

PO Box 650 S3-30  
Richland, WA 99352



July 5, 2011

Michael Neely  
CH2M-HILL PRC  
PO Box 1600  
Richland, WA 99352

Dear Michael Neely,

FINAL RESULT FOR SAMPLE DELIVERY GROUP WSCF112473

Reference: (1) SOW, Mod 2, #36587, Release 3  
(2) HNF-SD-CD-QAPP-017, current version, Waste Sampling & Characterization Facility Quality Assurance Plan

This letter contains the following information for sample delivery group WSCF112473

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

Very truly yours,

Electronically signed by Joseph Hale  
For Lab Manager  
WSCF Analytical Lab  
(509) 373-7495



Attachments 4

CC: w/Attachments

File/LB

ATTACHMENT 1

**COVER SHEET**

Consisting of 2 pages  
Including cover page

**WSCF SAF Number Cross Reference**

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Group # WSCF112473  
Data Deliverable Date 07/05/11

SAF #	Sample ID	Sample #	Matrix	Sampled	Received
F11-031	B2D752	112473001	OTHERSOLID	06/14/11	06/14/11
F11-031	B2D754	112473002	OTHERSOLID	06/14/11	06/14/11

ATTACHMENT 2

**NARRATIVE**

Consisting of 4 pages  
Including cover page

### Introduction

Samples were received at the WSCF laboratory as referenced on the WSCF SAF Number Cross Reference table included in the final report. The samples were analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Statement of Work (SOW), Modification No. 2 to Agreement 36587, Release 3, "FH WSCF ANALYTICAL SERVICES FOR GROUNDWATER."*

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 not stamped "ICED" by the WSCF Laboratory Sample Custodian during sample receiving. However, based on procedure LO-090-403 form "NOTICE OF IMPROPER SAMPLE SUBMITTAL" was not submitted and was not stamped "NOT ICED". No anomaly was noted during sample receipt.

The following generic data qualifiers (i.e., B, D, U and J) may be applicable to this report, as appropriate

- **B** – Sample results with a concentration greater than the MDL but less than the PQL are B flagged (applies to inorganic and wet chemical analyses), as appropriate.
- **D** – Sample results are D flagged if dilution(s) were required, as appropriate.
- **J** – Sample results with a concentration greater than the MDL but less than the PQL are J flagged (applies to organic analyses), as appropriate.
- **U** – Analyzed for but not detected above limiting criteria. Relative Percent Difference (RPD) values associated with an analyte qualified with a "U" are not applicable.

### Analytical Methodology for Requested Analyses

Refer to *WSCF Method References Report* for a complete listing of approved analytical methods.

### Inorganic Comments

**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. Analytical Note(s):

- All applicable QC controls are within the established limits.

**Radiochemistry Comments**

**Rad Chem** – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike (Matrix Spikes apply only to Neptunium-237), Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

Tracers are used to determine chemical yield. RPD is monitored in sample duplicate and is not required for tracer recovery per SOW.

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - Gross Alpha – Duplicate Relative Percent Difference(s) (RPD) did not meet the established laboratory limits. Duplicate Relative Percent Difference (RPD) does not apply to results below 5X the minimum detectable activity. No flags issued.
  - All other applicable QC controls are within the established limits.
- Americium-241:
  - All applicable QC controls are within the established limits.
- Neptunium-237:
  - All applicable QC controls are within the established limits.
- Isotopic Plutonium analysis:
  - All applicable QC controls are within the established limits.
- Isotopic Uranium analysis:
  - Uranium-238 – Duplicate Relative Percent Difference(s) (RPD) did not meet the established laboratory limits. Inhomogeneity in solids can lead to poor reproducibility. The duplicate is within 2 standard deviations. No flags issued on sample results. The quality control report was flagged for RPD failure.
  - Uranium-235 – Duplicate Relative Percent Difference(s) (RPD) did not meet the established laboratory limits. Duplicate Relative Percent Difference (RPD) does not apply to results below 5X the minimum detectable activity. No flags issued.
  - All other applicable QC controls are within the established limits.

- Strontium-89/90:
  - Duplicate Relative Percent Difference(s) (RPD) did not meet the established laboratory limits. Duplicate Relative Percent Difference (RPD) does not apply to results below 5X the minimum detectable activity. No flags issued.
  - All other applicable QC controls are within the established limits.

We certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this data package has been authorized by the Analytical Laboratory Manager (or designee) and the Client Services representative as verified by electronic signatures shown on the WSCF ANALYTICAL RESULTS REPORT.

ATTACHMENT 3

**ANALYTICAL RESULTS**

Consisting of 23 pages  
Including cover page

## WSCF ANALYTICAL RESULTS REPORT

For

CH2M Hill Plateau Remediation

PO Box 1600  
Richland, WA 99352

Attention: Michael Neely

**Contract #** MOA-FH-CHPRC-2008  
**Group #** WSCF112473  
**Report Date** July 5, 2011

**Analytical:** Electronically signed by Joseph Hale

**Client Services:** Electronically signed by Richard Barker

*Solid samples results that have a 'Percent Solid' test are reported on a "dry weight basis", except results of TCLP, Percent Solid, and Total Activity. If no 'Percent Solid' test is reported then the results are reported on an "as received" basis.*

This information is intended for the use of the addressee only. If the reader of this report is not the intended recipient or is not authorized by the recipient to receive the report, you are hereby notified that any dissemination, distribution or copying of this report is strictly prohibited. If you have received this report in error, please notify WSCF Laboratory immediately by telephone at (509) 373-7020 or (509) 531-8004. Information designation of this report is the responsibility of the customer.

**Batch QC List**

Attention Michael Neely  
Department Inorganic

Group # WSCF112473

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
183718	184417	4	BLANK	58433	BLANK		ICP-2008 MS All possible metal
183718	184417	5	LCS	58434	LCS		ICP-2008 MS All possible metal
183718	184417	6	MS	58435	B2D2N5(112460001MS)	112460001	ICP-2008 MS All possible metal
183718	184417	7	MSD	58436	B2D2N5(112460001MSD)	112460001	ICP-2008 MS All possible metal
183718	184417	31	SAMPLE	112473002	B2D754		ICP-2008 MS All possible metal

**Batch QC List**

Attention Michael Neely  
 Department Radiochemistry

Group # WSCF112473

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
183760	184678	1	BLANK	58534	BLANK		Americium/Curium (AEA)
183760	184678	2	LCS	58535	LCS		Americium/Curium (AEA)
183760	184678	3	SAMPLE	112473001	B2D752		Americium/Curium (AEA)
183760	184678	4	DUP	58536	B2D752(112473001DUP)	112473001	Americium/Curium (AEA)
183760	184679	1	BLANK	58534	BLANK		Plutonium (AEA)
183760	184679	2	LCS	58535	LCS		Plutonium (AEA)
183760	184679	3	SAMPLE	112473001	B2D752		Plutonium (AEA)
183760	184679	4	DUP	58536	B2D752(112473001DUP)	112473001	Plutonium (AEA)
183760	184680	1	BLANK	58534	BLANK		Uranium (AEA)
183760	184680	2	LCS	58535	LCS		Uranium (AEA)
183760	184680	3	SAMPLE	112473001	B2D752		Uranium (AEA)
183760	184680	4	DUP	58536	B2D752(112473001DUP)	112473001	Uranium (AEA)
183761	183920	1	BLANK	58537	BLANK		Strontium 89/90 (GPC/GEA)
183761	183920	2	LCS	58538	LCS		Strontium 89/90 (GPC/GEA)
183761	183920	3	DUP	58539	B2D752(112473001DUP)	112473001	Strontium 89/90 (GPC/GEA)
183761	183920	4	SAMPLE	112473001	B2D752		Strontium 89/90 (GPC/GEA)
183764	184761	1	SAMPLE	112473001	B2D752		Neptunium (AEA)
183764	184761	2	NpSPK	58545	NpSPK		Neptunium (AEA)
183764	184761	3	NpDUP	58546	B2D752(112473001NpDU)	112473001	Neptunium (AEA)
183764	184761	4	NDUPSK	58547	NDUPSK		Neptunium (AEA)
183764	184761	5	BLANK	58543	BLANK		Neptunium (AEA)
183764	184761	6	LCS	58544	LCS		Neptunium (AEA)
183778	183889	1	BLANK	58564	BLANK		Gross Alpha/Gross Beta

**Batch QC List**

Attention Michael Neely  
Department Radiochemistry

Group # WSCF112473

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
183778	183889	2	LCS	58565	LCS		Gross Alpha/Gross Beta
183778	183889	3	DUP	58566	B2D752(112473001DUP)	112473001	Gross Alpha/Gross Beta
183778	183889	4	SAMPLE	112473001	B2D752		Gross Alpha/Gross Beta
183778	183889	5	SAMPLE	112473001	B2D752		Gross Alpha/Gross Beta
183859	183864	1	IBLANK	58588	IBLANK		Gamma Energy Analysis-general
183859	183864	2	LCS	58589	LCS		Gamma Energy Analysis-general
183859	183864	3	DUP	58590	B2D752(112473001DUP)	112473001	Gamma Energy Analysis-general
183859	183864	4	SAMPLE	112473001	B2D752		Gamma Energy Analysis-general

**Batch QC List**

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**Attention** Michael Neely  
**Department** Wet Chemistry

**Group #** WSCF112473

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<b>QC Batch</b>	<b>Analytical Batch</b>	<b>S#</b>	<b>Type</b>	<b>Sample #</b>	<b>Client Sample#</b>	<b>Original</b>	<b>Test</b>
184709	184709	1	SAMPLE	112473001	B2D752		Dry Weight/Percent Moisture
184709	184709	2	SAMPLE	112473002	B2D754		Dry Weight/Percent Moisture

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## Method Reference

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Attention Michael Neely  
Department Inorganic

Group # WSCF112473

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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, industry methods or HEIS 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 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-505-412	Determination of Trace Elements in Waters & Wastes by ICP-Mass Spectrometry		
	EPA-600/R-94-111	200.8	Determination of Trace Elements in Waters and Waste by Inductively Coupled Plasma
	HEIS	200.8_METALS_ICPMS	Determination of Trace Elements in Waters and Waste by Inductively Coupled Plasma, Mass Spec.

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Note: A complete list of WSCF analytical procedures and reference regulatory or industry methods is available online at <http://www7.rl.gov/rapidweb/AS-DOL/index.cfm>

## Method Reference

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Attention Michael Neely  
Department Radiochemistry

Group # WSCF112473

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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, industry methods or HEIS 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 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-220-406	Strontium-89 and 90 in Aqueous Samples by SR-SPEC Separation
HEIS	SRTOT_SEP_PRECIP_GPC Strontium 89/90, by Sr-Spec Sep.
LA-508-471	Thorium, Neptunium, Plutonium, Americium, and Uranium In Soil and Water Using Eichrom Column Separation (Prep)
HEIS	PUISO_IE_PRECIP_AEA Isotopic Plutonium, Alpha Spec
LA-508-471	Determination Of Uranium, Plutonium, And Americium
HEIS	AMCMISO_IE_PREC_AEA Americium/Curium Iso, Alpha Spec
LA-508-481	Gamma Energy Analysis using the Canberra Genie Ssystem
HEIS	GAMMA_GS Gamma Energy Analysis
LA-508-471	Determination Of Uranium, Plutonium, And Americium
HEIS	UIISO_IE_PRECIP_AEA Uranium Iso, Alpha Spec
LA-904-400	Thorium, Neptunium, Plutonium, Americium, and Uranium In Soil and Water Using Eichrom Column Separation
HEIS	NP237_IE_PRECIP_AEA Neptunium-237, Iso, Alpha Spec.
LA-508-415	Operation Of The Protean 2-Inch Alpha/Beta Counting System For Gross Alpha/ Beta Samples
HEIS	ALPHA_GPC Gross Alpha by GPC
HEIS	BETA_GPC Gross Beta by GPC
HEIS	SRTOT_SEP_PRECIP_GPC Strontium beta isotopic, GPC

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Note: A complete list of WSCF analytical procedures and reference regulatory or industry methods is available online at <http://www7.rl.gov/rapidweb/AS-DOL/index.cfm>

**Method Reference**

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**Attention** Michael Neely  
**Department** Wet Chemistry

**Group #** WSCF112473

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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, industry methods or HEIS 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 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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<b>LA-519-412</b>	Total Residual Percent Solids Dried at 103 - 105 Degrees C		
	EPA-600/4-79-020	160.3	Total Residue
	Standard Methods	2540B	Total Solids Dried at 103-105 C
	HEIS	%SOLIDS	Dry Weight, Percent Solids

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Note: A complete list of WSCF analytical procedures and reference regulatory or industry methods is available online at <http://www7.rl.gov/rapidweb/AS-DOL/index.cfm>

# WSCF Analytical Results Report

Attention Michael Neely  
 Department Inorganic

Group # WSCF112473

Sample # 112473002  
 SAF# F11-031  
 Sample ID B2D754

Matrix OTHERSOLID  
 Sampled 06/14/11  
 Received 06/14/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
ICPMS Prep										06/15/11
ICP-MS										
Uranium	7440-61-1	LA-505-412		0.535		mg/kg	1	0.10	0.50	06/21/11

MDL = Minimum Detection  
 RQ = Result Qualifier  
 TP Err = Total Propagated  
 DF = Dilution Factor  
 + - Indicates more than nine qualifier

B - Analyte < the PQL(or EQL)but >= the IDL/MDL(Inorganic)  
 C - Analyte was found in the Associated Blank. (Inorganic)  
 D - Analyte was reported at a secondary dilution factor.  
 E - Analyte is an estimate, see comment section.  
 N - MS and/or MSD recovery outside control limits.

U - Analyzed for but not detected above limiting criteria.  
 X,Y or Z - See comment detail and/or narrative.  
 PQL is equivalent to Estimated Quantitation Limit (EQL)

WSCF Analytical Results Report

Attention Michael Neely  
 Department Radiochemistry

Group # WSCF112473

Sample # 112473001  
 SAF# F11-031  
 Sample ID B2D752

Matrix OTHERSOLID  
 Sampled 06/14/11  
 Received 06/14/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
<b>Alpha/Beta Prep</b>										06/16/11
<b>Gross Alpha/Beta</b>										
Gross Alpha	12587-46-1	LA-508-415		1.2	.31	pCi/g	1	0.27		06/20/11
Gross Beta	12587-47-2	LA-508-415		3.0	.5	pCi/g	1	0.69		06/20/11
<b>GEA Prep</b>										06/16/11
<b>GEA</b>										
Cesium-137	10045-97-3	LA-508-481	U	-8.8E-3	.017	pCi/g	1	0.036		06/16/11
Cobalt-60	10198-40-0	LA-508-481	U	8.3E-3	.015	pCi/g	1	0.035		06/16/11
Europium-152	14683-23-9	LA-508-481	U	-0.035	.067	pCi/g	1	0.11		06/16/11
Europium-154	15585-10-1	LA-508-481	U	-7.1E-3	.044	pCi/g	1	0.084		06/16/11
Europium-155	14391-16-3	LA-508-481	U	0.049	.068	pCi/g	1	0.15		06/16/11
<b>Np/Th/Pu/Am/U Prep</b>										06/23/11
<b>AEA Am-U-Pu</b>										
Americium-241	14596-10-2	LA-508-471	U	0.024	.029	pCi/g	1	0.059		06/28/11
<b>AEA Np-237</b>										
Neptunium-237	13994-20-2	LA-904-400	U	8.6E-3	.014	pCi/g	1	0.032		06/29/11
<b>AEA Pu-Np</b>										
Plutonium-238	13981-16-3	LA-508-471	U	0.011	.034	pCi/g	1	0.074		06/28/11
Plutonium-239/240	PU-239/240	LA-508-471	U	4.2E-3	.0068	pCi/g	1	0.016		06/28/11

MDL = Minimum Detection  
 RQ = Result Qualifier  
 TP Err = Total Propagated  
 DF = Dilution Factor  
 + - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE  
 U - Analyzed for but not detected above limiting criteria.  
 N - Spike Recovery is Outside Control Limits.  
 X,Y or Z - See comment detail and/or narrative.

# WSCF Analytical Results Report

Attention Michael Neely  
 Department Radiochemistry

Group # WSCF112473

Sample # 112473001  
 SAF# F11-031  
 Sample ID B2D752

Matrix OTHERSOLID  
 Sampled 06/14/11  
 Received 06/14/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
<b>Uranium Iso</b>										
Uranium-234	U-233/234	LA-508-471		0.16	.045	pCi/g	1	0.024		06/28/11
Uranium-235	15117-96-1	LA-508-471	U	4.8E-3	.0077	pCi/g	1	0.018		06/28/11
Uranium-238	U-238	LA-508-471		0.16	.044	pCi/g	1	0.016		06/28/11
<b>SR-89/90</b>										
<b>SR-89/90</b>										
Strontium-89/90	SR-RAD	LA-220-406	U	0.56	.63	pCi/g	1	0.59		06/22/11

MDL = Minimum Detection  
 RQ = Result Qualifier  
 TP Err = Total Propagated  
 DF = Dilution Factor  
 +- Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE  
 U - Analyzed for but not detected above limiting criteria.  
 N - Spike Recovery is Outside Control Limits.  
 X,Y or Z - See comment detail and/or narrative.

**WSCF Analytical Results Report**

Attention Michael Neely  
 Department Wet Chemistry

Group # WSCF112473

Sample # 112473001  
 SAF# F11-031  
 Sample ID B2D752

Matrix OTHERSOLID  
 Sampled 06/14/11  
 Received 06/14/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Total Residue										06/27/11
Total Residue										
Percent Solids	%SOLIDS	LA-519-412		79		percent	1			06/27/11

MDL = Minimum Detection  
 RQ = Result Qualifier  
 TP Err = Total Propagated  
 DF = Dilution Factor  
 + - Indicates more than nine qualifier

B - Analyte < the RDL but >= the IDL/MDL.  
 C - Analyte was found in the Associated Blank. (Inorganic)  
 D - Analyte was reported at a secondary dilution factor.  
 N - MS and/or MSD sample recovery outside control limits.  
 U - Analyzed for but not detected above limiting criteria.

N - Spike Recovery is Outside Control Limits.  
 X,Y or Z - See comment detail and/or narrative.  
 PQL is equivalent to Estimated Quantitation Limit (EQL)

**WSCF Analytical Results Report**

Attention Michael Neely  
 Department Wet Chemistry

Group # WSCF112473

Sample # 112473002  
 SAF# F11-031  
 Sample ID B2D754

Matrix OTHERSOLID  
 Sampled 06/14/11  
 Received 06/14/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Total Residue										06/27/11
Total Residue										
Percent Solids	%SOLIDS	LA-519-412		96		percent	1			06/27/11

MDL = Minimum Detection  
 RQ = Result Qualifier  
 TP Err = Total Propagated  
 DF = Dilution Factor  
 + - Indicates more than nine qualifier

B - Analyte < the RDL but >= the IDL/MDL.  
 C - Analyte was found in the Associated Blank. (Inorganic)  
 D - Analyte was reported at a secondary dilution factor.  
 N - MS and/or MSD sample recovery outside control limits.  
 U - Analyzed for but not detected above limiting criteria.

N - Spike Recovery is Outside Control Limits.  
 X,Y or Z - See comment detail and/or narrative.  
 PQL is equivalent to Estimated Quantitation Limit (EQL)

**Quality Control Report**

Attention Michael Neely  
 Department Inorganic

Group # WSCF112473

QC Batch 183718 Test ICP-2008 MS All possible metal  
 Associated Samples 112473002

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>LCS</b>			<b>QC Sample #58434</b>							
Uranium	7440-61-1	367		mg/kg	91.7	86 - 113				06/21/11
<b>MS</b>			<b>QC Sample #58435</b>							
			<b>Original 112460001</b>							
Uranium	7440-61-1	87.7		mg/kg	92.4	70 - 130				06/21/11
<b>MSD</b>			<b>QC Sample #58436</b>							
			<b>Original 112460001</b>							
Uranium	7440-61-1	78.8		mg/kg	84.9	70 - 130	8.50	30	Paired 58435	06/21/11
<b>BLANK</b>			<b>QC Sample #58433</b>							
Uranium	7440-61-1	<0.10		ug/L					U	06/21/11

**Quality Control Report**

Attention Michael Neely  
 Department Radiochemistry

Group # WSCF112473

QC Batch 183760 Test Americium/Curium (AEA)  
 Associated Samples 112473001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>		<b>QC Sample #58534</b>								
Americium-241	14596-10-2		0.016	pCi/g					U	06/28/11
Plutonium-238	13981-16-3		0.0090	pCi/g					U	06/28/11
Plutonium-239/240	PU-239/240		7.2E-3	pCi/g					U	06/28/11
Uranium-234	U-233/234		0.014	pCi/g					U	06/28/11
Uranium-235	15117-96-1		8.5E-3	pCi/g					U	06/28/11
Uranium-238	U-238		5.8E-3	pCi/g					U	06/28/11
<b>LCS</b>		<b>QC Sample #58535</b>								
Americium-241	14596-10-2		6.0	pCi/sample	108.9	80 - 120				06/28/11
Plutonium-239/240	PU-239/240		5.9	pCi/sample	102.2	80 - 120				06/28/11
Uranium-234	U-233/234		8.8	pCi/sample	107.6	80 - 120				06/28/11
<b>DUP</b>		<b>QC Sample #58536</b>								
		<b>Original 112473001</b>								
Plutonium-238	13981-16-3	0.011	-0.015	pCi/g			-709.10	30	* U	06/28/11
Americium-241	14596-10-2	0.024	-1.7E-3	pCi/g			239.30	30	* U	06/28/11
Plutonium-239/240	PU-239/240	4.2E-3	0.0050	pCi/g			38.10	30	* U	06/28/11
Uranium-234	U-233/234	0.16	0.14	pCi/g			7.40	30		06/28/11
Uranium-235	15117-96-1	4.8E-3	0.012	pCi/g			103.80	30	* X	06/28/11
Uranium-238	U-238	0.16	0.081	pCi/g			46.40	30	* X	06/28/11

**Quality Control Report**

Attention Michael Neely  
 Department Radiochemistry

Group # WSCF112473

QC Batch 183761 Test Strontium 89/90 (GPC/GEA)  
 Associated Samples 112473001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>		<b>QC Sample #58537</b>								
Strontium-89/90 LCS	SR-RAD	-0.033		pCi/g					U	06/22/11
		<b>QC Sample #58538</b>								
Strontium-89/90 DUP	SR-RAD	30		pCi/g	109.5	80 - 120				06/22/11
		<b>QC Sample #58539</b>								
		<b>Original 112473001</b>								
Strontium-89/90	SR-RAD	0.56	1.2	pCi/g			69.60	30	* X	06/22/11

**Quality Control Report**

Attention Michael Neely  
 Department Radiochemistry

Group # WSCF112473

QC Batch 183764 Test Neptunium (AEA)  
 Associated Samples 112473001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			QC Sample #58543							
Neptunium-237 LCS	13994-20-2	3.4E-3		pCi/g					U	06/29/11
			QC Sample #58544							
Neptunium-237 NpSPK	13994-20-2	5.2		pCi/sample	91.4	80 - 120				06/29/11
			QC Sample #58545							
Neptunium-237 NpDUP	13994-20-2	5.0		pCi/g	91.6	75 - 125				06/29/11
			QC Sample #58546							
			Original 112473001							
Neptunium-237 NDUPSK	13994-20-2	8.6E-3	3.9E-3	pCi/g			74.70	30	* U	06/29/11
			QC Sample #58547							
Neptunium-237	13994-20-2	5.5		pCi/g	100.5	75 - 125				06/29/11

**Quality Control Report**

Attention Michael Neely  
 Department Radiochemistry

Group # WSCF112473

QC Batch 183778 Test Gross Alpha/Gross Beta  
 Associated Samples 112473001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>			<b>QC Sample #58564</b>							
Gross Alpha	12587-46-1		0.066	pCi/g					U	06/20/11
Gross Beta	12587-47-2		0.18	pCi/g					U	06/20/11
<b>LCS</b>			<b>QC Sample #58565</b>							
Gross Alpha	12587-46-1		7.4	pCi/g	91.2	80 - 120				06/17/11
Gross Beta	12587-47-2		24	pCi/g	110.3	80 - 120				06/17/11
<b>DUP</b>			<b>QC Sample #58566</b>							
			<b>Original 112473001</b>							
Gross Alpha	12587-46-1	1.2	0.81	pCi/g			42.00	30	* X	06/20/11
Gross Beta	12587-47-2	3.0	2.4	pCi/g			23.30	30		06/20/11

# Quality Control Report

Attention Michael Neely  
 Department Radiochemistry

Group # WSCF112473

QC Batch 183859 Test Gamma Energy Analysis-general  
 Associated Samples 112473001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>IBLANK</b>		<b>QC Sample #58588</b>								
Cesium-137	10045-97-3		-3.0	pCi/g					U	06/17/11
Cobalt-60	10198-40-0		-4.8	pCi/g					U	06/17/11
Europium-152	14683-23-9		4.1	pCi/g					U	06/17/11
Europium-154	15585-10-1		-0.40	pCi/g					U	06/17/11
Europium-155	14391-16-3		2.3	pCi/g					U	06/17/11
<b>LCS</b>		<b>QC Sample #58589</b>								
Cesium-137	10045-97-3		6500	pCi/sample	106.8	80 - 120				06/16/11
Cobalt-60	10198-40-0		10000	pCi/sample	103.5	80 - 120				06/16/11
<b>DUP</b>		<b>QC Sample #58590</b>								
		<b>Original 112473001</b>								
Cesium-137	10045-97-3	-8.8E-3	0.019	pCi/g			550.00	30	* U	06/17/11
Cobalt-60	10198-40-0	8.3E-3	4.9E-3	pCi/g			51.40	30	* U	06/17/11
Europium-152	14683-23-9	-0.035	0.037	pCi/g			11400.0	30	* U	06/17/11
Europium-154	15585-10-1	-7.1E-3	-0.022	pCi/g			-103.80	30	* U	06/17/11
Europium-155	14391-16-3	0.049	0.035	pCi/g			32.80	30	* U	06/17/11

**Quality Control Report**

Attention Michael Neely  
 Department Radiochemistry

Group # WSCF112473

QC Batch 183760 Test Uranium (AEA)  
 Associated Samples 112473001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>SAMPLE</b>		<b>Sample #112473001</b>								
Uranium-232 Tracer	14158-29-3				91.2	25 - 105				06/28/11
Americium-243 Tracer	14993-75-0				99.5	25 - 105				06/28/11
Plutonium-242 Tracer	13982-10-0				93	25 - 105				06/28/11
<b>BLANK</b>		<b>QC Sample #58534</b>								
Uranium-232 Tracer	14158-29-3				86.8	25 - 105				06/28/11
Americium-243 Tracer	14993-75-0				91.7	25 - 105				06/28/11
Plutonium-242 Tracer	13982-10-0				86.5	25 - 105				06/28/11
<b>LCS</b>		<b>QC Sample #58535</b>								
Uranium-232 Tracer	14158-29-3				63.2	25 - 105				06/28/11
Americium-243 Tracer	14993-75-0				91	25 - 105				06/28/11
Plutonium-242 Tracer	13982-10-0				87.2	25 - 105				06/28/11
<b>DUP</b>		<b>QC Sample #58536</b>								
		<b>Original 112473001</b>								
Uranium-232 Tracer	14158-29-3				84.2	25 - 105	0.00			06/28/11
Americium-243 Tracer	14993-75-0				95	25 - 105	2.50			06/28/11
Plutonium-242 Tracer	13982-10-0				88.2	25 - 105	1.70			06/28/11

**Quality Control Report**

Attention Michael Neely  
 Department Radiochemistry

Group # WSCF112473

QC Batch 183761 Test Strontium 89/90 (GPC/GEA)  
 Associated Samples 112473001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>SAMPLE</b>										
										<b>Sample #112473001</b>
Strontium-85	13967-73-2				70.9	25 - 105				06/22/11
<b>BLANK</b>										<b>QC Sample #58537</b>
Strontium-85	13967-73-2				78	25 - 105				06/22/11
<b>LCS</b>										<b>QC Sample #58538</b>
Strontium-85	13967-73-2				74.9	25 - 105				06/22/11
<b>DUP</b>										<b>QC Sample #58539</b>
										<b>Original 112473001</b>
Strontium-85	13967-73-2				72.1	25 - 105	0.00			06/22/11

# Analytical Comment Report

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Attention: Michael Neely

Group # WSCF112473

## Quality Control Comments

Department Radiochemistry

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58536 B2D752(112473001DUP)

**Analyte** Uranium-235 - Uranium (AEA)

[1] Duplicate RPD out-of-limits. RPD limit does not apply to results near the Minimum Detectable Concentration.

**Analyte** Uranium-238 - Uranium (AEA)

[1] The duplicate is outside of RPD limits. Inhomogeneity in soil and other solid matrix samples can lead to poor reproducibility.

[2] The duplicate is outside of default RPD limits. The duplicate is within 2 standard deviations and is acceptable to the reviewing Scientist.

58539 B2D752(112473001DUP)

**Analyte** Strontium-89/90 - Strontium 89/90 (GPC/GEA)

[1] Duplicate RPD out-of-limits. RPD limit does not apply to results near the Minimum Detectable Concentration.

58566 B2D752(112473001DUP)

**Analyte** Gross Alpha - Gross Alpha/Gross Beta

[1] Duplicate RPD out-of-limits. RPD limit does not apply to results near the Minimum Detectable Concentration.

ATTACHMENT4

**SAMPLE RECEIPT**

Consisting of 4 pages  
Including cover page

Sample Receipt

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

ACKNOWLEDGEMENT OF SAMPLES RECEIVED

WSCF Laboratory  
PO Box 650 S3-30  
Richland, WA 99352

ATTN: Michael Neely

Customer Code: CHPRC  
PO #: 401639/ES20  
Work Order #: 112473  
Profile #: F11-031-006  
Proj. Mgr.:  
Phone:

The following samples were received from you on 6/14/2011 1:30:00 PM. 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	Matrix	Collected	Received
<b>Tests scheduled</b>				
112473001	B2D752	OTHERSOLID	6/14/2011 13:07	6/14/2011 13:30
AEA-AM-S; AEA-NP-S; AEA-PU-S; AEA-U-S; DRY-WEIGHT; GAB-AO-S; GAB-BO-S; GEA-S; SR89/90-S				
112473002	B2D754	SOIL	6/14/2011 12:52	6/14/2011 13:30
2008-S; DRY-WEIGHT				

Test Acronym Description

Test Acronym	Description
2008-S	ICP-MS (S)
AEA-AM-S	Americium (AEA) (S)
AEA-NP-S	Neptunium (AEA) (Solid)
AEA-PU-S	Plutonium (AEA) (S)
AEA-U-S	Uranium Isotopic (AEA) (S)
DRY-WEIGHT	Dry Weight as Pct Moisture
GAB-AO-S	Gross Alpha/Beta (A only)(S)
GAB-BO-S	Gross Alpha/Beta (B only)(S)
GEA-S	Gamma Energy Analysis (S)
SR89/90-S	Strontium 89/90 (GPC) (S)

CH2MHRH Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F81-031-006

PAGE 1 OF 1

**COLLECTOR**  
 KAUM, Rona, Becum  
**SAMPLING LOCATION**  
 2P-1 Spent GAC (PW-1 Z-1A area); Composite  
**ICE CHEST NO.**

**COMPANY CONTACT**  
 EVANS, RT  
**PROJECT DESIGNATION**  
 200-PW 1 & 200-2P 1 Spent GAC Canisters and Filters  
**FIELD LOGBOOK NO.** Pg 24  
 HNF-N-585-6  
**OFFSITE PROPERTY NO.**  
 N/A

**TELEPHONE NO.**  
 373-7524  
**PROJECT COORDINATOR**  
 EVANS, RT  
**SAF NO.**  
 F11-031  
**COA**  
 300209ES10  
**BILL OF LADING/AIR BILL NO.**  
 N/A

**PRICE CODE** 00  
**AIR QUALITY** [ ]  
**METHOD OF SHIPMENT**  
 GOVERNMENT VEHICLE

**DATA TURNAROUND**  
 21 Days / 21 Days

**ORIGINAL**

**SHIPPED TO**  
 Waste Sampling & Characterization  
**MATRIX\***  
 A-Air  
 D-Dust  
 L-Liquids  
 DS-Dross  
 SOLID  
 L-Liquid  
 D-Dust  
 S-Sol  
 S2-Sediment  
 T-Tissue  
 V-Vegetation  
 W-Water  
 WI-Wire  
 X-Other  
**POSSIBLE SAMPLE HAZARDS / REMARKS**  
 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)  
 112473  
**SPECIAL HANDLING AND/OR STORAGE**

**PRESERVATION** None  
**HOLDING TIME** 6 Months  
**TYPE OF CONTAINER** Square Bottle - Poly  
**NO. OF CONTAINER(S)** 1  
**VOLUME** 500ML  
**SAMPLE ANALYSIS** SEE FORM C1 & SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME
B20752	OTHER SOLID	6-14-11	1307

CHAIN OF POSSESSION

SIGN / PRINT NAMES

SPECIAL INSTRUCTIONS

RELINQUISHED BY / REMOVED FROM	DATE/TIME	RECEIVED BY / STORED IN	DATE/TIME
S. KAUM	6-14-11 1330	Robert Bayl	6-14-11 1330
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

Field samplers will composite GAC from Canisters AE-1068, AE-1089, AE-1086, AE-1071, AE-1093, AE-1111, AE-1085, AE-1203, AE-1095

\*\* The CACN for all analytical work being performed by WSCF laboratory is 401639ES20.

\*\* The 200 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.  
 (1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gross Alpha; Gross Beta; Isotopic Plutonium; Americium-241; Neptunium-237; Strontium-89,90 - Total Sr; Isotopic Uranium (Uranium-233/234, Uranium-235, Uranium-238);

LABORATORY SECTION	RECEIVED BY	DATE/TIME	DISPOSED BY	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD			

PRINTED ON 4/27/2011

A6004-B (REV 2)

CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F11-031-008	PAGE 1 OF 1
COLLECTOR <b>KAVEL, Remo, Bryan</b>	COMPANY CONTACT EVANS, RT	TELEPHONE NO. 373-7924	PROJECT COORDINATOR EVANS, RT	PRICE CODE 90	DATA TURNAROUND 21 Days / 21 Days
SAMPLING LOCATION 2P-1 Spent GAC (PW-1 2-1A area); AE-1095	PROJECT DESIGNATION 200-PW-1 B. 200-2P-1 Spent GAC Canisters and Filters	FIELD LOGBOOK NO. <b>Pg 24</b>	ACTUAL SAMPLE DEPTH <b>N/A</b>	AIR QUALITY <input type="checkbox"/>	<b>ORIGINAL</b>
ICE CHEST NO.	FIELD LOGBOOK NO. <b>11NF-N-585-6</b>	OFFSITE PROPERTY NO. N/A	COA 300209ES10	METHOD OF SHIPMENT GOVERNMENT VEHICLE	
SHIPPED TO Waste Sampling & Characterization	PRESERVATION None	HOLDING TIME 6 Months	TYPE OF CONTAINER 4G	NO. OF CONTAINER(S) 1	VOLUME 50ML
MATRIX* A=Air DL=Dust L=Leach DS=Dust S=Soil L=Liquid O=Oil S=Soil DS=Soilment T=Trace V=Vegetation W=Water H=Hole R=Other	POSSIBLE SAMPLE HAZARDOUS/ REMARKS 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)	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS ICAPS - 2018 Pack and Store		

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME
B2D764	2 OTHER SOLID	6-14-11	1252 ✓

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM <i>Edward L. Kause</i>	DATE/TIME 6-14-11 1330	RECEIVED BY/STORED IN <i>Michael P. Byl</i>
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN
LABORATORY SECTION	RECEIVED BY	TITLE
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY
PRINTED ON 4/21/2011		

Field Samplers will collect ICP/MS and VOA from AE-1095 only (do not collect from composite sample).

\*\* The CACN for all analytical work being performed by WSCF laboratory is 401639ES20.

\*\* The 200 Area S&GRP Characterization and Monitoring Sampling and Analysis GCI applies to this SAF.

A-6035-618 (REV 2)