

MAY 16, 2012

REVISION 3

WSCF Laboratory

PO Box 650 S3-30
Richland, WA 99352



May 16, 2012

Scot Fitzgerald
CH2M-HILL PRC
PO Box 1600
Richland, WA 99352

Dear Scot Fitzgerald,

REVISED120255 - 615451 [Report ID: 120255]

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

This letter contains the following information for sample delivery group WSCF120255

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

Very truly yours,

A handwritten signature in black ink, appearing to read "Rich A. Westberg", is written over a horizontal line.

Electronically signed by Joseph Hale
For Lab Manager, Rich A. Westberg
WSCF Analytical Lab
(509) 373-4657

Attachments 4

CC: w/Attachments

File/LB

REVISED120255 -

ATTACHMENT 1

COVER SHEET

Consisting of 2 pages
Including cover page

WSCF SAF Number Cross Reference

Group # WSCF120255
Data Deliverable Date 02/29/12

SAF #	Sample ID	Sample #	Matrix	Sampled	Received
F12-013	B2KCR5	120255001	SOIL	02/09/12	02/14/12

ATTACHMENT 2

NARRATIVE

Consisting of 7 pages
Including cover page

Attachment 2
Narrative Rev.3
WSCF120255

Rev. 3 – Addition of Selenium to the 200.8 TCLP requested metals.

Rev. 2 – Addition of 200.8 TCLP metals analysis.

Rev. 1 – Addition of Strontium rad analysis.

Introduction

A sample was received at the WSCF laboratory as referenced on the WSCF SAF Number Cross Reference table included in the final report. The sample was 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

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

Attachment 2
Narrative Rev.3
WSCF120255

- All applicable QC controls are within the established limits.

TCLP-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):

- Sample Issue Resolution Form SDR12-235 regarding addition of TCLP metals is attached to this report.
 - Chromium – Detected in the Blank and evaluated. No sample results in this batch were affected. “C” Flags not required.
 - Chromium – Exceeded spiking levels by a factor of 4. Spike recoveries and associated RPDs are not valid.
 - All other applicable 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. Analytical Note(s):

- Mercury – Matrix Spike and/or Matrix Spike Duplicate recoveries are outside established laboratory limits. Affected sample results in this batch were “N” flagged.
- Strontium – Detected in the Blank and evaluated. No sample results in this batch were affected. “C” Flags not required.
- All other applicable QC controls are within the established limits.

Radiochemistry Comments

Rad Chem – The hold time requirement for this analysis was met. A Duplicate, 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.

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Narrative Rev.3
WSCF120255

- Gross Alpha – The LCS recovery was outside laboratory acceptance limits, but within the 70 – 130% range allowed in the SOW.
- All other applicable QC controls are within the established limits.
- Strontium-89/90:
 - Sample Issue Resolution Form SDR12-211 regarding analysis of Strontium-89/90 is attached to this report.
 - The Blank is less than two times the RDL. “B” Flag not required.
 - Duplicate Relative Percent Difference(s) (RPD) did not meet the established laboratory limits due to sample inhomogeneity. No flags issued on sample results. The quality control report was flagged for RPD failure.
 - 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 2
Narrative Rev.3
WSCF120255

SAMPLE ISSUE RESOLUTION

SIR NUM SDR12-211
REV NUM 0
DATE INITIATED 2/28/2012

SAMPLE EVENT INFORMATION

SAF NUM(S) F12-013
OPERABLE UNIT(S) 100-KR-1
PROJECT(S) 100 K
SAMPLE EVENT TITLE(S) 100K Waste Characterization
LABORATORY Waste Sampling & Characterization

SAMPLING INFORMATION

NUMBER OF SAMPLES 1
SAMPLE NUMBERS B2KCR5
SAMPLE MATRIX SOIL
COLLECTION DATE 2/9/2012 - 2/9/2012
SDG NUM WSCF120255

ISSUE BACKGROUND

CLASS General Laboratory Direction
TYPE Addition of Analyses
DESCRIPTION Addition of analysis for listed sample.

DISPOSITION

DESCRIPTION PROPOSED DISPOSITION: Addition of analysis for total rad Strontium; sample number B2KCR5.
JUSTIFICATION ACCEPTED DISPOSITION: Added analysis; revised report will be due in 15 days.

SUBMITTED BY: Steve Trent/ CHPRC Date 2/28/12

ACCEPTED BY: Heather Medley/ WSCF Date 3/1/12

Attachment 2
Narrative Rev.3
WSCF120255

SAMPLE ISSUE RESOLUTION

SIR NUM SDR12-235
REV NUM 0
DATE INITIATED 4/18/2012

SAMPLE EVENT INFORMATION

SAF NUM(S) F12-013
OPERABLE UNIT(S) 100-KR-1
PROJECT(S) 100 K
SAMPLE EVENT TITLE(S) 100K Waste Characterization
LABORATORY Waste Sampling & Characterization

SAMPLING INFORMATION

NUMBER OF SAMPLES 1
SAMPLE NUMBERS B2KCR5
SAMPLE MATRIX SOIL
COLLECTION DATE 2/9/2012 - 2/9/2012
SDG NUM WSCF120255

ISSUE BACKGROUND

CLASS General Laboratory Direction
TYPE Addition of Analyses
DESCRIPTION Addition of the following analyses: TCLP analysis for sample B2KCR5 (WSCF120255). Method is 1311/200.8 for chromium, lead, mercury, and arsenic.

DISPOSITION

DESCRIPTION PROPOSED DISPOSITION: SMR requests the addition of TCLP analysis for sample B2KCR5 (WSCF120255). Method is 1311/200.8 for chromium, lead, mercury, and arsenic.

JUSTIFICATION ACCEPTED DISPOSITION:

SUBMITTED BY: Steve Trent/CHPRC DATE: 4/18/12

ACCEPTED BY: Heather Medley/WSCF DATE: 4/20/12

Attachment 2
Narrative Rev.3
WSCF120255

SAMPLE ISSUE RESOLUTION

SIR NUM SDR12-255
REV NUM 0
DATE INITIATED 5/9/2012

SAMPLE EVENT INFORMATION

SAF NUM(S) F12-013
OPERABLE UNIT(S) 100-KR-1
PROJECT(S) 100 K
SAMPLE EVENT TITLE(S) 100K Waste Characterization
LABORATORY Waste Sampling & Characterization

SAMPLING INFORMATION

NUMBER OF SAMPLES 1
SAMPLE NUMBERS B2KCR5
SAMPLE MATRIX SOIL
COLLECTION DATE 2/9/2012 - 2/9/2012
SDG NUM WSCF120255

ISSUE BACKGROUND

CLASS General Laboratory Direction
TYPE Addition of Analysis
DESCRIPTION Per a phone call request from Tom Gilmore, it was requested that WSCF also provide a TCLP 1311/200.8 Selenium result in the final report.

DISPOSITION

DESCRIPTION PROPOSED DISPOSITION: WSCF will issue a revised report, which will contain a result for Selenium by TCLP 1311/200.8.

JUSTIFICATION ACCEPTED DISPOSITION: Accept proposed resolution.

SUBMITTED BY: Marisol Avila/WSCF DATE: 5/9/12

ACCEPTED BY: Steve Trent/CHPRC Date: 5/9/12

ATTACHMENT 3

ANALYTICAL RESULTS

Consisting of 25 pages
Including cover page

WSCF ANALYTICAL RESULTS REPORT

For

CH2M Hill Plateau Remediation

PO Box 1600
Richland, WA 99352

Attention: Scot Fitzgerald

Contract # MOA-FH-CHPRC-2008
Group # WSCF120255
Report Date May 16, 2012

Analytical: Electronically signed by Joseph Hale

Client Services: Electronically signed by Marisol Avila

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) 373-7005. Information designation of this report is the responsibility of the customer.

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Batch QC List

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120255

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
195494	195697	4	BLANK	70736	BLANK		ICP-2008 MS All possible metal
195494	195697	5	LCS	70737	LCS		ICP-2008 MS All possible metal
195494	195697	6	SAMPLE	120255001	B2KCR5		ICP-2008 MS All possible metal
195494	195697	7	MS	70738	B2KCR5(120255001MS)	120255001	ICP-2008 MS All possible metal
195494	195697	8	MSD	70739	B2KCR5(120255001MSD)	120255001	ICP-2008 MS All possible metal
195494	195705	1	LCS	70737	LCS		ICP-2008 MS All possible metal
195494	195705	2	BLANK	70736	BLANK		ICP-2008 MS All possible metal
195494	195705	10	MSD	70739	B2KCR5(120255001MSD)	120255001	ICP-2008 MS All possible metal
195494	195705	11	MS	70738	B2KCR5(120255001MS)	120255001	ICP-2008 MS All possible metal
195494	195705	12	SAMPLE	120255001	B2KCR5		ICP-2008 MS All possible metal
195713	195714	1	BLANK	70897	BLANK		Hexavalent chromium
195713	195714	3	LCS	70898	LCS		Hexavalent chromium
195713	195714	5	DUP	70899	B2KCP4(120284001DUP)	120284001	Hexavalent chromium
195713	195714	6	MS	70900	B2KCP4(120284001MS)	120284001	Hexavalent chromium
195713	195714	7	PSTSPK	70901	PSTSPK		Hexavalent chromium
195713	195714	8	IMS	70902	B2KCP4(120284001IMS)	120284001	Hexavalent chromium
195713	195714	12	SAMPLE	120255001	B2KCR5		Hexavalent chromium
199206	199530	4	BLANK	73689	BLANK		TCLP-MS Metals
199206	199530	5	LCS	73690	LCS		TCLP-MS Metals
199206	199530	7	MS	73691	B2L274(120536001MS)	120536001	TCLP-MS Metals
199206	199530	8	MSD	73692	B2L274(120536001MSD)	120536001	TCLP-MS Metals
199206	199530	9	SAMPLE	120255001	B2KCR5		TCLP-MS Metals

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Batch QC List

Attention Scot Fitzgerald
 Department Radiochemistry

Group # WSCF120255

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
195097	195108	1	IBLANK	70484	IBLANK		Gamma Energy Analysis-general
195097	195108	2	LCS	70485	LCS		Gamma Energy Analysis-general
195097	195108	3	DUP	70486	B2KCR5(120255001DUP) 120255001		Gamma Energy Analysis-general
195097	195108	4	SAMPLE	120255001	B2KCR5		Gamma Energy Analysis-general
195098	195297	1	BLANK	70487	BLANK		Gross Alpha/Gross Beta
195098	195297	2	LCS	70488	LCS		Gross Alpha/Gross Beta
195098	195297	3	DUP	70489	B2KCR5(120255001DUP) 120255001		Gross Alpha/Gross Beta
195098	195297	4	SAMPLE	120255001	B2KCR5		Gross Alpha/Gross Beta
195098	195297	5	SAMPLE	120255001	B2KCR5		Gross Alpha/Gross Beta
196251	196424	1	BLANK	71349	BLANK		Strontium 89/90 (GPC/GEA)
196251	196424	2	LCS	71350	LCS		Strontium 89/90 (GPC/GEA)
196251	196424	3	DUP	71351	B2KCR5(120255001DUP) 120255001		Strontium 89/90 (GPC/GEA)
196251	196424	4	SAMPLE	120255001	B2KCR5		Strontium 89/90 (GPC/GEA)

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Batch QC List

Attention Scot Fitzgerald
Department Wet Chemistry

Group # WSCF120255

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
195798	195798	3	SAMPLE	120255001	B2KCR5		Dry Weight/Percent Moisture

Method Reference

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120255

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.

LA-265-403	Hexavalent Chromium Analysis		
	EPA SW-846	7196A	Hexavalent Chromium
	HEIS	7196_CR6	Hexavalent Chromium
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.
LA-544-441	WSCF Toxicity Characteristic Leaching Procedure (TCLP) Low Activity Samples		
	EPA SW-846	1311	Toxicity Characteristic Leaching Procedure
LA-505-412	Determination of Trace Elements in Waters & Wastes by ICP Mass Spectrometry (RCRA Metals)		
	EPA-600/R-94-111	200.8	Determination of Trace Elements in Waters and Waste by Inductively Coupled Plasma
	HEIS	TCLP_200.8_MET_ICP	TCLP Metal by ICP-MS, 1311/200.8

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

Attention Scot Fitzgerald
Department Radiochemistry

Group # WSCF120255

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.

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-508-481	Gamma Energy Analysis using the Canberra Genie Ssystem
HEIS	GAMMA_GS Gamma Energy Analysis
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

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

Attention Scot Fitzgerald
Department Wet Chemistry

Group # WSCF120255

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.

LA-519-412	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

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>

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF120255

Sample # 120255001
 SAF# F12-013
 Sample ID B2KCR5

Matrix SOIL
 Sampled 02/09/12
 Received 02/14/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Cr(VI) Prep										02/23/12
Cr(VI)										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.14		ug/g	1	0.14	0.69	02/23/12
ICPMS Prep										02/22/12
ICP-MS										
Manganese	7439-96-5	LA-505-412		248		mg/kg	1	0.14	1.4	02/23/12
Nickel	7440-02-0	LA-505-412		19.5		mg/kg	1	0.14	1.4	02/23/12
Silver	7440-22-4	LA-505-412	B	0.0803		mg/kg	1	0.069	0.69	02/23/12
Antimony	7440-36-0	LA-505-412	B	0.982		mg/kg	1	0.41	4.1	02/23/12
Barium	7440-39-3	LA-505-412		57.8		mg/kg	1	0.27	2.7	02/23/12
Beryllium	7440-41-7	LA-505-412	U	<0.14		mg/kg	1	0.14	1.4	02/23/12
Cadmium	7440-43-9	LA-505-412	B	0.511		mg/kg	1	0.069	0.69	02/23/12
Chromium	7440-47-3	LA-505-412		21.9		mg/kg	1	0.14	1.4	02/23/12
Cobalt	7440-48-4	LA-505-412		6.70		mg/kg	1	0.069	0.34	02/23/12
Copper	7440-50-8	LA-505-412		34.7		mg/kg	1	0.14	1.4	02/23/12
Vanadium	7440-62-2	LA-505-412		42.7		mg/kg	1	0.27	2.7	02/23/12
Zinc	7440-66-6	LA-505-412		154		mg/kg	1	1.4	14	02/23/12
Lead	7439-92-1	LA-505-412		39.8		mg/kg	1	0.069	0.69	02/23/12
Mercury	7439-97-6	LA-505-412	N	4.63		mg/kg	1	0.069	0.27	02/23/12

MDL = Minimum Detection Limit
 RQ = Result Qualifier
 TP Err = Total Propagated Error
 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)

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Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF120255

Sample # 120255001
 SAF# F12-013
 Sample ID B2KCR5

Matrix SOIL
 Sampled 02/09/12
 Received 02/14/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Molybdenum	7439-98-7	LA-505-412		1.42		mg/kg	1	0.069	0.69	02/23/12
Strontium	7440-24-6	LA-505-412		16.2		mg/kg	1	0.14	1.4	02/23/12
Tin	7440-31-5	LA-505-412		1.70		mg/kg	1	0.069	0.69	02/23/12
Uranium	7440-61-1	LA-505-412		1.14		mg/kg	1	0.069	0.34	02/23/12
Arsenic	7440-38-2	LA-505-412		7.21		mg/kg	1	0.27	2.7	02/23/12
Selenium	7782-49-2	LA-505-412	B	1.00		mg/kg	1	0.69	6.9	02/23/12
ICP-MS RCRA										
Chromium	7440-47-3	LA-505-412	U	<100		ug/L	1	100	1000	04/30/12
Lead	7439-92-1	LA-505-412	U	<50		ug/L	1	50	500	04/30/12
Mercury	7439-97-6	LA-505-412	U	<50		ug/L	1	50	200	04/30/12
Arsenic	7440-38-2	LA-505-412	U	<200		ug/L	1	200	2000	04/30/12
Selenium	7782-49-2	LA-505-412	U	<1000		ug/L	1	1000	1.0E4	04/30/12

MDL = Minimum Detection Limit
 RQ = Result Qualifier
 TP Err = Total Propagated Error
 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)

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Attention Scot Fitzgerald
 Department Radiochemistry

Group # WSCF120255

Sample # 120255001
 SAF# F12-013
 Sample ID B2KCR5

Matrix SOIL
 Sampled 02/09/12
 Received 02/14/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Alpha/Beta Prep										02/15/12
Gross Alpha/Beta										
Gross Alpha	12587-46-1	LA-508-415		8.0	1.8	pCi/g	1	2.5		02/22/12
Gross Beta	12587-47-2	LA-508-415		300	23	pCi/g	1	3.9		02/22/12
GEA Prep										02/15/12
GEA										
Americium-241	14596-10-2	LA-508-481		5.8	.92	pCi/g	1	0.99		02/15/12
Cesium-137	10045-97-3	LA-508-481		430	40	pCi/g	1	0.15		02/15/12
Cobalt-60	10198-40-0	LA-508-481		0.47	.039	pCi/g	1	0.024		02/15/12
Europium-152	14683-23-9	LA-508-481		2.7	.16	pCi/g	1	0.66		02/15/12
Europium-154	15585-10-1	LA-508-481		0.77	.13	pCi/g	1	0.091		02/15/12
Europium-155	14391-16-3	LA-508-481	U	-0.23	.32	pCi/g	1	0.74		02/15/12
SR-89/90										03/07/12
SR-89/90										
Strontium-89_90	SR-RAD	LA-220-406		6.2	.56	pCi/g	1	0.16		03/09/12

MDL = Minimum Detection Limit
 RQ = Result Qualifier
 TP Err = Total Propagated Error
 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.

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Attention Scot Fitzgerald
 Department Wet Chemistry

Group # WSCF120255

Sample # 120255001
 SAF# F12-013
 Sample ID B2KCR5

Matrix SOIL
 Sampled 02/09/12
 Received 02/14/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Total Residue										02/24/12
Total Residue										
Percent Solids	%SOLIDS	LA-519-412		71		percent	1			02/24/12

MDL = Minimum Detection Limit
 RQ = Result Qualifier
 TP Err = Total Propagated Error
 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)

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Quality Control Report

MAY 16, 2012

REVISION 3

Attention Scot Fitzgerald
 Department Radiochemistry

Group # WSCF120255

QC Batch 195097 Test Gamma Energy Analysis-general
 Associated Samples 120255001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
IBLANK		QC Sample #70484								
Americium-241	14596-10-2		4.6E-3	pCi/g					U	02/15/12
Cesium-137	10045-97-3		-2.8E-4	pCi/g					U	02/15/12
Cobalt-60	10198-40-0		-2.2E-3	pCi/g					U	02/15/12
Europium-152	14683-23-9		1.2E-3	pCi/g					U	02/15/12
Europium-154	15585-10-1		1.7E-3	pCi/g					U	02/15/12
Europium-155	14391-16-3		-0.014	pCi/g					U	02/15/12
LCS		QC Sample #70485								
Americium-241	14596-10-2		18000	pCi/sample	107.6	80 - 120				02/15/12
Cesium-137	10045-97-3		6400	pCi/sample	106.5	80 - 120				02/15/12
Cobalt-60	10198-40-0		10000	pCi/sample	102.1	80 - 120				02/15/12
DUP		QC Sample #70486								
		Original 120255001								
Americium-241	14596-10-2	5.8	6.3	pCi/g			9.30	30		02/15/12
Cesium-137	10045-97-3	430	430	pCi/g			0.00	30		02/15/12
Cobalt-60	10198-40-0	0.47	0.49	pCi/g			5.90	30		02/15/12
Europium-152	14683-23-9	2.7	2.6	pCi/g			5.40	30		02/15/12
Europium-154	15585-10-1	0.77	0.57	pCi/g			27.40	30		02/15/12
Europium-155	14391-16-3	-0.23	-0.14	pCi/g			-46.20	30	* U	02/15/12

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Attention Scot Fitzgerald
 Department Radiochemistry

Group # WSCF120255

QC Batch 195098 Test Gross Alpha/Gross Beta
 Associated Samples 120255001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK		QC Sample #70487								
Gross Alpha	12587-46-1		0.25	pCi/g					U	02/22/12
Gross Beta	12587-47-2		1.9	pCi/g					U	02/22/12
LCS		QC Sample #70488								
Gross Alpha	12587-46-1		4.7	pCi/g	78.7	80 - 120			X	02/22/12
Gross Beta	12587-47-2		25	pCi/g	96	80 - 120				02/22/12
DUP		QC Sample #70489								
		Original 120255001								
Gross Alpha	12587-46-1	8.0	11	pCi/g			36.00	30	* X	02/22/12
Gross Beta	12587-47-2	300	360	pCi/g			12.80	30		02/22/12

Quality Control Report

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REVISION 3

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF120255

QC Batch 195494 Test ICP-2008 MS All possible metal
 Associated Samples 120255001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK		QC Sample #70736								
Manganese	7439-96-5	<0.10		ug/L					U	02/23/12
Nickel	7440-02-0	<0.10		ug/L					U	02/23/12
Silver	7440-22-4	<0.050		ug/L					U	02/23/12
Antimony	7440-36-0	<0.30		ug/L					U	02/23/12
Barium	7440-39-3	<0.20		ug/L					U	02/23/12
Beryllium	7440-41-7	<0.10		ug/L					U	02/23/12
Cadmium	7440-43-9	<0.050		ug/L					U	02/23/12
Chromium	7440-47-3	<0.10		ug/L					U	02/23/12
Cobalt	7440-48-4	<0.050		ug/L					U	02/23/12
Copper	7440-50-8	<0.10		ug/L					U	02/23/12
Vanadium	7440-62-2	<0.20		ug/L					U	02/23/12
Zinc	7440-66-6	<1.0		ug/L					U	02/23/12
Lead	7439-92-1	<0.050		ug/L					U	02/23/12
Mercury	7439-97-6	<0.050		ug/L					U	02/23/12
Molybdenum	7439-98-7	<0.050		ug/L					U	02/23/12
Strontium	7440-24-6	0.132		ug/L					B	02/23/12
Tin	7440-31-5	<0.050		ug/L					U	02/23/12
Uranium	7440-61-1	<0.050		ug/L					U	02/23/12
Arsenic	7440-38-2	<0.20		ug/L					U	02/23/12

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Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF120255

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Selenium LCS	7782-49-2		<1.0	ug/L					U	02/23/12
QC Sample #70737										
Manganese	7439-96-5		264	mg/kg	92.3	75 - 121				02/23/12
Nickel	7440-02-0		57.6	mg/kg	97.4	74 - 122				02/23/12
Silver	7440-22-4		37.3	mg/kg	108.4	83 - 127				02/23/12
Antimony	7440-36-0		139	mg/kg	114.2	62 - 205				02/23/12
Barium	7440-39-3		161	mg/kg	95.2	78 - 118				02/23/12
Beryllium	7440-41-7		59.1	mg/kg	94.6	77 - 120				02/23/12
Cadmium	7440-43-9		62.0	mg/kg	100.3	76 - 129				02/23/12
Chromium	7440-47-3		67.1	mg/kg	94.1	68 - 119				02/23/12
Cobalt	7440-48-4		104	mg/kg	100.8	77 - 122				02/23/12
Copper	7440-50-8		76.1	mg/kg	93.7	67 - 120				02/23/12
Vanadium	7440-62-2		57.9	mg/kg	97.8	67 - 122				02/23/12
Zinc	7440-66-6		136	mg/kg	96.3	73 - 131				02/23/12
Lead	7439-92-1		91.1	mg/kg	98.5	79 - 124				02/23/12
Mercury	7439-97-6		3.68	mg/kg	97.5	69 - 124				02/23/12
Molybdenum	7439-98-7		45.9	mg/kg	107.8	80 - 125				02/23/12
Strontium	7440-24-6		68.7	mg/kg	94.9	78 - 119				02/23/12
Tin	7440-31-5		109	mg/kg	101.5	84 - 130				02/23/12
Uranium	7440-61-1		415	mg/kg	108.1	86 - 113				02/23/12
Arsenic	7440-38-2		93.8	mg/kg	101.3	79 - 125				02/23/12
Selenium MS	7782-49-2		83.1	mg/kg	92.9	82 - 133				02/23/12
QC Sample #70738										
Original 120255001										

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Quality Control Report

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Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF120255

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Antimony	7440-36-0	0.982	89.8	mg/kg	98.7	70 - 130	14.80	30		02/23/12
Barium	7440-39-3	57.8	92.7	mg/kg	101.9	70 - 130	15.20	30		02/23/12
Beryllium	7440-41-7	<0.14	95.6	mg/kg	105.1	70 - 130	13.10	30		02/23/12
Cadmium	7440-43-9	0.511	96.3	mg/kg	105.9	70 - 130	12.00	30		02/23/12
Chromium	7440-47-3	21.9	96.1	mg/kg	105.6	70 - 130	8.50	30		02/23/12
Cobalt	7440-48-4	6.70	97.1	mg/kg	106.8	70 - 130	11.10	30		02/23/12
Copper	7440-50-8	34.7	93.6	mg/kg	102.9	70 - 130	12.00	30		02/23/12
Vanadium	7440-62-2	42.7	94.2	mg/kg	103.6	70 - 130	10.00	30		02/23/12
Zinc	7440-66-6	154	105	mg/kg	115.6	70 - 130	2.30	30		02/23/12
Lead	7439-92-1	39.8	87.6	mg/kg	96.3	70 - 130	12.90	30		02/23/12
Mercury	7439-97-6	4.63	2.83	mg/kg	155.9	70 - 130	2.80	30	N	02/23/12
Molybdenum	7439-98-7	1.42	102	mg/kg	112.2	70 - 130	12.70	30		02/23/12
Strontium	7440-24-6	16.2	99.7	mg/kg	109.7	70 - 130	12.70	30		02/23/12
Tin	7440-31-5	1.70	97.9	mg/kg	107.7	70 - 130	14.00	30		02/23/12
Uranium	7440-61-1	1.14	99.8	mg/kg	109.8	70 - 130	12.10	30		02/23/12
Arsenic	7440-38-2	7.21	95.5	mg/kg	105.1	70 - 130	12.10	30		02/23/12
Selenium	7782-49-2	1.00	92.7	mg/kg	101.9	70 - 130	18.10	30		02/23/12

Quality Control Report

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Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF120255

QC Batch 195713 Test Hexavalent chromium
 Associated Samples 120255001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK										
			QC Sample #70897							
Hexavalent chromium	18540-29-9	<0.10		ug/g					U	02/23/12
LCS			QC Sample #70898							
Hexavalent chromium	18540-29-9	3.88		ug/g	98.2	80 - 120				02/23/12
DUP			QC Sample #70899							
			Original 120284001							
Hexavalent chromium	18540-29-9	<0.11		ug/g			0.30	30	U	02/23/12
MS			QC Sample #70900							
			Original 120284001							
Hexavalent chromium	18540-29-9	3.52		ug/g	91.3	75 - 125				02/23/12
PSTSPK			QC Sample #70901							
Hexavalent chromium	18540-29-9	0.0487		ug/g	97.4	85 - 115				02/23/12
IMS			QC Sample #70902							
			Original 120284001							
Hexavalent chromium	18540-29-9	310		ug/g	90	75 - 125				02/23/12

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Attention Scot Fitzgerald
 Department Radiochemistry

Group # WSCF120255

QC Batch 196251 Test Strontium 89/90 (GPC/GEA)
 Associated Samples 120255001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK										
Strontium-89_90	SR-RAD		0.12	pCi/g					X	03/09/12
LCS										
Strontium-89_90	SR-RAD		5.5	pCi/g	101.6	80 - 120				03/09/12
DUP										
Strontium-89_90	SR-RAD	6.2	13	pCi/g			72.50	30	* X	03/09/12

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Quality Control Report

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REVISION 3

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF120255

QC Batch 199206 Test TCLP-MS Metals
 Associated Samples 120255001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK		QC Sample #73689								
Chromium	7440-47-3		5.12	ug/L					B	04/30/12
Lead	7439-92-1		<0.50	ug/L					U	04/30/12
Mercury	7439-97-6		<0.50	ug/L					U	04/30/12
Arsenic	7440-38-2		<2.0	ug/L					U	04/30/12
Selenium	7782-49-2		<10	ug/L					U	04/30/12
LCS		QC Sample #73690								
Chromium	7440-47-3		427	ug/L	106.8	70 - 130				04/30/12
Lead	7439-92-1		410	ug/L	102.4	70 - 130				04/30/12
Mercury	7439-97-6		19.1	ug/L	95.4	70 - 130				04/30/12
Arsenic	7440-38-2		379	ug/L	94.7	70 - 130				04/30/12
Selenium	7782-49-2		362	ug/L	90.6	70 - 130				04/30/12
MS		QC Sample #73691								
		Original 120536001								
Chromium	7440-47-3		336	ug/L	84	70 - 130			X	04/30/12
Lead	7439-92-1		419	ug/L	104.7	70 - 130				04/30/12
Mercury	7439-97-6		20.4	ug/L	102	70 - 130				04/30/12
Arsenic	7440-38-2		407	ug/L	101.8	70 - 130				04/30/12
Selenium	7782-49-2		390	ug/L	97.6	70 - 130				04/30/12

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Quality Control Report

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REVISION 3

Attention Scot Fitzgerald
 Department Radiochemistry

Group # WSCF120255

QC Batch 196251 Test Strontium 89/90 (GPC/GEA)
 Associated Samples 120255001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
SAMPLE		Sample #120255001								
Strontium-85	13967-73-2				75	25 - 105				03/09/12
BLANK		QC Sample #71349								
Strontium-85	13967-73-2				76.4	25 - 105				03/09/12
LCS		QC Sample #71350								
Strontium-85	13967-73-2				80.8	25 - 105				03/09/12
DUP		QC Sample #71351								
		Original 120255001								
Strontium-85	13967-73-2				70	25 - 105	n/a			03/09/12

REVISED120255 -

Attention: Scot Fitzgerald

Group #

WSCF120255

Quality Control Comments

Department Inorganic

73691 B2L274(120536001MS)

Analyte Chromium - TCLP-MS Metals

[1] X5: Sample concentration exceed spiking level by a factor of 4. Spike recoveries are not valid.

73692 B2L274(120536001MSD)

Analyte Chromium - TCLP-MS Metals

[1] X5: Sample concentration exceed spiking level by a factor of 4. Spike recoveries are not valid.

Attention: Scot Fitzgerald

Group #

WSCF120255

Quality Control Comments

Department Radiochemistry

70488	LCS for HBN 195098 [RADP/6363]
Analyte	Gross Alpha - Gross Alpha/Gross Beta
[1]	The LCS is outside of default limits. The LCS is within the range of 70-130% and is acceptable, per S&GRP SOW. LMK
70489	B2KCR5(120255001DUP)
Analyte	Gross Alpha - Gross Alpha/Gross Beta
[1]	The duplicate is outside of default RPD limits. RPD limit does not apply to results less than 5X the Minimum Detectable Concentration.
71349	BLANK for HBN 196251 [RADP/643]
Analyte	Strontium-89_90 - Strontium 89/90 (GPC/GEA)
[1]	The blank is less than 2X the RDL and is acceptable, per S&GRP SOW
71351	B2KCR5(120255001DUP)
Analyte	Strontium-89_90 - Strontium 89/90 (GPC/GEA)
[1]	The duplicate is outside of RPD limits. Inhomogeneity in soil and other solid matrix samples can lead to poor reproducibility.

ATTACHMENT4

SAMPLE RECEIPT

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

ACKNOWLEDGEMENT OF SAMPLES RECEIVED

WSCF Laboratory

PO Box 650 S3-30
 Richland, WA 99352

ATTN: Scot Fitzgerald

Customer Code: CHPRC

PO #: 402581/ES20

Work Order #: 120255

Profile #: F12-013-001

Proj. Mgr.:

Phone:

The following samples were received from you on 2/14/2012 12:30:41 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
Tests scheduled				
120255001	B2KCR5	SOIL	2/9/2012 11:00	2/14/2012 12:30
2008-S; CR6-S; DRY-WEIGHT; GAB-AO-S; GAB-BO-S; GEA-S				

Test Acronym Description

Test Acronym	Description
2008-S	ICP-MS (S)
CR6-S	Cr6 (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)

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		FI2-013-001	PAGE 1 OF 1
COLLECTOR <i>K.J. Youngs</i>	COMPANY CONTACT TRENT, SJ	TELEPHONE NO. 373-5869	PROJECT COORDINATOR TRENT, SJ	PRICE CODE 8C	DATA TURNAROUND 15 Days / 15 Days
SAMPLING LOCATION 1908-K Sediment Sample #1	PROJECT DESIGNATION 1908-K-Sediment Sample and Analysis (100-K D&D Project)	SAF NO. FI2-013	COA 30262RES30	AIR QUALITY <input type="checkbox"/>	METHOD OF SHIPMENT GOVERNMENT VEHICLE
ICE CHEST NO. <i>6ws-107</i>	FIELD LOGBOOK NO. <i>N/A</i>	ACTUAL SAMPLE DEPTH <i>0-1'</i>	BILL OF LADING/ATR BILL NO. <i>N/A</i>	ORIGINAL	
SHIPPED TO Waste Sampling & Characterization	OFFSITE PROPERTY NO. <i>N/A</i>				
MATRIX* A=Air D=Drum L=Liquid DS=Drum S=Solids O=Other S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe 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)	Preservation Cool-4°C/Cool +4°C	Cool-4°C/Cool +4°C	None	None
<i>12D255</i>		30 Days	6 Months	6 Months	6 Months
SPECIAL HANDLING AND/OR STORAGE		ag	GP	Square bottle - Poly	GP
		1	1	1	1
		60ml	60ml	500ml	60ml
		Chromium He-7198 (Hexavalent Chromium)	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS
SAMPLE NO. <i>1</i>	MATRIX* <i>SOIL</i>	SAMPLE DATE <i>2/9/12</i>	SAMPLE TIME <i>1100</i>		

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM <i>K.J. Youngs</i>	DATE/TIME <i>2/14/12 1230</i>	RECEIVED BY/STORED IN <i>Robert Young</i>	DATE/TIME <i>2/14/12 1230</i>	** The CACN for WSCF Analytical is 402581ES20. □ ** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis G&I applies to this SAF.	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	(1) ICP/MS - 200.8 (100 Area RI/FS) {Antimony, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Molybdenum, Selenium, Strontium, Tin, Uranium}; 200.8_HG - ICPMS {Mercury};	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	(2) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155};	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	(3) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};	
LABORATORY SECTION	RECEIVED BY	TITLE		DATE/TIME	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY		DATE/TIME	DATE/TIME
PRINTED ON 2/7/2012					

A-6003-618 (REV 2)