

RECEIVED NOVEMBER 5, 2008

Fluor Hanford  
 WSCF Analytical Lab  
 P.O. Box 1000  
 Richland, Washington 99352  
 Telephone 373-7495  
 Telefax 372-0456

**FLUOR**<sup>®</sup>

M4W41-SLF-08-1218

November 5, 2008

Mr. M. A. Neely, Manager  
 CH2M HILL  
 Plateau Remediation Contract  
 1933 Jadwin MSIN B6-06  
 Richland, WA 99352

Dear Mike:

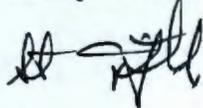
FINAL RESULTS FOR SAMPLE DELIVERY GROUP WSCF20082024 – SAF NUMBER F08-148

- Reference: (1) Memorandum of Agreement #MOA-FH-CHPRC-2008, Rev. 0, for the Performance & Payment of Services, dated October 1, 2008
- (2) HNF-SD-CD-QAPP-017, Rev. 9, Waste Sampling & Characterization Facility Quality Assurance Plan

This letter contains the following attachments for sample delivery group WSCF20082024:

- Cover Sheet (Attachment 1)
- Narrative (Attachment 2)
- Analytical Results (Attachment 3)
- Sample Receipt Information (Attachment 4)

SLF/grf



Attachments 4

cc: w/Attachments

T. F. Dale	S3-30	J. E. Trechter	S3-30
A. J. Kopriva	S3-30	S. J. Trent	B6-06
H. K. Meznarich	S3-30	File/LB	
P. D. Mix	S3-30		

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ATTACHMENT 1

**COVER SHEET**

Consisting of 2 pages  
Including cover page

## WSCF SAF NUMBER CROSS REFERENCE

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Group#: WSCF20082024  
Data Deliverable Date: 03-nov-2008  
Data Deliverable: Cover Sheet

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SAF#	Sample ID	WSCF#	Matrix
F08-148	B1WMK2	W08GR03788	SOIL

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M4W41-SLF-08-1218

ATTACHMENT 2

**NARRATIVE**

Consisting of 4 pages  
Including cover page

### Introduction

One (1) S&GRP sample was received at the WSCF Laboratory on September 19, 2008. This sample was analyzed at the WSCF Laboratory for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Memorandum of Agreement (MOA-FH-CHPRC-2008, Rev.0)*, referenced in the cover letter.

The narrative (Attachment 2) will address sample characteristics, analyses requested and general information in performance of the analytical methods. A Data Summary Report (Attachment 3) includes analytical results, a comment report detailing method abnormalities, tentatively identified peaks if applicable, method references, and Laboratory QC information as applicable. Copies of the chain of custody and sample receipt documentation are included as Attachment 4.

It should be noted that the attached chain of custody was stamped "ICED" by the WSCF Laboratory Sample Custodian during sample receiving, indicating the presence of ice in the sample container.

### Analytical Methodology for Requested Analyses

Refer to *WSCF Method References Report*, pages 13 through 15, for a complete listing of approved analytical methods.

**Anions** – Hold time requirements for this analysis were met. A Duplicate, Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. See page 17 for QC details. Analytical Note(s):

- Sample results were D flagged if dilution(s) were required.
- Sample results that were less than 5X the method detection limit, however greater than the method detection limit were B flagged.
- Matrix Spike, Matrix Spike Duplicate and Sample Duplicate analyzed on sample B1WMD9 (SDG 20081959, SAF# F08-148).

All QC controls are within the established limits.

**Hexavalent Chromium** – The hold time requirement for this analysis was met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. See page 18 for QC details. Analytical Note(s):

- Duplicate, Matrix Spike, Matrix Spike Duplicate were analyzed on sample# B1WMY4 (SDG# 20082029, SAF# F08-148).
- QC Sample B1WMY4: The Matrix Spike and Matrix Spike Duplicate recovery did not meet the laboratory established required of 75% at 70.7% and 74.4% respectively.
- All other QC controls are within the established limits.

**ICP-AES Metals** – The hold time requirement for this analysis was met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. See page 19 for QC details. Analytical Note(s):

- Sample results were D flagged if dilution(s) were required.
- Sample results that were less than 5x the method detection limit, however greater than the method detection limit were B flagged.
- Matrix Spike and Matrix Spike Duplicate were analyzed on sample# B1WMJ3 (SDG# 20081975, SAF# F08-148)
- Iron – Sample concentrations exceeded spiking levels by a factor of 4. Matrix Spike and Matrix Spike Duplicate recoveries exceeded established laboratory limits. Spike recoveries are not valid.
- Check standard was analyzed to ensure linearity, because the sample results exceeded the calibration standard.

All other QC controls are within the established limits.

**ICP-MS Metals** – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. See page 20 for QC details. Analytical Note(s):

- Matrix Spike, Matrix Spike Duplicate and Sample Duplicate analyzed on sample B1WMJ0 (SDG 20081975, SAF F08-148).
- Chromium and Manganese – RPD values did not meet the laboratory established limit. The MS/MSD and LCS percent recoveries for these analytes met the laboratory established limit. The data were accepted based on the acceptable spike recoveries. In addition, the non-homogenous nature of soil may have affected the RPD value.

All other QC controls are within the established limits.

**Total Solids** – analyzed for organic moisture correction.

#### **Organic Comments**

**TPHD-WA** – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. See page 23 for QC details. Analytical Note(s):

- Matrix Spike and Matrix Spike Duplicate were analyzed on sample# B1WMY4, SDG 20082029, SAF# F08-148).

All QC controls are within the established limits.

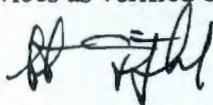
**Radiochemistry Comments**

**Rad Chem** – There are no hold times associated with WSCF’s radiochemical methods. A Duplicate, Matrix Spike (*Matrix Spikes apply only to Neptunium, Technetium & Tritium and Matrix Spike Duplicate applies to Neptunium*), Blank and Laboratory Control Sample were analyzed with this delivery group. See pages 26 through 28 for QC details. Analytical Note(s):

- Tc-99: Matrix Spike and Duplicate was analyzed on sample# B1WPP3 (SDG# 20082022, SAF# F08-147).
- Uranium Isotopic Analysis: Duplicate was analyzed on sample# B1WMK2 (SDG# 20082024 SAF# F08-148).
- Uranium Isotopic Analysis (QC Batch B1WMK2): The Duplicate RPD value for U-234 and U-235 did not meet the established limit for the laboratory. The sample is a low level sample and RPD values do not apply to low level samples. In addition, we attributed the difference in the duplicate results to the non-homogenous nature of soil.

All other QC controls are within the established limits.

I certify that this data package is in compliance with the MOA, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Analytical Manager and Client Services as verified by the following signatures.



Scot L. Fitzgerald  
WSCF Analytical Laboratory Manager



Andrew J. Kopriva  
WSCF Client Services

M4W41-SLF-08-1218

ATTACHMENT 3

**ANALYTICAL RESULTS**

Consisting of 22 pages  
Including cover page

**WSCF  
ANALYTICAL RESULTS REPORT**

for

**Groundwater Remediation Program**

**Richland, WA 99354**

**Attention: Steve Trent**

Analytical:

*S. Fitzgerald 11/5/08*

Client Services:

*A. Kopriva 11/5/08*

*All results are reported on an "as received" basis unless otherwise noted in the comment section.*

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Contract#: FH-EIS-2003-MEM-001

Report#: WSCF20082024

Report Date: 4-nov-2008

Report WGPP/ver. 5.2

Groundwater Remediation Program

Department: Inorganic

W13q Worklist/Batch/QC Report for Group# WSCF20082024

WL#	S#	Batch	QC#	Tray Type	Sample#	Test
				SAMPLE	W08GR03788	Percent Solids
38244	2	38663	43100	BLANK		Anions by Ion Chromatography
38244	17	38663	43100	BLANK		Anions by Ion Chromatography
38244	3	38663	43100	LCS		Anions by Ion Chromatography
38244	5	38663	43100	DUP	W08GR03514	Anions by Ion Chromatography
38244	6	38663	43100	MS	W08GR03514	Anions by Ion Chromatography
38244	7	38663	43100	MSD	W08GR03514	Anions by Ion Chromatography
38244	7	38663	43100	SPK-RPD	W08GR03514	Anions by Ion Chromatography
38244	16	38663	43100	SAMPLE	W08GR03788	Anions by Ion Chromatography
38273	2	38694	43131	BLNK-PREP		Hexavalent chromium
38273	3	38694	43131	LCS		Hexavalent chromium
38273	12	38694	43131	SAMPLE	W08GR03788	Hexavalent chromium
38273	5	38694	43131	DUP	W08GR03793	Hexavalent chromium
38273	6	38694	43131	MS	W08GR03793	Hexavalent chromium
38273	7	38694	43131	MSD	W08GR03793	Hexavalent chromium
38273	8	38694	43131	SPK-POST	W08GR03793	Hexavalent chromium
38273	7	38694	43131	SPK-RPD	W08GR03793	Hexavalent chromium
38302	1	38722	43155	BLANK		ICP-200.8 MS All possible meta
38302	2	38722	43155	LCS		ICP-200.8 MS All possible meta
38302	4	38722	43155	MS	W08GR03700	ICP-200.8 MS All possible meta
38302	5	38722	43155	MSD	W08GR03700	ICP-200.8 MS All possible meta
38302	5	38722	43155	SPK-RPD	W08GR03700	ICP-200.8 MS All possible meta
38302	10	38722	43155	SAMPLE	W08GR03788	ICP-200.8 MS All possible meta
38298	1	38718	43192	BLANK		ICP Metals Analysis, Grd H20 P
38298	2	38718	43192	LCS		ICP Metals Analysis, Grd H20 P
38298	4	38718	43192	MS	W08GR03701	ICP Metals Analysis, Grd H20 P
38298	5	38718	43192	MSD	W08GR03701	ICP Metals Analysis, Grd H20 P
38298	5	38718	43192	SPK-RPD	W08GR03701	ICP Metals Analysis, Grd H20 P
38298	8	38718	43192	SAMPLE	W08GR03788	ICP Metals Analysis, Grd H20 P

Department: Organic

W13q Worklist/Batch/QC Report for Group# WSCF20082024

WL#	S#	Batch	QC#	Tray Type	Sample#	Test
			43343	BLANK		NWTPH-D TPH Diesel Range (Wa)
			43343	LCS		NWTPH-D TPH Diesel Range (Wa)
			43343	SAMPLE	W08GR03788	NWTPH-D TPH Diesel Range (Wa)
			43343	SURR	W08GR03788	NWTPH-D TPH Diesel Range (Wa)
			43343	MS	W08GR03793	NWTPH-D TPH Diesel Range (Wa)
			43343	MSD	W08GR03793	NWTPH-D TPH Diesel Range (Wa)
			43343	SPK-RPD	W08GR03793	NWTPH-D TPH Diesel Range (Wa)

## W13q Worklist/Batch/QC Report for Group# WSCF20082024

WL#	S#	Batch	QC#	Tray Type	Sample#	Test
38162	1	38589	43199	BLANK		TC99 by Liquid Scin.
38162	2	38589	43199	LCS		TC99 by Liquid Scin.
38162	4	38589	43199	DUP	W08GR03785	TC99 by Liquid Scin.
38162	3	38589	43199	MS	W08GR03785	TC99 by Liquid Scin.
38162	7	38589	43199	SAMPLE	W08GR03788	TC99 by Liquid Scin.
38278	1	38699	43211	BLANK		Strontium 89/90
38278	2	38699	43211	LCS		Strontium 89/90
38278	3	38699	43211	DUP	W08GR03788	Strontium 89/90
38278	4	38699	43211	SAMPLE	W08GR03788	Strontium 89/90
38278	5	38699	43211	SURR	W08GR03788	Strontium 89/90
38456	1	38877	43378	BLANK		Uranium Isotopics by AEA
38456	2	38877	43378	LCS		Uranium Isotopics by AEA
38456	3	38877	43378	DUP	W08GR03788	Uranium Isotopics by AEA
38456	4	38877	43378	SAMPLE	W08GR03788	Uranium Isotopics by AEA
38456	5	38877	43378	SURR	W08GR03788	Uranium Isotopics by AEA

# WSCF

## METHOD REFERENCES REPORT

Department: Inorganic

The results provided in this report were generated using the following WSCF Laboratory procedures. For your convenience, this table provides a listing of the regulatory or industry methods that are referenced by each of these WSCF procedures. Please note that the most recent version of the regulatory or industry method is listed here even though the WSCF procedure may reference an older version of the method. Also, a reference to a regulatory or industry method here does not necessarily indicate a verbatim implementation of that method.

<b>LA-265-403</b>	<b>LA-265-403: Hexavalent Chromium analysis by Spectrophotometer</b> EPA SW-846 7196A      HEXAVALENT CHROMIUM HEIS 7196_CR6      Hexavalent Chromium
<b>LA-505-411</b>	<b>LA-505-411: ELEMENTAL ANALYSIS BY INDUCTIVELY COUPLED PLASMA ATOMIC EMISSION SPE</b> HEIS 6010_METALS_ICP      Inductively Coupled Plasma-Atomic Emission Spectrometry
<b>LA-505-412</b>	<b>LA-505-412: DETERMINATION OF TRACE ELEMENTS IN WATERS AND WASTES BY INDUCTIVELY</b> EPA-600/R-94-111 200.8      DETERMINATION OF TRACE ELEMENTS IN WATERS AND WASTES BY INDUCTIVELY COUPLED PLAS HEIS 200.8_METALS_ICPMS      Inductively Coupled Plasma - Mass Spectrometry HEIS RADISOTOPES_ICPMS      Radioisotopes by ICP/MS
<b>LA-519-412</b>	<b>LA-519-412: TOTAL RESIDUE/% SOLIDS DRIED AT 103 - 105 C</b> EPA-600/4-79-020 160.1      Residual, Filterable EPA-600/4-79-020 160.3      RESIDUE, TOTAL HEIS 160.1_TDS      Residual, Filterable Standard Methods 2540B      Total Solids Dried at 103-105 C
<b>LA-533-410</b>	<b>LA-533-410: ANION ANALYSIS BY ION CHROMATOGRAPHY</b> EPA-600/R-94-111 300.0      DETERMINATION OF INORGANIC ANIONS BY ION CHROMATOGRAPHY HEIS 300.0_ANIONS_IC      Determination of Inorganic Anions by Ion Chromatography

Note: A complete list of WSCF analytical procedures and referenced regulatory or industry methods is available online at <http://www2.rl.gov/phmc/as-dol>.

Report Date: 4-nov-2008  
Report#: WSCF20082024  
Report WGPPM/5.2

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# WSCF

## METHOD REFERENCES REPORT

Department: Organic

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The results provided in this report were generated using the following WSCF Laboratory procedures. For your convenience, this table provides a listing of the regulatory or industry methods that are referenced by each of these WSCF procedures. Please note that the most recent version of the regulatory or industry method is listed here even though the WSCF procedure may reference an older version of the method. Also, a reference to a regulatory or industry method here does not necessarily indicate a verbatim implementation of that method.

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LA-523-493	NWTPH-Diesel and/or Gasoline	
	HEIS WTPH_DIESEL (HEIS)	Total Petroleum Hydrocarbons in Diesel
	WDOE TPHD	Total Petroleum Hydrocarbons in Diesel

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Note: A complete list of WSCF analytical procedures and referenced regulatory or industry methods is available online at <http://www2.rl.gov/phmc/as-dol>.

Report Date: 4-nov-2008  
Report#: WSCF20082024  
Report WGPPM/5.2

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# WSCF

## METHOD REFERENCES REPORT

Department: Radiochemistry

The results provided in this report were generated using the following WSCF Laboratory procedures. For your convenience, this table provides a listing of the regulatory or industry methods that are referenced by each of these WSCF procedures. Please note that the most recent version of the regulatory or industry method is listed here even though the WSCF procedure may reference an older version of the method. Also, a reference to a regulatory or industry method here does not necessarily indicate a verbatim implementation of that method.

<b>LA-508-415</b>	<b>LA-508-415: OPERATION OF THE PROTEAN 2-INCH ALPHA/BETA COUNTING SYSTEM FOR GROSS</b>
<b>HEIS ALPHA_GPC</b>	GROSS ALPHA GPC
<b>HEIS BETA_GPC</b>	GROSS BETA GPC
<b>HEIS SRTOT_SEP_PRECIP_GPC</b>	Plutonium 89/90
<b>LA-508-421</b>	<b>LA-508-421: OPERATION OF THE TRI-CARB MODEL 2500TR LIQUID SCINTILLATION ANALYZER</b>
<b>HEIS ALPHA_LSC</b>	A/B Liquid Scintillation
<b>HEIS BETA_LSC</b>	A/B Liquid Scintillation
<b>HEIS TC99_3MDSK_LSC</b>	TC99 by Liquid Scintillation
<b>HEIS TRITIUM_EIE_LSC</b>	Tritium Liquid Scintillation
<b>LA-508-471</b>	<b>LA-508-471: ALPHA ENERGY ANALYZER DATA ACQUISITION AND SYSTEM CHECKOUT USING ALP</b>
<b>HEIS PUIISO_IE_PRECIP_AEA</b>	Plutonium by Alpha Energy Analysis
<b>HEIS RAISO_AEA</b>	Radium-226

Note: A complete list of WSCF analytical procedures and referenced regulatory or industry methods is available online at <http://www2.rl.gov/phmc/as-dol>.

Report Date: 4-nov-2008

Report #: WSCF20082024

Report WGPPM/5.2

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# WSCF ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent  
**SAF Number:** F08-148  
**Sample #** W08GR03788  
**Client ID:** B1WMK2

TRENT  
WSCF

**Matrix:** SOIL

**Group #:** WSCF20082024  
**Department:** Inorganic  
**Sampled:** 09/19/08  
**Received:** 09/19/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Anions by Ion Chromatography Prep</b>											
<b>Anions by Ion Chromatography</b>											
Nitrogen in Nitrate	NO3-N	LA-533-410	BD	0.366	mg/kg			49.00	0.24		09/29/08
<b>Hexavalent Chromium Prep</b>											
<b>Hexavalent Chromium</b>											
Hexavalent Chromium	18540-29-9	LA-265-403	U	< 0.300	mg/kg			1.00	0.30		10/02/08
<b>ICP Metals Analysis, Grd H2O P Prep</b>											
<b>ICP Metals Analysis, Grd H2O P</b>											
Iron	7439-89-6	LA-505-411		1.23e+04	mg/kg			1.01e+002	2.5		10/06/08
<b>ICP-200.8 MS All possible meta Prep</b>											
<b>ICP-200.8 MS All possible meta</b>											
Manganese	7439-96-5	LA-505-412		256	mg/kg			0.95	0.0955		10/01/08
Chromium	7440-47-3	LA-505-412		139	mg/kg			0.95	0.477		10/01/08
Arsenic	7440-38-2	LA-505-412		1.31	mg/kg			0.95	0.382		10/01/08
<b>Total solids</b>											
Total solids	TS	LA-519-412		97.0	Percent			1.00	0.0		09/29/08

**MDL=Minimum Detection Limit**

**RQ=Result Qualifier**

**TP Err=Total Propagated Error**

**DF=Dilution Factor**

B - The analyte < the RDL but > = the IDL/MDL (inorg)

U - Analyzed for but not detected above limiting criteria(inorg)

D - Analyte was identified at a secondary dilution factor(inorg)

U - Analyzed for but not detected above limiting criteria.(org)

\* - Indicates results that have NOT been validated;

+ - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2

Groundwater Remediation Program

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# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20082024  
 Matrix: SOLID  
 Test: Anions by Ion Chromatography

Sample Date: 08/27/08  
 Receive Date: 08/27/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08GR03514</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Nitrogen in Nitrate	NO3-N	0.4087		RPD			6.647	20.000		09/29/08
MS	Nitrogen in Nitrate	NO3-N	0.428146	95.144	% Recov	80.000	120.000				09/29/08
MSD	Nitrogen in Nitrate	NO3-N	0.43193	95.984	% Recov	80.000	120.000				09/29/08
SPK-RPD	Nitrogen in Nitrate	NO3-N	95.984		RPD			0.879	20.000		09/29/08
<b>BATCH QC</b>											
BLANK	Nitrogen in Nitrate	NO3-N	<5e-3	n/a	mg/L	0.000	0.040			U	09/29/08
BLANK	Nitrogen in Nitrate	NO3-N	<5e-3	n/a	mg/L	0.000	0.040			U	09/29/08
LCS	Nitrogen in Nitrate	NO3-N	92.9343	103.146	% Recov	80.000	120.000				09/29/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20082024  
 Matrix: SOLID  
 Test: Hexavalent chromium

Sample Date: 09/19/08  
 Receive Date: 09/21/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08GR03793</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Hexavalent chromium	18540-29-9	< 0.3		RPD			n/a	15.000	U	10/02/08
MS	Hexavalent chromium	18540-29-9	13.61	70.701	% Recov	75.000	125.000				10/02/08
MS	Hexavalent chromium	18540-29-9	336	82.759	% Recov	75.000	125.000				10/02/08
MSD	Hexavalent chromium	18540-29-9	14.30	74.363	% Recov	75.000	125.000				10/02/08
SPK-POST	Hexavalent chromium	18540-29-9	0.0548	102.622	% Recov	75.000	125.000				10/02/08
SPK-RPD	Hexavalent chromium	18540-29-9	74.363		RPD			5.049	20.000		10/02/08
<b>BATCH QC</b>											
BLNK-PREP	Hexavalent chromium	18540-29-9	< 0.3	n/a	ug/g	0.000	2.000			U	10/02/08
LCS	Hexavalent chromium	18540-29-9	16.42	86.878	% Recov	80.000	120.000				10/02/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20082024  
 Matrix: SOLID  
 Test: ICP Metals Analysis, Grd H2O P

Sample Date: 09/11/08  
 Receive Date: 09/11/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08GR03701</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
MS	Iron	7439-89-6	4201	4180.100	% Recov	75.000	125.000			•	10/06/08
MSD	Iron	7439-89-6	4021	3993.049	% Recov	75.000	125.000			•	10/06/08
SPK-RPD	Iron	7439-89-6	3993.049		RPD			4.577	20.000		10/06/08
<b>BATCH QC</b>											
BLANK	Iron	7439-89-6	<2.5e-2	n/a	ug/mL					U	10/06/08
LCS	Iron	7439-89-6	15050	80.481	% Recov	47.000	152.000				10/06/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Inorganic

SDG Number: WSCF20082024  
 Matrix: SOLID  
 Test: ICP-200.8 MS All possible meta

Sample Date: 09/11/08  
 Receive Date: 09/11/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
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Lab ID: W08GR03700  
**BATCH QC ASSOCIATED WITH SAMPLE**

MS	Arsenic	7440-38-2	173.72	86.860	% Recov	70.000	130.000				10/01/08
MS	Chromium	7440-47-3	217.04	108.520	% Recov	70.000	130.000				10/01/08
MS	Manganese	7439-96-5	147.4	73.700	% Recov	70.000	130.000				10/01/08
MSD	Arsenic	7440-38-2	175.12	87.560	% Recov	70.000	130.000				10/01/08
MSD	Chromium	7440-47-3	156.74	78.370	% Recov	70.000	130.000				10/01/08
MSD	Manganese	7439-96-5	181.5	90.750	% Recov	70.000	130.000				10/01/08
SPK-RPD	Arsenic	7440-38-2	87.560		RPD			0.803	20.000		10/01/08
SPK-RPD	Chromium	7440-47-3	78.370		RPD			32.265	20.000 *		10/01/08
SPK-RPD	Manganese	7439-96-5	90.750		RPD			20.736	20.000 *		10/01/08

**BATCH QC**

BLANK	Arsenic	7440-38-2	<0.4	n/a	ug/L					U	10/01/08
BLANK	Chromium	7440-47-3	<0.5	n/a	ug/L					U	10/01/08
BLANK	Manganese	7439-96-5	<0.1	n/a	ug/L					U	10/01/08
LCS	Arsenic	7440-38-2	118.9	90.076	% Recov	75.000	134.000				10/01/08
LCS	Chromium	7440-47-3	59.31	81.358	% Recov	77.000	125.000				10/01/08
LCS	Manganese	7439-96-5	392.4	86.623	% Recov	83.000	118.000				10/01/08

# WSCF

## ANALYTICAL COMMENT REPORT

Attention: Steve Trent  
Project Number F08-148

Group #: WSCF20082024  
Department: Inorganic

Sample #	Client ID	Lab Area	Test	Comment
		VALGROUP		<p>ICP-MS: Spike recovery RPDs over 20% on Chromium and Manganese. % Recoveries all acceptable. Soils often have poor RPDs due to small sample size and homogeneity problems</p> <p>ICP-AES: [Samples W08GR3788] Iron sample result exceeds spiking level by a factor of 4 so spike recoveries are not valid. High standard used to ensure iron linearity because sample result is greater than the calibration standards. Organics: All results are moisture corrected and reported on a dry weight basis. cgc W08GR03788/U RPD does not apply to results near the MDC.</p>

Lab Areas: VALGROUP - Group Validation  
LOGSAMP - Login for Sample

VALTEST - Test Validation  
LOGTEST - Login for Tests

TESTDATA - Test Data Entry

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# WSCF

## ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent  
**SAF Number:** F08-148  
**Sample #** W08GR03788  
**Client ID:** B1WMK2

TRENT  
 WSCF

**Matrix:** SOIL

**Group #:** WSCF20082024  
**Department:** Organic  
**Sampled:** 09/19/08  
**Received:** 09/19/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>NWTPH-D TPH Diesel Range (Wa) Prep</b>											
<b>NWTPH-D TPH Diesel Range (Wa)</b>											
Total Pet. Hydrocarbons Diesel	TPHDIESEL	LA-523-493	U	< 3.10e+03	ug/kg			1.00	3.1e+03		10/09/08
Kerosene	TPHKEROSENE	LA-523-493	U	< 3.10e+03	ug/kg			1.00	3.1e+03		10/09/08

**MDL=Minimum Detection Limit**  
**RQ=Result Qualifier**  
**TP Err=Total Propagated Error**  
**DF=Dilution Factor**

B - The analyte < the RDL but > = the IDL/MDL (inorg)  
 U - Analyzed for but not detected above limiting criteria.(inorg)

D - Analyte was identified at a secondary dilution factor.(inorg)  
 U - Analyzed for but not detected above limiting criteria.(org)

\* - Indicates results that have NOT been validated; + - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2  
 Groundwater Remediation Program

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: **Organic**

SDG Number: WSCF20082024  
 Matrix: SOLID  
 Test: NWTPH-D TPH Diesel Range (Wa)

Sample Date: 09/19/08  
 Receive Date: 09/19/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08GR03788</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
SURR	ortho-Terphenyl	Surr	84-15-1	20090	98.200	% Recov	70.000	130.000			10/09/08
<b>Lab ID: W08GR03793</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
MS	ortho-Terphenyl	Surr	84-15-1	21135	98.500	% Recov	70.000	130.000			10/09/08
MS	Total Pet. Hydrocarbons Diesel		TPHDIESEL	113740	106.000	% Recov	75.000	125.000			10/09/08
MSD	ortho-Terphenyl	Surr	84-15-1	19595	92.400	% Recov	70.000	130.000			10/09/08
MSD	Total Pet. Hydrocarbons Diesel		TPHDIESEL	102840	97.000	% Recov	75.000	125.000			10/09/08
SPK-RPD	ortho-Terphenyl	Surr	84-15-1	92.400		RPD			6.391	20.000	10/09/08
SPK-RPD	Total Pet. Hydrocarbons Diesel		TPHDIESEL	97.000		RPD			8.867	20.000	10/09/08
<b>BATCH QC</b>											
BLANK	Kerosene		TPHKEROSENE	< 3000	n/a	ug/Kg				U	10/09/08
BLANK	ortho-Terphenyl	Surr	84-15-1	17021	85.100	% Recov	70.000	130.000			10/09/08
BLANK	Total Pet. Hydrocarbons Diesel		TPHDIESEL	< 3000	n/a	ug/Kg				U	10/09/08
LCS	ortho-Terphenyl	Surr	84-15-1	17453	87.300	% Recov	70.000	130.000			10/09/08
LCS	Total Pet. Hydrocarbons Diesel		TPHDIESEL	91975	92.000	% Recov	80.000	120.000			10/09/08

# WSCF ANALYTICAL COMMENT REPORT

Attention: Steve Trent  
Project Number F08-148

Group #: WSCF20082024  
Department: Organic

Sample #	Client ID	Lab Area	Test	Comment
		VALGROUP		<p>ICP-MS: Spike recovery RPDs over 20% on Chromium and Manganese. % Recoveries all acceptable. Soils often have poor RPDs due to small sample size and homogeneity problems</p> <p>ICP-AES: [Samples W08GR3788] Iron sample result exceeds spiking level by a factor of 4 so spike recoveries are not valid. High standard used to ensure iron linearity because sample result is greater than the calibration standards. Organics: All results are moisture corrected and reported on a dry weight basis. cgc W08GR03788/U RPD does not apply to results near the MDC.</p>

Lab Areas: VALGROUP - Group Validation  
LOGSAMP - Login for Sample

VALTEST - Test Validation  
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TESTDATA - Test Data Entry

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# WSCF ANALYTICAL RESULTS REPORT

**Attention:** Steve Trent  
**SAF Number:** F08-148  
**Sample #** W08GR03788  
**Client ID:** B1WMK2

**TRENT  
WSCF**

**Matrix: SOIL**

**Group #:** WSCF20082024  
**Department:** Radiochemistry  
**Sampled:** 09/19/08  
**Received:** 09/19/08

Test Performed	CAS #	Method	RQ	Result	Unit	TP Err	Unit	DF	MDL	PQL	Analysis Date
<b>Strontium 89/90</b>											
Strontium-89/90	SR-RAD	LA-508-415	U	-0.320	pCi/g	+ -0.813	pCi/g	1.00	0.36		10/02/08
Sr-85 Tracer by Beta Counting	SR85	LA-508-415		90.4	Percent			1.00	0.0		10/02/08
<b>TC99 by Liquid Scin.</b>											
Tc-99 by Liquid Scin.	14133-76-7	LA-508-421	U	-0.0310	pCi/g	+ -0.186	pCi/g	1.00	0.30		10/06/08
<b>Uranium Isotopes by AEA</b>											
Uranium-233/234	U-233/234	LA-508-471		0.100	pCi/g	+ -0.0360	pCi/g	1.00	0.014		10/23/08
Uranium-235	15117-96-1	LA-508-471		0.0120	pCi/g	+ -9.60e-03	pCi/g	1.00	4.5e-03		10/23/08
Uranium-238	U-238	LA-508-471		0.130	pCi/g	+ -0.0442	pCi/g	1.00	4.1e-03		10/23/08
U-232 tracer by AEA	U232	LA-508-471		3.40	pCi/g			1.00	0.030		10/23/08

**MDL = Minimum Detection Limit**

**RQ = Result Qualifier**

**TP Err = Total Propagated Error**

**DF = Dilution Factor**

B - The analyte < the RDL but > = the IDL/MDL (inorg)

U - Analyzed for but not detected above limiting criteria (inorg)

D - Analyte was identified at a secondary dilution factor (inorg)

U - Analyzed for but not detected above limiting criteria (org)

\* - Indicates results that have NOT been validated; + - Indicates more than six qualifier symbols

Report WGPP/ver. 5.2

Groundwater Remediation Program

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Radiochemistry

SDG Number: WSCF20082024  
 Matrix: SOLID  
 Test: Strontium 89/90

Sample Date: 09/19/08  
 Receive Date: 09/19/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08GR03788</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Sr-85 Tracer by Beta Counting	SR85	90.4	90.400	% Recov	30.000	105.000				10/02/08
DUP	Strontium-89/90	SR-RAD	U1.5E-01		RPD			n/a	20.000		10/02/08
SURR	Sr-85 Tracer by Beta Counting	SR85	90.4	90.400	% Recov	30.000	105.000				10/02/08
<b>BATCH QC</b>											
BLANK	Sr-85 Tracer by Beta Counting	SR85	89.3	89.300	% Recov	30.000	105.000				10/02/08
BLANK	Strontium-89/90	10098-97-2	U-6.3E-01	n/a	pCi/g	-10.000	300.000				10/02/08
LCS	Sr-85 Tracer by Beta Counting	SR85	88	88.000	% Recov	30.000	105.000				10/02/08
LCS	Strontium-89/90	10098-97-2	69.9	100.691	% Recov	80.000	120.000				10/02/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Radiochemistry

SDG Number: WSCF20082024  
 Matrix: SOLID  
 Test: TC99 by Liquid Scin.

Sample Date: 09/18/08  
 Receive Date: 09/19/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
<b>Lab ID: W08GR03785</b>											
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>											
DUP	Tc-99 by Liquid Scin.	14133-76-7	U3.2E-02		RPD			n/a	20.000		10/06/08
MS	Tc-99 by Liquid Scin.	14133-76-7	18.929	96.331	% Recov	75.000	125.000				10/06/08
<b>BATCH QC</b>											
BLANK	Tc-99 by Liquid Scin.	14133-76-7	U3.3E-02	n/a	pCi/g	-10.000	1000.000				10/06/08
LCS	Tc-99 by Liquid Scin.	14133-76-7	6.6	85.714	% Recov	80.000	120.000				10/06/08

# WSCF ANALYTICAL LABORATORY QC REPORT

Department: Radiochemistry

SDG Number: WSCF20082024  
 Matrix: SOLID  
 Test: Uranium Isotopics by AEA

Sample Date: 09/19/08  
 Receive Date: 09/19/08

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Lower Limit	Upper Limit	RPD(%)	RPD Limit	RQ	Analysis Date
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**Lab ID: W08GR03788**  
**BATCH QC ASSOCIATED WITH SAMPLE**

DUP	U-232 tracer by AEA	U232	3.358	98.860	% Recov	30.000	105.000				10/23/08
DUP	Uranium-233/234	U-233/234	7.2e-2		RPD			32.558	20.000 *		10/23/08
DUP	Uranium-235	15117-96-1	U4.7e-3		RPD			n/a	20.000		10/23/08
DUP	Uranium-238	U-238	7.2e-2		RPD			57.426	20.000 *		10/23/08
SURR	U-232 tracer by AEA	U232	3.369	92.300	% Recov	30.000	105.000				10/23/08

**BATCH QC**

BLANK	U-232 tracer by AEA	U232	3.743	87.970	% Recov	30.000	105.000				10/23/08
BLANK	Uranium-233/234	13966-29-5	2e-2	0.020	pCi/g	-10.000	1000.000				10/23/08
BLANK	Uranium-235	15117-96-1	9.8e-3	0.010	pCi/g	-10.000	1000.000				10/23/08
BLANK	Uranium-238	24678-82-8	U1.8e-3	n/a	pCi/g	-10.000	1000.000				10/23/08
LCS	U-232 tracer by AEA	U232	11.42	84.350	% Recov	30.000	105.000				10/23/08
LCS	Uranium-233/234	13966-29-5	n/a	n/a	% Recov	75.000	125.000				10/23/08
LCS	Uranium-235	15117-96-1	n/a	n/a	% Recov	75.000	125.000				10/23/08
LCS	Uranium-238	24678-82-8	20.06	105.830	% Recov	80.000	120.000				10/23/08

# WSCF ANALYTICAL COMMENT REPORT

Attention: Steve Trent  
Project Number F08-148

Group #: WSCF20082024  
Department: Radiochemistry

Sample #	Client ID	Lab Area	Test	Comment
		VALGROUP		<p>ICP-MS: Spike recovery RPDs over 20% on Chromium and Manganese. % Recoveries all acceptable. Soils often have poor RPDs due to small sample size and homogeneity problems</p> <p>ICP-AES: [Samples W08GR3788] Iron sample result exceeds spiking level by a factor of 4 so spike recoveries are not valid. High standard used to ensure iron linearity because sample result is greater than the calibration standards. Organics: All results are moisture corrected and reported on a dry weight basis. cgc W08GR03788/U RPD does not apply to results near the MDC.</p>

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M4W41-SLF-08-1218

ATTACHMENT 4

**SAMPLE RECEIPT INFORMATION**

Consisting of 3 pages  
Including cover page

**Waste Sampling and Characterization Facility**  
P.O. BOX 1970 S3-30, Richland, WA 99352  
PHONE: (509) 373-7004/FAX: (509) 373-7134

11/3/08

ACKNOWLEDGMENT OF SAMPLES RECEIVED

FILE

Groundwater Remediation Program

Richland, WA 99354  
Attn: Steve Trent

Customer Code: GPP  
PO#: 123630/ES10  
Group#: 20082024  
Project#: F08-148  
Proj Mgr: Steve Trent E6-35  
Phone: 373-5869

The following samples were received from you on 09/19/08. They have been scheduled for the tests listed beside each sample. If this information is incorrect, please contact your service representative. Thank you for using Waste Sampling and Characterization Facility.

Sample#	Sample Id	Tests Scheduled	Matrix	Sample Date
408GR03788	B1WMK2	TRENT @2008 @AEA-32 @GPP6010 @IC-30 @SR89_90 @TC99-30 @TPHD-WA CR+6 PERSOLID	Solid, or handle as if solid	09/19/08

Test Acronym Description

Test Acronym	Description
@2008	ICP-200.8 MS All possible meta
@AEA-32	Uranium Isotopics by AEA
@GPP6010	ICP Metals Analysis, Grd H2O P
@IC-30	Anions by Ion Chromatography
@SR89_90	Strontium 89/90
@TC99-30	TC99 by Liquid Scin.
@TPHD-WA	NWTPH-D TPH Diesel Range (Wa)
CR+6	Hexavalent chromium
PERSOLID	Percent Solids

Fluor Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F08-148-102

PAGE 1 OF 1

<b>COLLECTOR</b> INDKLER, PFISTER, CROW	<b>COMPANY CONTACT</b> TRENT, SJ	<b>TELEPHONE NO.</b> 373-5869	<b>PROJECT COORDINATOR</b> WIDRIG, DL	<b>PRICE CODE</b> 8N	<b>DATA TURNAROUND</b> 45 Days / 45 Days
<b>SAMPLING LOCATION</b> C7016 1-003	<b>PROJECT DESIGNATION</b> K-West Characterization - Groundwater Contacted Sediments		<b>SAF NO.</b> F08-148	<b>AIR QUALITY</b> <input type="checkbox"/>	
<b>ICE CHEST NO.</b>	<b>FIELD LOGBOOK NO.</b>	<b>ACTUAL SAMPLE DEPTH</b> 67.5-70	<b>COA</b> 123630E510	<b>METHOD OF SHIPMENT</b> GOVERNMENT VEHICLE	
<b>SHIPPED TO</b> Waste Sampling & Characterization		<b>OFFSITE PROPERTY NO.</b>		<b>BILL OF LADING/AIR BILL NO.</b>	

<b>MATRIX*</b> A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	<b>POSSIBLE SAMPLE HAZARDS/ REMARKS</b> Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)	<b>PRESERVATION</b>	Cool~4C	None	Cool~4C	Cool~4C	None							
		<b>TYPE OF CONTAINER</b>	aG	G/P	G/P	G/P	Square Bottle - Poly							
		<b>NO. OF CONTAINER(S)</b>	1	1	1	1	1							
		<b>VOLUME</b>	120mL	250mL	500mL	120mL	500mL							
		<b>SPECIAL HANDLING AND/OR STORAGE</b>	20082024	<b>SAMPLE ANALYSIS</b>	SEE ITEM (1) IN SPECIAL INSTRUCTIONS 7-85 02706 02799	SEE ITEM (2) IN SPECIAL INSTRUCTIONS 027994	Chromium Hex - 7196; 027976	IC Arsons - 300.0 (Nitrogen in Nitrate) 025886	SEE ITEM (3) IN SPECIAL INSTRUCTIONS					

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B1WMK2	SOIL	9-19-08	1130	✓	✓	✓	✓	✓					
W08C023788													

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
R. PFISTER / [Signature]	9/19/08 1210	[Signature] [Signature]	9/19/08 1210
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

**SPECIAL INSTRUCTIONS**

(1)TPH-DieselKerosene Range - WTPH-D {Total petroleum hydrocarbons - kerosene range}

(2)ICP/MS - 200.8 (TAL) {Chromium, Manganese} ICP/MS - 200.8 (Add-on) {Arsenic} ICP Metals - 6010B (TAL) {Iron}

(3)Isotopic Uranium {Uranium-233/234, Uranium-235, Uranium-238} Strontium-89,90 -- Total Sr; Technetium-99;

**ICED**

<b>LABORATORY SECTION</b>	<b>RECEIVED BY</b>	<b>TITLE</b>	<b>DATE/TIME</b>
<b>FINAL SAMPLE DISPOSITION</b>	<b>DISPOSAL METHOD</b>	<b>DISPOSED BY</b>	<b>DATE/TIME</b>

32 of 32