Fluor Hanford, Inc.
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Richland, Washington 99352

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FLUOR

Memorandum

W1141-04-SLF-107

To:	S. J. Trent	Date:	January 27, 2004
From:	S. L. Fitzgerald, Manager For SLF WSCF Analytical Services	Telephone:	373-7495

	W/Attachments		W/O Attachments	
cc:	T. F. Dale	S3-28	D. Hart	S3-30
	S. L. Fitzgerald	S3-30	L. C. Swanson	E6-35
	H. K. Meznarich	S3-30	File/LB	
	J. E. Trechter	S3-30		
	M. Neely	S3-30		

Subject: FINAL RESULTS FOR 216-B-26 CHARACTERIZATION SAMPLING – SOIL SAMPLING - SAMPLE DELIVERY GROUP WSCF20031727 - SAF NUMBER F03-020

References: (1) Groundwater Protection Program-Letter of Instruction, FH-EIS-2003-MEM-001, October 31, 2002

(2) HNF-SD-CD-QAPP-017, Rev. 6, Waste Sampling and Characterization Facility Quality Assurance Plan

This letter contains a narrative (Attachment 1) for the sample delivery group (WSCF20031727), the analytical results (Attachment 2) and the sample receipt information (Attachment 3).

slf/ddw

Attachments 3

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W1141-04-SLF-107

ATTACHMENT 1

NARRATIVE

Consisting of 3 pages
Cover page not included

Sample Delivery Group	**WSCF20031727**
Sample Matrix	**Soil**
Sample Visual	**Brown**
SAF Number	**F03-020**
Data Deliverable	**Summary Report**

Introduction

One (1) soil sample (B183P2) from GPP was received at the WSCF Laboratory on December 31, 2003. The sample was analyzed for those analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Groundwater Protection Program- Letter of Instruction*, referenced in the cover letter.

The narrative (Attachment 1) will address sample characteristics, analyses requested and general information in performance of the analytical methods. A Data Summary Report (Attachment 2) includes analytical results, a comment report detailing method abnormalities, tentatively identified peaks if applicable, method references, and Laboratory QC information. Copies of the chain of custody and Request for Sample Analysis forms are included as Attachment 3.

Analytical Methodology for Requested Analyses

- ICP-MS Metals by EPA Method 200.8. Analytical work was performed with no deviations to the approved method.
- Semi-VOA's by EPA SW-846 Method 8270B. Analytical work was performed with no deviations to the approved method.
- WTPH-D by WDOE Method NWTPH-Dx. Analytical work was performed with no deviations to the approved method.
- IC Anions and Ammonium by EPA SW-846 Method 300.0 and 300.7. Analytical work was performed with no deviations to the approved method for Ammonium, but a deviation was required for the Anions (see comments below).
- The pH by EPA Method 150.1. Analytical work was performed with no deviations to the approved method.
- Percent Solids by EPA Method 160.3. Analytical work was performed with no deviations to the approved method.
- Cyanide by EPA SW-846 Method 9010. Analytical work was performed with no deviations to the approved method.

- All RadChem analyses (AEA's, GEA) were run by internal WDOE accredited WSCF procedures. Analytical work was performed with no deviations to the approved method.

Comments

ICP-MS Metals – The hold time(s) for this analysis was met. A Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GPP Letter of Instruction. See page(s) 2-12 and 2-13 for QC details. Analytical Note: For ICP-MS the preparation Blank contained -3.45 ug/L Chromium. Low Chromium LCS recovery. Flags not issued for high Arsenic, Cadmium, Selenium and Zinc LCS recoveries, sample concentrations were less than the MDL or all other QC is acceptable.

Semi-VOA's – The hold time(s) for this analysis was met. A Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GPP Letter of Instruction. See page(s) 2-20 through 2-23 for QC details. Compounds listed on the tentatively identified peak report with an "N" qualifier have been identified with the program used to interpret the raw data.

WTPH-D – The hold time(s) for this analysis was met. A Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GPP Letter of Instruction. See page(s) 2-19 for details.

IC Anions – The client requested hold time(s) for this analysis was not met. The client was notified and requested WSCF to continue with this analysis. A Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GPP Letter of Instruction. See page(s) 2-15 and 2-16 for QC details. Analytical Note: Chloride and Sulfate detected, but at concentrations less than that of the lowest calibration level. Sulfate and Nitrate-N Duplicate concentrations are less than 10X the MDL, so the +/- 20% RPD requirements do not apply.

NH4 – The hold time(s) for this analysis was met. A Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GPP Letter of Instruction. See page(s) 2-18 for QC details. Analytical Note: Ammonium-N was detected, the concentration is less than that of the lowest calibration level. Ammonium-N result is also an estimate due to potential matrix interference. Three separate matrix spikes were prepared and analyzed with consistently low results. Also while ammonium-N was detected in the sample it was not detected in the duplicate. Another aliquot was prepared and analyzed. Ammonium-N was not detected in this sample either. As the first ammonium-N results is <10X the MDL, the +/- 20% RPD does not apply.

Percent Solids – Semi-VOA's and WTPH-D analytical results were corrected for percent solids. All other analytical results were reported for the sample as received.

CN – The hold time(s) for this analysis was met. A Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GPP Letter of Instruction. See page(s) 2-14 for QC details. Analytical Note: The LCS was high at 116.9%

(limit is 115%), but concentration is below lowest calibration level. All other QC was within limits.

RadChem – There are no hold times associated with these WDOE accredited methods. A Laboratory Control Sample and Duplicate were analyzed with each delivery group per the GPP Letter of Instruction. See page(s) 2-17, 2-24, 2-25, 2-26, and 2-27 for QC details. Analytical Note: The Sample and Duplicate for Am-241 have poor RPD, but activity is below detection level. The Np LCS recovery is low at 49.4%. This is attributed to a slight excess of ascorbic acid which can occur in the LCS due to low iron levels and which causes retention of Np during separation. This effect did not occur with the samples as evidenced by the spike recoveries (A spike was added to the MS and MSD with recoveries of 82.7% and 93.1% respectively, limits for the spike are 75-125%.). All other QC was acceptable (the Duplicate RPD was high, but sample activity is below detection level) therefore no flags will be issued for Np. See page(s) 3-3, 3-4 and 3-5 for more detailed information on the Np issue.

Radiochemical Tracer Percent Recovery

Sample Number	Isotope	Blank	LCS	Sample	Duplicate
B183P2	U	80.31%	4.55%	88.36%	101.63%
	Pu	18.89%	32.45%	86.82%	81.17%
	Am	81.37%	63.17%	94.89%	73.85%

This Summary Report is in compliance with the SOW, both technically and for completeness. Release of the data contained in this hard copy report has been authorized by the WSCF Laboratory Analytical Manager and Client Services, as verified by the following signature.

Troy Dale
WSCF Production Control

Abbreviations

Hg – mercury
IC – ion chromatography
ICP – inductively coupled plasma
ICP/AES – ICP/atomic emission spectroscopy
ICP/MS – ICP/mass spectrometry
Total U – total uranium
AT/TB – total alpha/total beta
AEA – Alpha Energy Analysis
WTPH-G – Total Hydrocarbons-Gasoline
Am – americium
Cm - curium
Pu – plutonium
Np – neptunium
GEA – gamma energy analysis
H3 – Tritium
Sr – Strontium 89, 90
WTPH-D – Total Hydrocarbons-Diesel
TSS – Total Suspended Solids

W1141-04-SLF-107

ATTACHMENT 2

ANALYTICAL RESULTS

Consisting of 27 pages
Cover page not included

WSCF
ANALYTICAL RESULTS REPORT

for

Ground Water Protection Program

Richland, WA 99352

Attention: Steve Trent

Analytical: _____

Client Services: _____

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

Confidentiality Notice: The information contained in this report is privileged and confidential information intended only for the use of the addressee. If the reader of this report is not the intended recipient, or the employee or agent responsible to deliver it to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone at (509) 373-7020.

Contract#: FH-EIS-2003-MEM-001
Report#: WSCF20031727
Report Date: 22-jan-2004
Report WGPP/ver. 1
Ground Water Protection Program

WSCF
ANALYTICAL RESULTS REPORT

Attention: Steve Trent
Project: F03-020: F03-020

Group #: WSCF20031727

Sample #	Client ID			CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
Organic															
W030001235	B183P2	GPP	TRENT	100-02-7	4-Nitrophenol	SOIL	LA-523-456	U	< 660	ug/kg	1.00	6.6e+02	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	106-46-7	1,4-Dichlorobenzene	SOIL	LA-523-456	U	< 320	ug/kg	1.00	3.2e+02	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	108-95-2	Phenol	SOIL	LA-523-456	U	< 100	ug/kg	1.00	1.0e+02	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	120-82-1	1,2,4-Trichlorobenzene	SOIL	LA-523-456	U	< 300	ug/kg	1.00	3.0e+02	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	121-14-2	2,4-Dinitrotoluene	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	129-00-0	Pyrene	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	59-50-7	4-Chloro-3-methylphenol	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	621-64-7	N-Nitrosodi-n-dipropylamine	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	83-32-9	Acenaphthene	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	87-86-5	Pentachlorophenol	SOIL	LA-523-456	U	< 300	ug/kg	1.00	3.0e+02	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	95-57-8	2-Chlorophenol	SOIL	LA-523-456	U	< 150	ug/kg	1.00	1.5e+02	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	126-73-8	Tributyl phosphate	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	TPHDIESEL	Total Pet. Hydrocarbons Diesel	SOIL	NWTPH	U	< 3.80e+03	ug/kg	1.00	3.8e+03	01/13/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	TPHKEROSENE	Kerosene	SOIL	NWTPH	U	< 3.80e+03	ug/kg	1.00	3.8e+03	01/13/04	12/31/03	12/31/03

MDL=Minimum Detection Limit
RQ=Result Qualifier

B - The analyte < the RDL but > = the IDL/MDL (inorganic)
U - Analyzed for but not detected above limiting criteria.
E - Analyte is an estimate, has potentially larger errors

DF=Dilution Factor

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

WSCF
ANALYTICAL RESULTS REPORT

2-3

Attention: Steve Trent
Project: F03-020: F03-020

Group #: WSCF20031727

Sample #	Client ID			CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
Inorganic															
W030001235	B183P2	GPP	TRENT	57-12-5	Cyanide	SOIL	LA-695-402	U	< 0.200	mg/kg	1.00	0.20	01/12/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	NH4-N	Nitrogen in ammonium	SOIL	LA-503-401	BE	0.322	mg/kg	50.00	0.20	01/12/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	TS	Total solids	SOIL	LA-519-412		98.7	%	1.00	0.0	01/08/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	PH	pH Measurement	SOIL	LA-212-411		9.07	pH	1.00	0.010	01/08/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	16984-48-8	Fluoride	SOIL	LA-533-410	U	< 1.15	mg/kg	50.00	1.2	01/12/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	16887-00-6	Chloride	SOIL	LA-533-410	B	3.01	mg/kg	50.00	2.6	01/12/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	NO2-N	Nitrogen in Nitrite	SOIL	LA-533-410	U	< 0.950	mg/kg	50.00	0.95	01/12/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	NO3-N	Nitrogen in Nitrate	SOIL	LA-533-410	U	< 0.650	mg/kg	50.00	0.65	01/12/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	14265-44-2	Phosphate	SOIL	LA-533-410	U	< 2.70	mg/kg	50.00	2.7	01/12/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	14808-79-8	Sulfate	SOIL	LA-533-410	B	14.8	mg/kg	50.00	5.0	01/12/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	7440-43-9	Cadmium	SOIL	LA-505-412	U	< 0.958	mg/kg	9.58	0.96	01/10/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	7440-47-3	Chromium	SOIL	LA-505-412	EU	< 2.87	mg/kg	9.58	2.9	01/10/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	7440-50-8	Copper	SOIL	LA-505-412		9.72	mg/kg	9.58	4.8	01/10/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	7439-92-1	Lead	SOIL	LA-505-412	U	< 11.5	mg/kg	9.58	12	01/10/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	7440-02-0	Nickel	SOIL	LA-505-412		17.8	mg/kg	9.58	4.8	01/10/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	7440-22-4	Silver	SOIL	LA-505-412	U	< 1.92	mg/kg	9.58	1.9	01/10/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	7440-61-1	Uranium	SOIL	LA-505-412	U	< 0.958	mg/kg	9.58	0.96	01/10/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	7439-97-6	Mercury	SOIL	LA-505-412	U	< 0.958	mg/kg	9.58	0.96	01/10/04	12/31/03	12/31/03

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WSCF
ANALYTICAL RESULTS REPORT

Attention: Steve Trent
Project: F03-020: F03-020

Group #: WSCF20031727

Sample #	Client ID			CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
Radiochemistry															
W030001235	B183P2	GPP	TRENT	13994-20-2	Neptunium-237	SOIL	LA-508-471	U	0.0120	pCi/g	1.00	3.9e-03	01/16/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Np-237 by AEA Total Ctng Error	SOIL	LA-508-471		+- 0.012	pCi/g	1.00	0.0	01/16/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	14596-10-2	Americium-241	SOIL	LA-508-471		0.0190	pCi/g	1.00	4.4e-03	01/19/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Am-241 by AEA Total Cntg Error	SOIL	LA-508-471		+- 0.011	pCi/g	1.00	0.0	01/19/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	14234-35-6	Antimony-125	SOIL	LA-508-462	U	0.0254	pCi/g	1.00	0.035	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Sb-125 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.021	pCi/g	1.00	0.0	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	10198-40-0	Cobalt-60	SOIL	LA-508-462	U	-5.71e-03	pCi/g	1.00	0.011	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Co-60 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 6.9e-03	pCi/g	1.00	0.0	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	13967-70-9	Cesium-134	SOIL	LA-508-462	U	0.0388	pCi/g	1.00	0.040	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Cs-134 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.016	pCi/g	1.00	0.0	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	10045-97-3	Cesium-137	SOIL	LA-508-462	U	-6.07e-03	pCi/g	1.00	0.013	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Cs-137 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 7.6e-03	pCi/g	1.00	0.0	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	14683-23-9	Europium-152	SOIL	LA-508-462	U	6.57e-03	pCi/g	1.00	0.037	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Eu-152 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.042	pCi/g	1.00	0.0	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	15585-10-1	Europium-154	SOIL	LA-508-462	U	-0.0150	pCi/g	1.00	0.038	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Eu-154 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.023	pCi/g	1.00	0.0	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	14391-16-3	Europium-155	SOIL	LA-508-462	U	-9.32e-03	pCi/g	1.00	0.065	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Eu-155 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.039	pCi/g	1.00	0.0	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	15832-50-5	Tin-126	SOIL	LA-508-462	U	0.358	pCi/g	1.00	0.40	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Sn-126 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.075	pCi/g	1.00	0.0	01/09/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	13981-16-3	Plutonium-238	SOIL	LA-508-471	U	-0.0220	pCi/g	1.00	0.052	01/19/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Pu-238 by AEA Total Cntg Error	SOIL	LA-508-471		+- 0.026	pCi/g	1.00	0.0	01/19/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	PU-239/240	Pu-239/240 by AEA	SOIL	LA-508-471	U	5.80e-03	pCi/g	1.00	0.014	01/19/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	Pu-239/240 AEA Total Cntg Err	SOIL	LA-508-471		+- 8.7e-03	pCi/g	1.00	0.0	01/19/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	U-233/234	Uranium-233/234	SOIL	LA-508-471		0.120	pCi/g	1.00	0.016	01/20/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	U-233/234 AEA Total Cntg Error	SOIL	LA-508-471		+- 0.043	pCi/g	1.00	0.0	01/20/04	12/31/03	12/31/03

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WSCF
ANALYTICAL RESULTS REPORT

Attention: Steve Trent
Project: F03-020: F03-020

Group #: WSCF20031727

Sample #	Client ID			CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receiv
W030001235	B183P2	GPP	TRENT	15117-96-1	Uranium-235	SOIL	LA-508-471		9.50e-03	pCi/g	1.00	5.1e-03	01/20/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	U-235 by AEA Total Cntg Error	SOIL	LA-508-471		+- 8.8e-03	pCi/g	1.00	0.0	01/20/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	U-238	Uranium-238	SOIL	LA-508-471		0.130	pCi/g	1.00	4.7e-03	01/20/04	12/31/03	12/31/03
W030001235	B183P2	GPP	TRENT	E,T,C	U-238 by AEA Total Cntg Error	SOIL	LA-508-471		+- 0.044	pCi/g	1.00	0.10	01/20/04	12/31/03	12/31/03

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WSCF
ANALYTICAL COMMENT REPORT

2-6

Attention: Steve Trent
Project Number F03-020

Group #: WSCF20031727

Sample #	Client ID	Lab Area	Test	Comment
		VALGROUP		Ammonia: Three matrix spikes prepared and analyzed with consistently low results indicating a potential matrix interference. -wb Comments submitted to T.Dale. gar

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
TENTATIVELY IDENTIFIED PEAK REPORT

Attention: Steve Trent
Project Number F03-020 :F03-020

Group #: WSCF20031727

Sample #	Client ID			Test Name	Peak Name	CAS#	RT	RQ	Result	Units
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	BA-133				0.048	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	U-235				0.079	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	AM-241				0.18	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	TL-208				0.19	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	BI-212				0.45	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	BI-214				0.46	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	RA-226				0.46	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	PB-214				0.50	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	AC-228				0.60	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	RA-228				0.60	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	PB-212				0.66	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	PB-214 Count Error				11	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	TL-208 Count Error				14	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	BI-214 Count Error				15	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	RA-226 Count Error				15	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	AC-228 Count Error				15	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	RA-228 Count Error				15	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	K-40				17	pCi/g
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	BA-133 Count Error				25	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	BI-212 Count Error				26	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	U-235 Count Error				31	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	AM-241 Count Error				46	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	K-40 Count Error				9.0	%
W030001235	B183P2	GPP	TRENT	Gamma Energy Analysis-grd H2O	PB-212 Count Error				9.5	%

RQ=Result Qualifier

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WSCF
METHOD REFERENCES REPORT

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.

LA-212-411	Determination of Soil pH Measurement	
	EPA SW-846 9045C	SOIL AND WASTE pH
LA-503-401	LA-503-401: ANALYSIS OF CATIONS BY ION CHROMATOGRAPHY	
	EPA-600/4-86-024 300.7	Dissolved Sodium, Ammonium, Potassium, and Calcium in Wet Deposition by Chemical
LA-505-412	LA-505-412: DETERMINATION OF TRACE ELEMENTS IN WATERS AND WASTES BY INDUCTIVELY	
	EPA-600/R-94-111 200.8	DETERMINATION OF TRACE ELEMENTS IN WATERS AND WASTES BY INDUCTIVELY COUPLED PLAS
LA-508-462	Gamma Energy Analysis -- the Genie System -- WSCF	
	None	No reference to any industry method.
LA-508-471	LA-508-471: ALPHA ENERGY ANALYZER DATA ACQUISITION AND SYSTEM CHECKOUT USING ALP	
	None	No reference to any industry method.
LA-519-412	LA-519-412: TOTAL RESIDUE/% SOLIDS DRIED AT 103 - 105 C	
	EPA-600/4-79-020 160.3	RESIDUE, TOTAL
	Standard Methods 2540B	Total Solids Dried at 103-105 C
LA-523-456	LA-523-456: SEMIVOLATILE SAMPLE ANALYSIS BY SW-846, METHOD 8270C	
	EPA SW-846 8000B	DETERMINATIVE CHROMATOGRAPHIC SEPARATIONS
	EPA SW-846 8270C	SEMIVOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)
LA-533-410	LA-533-410: ANION ANALYSIS BY ION CHROMATOGRAPHY	
	EPA-600/R-94-111 300	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 \\ap006\aspdocs\WSCF\Sample Mgmt\ProcedureMethodCrossReference.pdf. This document includes on-line links to full-text versions of the procedures and methods, where available.

WSCF
METHOD REFERENCES REPORT

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.

LA-695-402 LA-695-402: DETERMINATION OF CYANIDE BY MIDIDISTILLATION AND SPECTROPHOTOMETRIC
EPA-600/4-79-020 335.2 Cyanide, Total

NWTPH NWTPH-Diesel and/or Gasoline
WDOE NWTPH-Dx/Gx Total Petroleum Hydrocarbons - Diesel/Gasoline

Note: A complete list of WSCF analytical procedures and referenced regulatory or industry methods is available online at \\ap006\aspdocs\WSCF\Sample Mgmt\ProcedureMethodCrossReference.pdf. This document includes on-line links to full-text versions of the procedures and methods, where available.

wl3qlog v1 27-jan-2004 14:32:28

W13q Worklist/Batch/QC Report for Group# WSCF20031727

WL#	S#	Batch	QC#	Tray Type	Sample#	Test
				SAMPLE	W030001235	Percent Solids
				SAMPLE	W030001235	pH Soil and Waste Measurement
21189	1	21562	24533	BLANK		ICP-2008 MS All possible metal
21189	2	21562	24533	LCS		ICP-2008 MS All possible metal
21189	4	21562	24533	MS	W030001150	ICP-2008 MS All possible metal
21189	5	21562	24533	MSD	W030001150	ICP-2008 MS All possible metal
21189	16	21562	24533	SAMPLE	W030001235	ICP-2008 MS All possible metal
			24567	BLANK		Cyanide by Midi/Spectrophotom
			24567	BLNK-PREP		Cyanide by Midi/Spectrophotom
			24567	DUP		Cyanide by Midi/Spectrophotom
			24567	LCS		Cyanide by Midi/Spectrophotom
			24567	LCS-2		Cyanide by Midi/Spectrophotom
			24567	MS	W030001229	Cyanide by Midi/Spectrophotom
			24567	MSD	W030001229	Cyanide by Midi/Spectrophotom
			24567	SPK-RPD	W030001229	Cyanide by Midi/Spectrophotom
			24567	SAMPLE	W030001235	Cyanide by Midi/Spectrophotom
21208	2	21581	24569	BLANK		Anions by Ion Chromatography
21208	8	21581	24569	BLANK		Anions by Ion Chromatography
21208	3	21581	24569	LCS		Anions by Ion Chromatography
21208	5	21581	24569	DUP	W030001235	Anions by Ion Chromatography
21208	6	21581	24569	MS	W030001235	Anions by Ion Chromatography
21208	7	21581	24569	MSD	W030001235	Anions by Ion Chromatography
21208	4	21581	24569	SAMPLE	W030001235	Anions by Ion Chromatography
21163	1	21538	24578	BLANK		Gamma Energy Analysis-grd H2O
21163	2	21538	24578	LCS		Gamma Energy Analysis-grd H2O
21163	3	21538	24578	DUP	W030001235	Gamma Energy Analysis-grd H2O
21163	4	21538	24578	SAMPLE	W030001235	Gamma Energy Analysis-grd H2O
21228	3	21601	24581	LCS		Ammonia (N) by IC
21228	5	21601	24581	DUP	W030001235	Ammonia (N) by IC
21228	6	21601	24581	MS	W030001235	Ammonia (N) by IC
21228	7	21601	24581	MSD	W030001235	Ammonia (N) by IC
21228	4	21601	24581	SAMPLE	W030001235	Ammonia (N) by IC
			24588	BLANK		WTPH-D TPH Diesel Range (Wa)
			24588	LCS		WTPH-D TPH Diesel Range (Wa)
			24588	MS	W030001229	WTPH-D TPH Diesel Range (Wa)
			24588	MSD	W030001229	WTPH-D TPH Diesel Range (Wa)
			24588	SPK-RPD	W030001229	WTPH-D TPH Diesel Range (Wa)
			24588	SAMPLE	W030001235	WTPH-D TPH Diesel Range (Wa)
			24588	SURR	W030001235	WTPH-D TPH Diesel Range (Wa)
			24592	BLANK		SW-846 8270B Semi-Vols
			24592	LCS		SW-846 8270B Semi-Vols
			24592	MS	W030001229	SW-846 8270B Semi-Vols
			24592	MSD	W030001229	SW-846 8270B Semi-Vols
			24592	SPK-RPD	W030001229	SW-846 8270B Semi-Vols
			24592	SAMPLE	W030001235	SW-846 8270B Semi-Vols
			24592	SURR	W030001235	SW-846 8270B Semi-Vols

21222	1	21595	24628	BLANK		& Neptunium by AEA
21222	2	21595	24628	LCS		& Neptunium by AEA
21222	3	21595	24628	DUP	W030001235	& Neptunium by AEA
21222	4	21595	24628	SAMPLE	W030001235	& Neptunium by AEA
21270	1	21644	24659	BLANK		Americium by AEA
21270	2	21644	24659	LCS		Americium by AEA
21270	3	21644	24659	DUP	W030001235	Americium by AEA
21270	4	21644	24659	SAMPLE	W030001235	Americium by AEA
21271	1	21643	24661	BLANK		Plutonium Isotopics by AEA
21271	2	21643	24661	LCS		Plutonium Isotopics by AEA
21271	3	21643	24661	DUP	W030001235	Plutonium Isotopics by AEA
21271	4	21643	24661	SAMPLE	W030001235	Plutonium Isotopics by AEA
21272	1	21642	24697	BLANK		Uranium Isotopics by AEA
21272	2	21642	24697	LCS		Uranium Isotopics by AEA
21272	3	21642	24697	DUP	W030001235	Uranium Isotopics by AEA
21272	4	21642	24697	SAMPLE	W030001235	Uranium Isotopics by AEA

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: ICP-2008 MS All possible metal

SAF Number: F03-020
Sample Date: 12/11/03
Receive Date:12/11/03

Lab ID: W030001150

BATCH QC ASSOCIATED WITH SAMPLE

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
MS	Silver	7440-22-4	332.7	83.175	% Recov	01/10/04	70.000	130.000	
MS	Cadmium	7440-43-9	406.2	101.550	% Recov	01/10/04	70.000	130.000	
MS	Chromium	7440-47-3	353.8	88.450	% Recov	01/10/04	70.000	130.000	
MS	Copper	7440-50-8	392.37	98.093	% Recov	01/10/04	70.000	130.000	
MS	Mercury	7439-97-6	22.49	112.450	% Recov	01/10/04	70.000	130.000	
MS	Nickel	7440-02-0	394.7	98.675	% Recov	01/10/04	70.000	130.000	
MS	Lead	7439-92-1	394.5	98.625	% Recov	01/10/04	70.000	130.000	
MS	Uranium	7440-61-1	381.95	95.487	% Recov	01/10/04	70.000	130.000	
MSD	Silver	7440-22-4	366.8	91.700	% Recov	01/10/04	70.000	130.000	
MSD	Cadmium	7440-43-9	420.9	105.225	% Recov	01/10/04	70.000	130.000	
MSD	Chromium	7440-47-3	355.6	88.900	% Recov	01/10/04	70.000	130.000	
MSD	Copper	7440-50-8	393.27	98.317	% Recov	01/10/04	70.000	130.000	
MSD	Mercury	7439-97-6	22.81	114.050	% Recov	01/10/04	70.000	130.000	
MSD	Nickel	7440-02-0	395.3	98.825	% Recov	01/10/04	70.000	130.000	
MSD	Lead	7439-92-1	402.4	100.600	% Recov	01/10/04	70.000	130.000	
MSD	Uranium	7440-61-1	390.55	97.638	% Recov	01/10/04	70.000	130.000	

BATCH QC

BLANK	Silver	7440-22-4	<0.2	n/a	ug/L	01/10/04	-0.440	0.440	U
BLANK	Cadmium	7440-43-9	<0.1	n/a	ug/L	01/10/04	-0.220	0.220	U
BLANK	Chromium	7440-47-3	<0.3	n/a	ug/L	01/10/04	-0.660	0.660	U
BLANK	Copper	7440-50-8	<0.5	n/a	ug/L	01/10/04	-1.100	1.100	U
BLANK	Mercury	7439-97-6	0.15	0.150	ug/L	01/10/04	-0.220	0.220	
BLANK	Nickel	7440-02-0	<0.5	n/a	ug/L	01/10/04	-1.100	1.100	U
BLANK	Lead	7439-92-1	<1.2	n/a	ug/L	01/10/04	-2.640	2.640	U
BLANK	Uranium	7440-61-1	<0.1	n/a	ug/L	01/10/04	-0.220	0.220	U

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: ICP-2008 MS All possible metal

SAF Number: F03-020
Sample Date:
Receive Date:

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit		RQ
LCS	Silver	7440-22-4	189.4	159.160	% Recov	01/10/04	85.000	115.000	*	
LCS	Cadmium	7440-43-9	83.71	122.026	% Recov	01/10/04	85.000	115.000	*	
LCS	Chromium	7440-47-3	59.94	69.295	% Recov	01/10/04	85.000	115.000	*	
LCS	Copper	7440-50-8	139.2	109.606	% Recov	01/10/04	85.000	115.000		
LCS	Mercury	7439-97-6	12.27	130.393	% Recov	01/10/04	85.000	115.000	*	
LCS	Nickel	7440-02-0	98.39	117.691	% Recov	01/10/04	85.000	115.000	*	
LCS	Lead	7439-92-1	107.2	113.439	% Recov	01/10/04	85.000	115.000		
LCS	Uranium	7440-61-1	402.2	100.550	% Recov	01/10/04	85.000	115.000		

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: Cyanide by Midi/Spectrophotom

SAF Number: F03-020
Sample Date: 12/30/03
Receive Date:12/30/03

Lab ID: W030001229

BATCH QC ASSOCIATED WITH SAMPLE

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
MS	Cyanide by Midi/Spectrophotom	57-12-5	104.6	104.600	% Recov	01/12/04	75.000	125.000	
MSD	Cyanide by Midi/Spectrophotom	57-12-5	89.0	89.000	% Recov	01/12/04	75.000	125.000	
SPK-RPD	Cyanide by Midi/Spectrophotom	57-12-5	89.000	16.116	RPD	01/12/04	0.000	20.000	

BATCH QC

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
BLANK	Cyanide by Midi/Spectrophotom	57-12-5	<1	n/a	ug/L	01/12/04	-4.000	4.000	U
BLNK-PREP	Cyanide by Midi/Spectrophotom	57-12-5	<1	n/a	ug/L	01/12/04	-4.000	4.000	U
DUP	Cyanide by Midi/Spectrophotom	57-12-5	n/a	n/a	RPD	01/12/04	0.000	20.000	
LCS	Cyanide by Midi/Spectrophotom	57-12-5	116.9	116.900	% Recov	01/12/04	85.000	115.000	
LCS-2	Cyanide by Midi/Spectrophotom	57-12-5	n/a	n/a	% Recov	01/12/04	85.000	115.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: Anions by Ion Chromatography

SAF Number: F03-020
Sample Date: 12/31/03
Receive Date:12/31/03

Lab ID: W030001235

BATCH QC ASSOCIATED WITH SAMPLE

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
DUP	Chloride	16887-00-6	3.53e+00	15.902	RPD	01/12/04	0.000	20.000	
DUP	Fluoride	16984-48-8	<1.13e0	n/a	RPD	01/12/04	0.000	20.000	U
DUP	Nitrogen in Nitrite	NO2-N	<9.31e-1	n/a	RPD	01/12/04	0.000	20.000	U
DUP	Nitrogen in Nitrate	NO3-N	1.09e+00	n/a	RPD	01/12/04	0.000	20.000	
DUP	Phosphate	14265-44-2	<2.65e0	n/a	RPD	01/12/04	0.000	20.000	U
DUP	Sulfate	14808-79-8	1.21e+01	20.074	RPD	01/12/04	0.000	20.000	
MS	Chloride	16887-00-6	9.45e-01	94.500	% Recov	01/12/04	75.000	125.000	
MS	Fluoride	16984-48-8	4.70e-01	95.142	% Recov	01/12/04	75.000	125.000	
MS	Nitrogen in Nitrite	NO2-N	4.89e-01	97.800	% Recov	01/12/04	75.000	125.000	
MS	Nitrogen in Nitrate	NO3-N	4.40e-01	97.561	% Recov	01/12/04	75.000	125.000	
MS	Phosphate	14265-44-2	7.34e-01	75.748	% Recov	01/12/04	75.000	125.000	
MS	Sulfate	14808-79-8	1.84e+00	92.000	% Recov	01/12/04	75.000	125.000	
MSD	Chloride	16887-00-6	9.75e-01	97.500	% Recov	01/12/04	75.000	125.000	
MSD	Fluoride	16984-48-8	4.69e-01	94.939	% Recov	01/12/04	75.000	125.000	
MSD	Nitrogen in Nitrite	NO2-N	5.17e-01	103.400	% Recov	01/12/04	75.000	125.000	
MSD	Nitrogen in Nitrate	NO3-N	4.54e-01	100.665	% Recov	01/12/04	75.000	125.000	
MSD	Phosphate	14265-44-2	7.85e-01	81.011	% Recov	01/12/04	75.000	125.000	
MSD	Sulfate	14808-79-8	1.81e+00	90.500	% Recov	01/12/04	75.000	125.000	

BATCH QC

BLANK	Chloride	16887-00-6	<5.20e-2	n/a	mg/L	01/12/04	0.000	300.000	U
BLANK	Chloride	16887-00-6	<5.20e-2	n/a	mg/L	01/12/04	0.000	300.000	U
BLANK	Fluoride	16984-48-8	<2.30e-2	n/a	mg/L	01/12/04	0.000	300.000	U
BLANK	Fluoride	16984-48-8	<2.30e-2	n/a	mg/L	01/12/04	0.000	300.000	U
BLANK	Nitrogen in Nitrite	NO2-N	<1.90e-2	n/a	mg/L	01/12/04	0.000	300.000	U
BLANK	Nitrogen in Nitrite	NO2-N	<1.90e-2	n/a	mg/L	01/12/04	0.000	300.000	U

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: Anions by Ion Chromatography

SAF Number: F03-020
Sample Date:
Receive Date:

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
BLANK	Nitrogen in Nitrate	NO3-N	<1.30e-2	n/a	mg/L	01/12/04	0.000	300.000	U
BLANK	Nitrogen in Nitrate	NO3-N	<1.30e-2	n/a	mg/L	01/12/04	0.000	300.000	U
BLANK	Phosphate	14265-44-2	<5.40e-2	n/a	mg/L	01/12/04	0.000	300.000	U
BLANK	Phosphate	14265-44-2	<5.40e-2	n/a	mg/L	01/12/04	0.000	300.000	U
BLANK	Sulfate	14808-79-8	<1.00e-1	n/a	mg/L	01/12/04	0.000	300.000	U
BLANK	Sulfate	14808-79-8	<1.00e-1	n/a	mg/L	01/12/04	0.000	300.000	U
LCS	Chloride	16887-00-6	1.99e+02	89.500	% Recov	01/12/04	80.000	120.000	
LCS	Fluoride	16984-48-8	9.07e+01	91.895	% Recov	01/12/04	80.000	120.000	
LCS	Nitrogen in Nitrite	NO2-N	1.04e+02	104.000	% Recov	01/12/04	80.000	120.000	
LCS	Nitrogen in Nitrate	NO3-N	9.13e+01	101.332	% Recov	01/12/04	80.000	120.000	
LCS	Phosphate	14265-44-2	1.93e+02	99.587	% Recov	01/12/04	80.000	120.000	
LCS	Sulfate	14808-79-8	3.80e+02	95.238	% Recov	01/12/04	80.000	120.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: Gamma Energy Analysis-grd H2O

SAF Number: F03-020
Sample Date: 12/31/03
Receive Date:12/31/03

Lab ID: W030001235

BATCH QC ASSOCIATED WITH SAMPLE

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
DUP	Cobalt-60	10198-40-0	U-7.95e-3	n/a	RPD	01/09/04	0.000	20.000	
DUP	Cesium-134	13967-70-9	U2.94e-02	n/a	RPD	01/09/04	0.000	20.000	
DUP	Cesium-137	10045-97-3	U6.42e-03	n/a	RPD	01/09/04	0.000	20.000	
DUP	Europium-152	14683-23-9	U-3.14e-2	n/a	RPD	01/09/04	0.000	20.000	
DUP	Europium-154	15585-10-1	U-2.72e-2	n/a	RPD	01/09/04	0.000	20.000	
DUP	Europium-155	14391-16-3	U3.93e-02	n/a	RPD	01/09/04	0.000	20.000	
DUP	Antimony-125	14234-35-6	U-1.51e-2	n/a	RPD	01/09/04	0.000	20.000	
DUP	Tin-126	15832-50-5	U6.44e-02	n/a	RPD	01/09/04	0.000	20.000	

BATCH QC

BLANK	Cobalt-60	10198-40-0	U-4.9e-4	n/a	pCi/g	01/13/04	-10000.000	1000.000	
BLANK	Cesium-134	13967-70-9	U2.44e-3	n/a	pCi/g	01/13/04	-10000.000	1000.000	
BLANK	Cesium-137	10045-97-3	U2.83e-3	n/a	pCi/g	01/13/04	-10000.000	1000.000	
BLANK	Europium-152	14683-23-9	U-3.5e-3	n/a	pCi/g	01/13/04	-10000.000	1000.000	
BLANK	Europium-154	15585-10-1	U-9.6e-3	n/a	pCi/g	01/13/04	-10000.000	1000.000	
BLANK	Europium-155	14391-16-3	U-4.6e-3	n/a	pCi/g	01/13/04	-10000.000	1000.000	
BLANK	Antimony-125	14234-35-6	U2.06e-3	n/a	pCi/g	01/13/04	-10000.000	1000.000	
BLANK	Tin-126	15832-50-5	U1.57e-3	n/a	pCi/g	01/13/04	-10000.000	1000.000	
LCS	Cobalt-60	10198-40-0	4.17e+03	99.523	% Recov	01/13/04	80.000	120.000	
LCS	Cesium-137	10045-97-3	3.68e+03	102.793	% Recov	01/13/04	80.000	120.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: Ammonia (N) by IC

SAF Number: F03-020
Sample Date: 12/31/03
Receive Date:12/31/03

Lab ID: W030001235

BATCH QC ASSOCIATED WITH SAMPLE

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
DUP	Ammonia (N) by IC	7664-41-7	<1.96e-1	n/a	RPD	01/12/04	0.000	20.000	U
MS	Ammonia (N) by IC	7664-41-7	2.26e-01	54.854	% Recov	01/12/04	75.000	125.000	*
MSD	Ammonia (N) by IC	7664-41-7	2.29e-01	55.583	% Recov	01/12/04	75.000	125.000	*

BATCH QC

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
LCS	Ammonia (N) by IC	7664-41-7	7.80e+01	94.660	% Recov	01/12/04	80.000	120.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: WTPH-D TPH Diesel Range (Wa)

SAF Number: F03-020
Sample Date: 12/30/03
Receive Date:12/30/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W030001229									
BATCH QC ASSOCIATED WITH SAMPLE									
MS	ortho-Terphenyl Surr	84-15-1	24549	96.800	% Recov	01/13/04	70.000	130.000	
MS	Total Pet. Hydrocarbons Diesel	TPHDIESEL	126600	99.900	% Recov	01/13/04	75.000	125.000	
MSD	ortho-Terphenyl Surr	84-15-1	24245	95.500	% Recov	01/13/04	70.000	130.000	
MSD	Total Pet. Hydrocarbons Diesel	TPHDIESEL	126470	99.600	% Recov	01/13/04	75.000	125.000	
SPK-RPD	ortho-Terphenyl Surr	84-15-1	95.500	1.352	RPD	01/13/04	0.000	20.000	
SPK-RPD	Total Pet. Hydrocarbons Diesel	TPHDIESEL	99.600	0.301	RPD	01/13/04	0.000	20.000	
Lab ID: W030001235									
BATCH QC ASSOCIATED WITH SAMPLE									
SURR	ortho-Terphenyl Surr	84-15-1	21152	83.400	% Recov	01/13/04	70.000	130.000	
BATCH QC									
BLANK	Kerosene	TPHKEROSENE	< 3800	n/a	ug/Kg	01/13/04			U
BLANK	ortho-Terphenyl Surr	84-15-1	23243	93.000	% Recov	01/13/04	70.000	130.000	
BLANK	Total Pet. Hydrocarbons Diesel	TPHDIESEL	< 3800	n/a	ug/Kg	01/13/04			U
LCS	Kerosene	TPHKEROSENE	115470	92.400	%Recove	01/13/04	70.000	130.000	
LCS	ortho-Terphenyl Surr	84-15-1	22866	91.500	% Recov	01/13/04	70.000	130.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: SW-846 8270B Semi-Vols

SAF Number: F03-020
Sample Date: 12/30/03
Receive Date:12/30/03

Lab ID: W030001229
BATCH QC ASSOCIATED WITH SAMPLE

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
MS	1,2,4-Trichlorobenzene	120-82-1	2927.8	86.600	% Recov	01/13/04	46.000	107.000	
MS	1,4-Dichlorobenzene	106-46-7	2658.9	78.700	% Recov	01/13/04	30.000	96.000	
MS	2,4-Dinitrotoluene	121-14-2	2922.4	86.500	% Recov	01/13/04	59.000	106.000	
MS	2-Fluorophenol	367-12-4	2675.8	79.200	%Recove	01/13/04	42.000	105.000	
MS	Acenaphthene	83-32-9	2993.2	88.600	% Recov	01/13/04	61.000	116.000	
MS	4-Chloro-3-methylphenol	59-50-7	3957.2	78.100	% Recov	01/13/04	61.000	106.000	
MS	2-Chlorophenol	95-57-8	4373.0	86.300	% Recov	01/13/04	66.000	106.000	
MS	N-Nitrosodi-n-dipropylamine	621-64-7	3120.1	92.300	% Recov	01/13/04	71.000	114.000	
MS	2-Fluorobiphenyl	321-60-8	2826.3	83.600	%Recove	01/13/04	56.000	122.000	
MS	Phenol	108-95-2	4635.2	91.400	% Recov	01/13/04	42.000	111.000	
MS	Nitrobenzene-d5	4165-60-0	2944.8	87.100	%Recove	01/13/04	64.000	111.000	
MS	4-Nitrophenol	100-02-7	3870.4	76.300	% Recov	01/13/04	32.000	118.000	
MS	Pentachlorophenol	87-86-5	4036.5	79.600	% Recov	01/13/04	62.000	114.000	
MS	Phenol-d5	4165-62-2	2931.8	86.700	%Recove	01/13/04	54.000	120.000	
MS	Pyrene	129-00-0	2809.6	83.100	% Recov	01/13/04	66.000	118.000	
MS	2,4,6-Tribromophenol	118-79-6	2954.1	87.400	%Recove	01/13/04	24.000	122.000	
MS	Terphenyl-d14 (7Cl)	98904-43-9	2753.6	81.500	%Recove	01/13/04	35.000	150.000	
MSD	1,2,4-Trichlorobenzene	120-82-1	2777.7	81.900	% Recov	01/13/04	46.000	107.000	
MSD	1,4-Dichlorobenzene	106-46-7	2653.8	78.300	% Recov	01/13/04	30.000	96.000	
MSD	2,4-Dinitrotoluene	121-14-2	2761.7	81.400	% Recov	01/13/04	59.000	106.000	
MSD	2-Fluorophenol	367-12-4	2608.2	76.900	%Recove	01/13/04	42.000	105.000	
MSD	Acenaphthene	83-32-9	2764.1	81.500	% Recov	01/13/04	61.000	116.000	
MSD	4-Chloro-3-methylphenol	59-50-7	3684.5	72.400	% Recov	01/13/04	61.000	106.000	
MSD	2-Chlorophenol	95-57-8	4114.6	80.900	% Recov	01/13/04	66.000	106.000	
MSD	N-Nitrosodi-n-dipropylamine	621-64-7	3020.5	89.100	% Recov	01/13/04	71.000	114.000	
MSD	2-Fluorobiphenyl	321-60-8	2674.9	78.900	%Recove	01/13/04	56.000	122.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: SW-846 8270B Semi-Vols

SAF Number: F03-020
Sample Date: 12/30/03
Receive Date:12/30/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
MSD	Phenol	108-95-2	4327.5	85.100	% Recov	01/13/04	42.000	111.000	
MSD	Nitrobenzene-d5	4165-60-0	2762.8	81.500	%Recove	01/13/04	64.000	111.000	
MSD	4-Nitrophenol	100-02-7	3682.9	72.400	% Recov	01/13/04	32.000	118.000	
MSD	Pentachlorophenol	87-86-5	3851.8	75.700	% Recov	01/13/04	62.000	114.000	
MSD	Phenol-d5	4165-62-2	2859.2	84.300	%Recove	01/13/04	54.000	120.000	
MSD	Pyrene	129-00-0	2667.0	78.700	% Recov	01/13/04	66.000	118.000	
MSD	2,4,6-Tribromophenol	118-79-6	2801.1	82.600	%Recove	01/13/04	24.000	122.000	
MSD	Terphenyl-d14 (7Cl)	98904-43-9	2610.2	77.000	%Recove	01/13/04	35.000	150.000	
SPK-RPD	1,2,4-Trichlorobenzene	120-82-1	81.900	5.579	RPD	01/13/04	0.000	20.000	
SPK-RPD	1,4-Dichlorobenzene	106-46-7	78.300	0.510	RPD	01/13/04	0.000	20.000	
SPK-RPD	2,4-Dinitrotoluene	121-14-2	81.400	6.075	RPD	01/13/04	0.000	20.000	
SPK-RPD	2-Fluorophenol	367-12-4	76.900	2.947	RPD	01/13/04	0.000	20.000	
SPK-RPD	Acenaphthene	83-32-9	81.500	8.348	RPD	01/13/04	0.000	20.000	
SPK-RPD	4-Chloro-3-methylphenol	59-50-7	72.400	7.575	RPD	01/13/04	0.000	20.000	
SPK-RPD	2-Chlorophenol	95-57-8	80.900	6.459	RPD	01/13/04	0.000	20.000	
SPK-RPD	N-Nitrosodi-n-dipropylamine	621-64-7	89.100	3.528	RPD	01/13/04	0.000	20.000	
SPK-RPD	2-Fluorobiphenyl	321-60-8	78.900	5.785	RPD	01/13/04	0.000	20.000	
SPK-RPD	Phenol	108-95-2	85.100	7.139	RPD	01/13/04	0.000	20.000	
SPK-RPD	Nitrobenzene-d5	4165-60-0	81.500	8.643	RPD	01/13/04	0.000	20.000	
SPK-RPD	4-Nitrophenol	100-02-7	72.400	5.245	RPD	01/13/04	0.000	20.000	
SPK-RPD	Pentachlorophenol	87-86-5	75.700	5.023	RPD	01/13/04	0.000	20.000	
SPK-RPD	Phenol-d5	4165-62-2	84.300	2.807	RPD	01/13/04	0.000	20.000	
SPK-RPD	Pyrene	129-00-0	78.700	5.439	RPD	01/13/04	0.000	20.000	
SPK-RPD	2,4,6-Tribromophenol	118-79-6	82.600	5.647	RPD	01/13/04	0.000	20.000	
SPK-RPD	Terphenyl-d14 (7Cl)	98904-43-9	77.000	5.678	RPD	01/13/04	0.000	20.000	

Lab ID: W030001235
BATCH QC ASSOCIATED WITH SAMPLE

SURR	2-Fluorophenol	367-12-4	2331.0	68.900	%Recove	01/13/04	42.000	105.000	
SURR	2-Fluorobiphenyl	321-60-8	2387.8	70.600	%Recove	01/13/04	56.000	122.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: SW-846 8270B Semi-Vols

SAF Number: F03-020
Sample Date: 12/31/03
Receive Date: 12/31/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
SURR	Nitrobenzene-d5	4165-60-0	2326.2	68.700	%Recove	01/13/04	64.000	111.000	
SURR	Phenol-d5	4165-62-2	2637.1	77.900	%Recove	01/13/04	54.000	120.000	
SURR	2,4,6-Tribromophenol	118-79-6	2321.1	68.600	%Recove	01/13/04	24.000	122.000	
SURR	Terphenyl-d14 (7Cl)	98904-43-9	2418.2	71.500	%Recove	01/13/04	35.000	150.000	

BATCH QC

BLANK	1,2,4-Trichlorobenzene	120-82-1	< 290	n/a	ug/Kg	01/13/04			U
BLANK	1,4-Dichlorobenzene	106-46-7	< 310	n/a	ug/Kg	01/13/04			U
BLANK	2,4-Dinitrotoluene	121-14-2	< 67	n/a	ug/Kg	01/13/04			U
BLANK	2-Fluorophenol	367-12-4	2374.2	71.200	%Recove	01/13/04	42.000	105.000	
BLANK	Acenaphthene	83-32-9	< 67	n/a	ug/Kg	01/13/04			U
BLANK	4-Chloro-3-methylphenol	59-50-7	< 67	n/a	ug/Kg	01/13/04			U
BLANK	2-Chlorophenol	95-57-8	< 150	n/a	ug/Kg	01/13/04			U
BLANK	N-Nitrosodi-n-dipropylamine	621-64-7	< 67	n/a	ug/Kg	01/13/04			U
BLANK	2-Fluorobiphenyl	321-60-8	2641.6	79.200	%Recove	01/13/04	56.000	122.000	
BLANK	Phenol	108-95-2	< 100	n/a	ug/Kg	01/13/04			U
BLANK	Nitrobenzene-d5	4165-60-0	2739.5	82.200	%Recove	01/13/04	64.000	111.000	
BLANK	4-Nitrophenol	100-02-7	< 650	n/a	ug/Kg	01/13/04			U
BLANK	Pentachlorophenol	87-86-5	< 300	n/a	ug/Kg	01/13/04			U
BLANK	Phenol-d5	4165-62-2	2633.5	79.000	%Recove	01/13/04	54.000	120.000	
BLANK	Pyrene	129-00-0	< 67	n/a	ug/Kg	01/13/04			U
BLANK	Tributyl phosphate	126-73-8	< 67	n/a	ug/Kg	01/13/04			U
BLANK	2,4,6-Tribromophenol	118-79-6	1887.4	56.600	%Recove	01/13/04	24.000	122.000	
BLANK	Terphenyl-d14 (7Cl)	98904-43-9	2586.7	77.600	%Recove	01/13/04	35.000	150.000	
LCS	1,2,4-Trichlorobenzene	120-82-1	5173.0	77.600	% Recov	01/13/04	46.000	107.000	
LCS	1,4-Dichlorobenzene	106-46-7	4983.8	74.800	% Recov	01/13/04	42.000	111.000	
LCS	2,4-Dinitrotoluene	121-14-2	5171.8	77.600	% Recov	01/13/04	59.000	106.000	
LCS	2-Fluorophenol	367-12-4	4946.3	74.200	% Recov	01/13/04	50.000	110.000	
LCS	Acenaphthene	83-32-9	5520.6	82.800	% Recov	01/13/04	61.000	116.000	
LCS	4-Chloro-3-methylphenol	59-50-7	6596.2	66.000	% Recov	01/13/04	61.000	106.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: SW-846 8270B Semi-Vols

SAF Number: F03-020
Sample Date:
Receive Date:

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
LCS	2-Chlorophenol	95-57-8	7986.1	79.900	% Recov	01/13/04	66.000	106.000	
LCS	N-Nitrosodi-n-dipropylamine	621-64-7	5058.1	75.900	% Recov	01/13/04	71.000	114.000	
LCS	2-Fluorobiphenyl	321-60-8	5373.0	80.600	% Recov	01/13/04	58.000	109.000	
LCS	Phenol	108-95-2	8414.2	84.100	% Recov	01/13/04	67.000	105.000	
LCS	Nitrobenzene-d5	4165-60-0	5236.9	78.600	% Recov	01/13/04	60.000	118.000	
LCS	4-Nitrophenol	100-02-7	7180.8	71.800	% Recov	01/13/04	32.000	118.000	
LCS	Pentachlorophenol	87-86-5	7871.5	78.700	% Recov	01/13/04	62.000	114.000	
LCS	Phenol-d5	4165-62-2	5253.0	78.800	% Recov	01/13/04	59.000	116.000	
LCS	Pyrene	129-00-0	5304.8	79.600	% Recov	01/13/04	66.000	118.000	
LCS	2,4,6-Tribromophenol	118-79-6	5141.8	77.100	% Recov	01/13/04	60.000	120.000	
LCS	Terphenyl-d14 (7Cl)	98904-43-9	5336.0	80.000	% Recov	01/13/04	60.000	120.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: & Neptunium by AEA

SAF Number: F03-020
Sample Date: 12/31/03
Receive Date:12/31/03

Lab ID: W030001235

BATCH QC ASSOCIATED WITH SAMPLE

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
DUP	Neptunium-237	13994-20-2	1.7e-03	150.365	RPD	01/16/04	0.000	25.000	*

BATCH QC

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
BLANK	Neptunium-237	13994-20-2	1.7e-03	0.002	pCi/g	01/15/04	0.000	1000.000	
LCS	Neptunium-237	13994-20-2	6.225	49.405	%Recove	01/16/04	75.000	125.000	*

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: Americium by AEA

SAF Number: F03-020
Sample Date: 12/31/03
Receive Date:12/31/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W030001235									
BATCH QC ASSOCIATED WITH SAMPLE									
DUP	Americium-241	14596-10-2	3.3e-02	53.846	RPD	01/19/04	0.000	20.000	
BATCH QC									
BLANK	Americium-241	14596-10-2	3.5e-02	0.035	pCi/g	01/19/04	0.000	1000.000	
LCS	Americium-241	14596-10-2	1.3e+01	98.859	% Recov	01/19/04	75.000	125.000	

WSCF ANALYTICAL LABORATORY QC REPORT

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SDG Number: WSCF20031727
Matrix: SOLID
Test: Plutonium Isotopics by AEA

SAF Number: F03-020
Sample Date: 12/31/03
Receive Date:12/31/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W030001235									
BATCH QC ASSOCIATED WITH SAMPLE									
DUP	Pu-239/240 by AEA	PU-239/240	3.6e-03	46.809	RPD	01/19/04	0.000	20.000	
BATCH QC									
BLANK	Pu-239/240 by AEA	PU-239/240	8.0e-03	0.008	pCi/g	01/19/04	0.000	1000.000	
LCS	Pu-239/240 by AEA	PU-239/240	1.2e+01	97.561	% Recov	01/19/04	75.000	125.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031727
Matrix: SOLID
Test: Uranium Isotopics by AEA

SAF Number: F03-020
Sample Date: 12/31/03
Receive Date:12/31/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W030001235									
BATCH QC ASSOCIATED WITH SAMPLE									
DUP	Uranium-238	U-238	1.2e-01	8.000	RPD	01/19/04	0.000	20.000	
BATCH QC									
BLANK	Uranium-238	24678-82-8	7.5e-03	0.007	pCi/g	01/19/04	0.000	1000.000	
LCS	Uranium-238	24678-82-8	4.0e+01	105.513	% Recov	01/21/04	75.000	125.000	

W1141-04-SLF-107

ATTACHMENT 3

SAMPLE RECEIPT INFORMATION

Consisting of 5 pages
Cover page not included

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

File 1/3

1/19/03

ACKNOWLEDGMENT OF SAMPLES RECEIVED

Ground Water Protection Program
Richland, WA 99352
Attn: Steve Trent

Customer Code: GPP
PO#: 119142/ES20
Group#: 20031727
Project#: F03-020
Proj Mgr: Steve Trent A0-21
Phone: 373-5869

The following samples were received from you on 12/31/03. 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	Tests Scheduled					Sample Date
W030001235	B183P2	GPP	TRENT Solid, or handle as if solid					12/31/0
			@2008	@AEA-30	@AEA-31	@AEA-32	@AEA-33	
			@GEA-GPP	@IC-30	@SVOCGPP	@TPHD-WA	CN-02	NH4-
			PERSOLID	PH-30				

Test Acronym Description

Test Acronym	Description
@2008	ICP-2008 MS All possible metal
@AEA-30	Plutonium Isotopics by AEA
@AEA-31	Americium by AEA
@AEA-32	Uranium Isotopics by AEA
@AEA-33	& Neptunium by AEA
@GEA-GPP	Gamma Energy Analysis-grd H2O
@IC-30	Anions by Ion Chromatography
@SVOCGPP	SW-846 8270B Semi-Vols
@TPHD-WA	WTPH-D TPH Diesel Range (Wa)
CN-02	Cyanide by Midi/Spectrophotom
NH4-IC	Ammonia (N) by IC
PERSOLID	Percent Solids
PH-30	pH Soil and Waste Measurement

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-020-030	Page 1 of 1 2
Collector: Pope/Hughes/Pfister	Company Contact: Steve Trent; Telephone No.: 373-5869	Project Coordinator: TRENT, SJ	Price Code: 8N 8H; Data Turnaround: ~~45 Days~~ 30 DAYS
Project Designation: 216-B-26 Characterization Sampling - Soil Sampling	Sampling Location: C3245 (292.5-295 ft)	SAF No.: F03-020	Air Quality: ☐
Ice Chest No.	Field Logbook No.: HNF-N-356-1; COA: 119142ES10	Method of Shipment: Govt. Vehicle	
Shipped To: Waste Sampling & Characterization	Offsite Property No.: N/A	Bill of Lading/Air Bill No.: N/A	

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool 4C	None	Cool 4C	Cool 4C	None						
Type of Container	aG	P	G/P	G	P						
No. of Container(s)	1	1	1	1	1						
Volume	120mL	500mL	250mL	120mL	20mL						
SAMPLE ANALYSIS	See item (1) in Special Instructions.	See item (2) in Special Instructions.	See item (3) in Special Instructions.	See item (4) in Special Instructions.	Activity Scan 12/10/03						

20031727

Sample No.	Matrix *	Sample Date	Sample Time										
B183P2 W03000235	SOIL	12/10/03	1345	X	X	✓	✓						

CHAIN OF POSSESSION	Sign/Print Names	
Relinquished By/Removed From: R PFISTER/Rich Pfister; Date/Time: 12-31-03 1340	Received By/Stored In: Victor Burns; Date/Time: 12/13/03 15:40	
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

FH acknowledges that the analytical holding time for NO2, NO3, and PO4 by EPA Method 300.0 will not be met. The lab is to analyze pH within 24 hours of receipt. The laboratory is to report kerosene range organics from the WTPH-D analysis.

(1) Semi-VOA -- 8270A (Add-On) {Tributyl phosphate}; TPH-Diesel Range - WTPH-D {Total petroleum hydrocarbons - diesel range, Total petroleum hydrocarbons - kerosene range}
(2) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Antimony-125, Cesium-134, Tin-126}; Isotopic Plutonium; Isotopic Uranium; Neptunium-237; Americium-241
(3) ICP/MS - 200.8 (TAL) {Cadmium, Chromium, Copper, Nickel, Silver}; ICP/MS - 200.8 (Add-on) {Lead, Mercury, Uranium}
(4) IC Anions - 300.0 {Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphate, Sulfate}; Cations (IC) - 300.7 {Nitrogen in ammonium}; Cyanide (Total) - 335.2; pH (Soil) - 9045; TOC - 9060

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

A-6003-618(03/03)

Dale, Troy F

From:	Iwatate, Kenneth
Sent:	Thursday, January 22, 2004 11:10 AM
To:	Dale, Troy F; Trechter, John E Jr.
Cc:	Rice, Andrew D; Fitzgerald, Scot L
Subject:	Low Neptunium Recovery for LCS
Importance:	High

Troy, John

The Groundwater Protection Project (GPP) sent to the WSCF laboratory several soil samples and requested neptunium analyses. All of this work had to be done in a short period of time. All samples were analyzed using the following batch criteria: Blank, LCS, "LCS+spike", Sample, Duplicate, Sample+spike, and Duplicate+spike, since we did not have any suitable neptunium tracer. It should be noted that the LCS and "LCS+spike" are made up by using 25 mLs of 2M nitric acid and, in the case of the LCS, spiked with 0.025 mL of a 252 dpm/mL Np-237 solution and, in the case of the "LCS+spike", 0.05 mL of the Np-237 solution. The spiked duplicate and samples were done with 0.025 mL of the same Np-237 solution.

After an initial batch of soils was processed and the data analyzed, the Np-237 recovery for the LCS and "LCS+spike" were found to be approximately 50-60%. Initially, it was thought that there was just a simple error since the same data showed that the spike recoveries of the duplicate and soil samples were in the acceptable range of 75 - 125% (QAPP-017).

Due to the time crunch all soils were processed for Np. The data was analyzed and the same problem was apparent; LCS and "LCS+spike" recoveries on the order of 50% whereas, the soil spikes were in the range of approximately 75-125%. The results of the spike recoveries for the soils alone showed that the method was working properly, yet there seemed to be an oddity with the LCS and "LCS+spike".

Before the last batch of soils was to be processed (report due to GPP on 1/29), a test of a hypothesis was conducted. It was the chemist's idea that the major difference between the soils and the LCS was the level of iron. It isn't so much that the iron helps in extraction *per se*, but that the addition of ascorbic acid to convert all iron(III) to iron(II) was excessive due to a poorly detected color change or lack thereof. If excess ascorbic acid is present, Np could change its oxidation state to one that has a lower Kd (distribution coefficient) on the TEVA resin at the conditions for efficient extraction. Conversely, if the iron(II) sulfamate reagent was at 0.6M, the excess ascorbic acid would not be present, due to an easily detectable color change. Could this mean that the iron(II) sulfamate solution was less than the required 0.6M?

Four test samples were run. These consisted of 25 mLs of 2M nitric acid spiked with Np-237. Two of the samples contained 1 mL of iron carrier (10 mg) and 2 mL of the iron(II) sulfamate. The other two samples just had 4 mLs of the iron(II) sulfamate added. Also in all cases, the technician took great pains by adding the ascorbic acid solution dropwise and letting the sample sit for a few seconds between additions. (SEE attached Excel™ spreadsheet for details).

NpTest.xls (19 KB)

As you can see in the spreadsheet data, the recoveries ran 88-107%. The extra iron, from either adding 10 mg of iron or doubling the iron(II) sulfamate, aided in the extraction of Np using TEVA resin. I believe that this is mostly attributable to the fact that ascorbic acid is kept to a minimum by detecting the color change. It may also be concluded that the iron(II) sulfamate concentration may not be 0.6M. To improve on this, one can either add a very small amount of iron to the samples, except for those containing lots of iron, or use a more sensitive indicator such as 1 drop of ammonium thiocyanate (1M).

If you have any questions, feel free to call.

Ken Iwatate
Radiochemistry
Analytical Services, WSCF
Voice: (509)373-7198 (Office)
FAX: (509) 372-0456
Fluor Hanford, S3-30, PO Box 1000, Richland, WA 99352

Neptunium Test Results - 1/22/04

Test ID	AEA ID	AEA Net Area	AEA Bkg	Count Time min	AEA Eff	^{237}Np Found dpm	^{237}Np Added dpm	% Recovery
LCS1	10	1271	7	1000	0.2039	6.20	6.3	98.4%
LCS2	11	2641	4	1000	0.2369	11.13	12.6	88.3%
LCS3	12	1437	1	1000	0.2120	6.77	6.3	107.5%
LCS4	13	2710	3	1000	0.2211	12.24	12.6	97.2%
Blank	9	9	5	1000	0.2211	0.02	<----- MDA	

LCS1 25mLs of 2M HNO_3 spiked with 0.025 mL ^{237}Np (252 dpm/mL). 1 mL of 10 mg/mL Fe carrier and 2 mL of iron(II) sulfamate

LCS2 same as LCS1 but spiked with 0.05 mL ^{237}Np

LCS3 25 mLs of 2M HNO_3, spiked with 0.025 mL ^{237}Np. 4 mLs of iron(II) sulfamate was used.

LCS4 same as LCS3 but spiked with 0.05 mL ^{237}Np.

Addition of the ascorbic acid was performed dropwise and the solution was allowed to sit for a few seconds between additions.