18/09 16:55	ND	
MW-3-3	P0903983-003	0.010	0.003	1	NA	11/18/09 16:55	ND	
MW-3-2	P0903983-004	0.010	0.003	1	NA	11/18/09 16:55	ND	
MW-3-1	P0903983-005	0.010	0.003	1	NA	11/18/09 16:55	ND	
DUPE-02-4Q09	P0903983-006	0.010	0.003	1	NA	11/18/09 16:55	ND	
EB-04-11/18/09	P0903983-007	0.010	0.003	1	NA	11/18/09 16:55	ND	
Method Blank	P0903983-MB	0.010	0.003	1	NA	11/18/09 16:55	ND	

Approved By Karen Ryan Date : 11/19/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P0903983
Project:	JPL GW Mon 4Q09 / G486090	**Date Analyzed:**	11/18/09

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	0.003	ND
CCB1	0.010	0.003	ND
CCB2	0.010	0.003	ND

Approved By: Karen Ryan Date: 11/19/09

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P0903983
Project:	JPL GW Mon 4Q09 / G486090	**Date Analyzed:**	11/18/09

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	0.0579	0.0566	98	90-110
CCV1	0.0579	0.0566	98	90-110
CCV2	0.0579	0.0577	100	90-110

Approved By: Karen Ryan Date: 11/19/09

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0903983
Project Name :	JPL GW Mon 4Q09	**Date Collected :**	NA
Project Number :	G486090	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/18/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P0903983-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	0.0410	103	86-114	

Approved By Karen Ryan Date : 11/19/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0903983
Project Name :	JPL GW Mon 4Q09	**Date Collected :**	11/18/09
Project Number :	G486090	**Date Received :**	11/18/09
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/18/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-3-1
Lab Code : P0903983-005MS P0903983-005DMS
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	0.0462	0.0473	92	95	80-120	2	

Approved By Karen Ryan Date : 11/19/09

Report By:SAnderson

CAS SR #P0903984

Table of Contents

Cover Letter..... 1

Case Narrative..... 2

Sample Cross-Reference..... 3

Acronym List..... 4

Chain of Custody..... 5

Internal Chain of Custody..... 6

Sample Acceptance Check Form..... 7

Hexavalent Chromium Analytical Data 8-13

Hexavalent Chromium Raw Data..... 14-26

Columbia Analytical Services™ 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

LABORATORY REPORT

November 20, 2009

David Conner
Battelle
3990 Old Town Ave., Suite C-205
San Diego, CA 92110

RE: JPL-GW-4Q09

Dear David:

Enclosed are the results of the samples submitted to our laboratory on November 18, 2009. For your reference, these analyses have been assigned our service request number P0903984.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-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. Your report contains 26 pages.

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; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. 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.

Sue Anderson
Project Manager

Client: Battelle
Project: JPL-GW-4Q09

CAS Project No: P0903984

CASE NARRATIVE

The samples were received intact under chain of custody on November 18, 2009 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 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.

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P0903984-001	MW-13	11/18/09	08:36
P0903984-002	MW-8	11/18/09	10:45
P0903984-003	MW-1	11/18/09	13:00

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.

P0903984

Billing Information:
Name Gerald Tompkins
Address 505 King Avenue
City, State, Zip Columbus, OH 43201
Phone Number 614-424-4849 Fax 614-424-3667

LABORATORY

Name Columbia Analytical
Address 2655 Park Center Dr. Suite A
Simi Valley, CA 93065
Phone 805 526 7161

Analyses Required (1/96)

DATA REPORT
NEDTS FORMAT ☐
EDF FORMAT ☒

Client Name: **Battelle Memorial Institute**	P.O. # 214375	D.O. JPL-GW-4Q09	
Address: **505 King Avenue**	PWS # email, connerd	DWR # @battelle.org	
City, State, Zip: **Columbus, OH 43201**	Phone # ~~~~	Fax # 614 458-6641	
Sampled by GH/DBL	Report Attention DAVID CONNER		

Time Sampled	Date Sampled	Matrix* See Key Below	Office Use Only Lab ID Number	Sample Description	Total and type of containers **See below	TPH/E	TPH/P	NO_2, NO_3, SO_4	Pb, Mn^{+2}, Fe^{+2}	TDS, AIK	TOC	VOC* see below	Other: Cr VI	Other:	REMARKS
0836	18NOV	AQ		MW-13-MS/MSD	1 P								X		
0836	18NOV	AQ		MW-13	1 P								X		
1045	18NOV	AQ		MW-8	1 P								X		
1300	18NOV	AQ		MW-1	1 P								X		

ADDITIONAL INSTRUCTIONS: **Specific VOC Requirements (please specify)**

D. CONNER PHONE # 619-726-7311 QC Level III

	Signature	Print Name	Company	Date	Time
Relinquished by	[signature]	GREG HEADINGTON	BATTELLE	18NOV09	1422
Received by	[signature]	MARCO MENDOZA	INSIGHT	11/18/09	1430
Relinquished by	[signature]	MARCO MENDOZA	INSIGHT	11/18/09	1506
Received by	[signature]	Erica Quevg	CAS	11/18/09	15:06
Relinquished by	[signature]	Erica Quevg	CAS	11/18/09	15:45
Received by	[signature]	[signature]	CAS	11/18/09	1545

*Key: AQ - Aqueous ~~SO - Soil~~ WA - Waste OT - Other **: L- Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0903984

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P0903984-001.01					
	7196A				
		11/18/09	1607	SMO / MZAMORA	
		11/18/09	1609	P-37 / MZAMORA	
		11/18/09	1621	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	
P0903984-001.02					
		11/18/09	1607	SMO / MZAMORA	
		11/18/09	1609	P-37 / MZAMORA	
		11/18/09	1621	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	
P0903984-002.01					
	7196A				
		11/18/09	1607	SMO / MZAMORA	
		11/18/09	1609	P-37 / MZAMORA	
		11/18/09	1621	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	
P0903984-003.01					
	7196A				
		11/18/09	1607	SMO / MZAMORA	
		11/18/09	1609	P-37 / MZAMORA	
		11/18/09	1621	In Lab / SANDERSON	
		11/18/09	1743	P-37 / SANDERSON	

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0903984

Project: JPL-GW-4Q09

Sample(s) received on: 11/18/09 Date opened: 11/18/09 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	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: _____			
11	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?	☐	☐	☒
12	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?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**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
P0903984-001.01	125mL Plastic NP					
P0903984-001.02	125mL Plastic NP					
P0903984-002.01	125mL Plastic NP					
P0903984-003.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

DIVIDER SHEET

ANALYTICAL DATA FOR

Hexavalent Chromium

ANALYSIS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL-GW-4Q09
Project Number : NA
Sample Matrix : WATER

Service Request : P0903984
Date Collected : 11/18/09
Date Received : 11/18/09

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-13	P0903984-001	0.010	0.003	1	NA	11/18/09 16:55	ND	
MW-8	P0903984-002	0.010	0.003	1	NA	11/18/09 16:55	ND	
MW-1	P0903984-003	0.010	0.003	1	NA	11/18/09 16:55	ND	
Method Blank	P0903984-MB	0.010	0.003	1	NA	11/18/09 16:55	ND	

Approved By Karen Ryan Date : 11/19/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P0903984
Project:	JPL-GW-4Q09	**Date Analyzed:**	11/18/09

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	0.003	ND
CCB1	0.010	0.003	ND
CCB2	0.010	0.003	ND

Approved By: Karen Ryan Date: 11/19/09

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0903984
Date Analyzed: 11/18/09

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	0.0579	0.0566	98	90-110
CCV1	0.0579	0.0566	98	90-110
CCV2	0.0579	0.0577	100	90-110

Approved By: Karen Ryan Date: 11/19/09

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0903984
Project Name :	JPL-GW-4Q09	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/18/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P0903984-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	0.0410	103	86-114	

Approved By Karen Ryan Date : 11/19/09

Report By: SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0903984
Project Name :	JPL-GW-4Q09	**Date Collected :**	11/18/09
Project Number :	NA	**Date Received :**	11/18/09
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/18/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-13 Units : mg/L (ppm)
Lab Code : P0903984-001MS P0903984-001DMS 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	0.0494	0.0494	99	99	80-120	<1	

Approved By Karen Ryan Date : 11/19/09

Report By:SAnderson

CAS SR #P0904000

Table of Contents

Cover Letter..... 1

Case Narrative..... 2

Sample Cross-Reference..... 3

Acronym List..... 4

Chain of Custody..... 5

Internal Chain of Custody..... 6-7

Sample Acceptance Check Form..... 8-9

Hexavalent Chromium Analytical Data 10-15

Hexavalent Chromium Raw Data..... 16-28

Columbia Analytical Services™ 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

LABORATORY REPORT

November 20, 2009

David Conner
Battelle
3990 Old Town Ave., Suite C-205
San Diego, CA 92110

RE: JPL GW Mon 4Q09 / G486090

Dear David:

Enclosed are the results of the samples submitted to our laboratory on November 19, 2009. For your reference, these analyses have been assigned our service request number P0904000.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-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. Your report contains 28 pages.

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; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. 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.

Sue Anderson
Project Manager

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

CAS Project No: P0904000

CASE NARRATIVE

The samples were received intact under chain of custody on November 19, 2009 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 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.

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0904000

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P0904000-001	MW-17-5	11/19/09	08:20
P0904000-002	MW-17-4	11/19/09	08:52
P0904000-003	MW-17-3	11/19/09	09:19
P0904000-004	MW-17-2	11/19/09	09:47
P0904000-005	MW-17-1	11/19/09	10:21
P0904000-006	DUPE-03-4Q09	11/19/09	00:00
P0904000-007	EB-05-11/19/09	11/19/09	10:09

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. P0904000

CAS Contact:

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

Project Name
SPL GW MON 4Q09

Project Number
G486090

Project Manager
DAVID CONNELL

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

Phone
(619) 726-7311

Fax

Email Address for Result Reporting

Sampler (Print & Sign)

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	C VL (7196)	Remarks
MW-17-5	1	11/9/09	0820	W	1							X		
MW-17-4	2	"	0852	"	1							X		
MW-17-3	3	"	0919	"	1							X		
MW-17-2	4	"	0947	"	1							X		
MW-17-1	5	"	1021	"	2							X		MS/MSD
DUPE-03-4Q09	6	11/9/09	—	"	1							X		DUPLICATE
EB-05-11/19/09	7	11/9/09	1009	"	1							X		EQUIPMENT 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)	11/19/09	1500	Received by: (Signature)	11/19/09	1720
Relinquished by: (Signature)	11/19/09	1731	Received by: (Signature)	11/19/09	1745
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

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

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0904000

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P0904000-001.01					
	7196A				
		11/19/09	1551	SMO / MZAMORA	
		11/19/09	1552	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	
P0904000-002.01					
	7196A				
		11/19/09	1551	SMO / MZAMORA	
		11/19/09	1552	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	
P0904000-003.01					
	7196A				
		11/19/09	1551	SMO / MZAMORA	
		11/19/09	1552	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	
P0904000-004.01					
	7196A				
		11/19/09	1551	SMO / MZAMORA	
		11/19/09	1552	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	
P0904000-005.01					
	7196A				
		11/19/09	1551	SMO / MZAMORA	
		11/19/09	1552	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	
P0904000-005.02					
		11/19/09	1551	SMO / MZAMORA	
		11/19/09	1552	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	
P0904000-006.01					
	7196A				
		11/19/09	1551	SMO / MZAMORA	
		11/19/09	1552	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	
P0904000-007.01					
	7196A				

6

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0904000

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
		11/19/09	1551	SMO / MZAMORA	
		11/19/09	1552	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	

7

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0904000

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/19/09 Date opened: 11/19/09 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	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: _____			
11	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?	☐	☐	☒
12	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?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**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
P0904000-001.01	125mL Plastic NP					
P0904000-002.01	125mL Plastic NP					
P0904000-003.01	125mL Plastic NP					
P0904000-004.01	125mL Plastic NP					
P0904000-005.01	125mL Plastic NP					
P0904000-005.02	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0904000

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/19/09 Date opened: 11/19/09 by: MZAMORA

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P0904000-006.01	125mL Plastic NP					
P0904000-007.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

DIVIDER SHEET

ANALYTICAL DATA FOR

Hexavalent Chromium

ANALYSIS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL GW Mon 4Q09
Project Number : G486090
Sample Matrix : WATER

Service Request : P0904000
Date Collected : 11/19/09
Date Received : 11/19/09

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-17-5	P0904000-001	0.010	0.003	1	NA	11/19/09 17:10	ND	
MW-17-4	P0904000-002	0.010	0.003	1	NA	11/19/09 17:10	ND	
MW-17-3	P0904000-003	0.010	0.003	1	NA	11/19/09 17:10	ND	
MW-17-2	P0904000-004	0.010	0.003	1	NA	11/19/09 17:10	ND	
MW-17-1	P0904000-005	0.010	0.003	1	NA	11/19/09 17:10	ND	
DUPE-03-4Q09	P0904000-006	0.010	0.003	1	NA	11/19/09 17:10	ND	
EB-05-11/19/09	P0904000-007	0.010	0.003	1	NA	11/19/09 17:10	ND	
Method Blank	P0904000-MB	0.010	0.003	1	NA	11/19/09 17:10	ND	

Approved By Karen Rya Date : 11/20/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P0904000
Project:	JPL GW Mon 4Q09 / G486090	**Date Analyzed:**	11/19/09

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	0.003	ND
CCB1	0.010	0.003	ND
CCB2	0.010	0.003	ND

Approved By: Karen Ryan Date: 11/20/09

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

Service Request: P0904000
Date Analyzed: 11/19/09

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	0.0579	0.0567	98	90-110
CCV1	0.0579	0.0567	98	90-110
CCV2	0.0579	0.0577	100	90-110

Approved By: Karen Rya Date: 11/20/09

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0904000
Project Name :	JPL GW Mon 4Q09	**Date Collected :**	NA
Project Number :	G486090	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/19/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P0904000-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	0.0413	103	86-114	

Approved By Karen Rya Date : 11/20/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0904000
Project Name :	JPL GW Mon 4Q09	**Date Collected :**	11/19/09
Project Number :	G486090	**Date Received :**	11/19/09
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/19/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-17-1
Lab Code : P0904000-005MS P0904000-005DMS
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	0.0454	0.0474	91	95	80-120	4	

Approved By Karen Ryan Date : 11/20/09

Report By:SAnderson

CAS SR #P0904001

Table of Contents

Cover Letter..... 1

Case Narrative..... 2

Sample Cross-Reference..... 3

Acronym List..... 4

Chain of Custody..... 5

Internal Chain of Custody..... 6

Sample Acceptance Check Form..... 7

Hexavalent Chromium Analytical Data 8-13

Hexavalent Chromium Raw Data..... 14-26

Columbia Analytical Services™ 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

LABORATORY REPORT

November 20, 2009

David Conner
Battelle
3990 Old Town Ave., Suite C-205
San Diego, CA 92110

RE: JPL-GW-4Q09

Dear David:

Enclosed are the results of the samples submitted to our laboratory on November 19, 2009. For your reference, these analyses have been assigned our service request number P0904001.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-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. Your report contains 26 pages.

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; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. 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.

Sue Anderson

Sue Anderson
Project Manager

Client: Battelle
Project: JPL-GW-4Q09

CAS Project No: P0904001

CASE NARRATIVE

The samples were received intact under chain of custody on November 19, 2009 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 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.

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P0904001-001	MW-16	11/18/09	08:30
P0904001-002	MW-7	11/18/09	10:50
P0904001-003	MW-9	11/18/09	13:55
P0904001-004	DUPE-8-4Q09	11/18/09	13:55

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.

Billing Information:
Name Gerald Tompkins
Address 505 King Avenue
City, State, Zip Columbus, OH 43201
Phone Number 614-424-4849 Fax 614-424-3667

LABORATORY
Name Columbia Analytical
Address 2655 Park Center Dr. Suite A
Simi Valley, CA 93065
Phone 805 526-7161

Page # 1 of 1

P090480 01

Client Name	Battelle Memorial Institute	P.O. # 214375	D.O. JPL-GW-4Q09
Address	505 King Avenue	PWS # email: conner@battelle.org	DWR #
City, State, Zip	Columbus, OH 43201	Phone # ~~818 393-2865~~ 614 458-6641	Fax # 614 458-6641
		Report Attention DAVID CONNER	

Analyses Required

DATA REPORT
NEDTS FORMAT ❑
EDD ☒
EDF FORMAT ❑

Time Sampled	Date Sampled	Matrix* See Key Below	Office Use Only Lab ID Number	Sample Description	Total and type of containers **See below	TPH/E	TPH/P	NO_2, NO_3, SO_4	Pb, Mn^{+2}, Fe^{+2}	TDS, AIK	TOC	VOC* see below	Other: Cr VI (7196)	Other:	REMARKS
0830	19NOV	AQ		MW-16	1 P								X		
1050	19NOV	AQ		MW-7	1 P								X		
1355	19NOV	AQ		MW-9	1 P								X		
1355	19NOV	AQ		DUPE-8-4Q09	1 P								X		
															3°C

ADDITIONAL INSTRUCTIONS: **Specific VOC Requirements (please specify)**

D. CONNER PHONE # 619-726-7311 Level III QA/QC

	Signature	Print Name	Company	Date	Time
Relinquished by		GREG HEADINGTON	BATTELLE	19 NOV 09	1412
Received by		MARCO MENDOZA	INSIGHT	11/19/09	1431
Relinquished by		MARCO MENDOZA	INSIGHT	11/19/09	1500
Received by		AL DAVID	CAJ	11/19/09	1500
Relinquished by		AL DAVID	CAJ	11/19/09	1545
Received by		MZamora	CAS	11/19/09	1545

*Key: AQ - Aqueous SO - Soil WA - Waste OT - Other **: L- Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0904001

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P0904001-001.01					
	7196A				
		11/19/09	1558	SMO / MZAMORA	
		11/19/09	1558	P-37 / MZAMORA	
		11/19/09	1616	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	
P0904001-002.01					
	7196A				
		11/19/09	1558	SMO / MZAMORA	
		11/19/09	1558	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	
P0904001-003.01					
	7196A				
		11/19/09	1558	SMO / MZAMORA	
		11/19/09	1558	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	
P0904001-004.01					
	7196A				
		11/19/09	1558	SMO / MZAMORA	
		11/19/09	1558	P-37 / MZAMORA	
		11/19/09	1617	In Lab / SANDERSON	
		11/19/09	1740	P-37 / SANDERSON	

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0904001

Project: JPL-GW-4Q09

Sample(s) received on: 11/19/09 Date opened: 11/19/09 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	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: _____			
11	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?	☐	☐	☒
12	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?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**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
P0904001-001.01	125mL Plastic NP					
P0904001-002.01	125mL Plastic NP					
P0904001-003.01	125mL Plastic NP					
P0904001-004.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

DIVIDER SHEET

ANALYTICAL DATA FOR

Hexavalent Chromium

ANALYSIS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL-GW-4Q09
Project Number : NA
Sample Matrix : WATER

Service Request : P0904001
Date Collected : 11/18/09
Date Received : 11/19/09

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-16	P0904001-001	0.010	0.003	1	NA	11/19/09 17:10	ND	
MW-7	P0904001-002	0.010	0.003	1	NA	11/19/09 17:10	ND	
MW-9	P0904001-003	0.010	0.003	1	NA	11/19/09 17:10	ND	
DUPE-8-4Q09	P0904001-004	0.010	0.003	1	NA	11/19/09 17:10	ND	
Method Blank	P0904001-MB	0.010	0.003	1	NA	11/19/09 17:10	ND	

Approved By Karen Ryan Date : 11/20/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0904001
Date Analyzed: 11/19/09

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	0.003	ND
CCB1	0.010	0.003	ND
CCB2	0.010	0.003	ND

Approved By: Karen Ryan Date: 11/20/09

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0904001
Date Analyzed: 11/19/09

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	0.0579	0.0567	98	90-110
CCV1	0.0579	0.0567	98	90-110
CCV2	0.0579	0.0577	100	90-110

Approved By: Karen Ryan Date: 11/20/09

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0904001
Project Name :	JPL-GW-4Q09	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/19/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P0904001-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	0.0413	103	86-114	

Approved By Karen Ryan Date : 11/20/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0904001
Project Name :	JPL-GW-4Q09	**Date Collected :**	11/18/09
Project Number :	NA	**Date Received :**	11/19/09
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/19/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-16
Lab Code : P0904001-001MS P0904001-001DMS
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	0.0464	0.0464	93	93	80-120	<1	

Approved By Karen Ryan Date : 11/30/09

Report By:SAnderson

CAS SR #P0904014

Table of Contents

Cover Letter..... 1

Case Narrative..... 2

Sample Cross-Reference..... 3

Acronym List..... 4

Chain of Custody..... 5

Internal Chain of Custody..... 6

Sample Acceptance Check Form..... 7

Hexavalent Chromium Analytical Data 8-13

Hexavalent Chromium Raw Data..... 14-25

Columbia Analytical Services, Inc. 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

LABORATORY REPORT

November 25, 2009

David Conner
Battelle
3990 Old Town Ave., Suite C-205
San Diego, CA 92110

RE: JPL-GW-4Q09

Dear David:

Enclosed are the results of the sample submitted to our laboratory on November 20, 2009. For your reference, this analysis has been assigned our service request number P0904014.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-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. Your report contains 25 pages.

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; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. 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.

Sue Anderson

Sue Anderson
Project Manager

Client: Battelle
Project: JPL-GW-4Q09

CAS Project No: P0904014

CASE NARRATIVE

The sample was received intact under chain of custody on November 20, 2009 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 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.

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P0904014-001	MW-10	11/20/09	08:50

3

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.

Billing Information:

Name Gerald Tompkins
Address 505 King Avenue
City, State, Zip Columbus, OH 43201
Phone Number 614-424-4849 Fax 614-424-3667

LABORATORY

Name Columbia Analytical
Address 2655 Park Center Dr, Suite A
Simi Valley, CA 93065
Phone 805 526-7161

P0904014

Client Name **Battelle Memorial Institute**
Address **505 King Avenue**
City, State, Zip **Columbus, OH 43201**

P.O. # 214375 | D.O. SPL-GW-4Q09
PWS # email conners@ | DWR # battelle.org
Phone # ~~518 373-2308~~ | Fax # 614 458-6641
Sampled by GH/DBL | Report Attention DAVID CONNER

Analyses Required

DATA REPORT: NEDTS FORMAT ❑ EDD ✓ EDF FORMAT ❑

Time Sampled	Date Sampled	Matrix* See Key Below	Office Use Only Lab ID Number	Sample Description	Total and type of containers **See below	TPH/E	TPH/P	NO_2, NO_3, SO_4	Pb, Mn^{+2}, Fe^{+2}	TDS, AIK	TOC	VOC* see below	Other: Cr VI	Other: (7196)	REMARKS
0830	20NOV	AQ		MW-10	1 P								X		
—	20NOV	AQ		Temp Blank											
															4°C

ADDITIONAL INSTRUCTIONS: **Specific VOC Requirements (please specify)**

D. CONNER PHONE # 614-726-7311 Level III QC

	Signature	Print Name	Company	Date	Time
Relinquished by	[signature]	GREG HEADINGTON	BATTELLE	20NOV09	0930
Received by	[signature]	AL DAVID	CAS	11/20/09	1130
Relinquished by	[signature]	AL DAVID	CAS	11/20/09	1230
Received by	[signature]	[illegible]	CAS	11/20/09	1230
Relinquished by					
Received by					

*Key: AQ - Aqueous SO - Soil WA - Waste OT - Other **: L- Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0904014

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P0904014-001.01					
	7196A				
		11/20/09	1235	SMO / MZAMORA	
		11/20/09	1235	P-37 / MZAMORA	
		11/20/09	1300	In Lab / SANDERSON	
		11/20/09	1354	P-37 / SANDERSON	

6

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0904014

Project: JPL-GW-4Q09

Sample(s) received on: 11/20/09 Date opened: 11/20/09 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	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 4 °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: _____			
11	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?	☐	☐	☒
12	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?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**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
P0904014-001.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

DIVIDER SHEET

ANALYTICAL DATA FOR

Hexavalent Chromium

ANALYSIS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL-GW-4Q09
Project Number : NA
Sample Matrix : WATER

Service Request : P0904014
Date Collected : 11/20/09
Date Received : 11/20/09

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-10	P0904014-001	0.010	0.003	1	NA	11/20/09 13:25	ND	
Method Blank	P0904014-MB	0.010	0.003	1	NA	11/20/09 13:25	ND	

Approved By Karen Ryfa Date : 11/20/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P0904014
Project:	JPL-GW-4Q09	**Date Analyzed:**	11/20/09

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	0.003	ND
CCB1	0.010	0.003	ND

Approved By: Karen Ryan Date: 11/20/09

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL-GW-4Q09

Service Request: P0904014
Date Analyzed: 11/20/09

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	0.0579	0.0559	97	90-110
CCV1	0.0579	0.0559	97	90-110

Approved By: Karen Ryan Date: 11/20/09

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0904014
Project Name :	JPL-GW-4Q09	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/20/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P0904014-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	0.0395	99	86-114	

Approved By Karen Ryan Date : 11/20/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Battelle
Project Name : JPL-GW-4Q09
Project Number : NA
Sample Matrix : WATER

Service Request : P0904014
Date Collected : 11/20/09
Date Received : 11/20/09
Date Extracted : NA
Date Analyzed : 11/20/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-10
Lab Code : P0904014-001MS P0904014-001DMS
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	0.0498	0.0498	100	100	80-120	<1	

Approved By Karen Ryan Date : 11/20/09

Report By:SAnderson

CAS SR #P0904023

Table of Contents

Cover Letter..... 1

Case Narrative..... 2

Sample Cross-Reference..... 3

Acronym List..... 4

Chain of Custody..... 5

Internal Chain of Custody..... 6

Sample Acceptance Check Form..... 7-8

Hexavalent Chromium Analytical Data 9-14

Hexavalent Chromium Raw Data..... 15-26

Columbia Analytical Services™ 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

LABORATORY REPORT

November 25, 2009

David Conner
Battelle
3990 Old Town Ave., Suite C-205
San Diego, CA 92110

RE: JPL GW Mon 4Q09 / G486090

Dear David:

Enclosed are the results of the samples submitted to our laboratory on November 23, 2009. For your reference, these analyses have been assigned our service request number P0904023.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-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. Your report contains 26 pages.

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; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. 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.

Sue Anderson
Project Manager

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

CAS Project No: P0904023

CASE NARRATIVE

The samples were received intact under chain of custody on November 23, 2009 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 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.

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P0904023-001	MW-14-5	11/23/09	08:09
P0904023-002	MW-14-4	11/23/09	08:47
P0904023-003	MW-14-3	11/23/09	09:16
P0904023-004	MW-14-2	11/23/09	09:46
P0904023-005	MW-14-1	11/23/09	10:13
P0904023-006	EB-06-11/23/09	11/23/09	10:00

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

Page 1 of 1

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. 9090423

CAS Contact:

Company Name & Address (Reporting Information)	Project Name
BATTELLE 3990 OLD TOWN AVE., C-205 SAN DIEGO CA 92110	SPL GW MON 4Q09
Project Manager	**Project Number**
DAVID CANNON	G486090
Phone / **Fax**	**P.O. # / Billing Information**
(619) 726-7311	214319/BATTELLE ATTN: GERALD TOMPKINS 505 KING AVE. COLUMBUS OH 43201
Email Address for Result Reporting	**Sampler (Print & Sign)**

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 VI (7196)											Remarks
MW-14-5		11/23/09	0809	W	1							X											
MW-14-4			0847		2							X											MS/MSD
MW-14-3			0916		1							X											
MW-14-2			0946		1							X											
MW-14-1			1013		1							X											LEVEL IV QC
EB-06-11/23/09		11/23/09	1000		1							X											EQUIPMENT 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)

Relinquished by: (Signature)		Date: 11/23/09	Time: 1200	Received by: (Signature)		Date: 11/23/09	Time: 1209
Relinquished by: (Signature)		Date: 11/23/09	Time: 1257	Received by: (Signature)		Date: 11/23/09	Time: 1257
Relinquished by: (Signature)		Date: 11/23/09	Time: 1250	Received by: (Signature)		Date: 11/23/09	Time: 1250

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

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0904023

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P0904023-001.01					
	7196A				
		11/23/09	1329	SMO / MZAMORA	
		11/23/09	1330	P-37 / MZAMORA	
		11/23/09	1343	In Lab / SANDERSON	
		11/23/09	1718	P-37 / SANDERSON	
P0904023-002.01					
	7196A				
		11/23/09	1329	SMO / MZAMORA	
		11/23/09	1330	P-37 / MZAMORA	
		11/23/09	1343	In Lab / SANDERSON	
		11/23/09	1718	P-37 / SANDERSON	
P0904023-002.02					
		11/23/09	1329	SMO / MZAMORA	
		11/23/09	1330	P-37 / MZAMORA	
		11/23/09	1343	In Lab / SANDERSON	
		11/23/09	1718	P-37 / SANDERSON	
P0904023-003.01					
	7196A				
		11/23/09	1329	SMO / MZAMORA	
		11/23/09	1330	P-37 / MZAMORA	
		11/23/09	1343	In Lab / SANDERSON	
		11/23/09	1718	P-37 / SANDERSON	
P0904023-004.01					
	7196A				
		11/23/09	1329	SMO / MZAMORA	
		11/23/09	1330	P-37 / MZAMORA	
		11/23/09	1343	In Lab / SANDERSON	
		11/23/09	1718	P-37 / SANDERSON	
P0904023-005.01					
	7196A				
		11/23/09	1329	SMO / MZAMORA	
		11/23/09	1330	P-37 / MZAMORA	
		11/23/09	1343	In Lab / SANDERSON	
		11/23/09	1718	P-37 / SANDERSON	
P0904023-006.01					
	7196A				
		11/23/09	1329	SMO / MZAMORA	
		11/23/09	1330	P-37 / MZAMORA	
		11/23/09	1343	In Lab / SANDERSON	
		11/23/09	1718	P-37 / SANDERSON	

6

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0904023

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/23/09 Date opened: 11/23/09 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	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: _____			
11	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?	☐	☐	☒
12	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?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**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
P0904023-001.01	125mL Plastic NP					
P0904023-002.01	125mL Plastic NP					
P0904023-002.02	125mL Plastic NP					
P0904023-003.01	125mL Plastic NP					
P0904023-004.01	125mL Plastic NP					
P0904023-005.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0904023

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/23/09 Date opened: 11/23/09 by: MZAMORA

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P0904023-006.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12);
Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

DIVIDER SHEET

ANALYTICAL DATA FOR

Hexavalent Chromium

ANALYSIS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL GW Mon 4Q09
Project Number : G486090
Sample Matrix : WATER

Service Request : P0904023
Date Collected : 11/23/09
Date Received : 11/23/09

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-14-5	P0904023-001	0.010	0.003	1	NA	11/23/09 14:30	ND	
MW-14-4	P0904023-002	0.010	0.003	1	NA	11/23/09 14:30	ND	
MW-14-3	P0904023-003	0.010	0.003	1	NA	11/23/09 14:30	ND	
MW-14-2	P0904023-004	0.010	0.003	1	NA	11/23/09 14:30	ND	
MW-14-1	P0904023-005	0.010	0.003	1	NA	11/23/09 14:30	ND	
EB-06-11/23/09	P0904023-006	0.010	0.003	1	NA	11/23/09 14:30	ND	
Method Blank	P0904023-MB	0.010	0.003	1	NA	11/23/09 14:30	ND	

Approved By Karen Ryan Date : 11/24/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

Service Request: P0904023
Date Analyzed: 11/23/09

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	0.003	ND
CCB1	0.010	0.003	ND
CCB2	0.010	0.003	ND

Approved By: Karen Ryan Date: 11/24/09

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

Service Request: P0904023
Date Analyzed: 11/23/09

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	0.0579	0.0572	99	90-110
CCV1	0.0579	0.0572	99	90-110
CCV2	0.0579	0.0572	99	90-110

Approved By: Karen Ryan Date: 11/24/09

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0904023
Project Name :	JPL GW Mon 4Q09	**Date Collected :**	NA
Project Number :	G486090	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/23/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P0904023-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	0.0374	94	86-114	

Approved By Karen Rya Date : 11/24/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0904023
Project Name :	JPL GW Mon 4Q09	**Date Collected :**	11/23/09
Project Number :	G486090	**Date Received :**	11/23/09
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/23/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-14-4
Lab Code : P0904023-002MS P0904023-002DMS
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	0.0499	0.0499	100	100	80-120	<1	

Approved By Karen Ryan Date : 11/24/09

Report By:SAnderson

Columbia Analytical Services, Inc. 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

CAS SR #P0904048

Table of Contents

Cover Letter..... 1

Case Narrative..... 2

Sample Cross-Reference..... 3

Acronym List..... 4

Chain of Custody..... 5

Internal Chain of Custody..... 6

Sample Acceptance Check Form..... 7-8

Hexavalent Chromium Analytical Data 9-14

Hexavalent Chromium Raw Data..... 15-26

Columbia Analytical Services, Inc. 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

LABORATORY REPORT

November 25, 2009

David Conner
Battelle
3990 Old Town Ave., Suite C-205
San Diego, CA 92110

RE: JPL GW Mon 4Q09 / G486090

Dear David:

Enclosed are the results of the samples submitted to our laboratory on November 24, 2009. For your reference, these analyses have been assigned our service request number P0904048.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-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. Your report contains 26 pages.

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; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. 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.

Sue Anderson
Project Manager

Client: Battelle CAS Project No: P0904048
Project: JPL GW Mon 4Q09 / G486090

CASE NARRATIVE

The samples were received intact under chain of custody on November 24, 2009 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 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.

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0904048

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P0904048-001	MW-22-5	11/24/09	08:10
P0904048-002	MW-22-4	11/24/09	08:38
P0904048-003	MW-22-3	11/24/09	09:00
P0904048-004	MW-22-2	11/24/09	09:22
P0904048-005	MW-22-1	11/24/09	09:47
P0904048-006	DUPE-04-4Q09	11/24/09	00:00
P0904048-007	EB-07-11/24/09	11/24/09	09:37

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

Page 1 of 1

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: 109 04048

CAS Contact:

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

Project Name: JPL GW MON 4Q09

Project Number: G486090

Project Manager: DAVID CONNER

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

Phone: (619) 726-7311

Fax:

Email Address for Result Reporting:

Sampler (Print & Sign):

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 VI (7196)	Remarks
MW-22-5	1	11/24/09	0810	W	1						X	
MW-22-4	2		0838		1						X	
MW-22-3	3		0900		1						X	
MW-22-2	4		0922		1						X	
MW-22-1	5		0947		1						X	
DUPE-04-4Q09	6	11/24/09	"		1						X	DUPLICATE
EB-07-11/24/09	7	11/24/09	0937		1						X	EQUIPMENT 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)	11/24/09	1130	Received by: (Signature)	11/24/09	1130
Relinquished by: (Signature)	11/24/09	1134	Received by: (Signature)	11/24/09	1134
Relinquished by: (Signature)	11/24/09	1221	Received by: (Signature)	11/24/09	1221

Cooler / Blank / Ice / No Ice

Temperature 2 °C

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0904048

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P0904048-001.01					
	7196A				
		11/24/09	1251	SMO / SSTAPLES	
		11/24/09	1251	P-37 / SSTAPLES	
		11/24/09	1259	P-37 / SSTAPLES	
		11/24/09	1312	In Lab / SANDERSON	
P0904048-002.01					
	7196A				
		11/24/09	1251	SMO / SSTAPLES	
		11/24/09	1251	P-37 / SSTAPLES	
		11/24/09	1259	P-37 / SSTAPLES	
		11/24/09	1312	In Lab / SANDERSON	
P0904048-003.01					
	7196A				
		11/24/09	1251	SMO / SSTAPLES	
		11/24/09	1251	P-37 / SSTAPLES	
		11/24/09	1259	P-37 / SSTAPLES	
		11/24/09	1312	In Lab / SANDERSON	
P0904048-004.01					
	7196A				
		11/24/09	1251	SMO / SSTAPLES	
		11/24/09	1251	P-37 / SSTAPLES	
		11/24/09	1259	P-37 / SSTAPLES	
		11/24/09	1312	In Lab / SANDERSON	
P0904048-005.01					
	7196A				
		11/24/09	1251	SMO / SSTAPLES	
		11/24/09	1251	P-37 / SSTAPLES	
		11/24/09	1259	P-37 / SSTAPLES	
		11/24/09	1312	In Lab / SANDERSON	
P0904048-006.01					
	7196A				
		11/24/09	1251	SMO / SSTAPLES	
		11/24/09	1251	P-37 / SSTAPLES	
		11/24/09	1259	P-37 / SSTAPLES	
		11/24/09	1312	In Lab / SANDERSON	
P0904048-007.01					
	7196A				
		11/24/09	1251	SMO / SSTAPLES	
		11/24/09	1251	P-37 / SSTAPLES	
		11/24/09	1259	P-37 / SSTAPLES	
		11/24/09	1312	In Lab / SANDERSON	

6

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0904048

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/24/09 Date opened: 11/24/09 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	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 2 °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: _____			
11	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?	☐	☐	☒
12	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?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**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
P0904048-001.01	125mL Plastic NP					
P0904048-002.01	125mL Plastic NP					
P0904048-003.01	125mL Plastic NP					
P0904048-004.01	125mL Plastic NP					
P0904048-005.01	125mL Plastic NP					
P0904048-006.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0904048

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/24/09 Date opened: 11/24/09 by: SSTAPLES

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P0904048-007.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

DIVIDER SHEET

ANALYTICAL DATA FOR

Hexavalent Chromium

ANALYSIS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Battelle
Project Name : JPL GW Mon 4Q09
Project Number : G486090
Sample Matrix : WATER

Service Request : P0904048
Date Collected : 11/24/09
Date Received : 11/24/09

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-22-5	P0904048-001	0.010	0.003	1	NA	11/24/09 15:25	ND	
MW-22-4	P0904048-002	0.010	0.003	1	NA	11/24/09 15:25	ND	
MW-22-3	P0904048-003	0.010	0.003	1	NA	11/24/09 15:25	ND	
MW-22-2	P0904048-004	0.010	0.003	1	NA	11/24/09 15:25	ND	
MW-22-1	P0904048-005	0.010	0.003	1	NA	11/24/09 15:25	ND	
DUPE-04-4Q09	P0904048-006	0.010	0.003	1	NA	11/24/09 15:25	ND	
EB-07-11/24/09	P0904048-007	0.010	0.003	1	NA	11/24/09 15:25	ND	
Method Blank	P0904048-MB	0.010	0.003	1	NA	11/24/09 15:25	ND	

Approved By Karen Ryan Date : 11/25/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Battelle	**Service Request:**	P0904048
Project:	JPL GW Mon 4Q09 / G486090	**Date Analyzed:**	11/24/09

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	0.003	ND
CCB1	0.010	0.003	ND
CCB2	0.010	0.003	ND

Approved By: Karen Ryan Date: 11/25/09

ICCBMDL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

Service Request: P0904048
Date Analyzed: 11/24/09

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	0.0579	0.0583	101	90-110
CCV1	0.0579	0.0583	101	90-110
CCV2	0.0579	0.0583	101	90-110

Approved By: Karen Ryan Date: 11/25/09

CCV1A/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0904048
Project Name :	JPL GW Mon 4Q09	**Date Collected :**	NA
Project Number :	G486090	**Date Received :**	NA
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/24/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	mg/L (ppm)
Lab Code :	P0904048-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	0.0405	101	86-114	

Approved By Karen Rya Date : 11/25/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Battelle	**Service Request :**	P0904048
Project Name :	JPL GW Mon 4Q09	**Date Collected :**	11/24/09
Project Number :	G486090	**Date Received :**	11/24/09
Sample Matrix :	WATER	**Date Extracted :**	NA
		Date Analyzed :	11/24/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : MW-22-5 Units : mg/L (ppm)
Lab Code : P0904048-001MS P0904048-001DMS 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	0.0437	0.0437	87	87	80-120	<1	

Approved By Karen Ryan Date : 11/25/09

Report By:SAnderson

CAS SR #P0904091

Table of Contents

Cover Letter..... 1

Case Narrative..... 2

Sample Cross-Reference..... 3

Acronym List..... 4

Chain of Custody..... 5

Internal Chain of Custody..... 6-7

Sample Acceptance Check Form..... 8-9

Hexavalent Chromium Analytical Data 10-15

Hexavalent Chromium Raw Data..... 16-27

Columbia Analytical Services, Inc. 2655 Park Center Drive, Suite A | Simi Valley, CA 93065 | 805.526.7161 | 805.526.7270 fax | www.caslab.com

LABORATORY REPORT

December 1, 2009

David Conner
Battelle
3990 Old Town Ave., Suite C-205
San Diego, CA 92110

RE: JPL GW Mon 4Q09 / G486090

Dear David:

Enclosed are the results of the samples submitted to our laboratory on November 30, 2009. For your reference, these analyses have been assigned our service request number P0904091.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-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. Your report contains 27 pages.

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; Department of the Navy (NFESC); Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. 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.

Sue Anderson
Project Manager

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

CAS Project No: P0904091

CASE NARRATIVE

The samples were received intact under chain of custody on November 30, 2009 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 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.

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0904091

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P0904091-001	MW-4-5	11/30/09	08:31
P0904091-002	MW-4-4	11/30/09	08:56
P0904091-003	MW-4-3	11/30/09	09:28
P0904091-004	MW-4-2	11/30/09	09:57
P0904091-005	MW-4-1	11/30/09	10:38
P0904091-006	DUPE-05-4Q09	11/30/09	00:00
P0904091-007	EB-08-11/30/09	11/30/09	10:18

3

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

Page 1 of 1

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. 9090409 41

CAS Contact:

Company Name & Address (Reporting Information)	Project Name
BATTELLE 3990 OLD TOWN AVE. C-205 SAN DIEGO CA 92110	JPL GW MON 4Q09
Project Manager	**Project Number**
DAVID CONNER	64860 90
Phone / **Fax**	**P.O. # / Billing Information**
(619) 726-7311	214319 / BATTELLE ATTN: GERALD TOMPKINS 505 KING AVE. COLUMBUS OH 43201
Email Address for Result Reporting	**Sampler (Print & Sign)**

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
												CrIII (4196)												
MW-4-5	1	11/30/09	0831	W	1							X												
MW-4-4	2	"	0856	"	1							X												QC LEVEL IV
MW-4-3	3	"	0928	"	1							X												
MW-4-2	4	"	0957	"	1							X												
MW-4-1	5	"	1038	"	2							X												MS/MSD
	6																							
DUPE-05-4Q09	7	"	—	"	1							X												DUPLICATE
EB-05-11/30/09	8	"	1018	"	1							X												EQUIPMENT 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)

Relinquished by: (Signature)	Date: 11/30/09	Time: 1200	Received by: (Signature)	Date: 12/2/09	Time: 1200
Relinquished by: (Signature)	Date: 12/2/09	Time: 1241	Received by: (Signature)	Date: 12/2/09	Time: 1245
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Cooler / Blank / Ice / No Ice

Temperature 3°C °C

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0904091

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
P0904091-001.01					
	7196A				
		11/30/09	1249	SMO / MZAMORA	
		11/30/09	1250	P-04 / MZAMORA	
		11/30/09	1255	P-37 / MZAMORA	
		11/30/09	1319	In Lab / SANDERSON	
		12/1/09	0849	P-37 / SANDERSON	
P0904091-002.01					
	7196A				
		11/30/09	1249	SMO / MZAMORA	
		11/30/09	1250	P-04 / MZAMORA	
		11/30/09	1255	P-37 / MZAMORA	
		11/30/09	1319	In Lab / SANDERSON	
		12/1/09	0849	P-37 / SANDERSON	
P0904091-003.01					
	7196A				
		11/30/09	1249	SMO / MZAMORA	
		11/30/09	1250	P-04 / MZAMORA	
		11/30/09	1255	P-37 / MZAMORA	
		11/30/09	1319	In Lab / SANDERSON	
		12/1/09	0849	P-37 / SANDERSON	
P0904091-004.01					
	7196A				
		11/30/09	1249	SMO / MZAMORA	
		11/30/09	1250	P-04 / MZAMORA	
		11/30/09	1255	P-37 / MZAMORA	
		11/30/09	1319	In Lab / SANDERSON	
		12/1/09	0849	P-37 / SANDERSON	
P0904091-005.01					
	7196A				
		11/30/09	1249	SMO / MZAMORA	
		11/30/09	1250	P-04 / MZAMORA	
		11/30/09	1255	P-37 / MZAMORA	
		11/30/09	1319	In Lab / SANDERSON	
		12/1/09	0849	P-37 / SANDERSON	
P0904091-005.02					
		11/30/09	1249	SMO / MZAMORA	
		11/30/09	1250	P-04 / MZAMORA	
		11/30/09	1255	P-37 / MZAMORA	
		11/30/09	1319	In Lab / SANDERSON	
		12/1/09	0849	P-37 / SANDERSON	
P0904091-006.01					
	7196A				

6

Columbia Analytical Services, Inc.
Chain of Custody Report

Client: Battelle
Project: JPL GW Mon 4Q09/G486090

Service Request: P0904091

Bottle ID	Tests	Date	Time	Sample Location / User	Disposed On
		11/30/09	1249	SMO / MZAMORA	
		11/30/09	1250	P-04 / MZAMORA	
		11/30/09	1255	P-37 / MZAMORA	
		11/30/09	1319	In Lab / SANDERSON	
		12/1/09	0849	P-37 / SANDERSON *	
P0904091-007.01					
	7196A				
		11/30/09	1249	SMO / MZAMORA	
		11/30/09	1250	P-04 / MZAMORA	
		11/30/09	1255	P-37 / MZAMORA	
		11/30/09	1319	In Lab / SANDERSON	
		12/1/09	0849	P-37 / SANDERSON *	

* NOTE: ALL BOTTLES PLACED IN P-37 11/30/09 @ 1600. COULD NOT SCAN IN LIMS DUE TO COMPUTER ISSUE. SM 12/1/09

7

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0904091

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/30/09 Date opened: 11/30/09 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	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature _____ °C Blank Temperature 3 °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: _____			
11	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?	☐	☐	☒
12	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?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**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
P0904091-001.01	125mL Plastic NP					
P0904091-002.01	125mL Plastic NP					
P0904091-003.01	125mL Plastic NP					
P0904091-004.01	125mL Plastic NP					
P0904091-005.01	125mL Plastic NP					
P0904091-005.02	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide NaOH (pH>12); T. Sulfide NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Battelle Work order: P0904091

Project: JPL GW Mon 4Q09 / G486090

Sample(s) received on: 11/30/09 Date opened: 11/30/09 by: MZAMORA

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P0904091-006.01	125mL Plastic NP					
P0904091-007.01	125mL Plastic NP					

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

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12);
Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

DIVIDER SHEET

ANALYTICAL DATA FOR

Hexavalent Chromium

ANALYSIS

Analytical Report

Client : Battelle
Project Name : JPL GW Mon 4Q09
Project Number : G486090
Sample Matrix : WATER

Service Request : P0904091
Date Collected : 11/30/09
Date Received : 11/30/09

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-4-5	P0904091-001	0.010	0.003	1	NA	11/30/09 15:00	ND	
MW-4-4	P0904091-002	0.010	0.003	1	NA	11/30/09 15:00	ND	
MW-4-3	P0904091-003	0.010	0.003	1	NA	11/30/09 15:00	ND	
MW-4-2	P0904091-004	0.010	0.003	1	NA	11/30/09 15:00	ND	
MW-4-1	P0904091-005	0.010	0.003	1	NA	11/30/09 15:00	ND	
DUPE-05-4Q09	P0904091-006	0.010	0.003	1	NA	11/30/09 15:00	ND	
EB-08-11/30/09	P0904091-007	0.010	0.003	1	NA	11/30/09 15:00	ND	
Method Blank	P0904091-MB	0.010	0.003	1	NA	11/30/09 15:00	ND	

Approved By Karen Ryan Date : 12/1/09

Report By:SAnderson

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle
Project: JPL GW Mon 4Q09 / G486090

Service Request: P0904091
Date Analyzed: 11/30/09

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	0.003	ND
CCB1	0.010	0.003	ND
CCB2	0.010	0.003	ND

Approved By: Karen Ryan Date: 12/1/09

ICCBMDL/120594