4
1213026

SAMPLE DISPOSITION RECORD

ORIGINAL
Dhynes

SDR No.: F04-021
Revision No.: 0
Date Initiated: 12/15/03

Sample Event Information

SAF: F03-020

OU: 200-TW-1

Project: CPP 600 Area

Sampling Event: 216-B-26 Characterization - Soil

Laboratory: WSCF

Sampling Information

Number of Samples: 12

ID Numbers: B183M0, B183M2, B183M3, B183M5, B183M8, B183N0, B183N2, B183N5, B183N7, B183N9, B183P2, B183P4

Matrix: Soil

Collection Date: 12/11/03 - 01/13/04

Issue Background

Class ☐ Project Data Use ☒ General Laboratory Direction ☐ Validation Direction ☐ General Sample Management Direction

Type: Cancellation of Analyses

Description:

Total Organic Carbon Analysis Cancelled

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APR 06 2012
EDMC

Disposition

Description:

Total Organic Carbon (TOC) analyses were erroneously requested for the listed samples. As a result the TOC was subsequently cancelled for the listed samples. TOC was added to the analytical request for samples submitted to the Lionville Laboratory for chemical analyses (see SDR F04-022).

Justification:

TOC analysis is not performed by the WSCF laboratory. TOC was added to the analytical request for samples submitted to the Lionville laboratory because TOC is a data quality objective for the GRP.

Approval Signatures

SJ Trent — 02/05/04
Project Coordinator (Print/Sign Name) — **Date**

MW Benecke — 2/18/04
Task Manager (Print/Sign Name) — **Date**

A-6003-640 (03/03)

REVIEW COMMENT RECORD (RCR)

1. Date 6/10/04	2. Review No.
3. Project No. 216-B-26	4. Page 1 of 2

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
Validation Packages for SDG WSCF 20031684	216-B-26	RL Weiss	S&DM	Sigma 1 372-9631

17. Comment Submittal Approval:	10. Agreement with indicated comment disposition(s)	11.
Organization Manager (Optional)	Reviewer/Point of Contract	Reviewer/Point of Contact
	Date	8-25-05 Date
	Author/Originator	Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	14. Reviewer Concurrence Required	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	All – Laboratory reports showing results for sample not validated (B183N5) should be marked (e.g. use a separating line and a diagonal line out) to identify results not validated			OK Accept RLW
2	Radiochemistry – pg. 1, Introduction; Note 1 is incorrect, identified analysis for tritium, C-14, Ni-63, Sr-90 and Th-isotopic which was not performed. The note should also identify analysis for U-isotopic, Pu-isotopic, and Am-241..			
3	Radiochemistry – pg. 2, Laboratory blanks; The provided blanks data for Np-237, Pu-239/24, Am-241, & U-238 contains no non-detect qualifiers. As no MDA information (or counting errors) is provided for these blanks, it appears that all actinide blanks are positive. Recommend that this be noted as part of the validation narrative.			
4	Radiochemistry – pg. 2, Accuracy: It appears that the Np-237 LCS value was low (66%). Criteria is 70-130%.			
5	Radiochemistry – pg. 3, Detection Levels; Narrative states that Co-60 TRQL was exceeded. Co-60 result was a detect (normally eliminates any evaluation of TRQL levels) and all Gamma MDAs (detect and non-detect) appear to meet TRQL levels shown on page 10.			

ORP-114
(02/02)

ORP - REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
May 25, 2004	N/A
3. Project No. 216-B-26	4. Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
SDG No. 31684	Groundwater Remediation Proj	Bill Thackaberry	Env & Science Assurance (QA)	E6-35/2-0742

17. Comment Submittal Approval	10. Agreement with indicated comment disposition(s)	11. CLOSED
Organization Manager (optional)	WR Thackaberry 8/26/04 Reviewer/Point of Contact; Date; Requester	WR Thackaberry 8/26/04 Reviewer/Point of Contact; Date; Requester

12. Item	13a. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	14. Reviewer Concurrence Required	15. Disposition (Provide justification if NOT accepted). Provide separate attachments if necessary.	16. Status
1	Radiochemistry, pg 18, Completeness on validation checklist has been marked N/A.	accepted Daynes 8/25/04	~~the completions in this section of the checklist refers to a no longer used technical verification step~~	C
2	Radiochemistry, pg 20, checklist item 5 comment says, " Np-237 - blank cont. - U", The validation letter says "...Np 237 result was qualified as an estimate and flagged J". Appears inconsistent.		carried to J K	C
3	Wet Chemistry, pg 18, Completeness on validation checklist has been marked N/A.	accepted Daynes 8/25/04	~~See #1 above~~	C
4	Inorganics, Pg 3, Accuracy section, LCS results, LAst sentence should say "All other LCS results were acceptable."		Corrected K	C
5	Inorganics, pg 18, Completeness on validation checklist has been marked N/A.	accepted Daynes 8/25/04	~~Corrected K~~ ~~See #1 above~~	C
6	Semivolatile - pg 18, Completeness on validation checklist has been marked N/A.	accepted Daynes 8/25/04	~~See #1 above~~	C

Date: 18 May 2004
To: Fluor Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 216-B-26 Characterization Sampling - Soil Sampling
Subject: Wet Chemistry - Data Package No. WSCF20031684 (SDG No. 31684)

INTRODUCTION

This memo presents the results of data validation on Data Package No. 31684 prepared by WSCF. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B183N2	12/17/03	Soil	C	See note 1 & 2

1 - Ammonia - 350.3; pH - 9040A; IC anions - 300.0; cyanide - 9010B.
2 - Phosphate, nitrate and nitrite were not validated or reported per FHI.

Data validation was conducted in accordance with the FHI validation statement of work and the BC Cribs and Trenches 200-TW-1 Operable Unit Borehole Sampling and Analysis Plan (DOE/RL-2003-44, Rev. 0). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. Additional Documentation Requested by Client

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DATA QUALITY PARAMETERS

- **Holding Times/Sample Preservation**

Analytical holding times are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within 28 days for ammonia, chloride, fluoride and sulfate; 14 days for cyanide; and immediate (24 hours) for pH.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

Due to the holding time being exceeded by greater than twice the limit, all pH results were qualified as estimates and flagged "J".

All other holding times were acceptable.

- **Method Blanks**

Method Blanks

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. All blank results must fall below the contract required detection limit (CRQL) to be acceptable.

Due to the lack of a blank analysis, all ammonia results were qualified as estimates and flagged "J".

All other method blank results were acceptable.

Field (Equipment) Blank

No equipment blanks were submitted for analysis.

- **Accuracy**

Matrix Spike

Matrix spike (MS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike is used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike and LCS recoveries must fall within the range of 75% to 125%. Samples with a recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a recovery of greater than 125% or less than 75% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a recovery greater than 125% and a sample result less than the IDL, no qualification is required.

All matrix spike recovery results were acceptable.

Laboratory Control Sample

The LCS is used to monitor the overall performance of all steps in the analysis. Recoveries must fall within the range of 80% to 120% for LCS analysis. Samples

with a recovery of less than 50% are rejected and flagged "UR". Samples with a recovery of 50% to 79% and a sample recovery below the IDL are qualified "UJ". Samples with a recovery of greater than 120% or less than 80% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a recovery greater than 120% and a sample result less than the IDL, no qualification is required.

All LCS results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Analytical precision is expressed by the relative percent differences (RPD) between the recoveries of matrix spike duplicate (MSD) analyses performed on a sample in the analytical batch. Precision may alternatively be assessed using unspiked duplicate analyses performed on a sample in the analytical batch. If both sample and replicate activities (concentrations) are greater than five times the CRDL and the RPD is less than 35%, no qualification is required. If either activity (concentration) is less than five times the CRDL, the RPD control limit is less than or equal to two times the CRDL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

Due to the lack of a duplicate analysis, all pH results were qualified as estimates and flagged "J".

All other laboratory duplicate results were acceptable.

Field Duplicate

No field duplicates were submitted for analysis.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the target required quantitation limits (TQLs) to ensure that laboratory detection levels meet the required criteria. All results met the TRQL.

- **Completeness**

Data package No. 31684 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to the holding time being exceeded by greater than twice the limit, all pH results were qualified as estimates and flagged "J". Due to the lack of a duplicate analysis, all pH results were qualified as estimates and flagged "J". Due to the lack of a blank analysis, all ammonia results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the FHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

FHI, Contract #20266, *Validation Statement of Work*, Fluor Hanford Incorporated, July 7, 2003.

DOE/RL-2003-44, Rev. 0, *BC Cribs and Trenches 200-TW-1 Operable Unit Borehole Sampling and Analysis Plan*, November 2003.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with FHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

INORGANIC DATA QUALIFICATION SUMMARY

SDG: 31684	REVIEWER: TLI	DATE: 5/18/04	PAGE_1_OF_1_
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
pH	J	All	Holding time
pH	J	All	No duplicate analysis
Ammonia	J	All	No blank analysis

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: FLUOR-HANFORD											
Laboratory: WSCF											
Case	SDG: WSCF20031684										
Sample Number		B183N2									
Remarks											
Sample Date		12/17/04									
Wet Chemistry	TQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Cyanide	0.5	2.14									
Ammonia	0.5	5.13	J								
pH**		8.23	J								
Fluoride	5	<1.13	U								
Chloride	2	24.4									
Sulfate	5	137									
**-Units pH units											

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Laboratory applied non-detect qualifiers "U" have been included in this table to minimize miss-interpretation of results. All other qualifiers shown were applied during validation.

WSCF
ANALYTICAL RESULTS REPORT

2-4

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

Group #: WSCF20031684

Sample #	Client ID		CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
Inorganic														
W030001217	B183N2	GPP	57-12-5	Cyanide	SOIL	LA-695-402		2.14	mg/kg	1.00	0.20	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	NH4-N	Nitrogen in ammonium	SOIL	LA-503-401	E J	5.13	mg/kg	49.00	0.20	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	TS	Total solids	SOIL	LA-519-412		94.6	%	1.00	0.0	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	PH	pH Measurement	SOIL	LA-212-411	J	8.23	pH	1.00	0.010	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	16984-48-8	Fluoride	SOIL	LA-533-410	U	< 1.13	mg/kg	49.00	1.1	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	16887-00-6	Chloride	SOIL	LA-533-410		24.4	mg/kg	49.00	2.5	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	NO2-N	Nitrogen in Nitrite	SOIL	LA-533-410	U	< 0.931	mg/kg	49.00	0.93	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	NO3-N	Nitrogen in Nitrate	SOIL	LA-533-410		924	mg/kg	1.97e+003	26	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	14265-44-2	Phosphate	SOIL	LA-533-410	U	< 2.65	mg/kg	49.00	2.6	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	14808-79-8	Sulfate	SOIL	LA-533-410		137	mg/kg	49.00	4.9	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-43-9	Cadmium	SOIL	LA-505-412	U	< 0.957	mg/kg	9.57	0.96	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-47-3	Chromium	SOIL	LA-505-412	EU	< 2.87	mg/kg	9.57	2.9	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-50-8	Copper	SOIL	LA-505-412	U	< 4.78	mg/kg	9.57	4.8	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7439-92-1	Lead	SOIL	LA-505-412	U	< 11.5	mg/kg	9.57	12	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-02-0	Nickel	SOIL	LA-505-412		10.7	mg/kg	9.57	4.8	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-22-4	Silver	SOIL	LA-505-412	U	< 1.91	mg/kg	9.57	1.9	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-61-1	Uranium	SOIL	LA-505-412	U	< 0.957	mg/kg	9.57	0.96	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7439-97-6	Mercury	SOIL	LA-505-412	U	< 0.957	mg/kg	9.57	0.96	01/10/04	12/17/03	12/18/03
W030001219	B183N5	GPP	57-12-5	Cyanide	SOIL	LA-695-402		0.260	mg/kg	1.00	0.20	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	NH4-N	Nitrogen in ammonium	SOIL	LA-503-401	U	< 0.192	mg/kg	48.00	0.19	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	TS	Total solids	SOIL	LA-519-412		97.3	%	1.00	0.0	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	PH	pH Measurement	SOIL	LA-212-411		8.47	pH	1.00	0.010	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	16984-48-8	Fluoride	SOIL	LA-533-410	U	< 1.10	mg/kg	48.00	1.1	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	16887-00-6	Chloride	SOIL	LA-533-410	B	[illegible]	mg/kg	48.00	2.5	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	NO2-N	Nitrogen in Nitrite	SOIL	LA-533-410	U	< 0.912	mg/kg	48.00	0.91	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	NO3-N	Nitrogen in Nitrate	SOIL	LA-533-410		41.8	mg/kg	48.00	0.62	12/31/03	12/18/03	12/18/03

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

5/15/05

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Sample Delivery Group	**WSCF20031684**
Sample Matrix	**Soil**
Sample Visual	**Brown**
SAF Number	**F03-020**
Data Deliverable	**Summary Report**

Introduction

Two (2) soil samples (B183N2 and B183N5) from GPP were received at the WSCF Laboratory on December 18, 2003. The samples were 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 and ICP-AES Metals by EPA SW-846 Method 6010A. 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.

Revised pg
DLyes
1-1
3/31/04

- 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) 2-25 and 2-26 for QC details. Analytical Note: Estimated Chromium results due to low preparation Blank result and low LCS recovery. High Cadmium LCS recovery but no flag issued because sample results were not detectable. All other LCS recoveries are within manufacturers specifications.

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 2-24 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) 2-18 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) 2-27 and 2-28 for QC details. Analytical Note: B183N5 Chloride detected but at level less than lowest calibration standard.

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) 2-19 for QC details. Analytical Note: Potential sodium interference with Ammonium-N for B183N2.

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) 2-17 for QC details.

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) 2-29 through 2-33 for QC details. Analytical Note: The Duplicates for U, Pu, and Am high RPD's, but RPD does not apply to low level samples. The Np LCS recovery is low at 65.7%. 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 B183N2MS, B183N5MS and B183N2MSD with recoveries of 79.9%, 89.5% and

Revised pg Dayes 1-2 3/31/04

91.3% respectively, limits for the spike are 75-125%.). All other QC was acceptable (the Np Duplicate RPD is high, but sample activity is below detection level) therefore no flags will be issued for Np. See page(s) 3-4, 3-5 and 3-6 for more detailed information on the Np issue.

Radiochemical Tracer Percent Recovery					
Sample Number	**Isotope**	**Blank**	**LCS**	**Sample**	**Duplicate**
B183N2	U	81.40%	86.78%	76.68%	85.80%
	Pu	71.85%	65.44%	18.80%	18.59%
	Am	85.42%	86.54%	45.34%	37.15%
B183N5	U	81.40%	86.78%	75.24%	N/A
	Pu	71.85%	65.44%	41.20%	N/A
	Am	85.42%	86.54%	30.65%	N/A

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

~~000005~~ → Revised pg Daynes 1 of 3 3/31/04

FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-020-020	Page 1 of 1

Collector Pope/Hughes/Pfister	Company Contact Steve Trent	Telephone No. 373-5869	Project Coordinator TRENT, SJ
Project Designation 216-B-26 Characterization Sampling - Soil Sampling	Sampling Location C3245 (97.5-100 ft)		SAF No. F03-020
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

Price Code ~~8N~~ 8H
Air Quality ☐
Data Turnaround ~~45 Days~~ 30 DAYS

000043

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

~~[illegible]~~ 20031684

Sample No.	Matrix *	Sample Date	Sample Time					
B183N2	SOIL	12/17/03	1219	X	X	X	X	
W030001217								

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
JS Pope/Pfister	12/18/03 1245	[illegible]	12/18/03 1245

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

Unable to do TOC, customer notified 12-18-03

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=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)

000016

Appendix 5

Data Validation Supporting Documentation

GENERAL CHEMISTRY DATA VALIDATION CHECKLISTS

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 216-B-26			DATA PACKAGE: WSCF20031684		
VALIDATOR: TLP		LAB:		DATE: 5/14/04	
CASE:			SDG: 31684		

ANALYSES PERFORMED					
Anions/IC	TOC	TOX	TPH-418.1	Oil and Grease	Alkalinity
Ammonia	BOD/COD	Chloride	Chromium-VI	pH	NO_3/NO_2
Sulfate	TDS	TKN	Phosphate	Cyanide	

SAMPLES/MATRIX
B183N2
NO_2 NO_3 phosphate – not validated or reported soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? ..... Yes No N/A

Comments:

2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)

Initial calibrations performed on all instruments? ..... Yes No N/A

Initial calibrations acceptable? ..... Yes No N/A

ICV and CCV checks performed on all instruments? ..... Yes No N/A

ICV and CCV checks acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

Calculation check acceptable? ..... Yes No N/A

Comments:

GENERAL CHEMISTRY DATA VALIDATION CHECKLISTS

3. BLANKS (Levels B, C, D, and E)

ICB and CCB checks performed for all applicable analyses? (Levels D, E) ..... Yes No N/A

ICB and CCB results acceptable? (Levels D, E) ..... Yes No N/A

Laboratory blanks analyzed? ..... Yes No N/A

Laboratory blank results acceptable? ..... Yes No N/A

Field blanks analyzed? (Levels C, D, E) ..... Yes No N/A

Field blank results acceptable? (Levels C, D, E) ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: ammonia – no blank J

no FB

4. ACCURACY (Levels C, D, and E)

Spike samples analyzed? ..... Yes No N/A

Spike recoveries acceptable? ..... Yes No N/A

Sike standards NIST traceable? (Levels D, E) ..... Yes No N/A

Spike standards expired? (Levels D, E) ..... Yes No N/A

LCS/BSS samples analyzed? ..... Yes No N/A

LCS/BSS results acceptable? ..... Yes No N/A

Standards traceable? (Levels D, E) ..... Yes No N/A

Standards expired? (Levels D, E) ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Performance audit sample(s) analyzed? ..... Yes No N/A

Performance audit sample results acceptable? ..... Yes No N/A

Comments: NO PAS

GENERAL CHEMISTRY DATA VALIDATION CHECKLISTS

5. PRECISION (Levels C, D, and E)

Duplicate RPD values acceptable? ..... Yes No N/A

Duplicate results acceptable? ..... Yes No N/A

MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A

MS/MSD standards expired? (Levels D, E) ..... Yes No N/A

Field duplicate RPD values acceptable? ..... Yes No N/A

Field split RPD values acceptable? ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: No pH dup - J

6. HOLDING TIMES (all levels)

Samples properly preserved? ..... Yes No N/A

Sample holding times acceptable? ..... Yes No N/A

Comments: pH over - J

GENERAL CHEMISTRY DATA VALIDATION CHECKLISTS

7. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

Results reported for all requested analyses? ..... Yes No N/A

Rresults supported in the raw data? (Levels D, E) ..... Yes No N/A

Samples properly prepared? (Levels D, E) ..... Yes No N/A

Detection limits meet RDL? ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments:

Appendix 6

Additional Documentation Requested by Client

WSCF ANALYTICAL LABORATORY QC REPORT

2-19

SDG Number: WSCF20031684
Matrix: SOLID
Test: Ammonia (N) by IC

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date:12/18/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W030001217									
BATCH QC ASSOCIATED WITH SAMPLE									
DUP	Ammonia (N) by IC	7664-41-7	5.09e+00	0.783	RPD	12/31/03	0.000	20.000	
MS	Ammonia (N) by IC	7664-41-7	1.79e-01	109.146	% Recov	12/31/03	75.000	125.000	
MSD	Ammonia (N) by IC	7664-41-7	1.71e-01	104.268	% Recov	12/31/03	75.000	125.000	
BATCH QC									
LCS	Ammonia (N) by IC	7664-41-7	7.74e+01	93.932	% Recov	12/31/03	80.000	120.000	

000023

WSCF ANALYTICAL LABORATORY QC REPORT

2-17

SDG Number: WSCF20031684
Matrix: SOLID
Test: Cyanide by Midi/Spectrophotom

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date:12/18/03

Lab ID: W030001203

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	89.3	89.300	% Recov	12/31/03	75.000	125.000	
MSD	Cyanide by Midi/Spectrophotom	57-12-5	97.2	97.200	% Recov	12/31/03	75.000	125.000	
SPK-RPD	Cyanide by Midi/Spectrophotom	57-12-5	97.200	8.472	RPD	12/31/03	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	12/31/03	-4.000	4.000	U
BLNK-PREP	Cyanide by Midi/Spectrophotom	57-12-5	<1	n/a	ug/L	12/31/03	-4.000	4.000	U
DUP	Cyanide by Midi/Spectrophotom	57-12-5	n/a	n/a	RPD	12/31/03	0.000	20.000	
LCS	Cyanide by Midi/Spectrophotom	57-12-5	99.7	99.700	% Recov	12/31/03	85.000	115.000	
LCS-2	Cyanide by Midi/Spectrophotom	57-12-5	n/a	n/a	% Recov	12/31/03	85.000	115.000	

000024

WSCF ANALYTICAL LABORATORY QC REPORT

2-27

SDG Number: WSCF20031684
Matrix: SOLID
Test: Anions by Ion Chromatography

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date: 12/18/03

Lab ID: W030001217

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	2.94e+01	18.587	RPD	12/31/03	0.000	20.000	
DUP	Fluoride	16984-48-8	<1.13e0	n/a	RPD	12/31/03	0.000	20.000	U
DUP	Nitrogen in Nitrite	NO2-N	<9.31e-1	n/a	RPD	12/31/03	0.000	20.000	U
DUP	Nitrogen in Nitrate	NO3-N	1.12e+03	19.178	RPD	12/31/03	0.000	20.000	
DUP	Phosphate	14265-44-2	<2.65e0	n/a	RPD	12/31/03	0.000	20.000	U
DUP	Sulfate	14808-79-8	1.51e+02	9.722	RPD	12/31/03	0.000	20.000	
MS	Chloride	16887-00-6	1.01e+00	102.020	% Recov	12/31/03	75.000	125.000	
MS	Fluoride	16984-48-8	4.40e-01	89.980	% Recov	12/31/03	75.000	125.000	
MS	Nitrogen in Nitrite	NO2-N	4.87e-01	96.627	% Recov	12/31/03	75.000	125.000	
MS	Nitrogen in Nitrate	NO3-N	4.68e-01	104.933	% Recov	12/31/03	75.000	125.000	
MS	Phosphate	14265-44-2	8.74e-01	91.137	% Recov	12/31/03	75.000	125.000	
MS	Sulfate	14808-79-8	2.13e+00	108.122	% Recov	12/31/03	75.000	125.000	
MSD	Chloride	16887-00-6	9.62e-01	97.172	% Recov	12/31/03	75.000	125.000	
MSD	Fluoride	16984-48-8	4.29e-01	87.730	% Recov	12/31/03	75.000	125.000	
MSD	Nitrogen in Nitrite	NO2-N	4.43e-01	87.897	% Recov	12/31/03	75.000	125.000	
MSD	Nitrogen in Nitrate	NO3-N	4.77e-01	106.951	% Recov	12/31/03	75.000	125.000	
MSD	Phosphate	14265-44-2	7.61e-01	79.353	% Recov	12/31/03	75.000	125.000	
MSD	Sulfate	14808-79-8	1.89e+00	95.939	% Recov	12/31/03	75.000	125.000	

BATCH QC

BLANK	Chloride	16887-00-6	<5.20e-2	n/a	mg/L	01/01/04	0.000	300.000	U
BLANK	Chloride	16887-00-6	<5.20e-2	n/a	mg/L	12/31/03	0.000	300.000	U
BLANK	Fluoride	16984-48-8	<2.30e-2	n/a	mg/L	12/31/03	0.000	300.000	U
BLANK	Fluoride	16984-48-8	<2.30e-2	n/a	mg/L	01/01/04	0.000	300.000	U
BLANK	Nitrogen in Nitrite	NO2-N	<1.90e-2	n/a	mg/L	01/01/04	0.000	300.000	U
BLANK	Nitrogen in Nitrite	NO2-N	<1.90e-2	n/a	mg/L	12/31/03	0.000	300.000	U

000025

WSCF ANALYTICAL LABORATORY QC REPORT

2-28

SDG Number: WSCF20031684
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	01/01/04	0.000	300.000	U
BLANK	Nitrogen in Nitrate	NO3-N	<1.30e-2	n/a	mg/L	12/31/03	0.000	300.000	U
BLANK	Phosphate	14265-44-2	<5.40e-2	n/a	mg/L	01/01/04	0.000	300.000	U
BLANK	Phosphate	14265-44-2	<5.40e-2	n/a	mg/L	12/31/03	0.000	300.000	U
BLANK	Sulfate	14808-79-8	<1.00e-1	n/a	mg/L	12/31/03	0.000	300.000	U
BLANK	Sulfate	14808-79-8	<1.00e-1	n/a	mg/L	01/01/04	0.000	300.000	U
LCS	Chloride	16887-00-6	1.93e+02	96.500	% Recov	12/31/03	80.000	120.000	
LCS	Fluoride	16984-48-8	9.11e+01	92.300	% Recov	12/31/03	80.000	120.000	
LCS	Nitrogen in Nitrite	NO2-N	9.68e+01	96.800	% Recov	12/31/03	80.000	120.000	
LCS	Nitrogen in Nitrate	NO3-N	8.57e+01	95.117	% Recov	12/31/03	80.000	120.000	
LCS	Phosphate	14265-44-2	1.87e+02	96.491	% Recov	12/31/03	80.000	120.000	
LCS	Sulfate	14808-79-8	3.81e+02	95.489	% Recov	12/31/03	80.000	120.000	

000026

Date: 18 May 2004
To: Fluor Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 216-B-26 Characterization Sampling - Soil Sampling
Subject: Semivolatile - Data Package No. WSCF20031684 (SDG No. 31684)

INTRODUCTION

This memo presents the results of data validation on Data Package No. 31684 prepared by WSCF. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B183N2	12/17/03	Soil	C	See note 1

1-Semivolatiles by 8270B and TPH diesel.

Data validation was conducted in accordance with the FHI validation statement of work and the BC Cribs and Trenches 200-TW-1 Operable Unit Borehole Sampling and Analysis Plan (DOE/RL-2003-44, Rev. 0). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. Additional Documentation Requested by Client

RECEIVED
JUN 29 2004

DATA QUALITY OBJECTIVES

- **Holding Times/Sample Preservation**

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Samples must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for

detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were met.

- **Method Blanks**

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL level and qualified as undetected "U".

All method blank results were acceptable.

Field Blanks

No field blanks were submitted for analysis.

- **Accuracy**

Matrix Spike/Matrix Spike Duplicate & Blank Spike

Matrix spike/matrix spike duplicate and blank spike sample analyses are used to assess the analytical accuracy of the reported data. Matrix spike/matrix duplicate results are used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries outside control limits are qualified as estimates and flagged

"UJ". Sample results greater than five times the spike concentration require no qualification.

All matrix spike/matrix spike duplicate and blank spike results were acceptable.

Surrogate Recovery

The analyses of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. If two surrogates of the same class of compounds (base/neutral or acid) are out of control limits, all associated sample results greater than the contract required quantitation limit (CRQL) are qualified as estimates and flagged "J". Sample results less than the CRQL and below the lower control limit are qualified as estimates and flagged "UJ". Sample results less than the CRQL with recoveries above the upper control limit require no qualification. If a surrogate recovery is less than 10%, detects are qualified as estimates and flagged "J" and nondetects are rejected and flagged "UR".

All surrogate results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike (MS)/matrix spike duplicate (MSD) results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. Samples results must be within RPD limits of +/-35%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All MS/MSD RPD results were acceptable.

Field Duplicate Samples

No field duplicate results were submitted for analysis.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the target required quantitation limits (TRQL's) to ensure that laboratory detection levels meet the required criteria. All semivolatile results met the anaylyte specific TQL.

- **Completeness**

Data package No. 31684 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

FHI, Contract #20266, *Validation Statement of Work*, Fluor Hanford Incorporated, July 7, 2003.

DOE/RL-2003-44, Rev. 0, *BC Cribs and Trenches 200-TW-1 Operable Unit Borehole Sampling and Analysis Plan*, November 2003.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the FHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

SEMIVOLATILE DATA QUALIFICATION SUMMARY

SDG: 31684	REVIEWER: TLI	DATE: 5/18/04	PAGE 1 OF 1
COMMENTS: No qualifiers assigned			

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

SEMIVOLATILE ANALYSIS, SOIL MATRIX, (UG/KG)

Project: FLOUR-HANFORD							
Laboratory: WSCF							
Case:	SDG: WSCF20031684						
Sample Number		B183N2					
Remarks							
Sample Date		12/17/03					
Analysis Date		1/5/04					
Semivolatile (8270B)	RTQL	Result	Q	Result	Q	Result	Q
4-Nitrophenol		<680	U				
1,4-Dichlorobenzene		<330	U				
Phenol		<110	U				
1,2,4-Trichlorobenzene		<310	U				
2,4-Dinitrotoluene		<70.0	U				
Pyrene		<70.0	U				
4-Chloro-3-methylphenol		<70.0	U				
N-Nitroso-di-n-dipropylamine		<70.0	U				
Acenaphthene		<70.0	U				
Pentachlorophenol		<320	U				
2-Chlorophenol		<160	U				
Tri-n-butylphosphate	3300	<70.0	U				
TPH-Diesel		<3900	U				
Kerosene	5000	<3900	U				

000010

Laboratory applied non-detect qualifiers "U" have been included in this table to minimize miss-interpretation of results. All other qualifiers shown were applied during validation.

WSCF
ANALYTICAL RESULTS REPORT

2 - 2

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

Group #: WSCF20031684

Sample #	Client ID		CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
Organic														
W030001217	B183N2	GPP	100-02-7	4-Nitrophenol	SOIL	LA-523-456	U	< 680	ug/kg	1.00	6.8e+02	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	106-46-7	1,4-Dichlorobenzene	SOIL	LA-523-456	U	< 330	ug/kg	1.00	3.3e+02	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	108-95-2	Phenol	SOIL	LA-523-456	U	< 110	ug/kg	1.00	1.1e+02	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	120-82-1	1,2,4-Trichlorobenzene	SOIL	LA-523-456	U	< 310	ug/kg	1.00	3.1e+02	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	121-14-2	2,4-Dinitrotoluene	SOIL	LA-523-456	U	< 70.0	ug/kg	1.00	70	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	129-00-0	Pyrene	SOIL	LA-523-456	U	< 70.0	ug/kg	1.00	70	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	59-50-7	4-Chloro-3-methylphenol	SOIL	LA-523-456	U	< 70.0	ug/kg	1.00	70	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	621-64-7	N-Nitrosodi-n-dipropylamine	SOIL	LA-523-456	U	< 70.0	ug/kg	1.00	70	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	83-32-9	Acenaphthene	SOIL	LA-523-456	U	< 70.0	ug/kg	1.00	70	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	87-86-5	Pentachlorophenol	SOIL	LA-523-456	U	< 320	ug/kg	1.00	3.2e+02	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	95-57-8	2-Chlorophenol	SOIL	LA-523-456	U	< 160	ug/kg	1.00	1.6e+02	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	126-73-8	Tributyl phosphate	SOIL	LA-523-456	U	< 70.0	ug/kg	1.00	70	01/05/04	12/17/03	12/18/03
W030001217	B183N2	GPP	TPHDIESEL	Total Pet. Hydrocarbons Diesel	SOIL	NWTPH	U	< 3.90e+03	ug/kg	1.00	3.9e+03	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	TPHKEROSENE	Kerosene	SOIL	NWTPH	U	< 3.90e+03	ug/kg	1.00	3.9e+03	12/31/03	12/17/03	12/18/03
W030001219	B183N5	GPP	100-02-7	4-Nitrophenol	SOIL	LA-523-456	U	< 660	ug/kg	1.00	6.6e+02	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	106-46-7	1,4-Dichlorobenzene	SOIL	LA-523-456	U	< 320	ug/kg	1.00	3.2e+02	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	108-95-2	Phenol	SOIL	LA-523-456	U	< 100	ug/kg	1.00	1.0e+02	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	120-82-1	1,2,4-Trichlorobenzene	SOIL	LA-523-456	U	< 300	ug/kg	1.00	3.0e+02	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	121-14-2	2,4-Dinitrotoluene	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	129-00-0	Pyrene	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	59-50-7	4-Chloro-3-methylphenol	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	621-64-7	N-Nitrosodi-n-dipropylamine	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	83-32-9	Acenaphthene	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	87-86-5	Pentachlorophenol	SOIL	LA-523-456	U	< 310	ug/kg	1.00	3.1e+02	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	95-57-8	2-Chlorophenol	SOIL	LA-523-456	U	< 150	ug/kg	1.00	1.5e+02	01/06/04	12/18/03	12/18/03
W030001219	B183N5	GPP	126-73-8	Tributyl phosphate	SOIL	LA-523-456	U	< 68.0	ug/kg	1.00	68	01/06/04	12/18/03	12/18/03

MDL=Minimum Detection Limit
RQ=Result Qualifier
DF=Dilution Factor

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

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

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Sample Delivery Group	**WSCF20031684**
Sample Matrix	**Soil**
Sample Visual	**Brown**
SAF Number	**F03-020**
Data Deliverable	**Summary Report**

Introduction

Two (2) soil samples (B183N2 and B183N5) from GPP were received at the WSCF Laboratory on December 18, 2003. The samples were 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 and ICP-AES Metals by EPA SW-846 Method 6010A. 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.

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- 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) 2-25 and 2-26 for QC details. Analytical Note: Estimated Chromium results due to low preparation Blank result and low LCS recovery. High Cadmium LCS recovery but no flag issued because sample results were not detectable. All other LCS recoveries are within manufacturers specifications.

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 2-24 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) 2-18 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) 2-27 and 2-28 for QC details. Analytical Note: B183N5 Chloride detected but at level less than lowest calibration standard.

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) 2-19 for QC details. Analytical Note: Potential sodium interference with Ammonium-N for B183N2.

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) 2-17 for QC details.

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) 2-29 through 2-33 for QC details. Analytical Note: The Duplicates for U, Pu, and Am high RPD's, but RPD does not apply to low level samples. The Np LCS recovery is low at 65.7%. 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 B183N2MS, B183N5MS and B183N2MSD with recoveries of 79.9%, 89.5% and

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91.3% respectively, limits for the spike are 75-125%.). All other QC was acceptable (the Np Duplicate RPD is high, but sample activity is below detection level) therefore no flags will be issued for Np. See page(s) 3-4, 3-5 and 3-6 for more detailed information on the Np issue.

Radiochemical Tracer Percent Recovery					
Sample Number	**Isotope**	**Blank**	**LCS**	**Sample**	**Duplicate**
B183N2	U	81.40%	86.78%	76.68%	85.80%
	Pu	71.85%	65.44%	18.80%	18.59%
	Am	85.42%	86.54%	45.34%	37.15%
B183N5	U	81.40%	86.78%	75.24%	N/A
	Pu	71.85%	65.44%	41.20%	N/A
	Am	85.42%	86.54%	30.65%	N/A

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

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FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-020-020	Page 1 of 1
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 (97.5-100 ft)	SAF No. ~~F03-020~~	Air Quality ☐
Ice Chest No.	Field Logbook No. HNF-N-3510-1 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						

~~20031680~~ 20031684

Sample No.	Matrix *	Sample Date	Sample Time										
B183N2	SOIL	12/12/03	1219	X	X	X	X						
W03000217													

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
JS Pope/[illegible]	12/18/03 1245	[illegible]	12/18/03 1245

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

Unable to do TOC, customer instructed 12-18-03 [illegible]

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=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

6003-618(03/03)

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Appendix 5

Data Validation Supporting Documentation

GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 216-B-26			DATA PACKAGE: WSCF20031684		
VALIDATOR: TLT		LAB: WSCF		DATE: 5/12/04	
CASE:			SDG: 31684		
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270		SW-846 8270 (TCLP)
SAMPLES/MATRIX B183N2					
					soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? ..... Yes No N/A

Comments:

2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E)

GC/MS tuning/performance check acceptable? ..... Yes No N/A

Initial calibrations acceptable? ..... Yes No N/A

Continuing calibrations acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

Calculation check acceptable? ..... Yes No N/A

Comments:

GC/MS ORGANIC DATA VALIDATION CHECKLIST

3. BLANKS (Levels B, C, D, and E)

Calibration blanks analyzed? (Levels D, E) ..... Yes No N/A
Calibration blank results acceptable? (Levels D, E) ..... Yes No N/A
Laboratory blanks analyzed? ..... Yes No N/A
Laboratory blank results acceptable? ..... Yes No N/A
Field/trip blanks analyzed? (Levels C, D, E) ..... Yes No N/A
Field/trip blank results acceptable? (Levels C, D, E) ..... Yes No N/A
Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: NO FB

4. ACCURACY (Levels C, D, and E)

Surrogates/system monitoring compounds analyzed? ..... Yes No N/A
Surrogate/system monitoring compound recoveries acceptable? ..... Yes No N/A
Surrogates traceable? (Levels D, E) ..... Yes No N/A
Surrogates expired? (Levels D, E) ..... Yes No N/A
MS/MSD samples analyzed? ..... Yes No N/A
MS/MSD results acceptable? ..... Yes No N/A
MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A
MS/MSD standards? (Levels D, E) ..... Yes No N/A
LCS/BSS samples analyzed? ..... Yes No N/A
LCS/BSS results acceptable? ..... Yes No N/A
Standards traceable? (Levels D, E) ..... Yes No N/A
Standards expired? (Levels D, E) ..... Yes No N/A
Transcription/calculation errors? (Levels D, E) ..... Yes No N/A
Performance audit sample(s) analyzed? ..... Yes No N/A
Performance audit sample results acceptable? ..... Yes No N/A

Comments: NO PAS

GC/MS ORGANIC DATA VALIDATION CHECKLIST

5. PRECISION (Levels C, D, and E)

MS/MSD samples analyzed? ..... Yes No N/A
MS/MSD RPD values acceptable? ..... Yes No N/A
MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A
MS/MSD standards expired? (Levels D, E) ..... Yes No N/A
Field duplicate RPD values acceptable? ..... Yes No N/A
Field split RPD values acceptable? ..... Yes No N/A
Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: _____

6. SYSTEM PERFORMANCE (Levels D and E)

Internal standards analyzed? ..... Yes No N/A
Iinternal standard areas acceptable? ..... Yes No N/A
Internal standard retention times acceptable? ..... Yes No N/A
Standards traceable? ..... Yes No N/A
Standards expired? ..... Yes No N/A
Transcription/calculation errors? ..... Yes No N/A

Comments: _____

7. HOLDING TIMES (all levels)

Samples properly preserved? ..... Yes No N/A
Sample holding times acceptable? ..... Yes No N/A

Comments: _____

GC/MS ORGANIC DATA VALIDATION CHECKLIST

8. COMPOUND IDENTIFICATION, QUANTITATION, AND DETECTION LIMITS (all levels)

Compound identification acceptable? (Levels D, E) ..... Yes No N/A

Compound quantitation acceptable? (Levels D, E) ..... Yes No N/A

Results reported for all requested analyses? ..... Yes No N/A

Rresults supported in the raw data? (Levels D, E) ..... Yes No N/A

Samples properly prepared? (Levels D, E) ..... Yes No N/A

Laboratory properly identified and coded all TIC? (Levels D, E) ..... Yes No N/A

Detection limits meet RDL? ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: _____

9. SAMPLE CLEANUP (Levels D and E)

GPC cleanup performed? ..... Yes No N/A

GPC check performed? ..... Yes No N/A

GPC check recoveries aceptable? ..... Yes No N/A

GPC calibration performed? ..... Yes No N/A

GPC calibration check performed? ..... Yes No N/A

GPC calibration check retention times acceptable? ..... Yes No N/A

Check/calibration materials traceable? ..... Yes No N/A

Check/calibration materials Expired? ..... Yes No N/A

Analytical batch QC given similar cleanup? ..... Yes No N/A

Transcription/Calculation Errors? ..... Yes No N/A

Comments: _____

Appendix 6

Additional Documentation Requested by Client

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031684
Matrix: SOLID
Test: WTPH-D TPH Diesel Range (Wa)

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date:12/18/03

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QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W030001203									
BATCH QC ASSOCIATED WITH SAMPLE									
MS	ortho-Terphenyl Surr	84-15-1	24964	86.500	% Recov	12/30/03	70.000	130.000	
MS	Total Pet. Hydrocarbons Diesel	TPHDIESEL	126040	87.300	% Recov	12/30/03	75.000	125.000	
MSD	ortho-Terphenyl Surr	84-15-1	26919	93.500	% Recov	12/30/03	70.000	130.000	
MSD	Total Pet. Hydrocarbons Diesel	TPHDIESEL	138240	96.000	% Recov	12/30/03	75.000	125.000	
Lab ID: W030001217									
BATCH QC ASSOCIATED WITH SAMPLE									
MS	ortho-Terphenyl Surr	84-15-1	25098	95.300	% Recov	12/31/03	70.000	130.000	
MS	Total Pet. Hydrocarbons Diesel	TPHDIESEL	244940	93.000	% Recov	12/31/03	75.000	125.000	
MSD	ortho-Terphenyl Surr	84-15-1	22737	86.100	% Recov	12/31/03	70.000	130.000	
MSD	Total Pet. Hydrocarbons Diesel	TPHDIESEL	113070	85.700	% Recov	12/31/03	75.000	125.000	
SPK-RPD	ortho-Terphenyl Surr	84-15-1	86.100	10.143	RPD	12/30/03	0.000	20.000	
SPK-RPD	Total Pet. Hydrocarbons Diesel	TPHDIESEL	85.700	8.170	RPD	12/30/03	0.000	20.000	
SURR	ortho-Terphenyl Surr	84-15-1	20246	77.000	% Recov	12/31/03	70.000	130.000	
Lab ID: W030001219									
BATCH QC ASSOCIATED WITH SAMPLE									
SURR	ortho-Terphenyl Surr	84-15-1	23091	90.100	% Recov	12/31/03	70.000	130.000	
BATCH QC									
BLANK	Kerosene	TPHKEROSENE	< 3800	n/a	ug/Kg	12/30/03			U
BLANK	ortho-Terphenyl Surr	84-15-1	24165	96.700	% Recov	12/30/03	70.000	130.000	
BLANK	Total Pet. Hydrocarbons Diesel	TPHDIESEL	< 3800	n/a	ug/Kg	12/30/03			U
LCS	Kerosene	TPHKEROSENE	113360	90.700	%Recove	12/30/03	70.000	130.000	
LCS	ortho-Terphenyl Surr	84-15-1	22495	90.000	% Recov	12/30/03	70.000	130.000	

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WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031684
Matrix: SOLID
Test: SW-846 8270B Semi-Vols

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date: 12/18/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
MSD	Phenol	108-95-2	4680.7	93.800	% Recov	01/05/04	42.000	111.000	
MSD	Nitrobenzene-d5	4165-60-0	2837.9	85.300	%Recove	01/05/04	64.000	111.000	
MSD	4-Nitrophenol	100-02-7	3911.6	78.400	% Recov	01/05/04	32.000	118.000	
MSD	Pentachlorophenol	87-86-5	4125.2	82.600	% Recov	01/05/04	62.000	114.000	
MSD	Phenol-d5	4165-62-2	3417.6	103.000	%Recove	01/05/04	54.000	120.000	
MSD	Pyrene	129-00-0	2995.6	90.000	% Recov	01/05/04	66.000	118.000	
MSD	2,4,6-Tribromophenol	118-79-6	3166.4	95.200	%Recove	01/05/04	24.000	122.000	
MSD	Terphenyl-d14 (7Cl)	98904-43-9	3209.2	96.400	%Recove	01/05/04	35.000	150.000	

Lab ID: W030001217
BATCH QC ASSOCIATED WITH SAMPLE

MS	1,2,4-Trichlorobenzene	120-82-1	3076.7	92.400	% Recov	01/06/04	46.000	107.000	
MS	1,4-Dichlorobenzene	106-46-7	2933.3	88.100	% Recov	01/06/04	30.000	96.000	
MS	2,4-Dinitrotoluene	121-14-2	2882.6	86.500	% Recov	01/06/04	59.000	106.000	
MS	2-Fluorophenol	367-12-4	2987.4	89.700	%Recove	01/06/04	42.000	105.000	
MS	Acenaphthene	83-32-9	3311.7	99.400	% Recov	01/06/04	61.000	116.000	
MS	4-Chloro-3-methylphenol	59-50-7	4322.0	86.500	% Recov	01/06/04	61.000	106.000	
MS	2-Chlorophenol	95-57-8	4517.3	90.400	% Recov	01/06/04	66.000	106.000	
MS	N-Nitrosodi-n-dipropylamine	621-64-7	2590.2	77.800	% Recov	01/06/04	71.000	114.000	
MS	2-Fluorobiphenyl	321-60-8	3334.5	100.000	%Recove	01/06/04	56.000	122.000	
MS	Phenol	108-95-2	4829.4	96.600	% Recov	01/06/04	42.000	111.000	
MS	Nitrobenzene-d5	4165-60-0	3065.5	92.000	%Recove	01/06/04	64.000	111.000	
MS	4-Nitrophenol	100-02-7	3650.7	73.100	% Recov	01/06/04	32.000	118.000	
MS	Pentachlorophenol	87-86-5	4300.4	86.100	% Recov	01/06/04	62.000	114.000	
MS	Phenol-d5	4165-62-2	3555.4	107.000	%Recove	01/06/04	54.000	120.000	
MS	Pyrene	129-00-0	2807.5	84.300	% Recov	01/06/04	66.000	118.000	
MS	2,4,6-Tribromophenol	118-79-6	3234.3	97.100	%Recove	01/06/04	24.000	122.000	
MS	Terphenyl-d14 (7Cl)	98904-43-9	2942.0	88.300	%Recove	01/06/04	35.000	150.000	
MSD	1,2,4-Trichlorobenzene	120-82-1	2802.5	84.100	% Recov	01/06/04	46.000	107.000	
MSD	1,4-Dichlorobenzene	106-46-7	2916.3	87.500	% Recov	01/06/04	30.000	96.000	

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WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031684
Matrix: SOLID
Test: SW-846 8270B Semi-Vols

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date:12/18/03

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QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
MSD	2,4-Dinitrotoluene	121-14-2	2824.8	84.800	% Recov	01/06/04	59.000	106.000	
MSD	2-Fluorophenol	367-12-4	3152.0	94.600	%Recove	01/06/04	42.000	105.000	
MSD	Acenaphthene	83-32-9	3268.0	98.100	% Recov	01/06/04	61.000	116.000	
MSD	4-Chloro-3-methylphenol	59-50-7	4721.5	94.500	% Recov	01/06/04	61.000	106.000	
MSD	2-Chlorophenol	95-57-8	4474.5	89.500	% Recov	01/06/04	66.000	106.000	
MSD	N-Nitrosodi-n-dipropylamine	621-64-7	2979.3	89.400	% Recov	01/06/04	71.000	114.000	
MSD	2-Fluorobiphenyl	321-60-8	3116.0	93.500	%Recove	01/06/04	56.000	122.000	
MSD	Phenol	108-95-2	5132.7	103.000	% Recov	01/06/04	42.000	111.000	
MSD	Nitrobenzene-d5	4165-60-0	2639.5	79.200	%Recove	01/06/04	64.000	111.000	
MSD	4-Nitrophenol	100-02-7	3892.6	77.900	% Recov	01/06/04	32.000	118.000	
MSD	Pentachlorophenol	87-86-5	4537.8	90.800	% Recov	01/06/04	62.000	114.000	
MSD	Phenol-d5	4165-62-2	3604.8	108.000	%Recove	01/06/04	54.000	120.000	
MSD	Pyrene	129-00-0	2908.6	87.300	% Recov	01/06/04	66.000	118.000	
MSD	2,4,6-Tribromophenol	118-79-6	3199.0	96.000	%Recove	01/06/04	24.000	122.000	
MSD	Terphenyl-d14 (7Cl)	98904-43-9	3004.7	90.200	%Recove	01/06/04	35.000	150.000	
SPK-RPD	1,2,4-Trichlorobenzene	120-82-1	84.100	9.405	RPD	01/05/04	0.000	20.000	
SPK-RPD	1,4-Dichlorobenzene	106-46-7	87.500	0.683	RPD	01/05/04	0.000	20.000	
SPK-RPD	2,4-Dinitrotoluene	121-14-2	84.800	1.985	RPD	01/05/04	0.000	20.000	
SPK-RPD	2-Fluorophenol	367-12-4	94.600	5.317	RPD	01/05/04	0.000	20.000	
SPK-RPD	Acenaphthene	83-32-9	98.100	1.316	RPD	01/05/04	0.000	20.000	
SPK-RPD	4-Chloro-3-methylphenol	59-50-7	94.500	8.840	RPD	01/05/04	0.000	20.000	
SPK-RPD	2-Chlorophenol	95-57-8	89.500	1.001	RPD	01/05/04	0.000	20.000	
SPK-RPD	N-Nitrosodi-n-dipropylamine	621-64-7	89.400	13.876	RPD	01/05/04	0.000	20.000	
SPK-RPD	2-Fluorobiphenyl	321-60-8	93.500	6.718	RPD	01/05/04	0.000	20.000	
SPK-RPD	Phenol	108-95-2	103.000	6.413	RPD	01/05/04	0.000	20.000	
SPK-RPD	Nitrobenzene-d5	4165-60-0	79.200	14.953	RPD	01/05/04	0.000	20.000	
SPK-RPD	4-Nitrophenol	100-02-7	77.900	6.358	RPD	01/05/04	0.000	20.000	
SPK-RPD	Pentachlorophenol	87-86-5	90.800	5.314	RPD	01/05/04	0.000	20.000	
SPK-RPD	Phenol-d5	4165-62-2	108.000	0.930	RPD	01/05/04	0.000	20.000	
SPK-RPD	Pyrene	129-00-0	87.300	3.497	RPD	01/05/04	0.000	20.000	

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WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031684
Matrix: SOLID
Test: SW-846 8270B Semi-Vols

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date: 12/18/03

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QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
SPK-RPD	2,4,6-Tribromophenol	118-79-6	96.000	1.139	RPD	01/05/04	0.000	20.000	
SPK-RPD	Terphenyl-d14 (7Cl)	98904-43-9	90.200	2.129	RPD	01/05/04	0.000	20.000	
SURR	2-Fluorophenol	367-12-4	2725.0	81.800	%Recove	01/05/04	42.000	105.000	
SURR	2-Fluorobiphenyl	321-60-8	3391.5	102.000	%Recove	01/05/04	56.000	122.000	
SURR	Nitrobenzene-d5	4165-60-0	2836.6	85.100	%Recove	01/05/04	64.000	111.000	
SURR	Phenol-d5	4165-62-2	3293.2	98.800	%Recove	01/05/04	54.000	120.000	
SURR	2,4,6-Tribromophenol	118-79-6	2430.2	72.900	%Recove	01/05/04	24.000	122.000	
SURR	Terphenyl-d14 (7Cl)	98904-43-9	3294.5	98.800	%Recove	01/05/04	35.000	150.000	

Lab ID: W030001219
BATCH QC ASSOCIATED WITH SAMPLE

SURR	2-Fluorophenol	367-12-4	2496.7	75.000	%Recove	01/06/04	42.000	105.000	
SURR	2-Fluorobiphenyl	321-60-8	2935.1	88.200	%Recove	01/06/04	56.000	122.000	
SURR	Nitrobenzene-d5	4165-60-0	2621.5	78.700	%Recove	01/06/04	64.000	111.000	
SURR	Phenol-d5	4165-62-2	2877.6	86.400	%Recove	01/06/04	54.000	120.000	
SURR	2,4,6-Tribromophenol	118-79-6	2248.7	67.500	%Recove	01/06/04	24.000	122.000	
SURR	Terphenyl-d14 (7Cl)	98904-43-9	2585.4	77.700	%Recove	01/06/04	35.000	150.000	

BATCH QC

BLANK	1,2,4-Trichlorobenzene	120-82-1	< 290	n/a	ug/Kg	01/05/04			U
BLANK	1,4-Dichlorobenzene	106-46-7	< 310	n/a	ug/Kg	01/05/04			U
BLANK	2,4-Dinitrotoluene	121-14-2	< 67	n/a	ug/Kg	01/05/04			U
BLANK	2-Fluorophenol	367-12-4	2919.5	87.600	%Recove	01/05/04	42.000	105.000	
BLANK	Acenaphthene	83-32-9	< 67	n/a	ug/Kg	01/05/04			U
BLANK	4-Chloro-3-methylphenol	59-50-7	< 67	n/a	ug/Kg	01/05/04			U
BLANK	2-Chlorophenol	95-57-8	< 150	n/a	ug/Kg	01/05/04			U
BLANK	N-Nitrosodi-n-dipropylamine	621-64-7	< 67	n/a	ug/Kg	01/05/04			U
BLANK	2-Fluorobiphenyl	321-60-8	3366.7	101.000	%Recove	01/05/04	56.000	122.000	
BLANK	Phenol	108-95-2	< 100	n/a	ug/Kg	01/05/04			U
BLANK	Nitrobenzene-d5	4165-60-0	2748.1	82.400	%Recove	01/05/04	64.000	111.000	

WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20031684
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
BLANK	4-Nitrophenol	100-02-7	< 650	n/a	ug/Kg	01/05/04			U
BLANK	Pentachlorophenol	87-86-5	< 300	n/a	ug/Kg	01/05/04			U
BLANK	Phenol-d5	4165-62-2	3260.0	97.800	%Recove	01/05/04	54.000	120.000	
BLANK	Pyrene	129-00-0	< 67	n/a	ug/Kg	01/05/04			U
BLANK	Tributyl phosphate	126-73-8	< 67	n/a	ug/Kg	01/05/04			U
BLANK	2,4,6-Tribromophenol	118-79-6	2372.2	71.200	%Recove	01/05/04	24.000	122.000	
BLANK	Terphenyl-d14 (7Cl)	98904-43-9	3386.4	102.000	%Recove	01/05/04	35.000	150.000	
LCS	1,2,4-Trichlorobenzene	120-82-1	2491.9	74.800	% Recov	01/05/04	46.000	107.000	
LCS	1,4-Dichlorobenzene	106-46-7	2745.8	82.400	% Recov	01/05/04	42.000	111.000	
LCS	2,4-Dinitrotoluene	121-14-2	2740.8	82.200	% Recov	01/05/04	59.000	106.000	
LCS	2-Fluorophenol	367-12-4	2996.6	89.900	% Recov	01/05/04	50.000	110.000	
LCS	Acenaphthene	83-32-9	3245.1	97.400	% Recov	01/05/04	61.000	116.000	
LCS	4-Chloro-3-methylphenol	59-50-7	4013.7	80.300	% Recov	01/05/04	61.000	106.000	
LCS	2-Chlorophenol	95-57-8	4179.8	83.600	% Recov	01/05/04	66.000	105.000	
LCS	N-Nitrosodi-n-dipropylamine	621-64-7	2671.9	80.200	% Recov	01/05/04	71.000	114.000	
LCS	2-Fluorobiphenyl	321-60-8	2991.2	89.700	% Recov	01/05/04	58.000	109.000	
LCS	Phenol	108-95-2	4834.4	96.700	% Recov	01/05/04	67.000	105.000	
LCS	Nitrobenzene-d5	4165-60-0	2439.9	73.200	% Recov	01/05/04	60.000	118.000	
LCS	4-Nitrophenol	100-02-7	4065.2	81.300	% Recov	01/05/04	32.000	118.000	
LCS	Pentachlorophenol	87-86-5	3765.4	75.300	% Recov	01/05/04	62.000	114.000	
LCS	Phenol-d5	4165-62-2	3321.5	99.600	% Recov	01/05/04	59.000	116.000	
LCS	Pyrene	129-00-0	2697.6	80.900	% Recov	01/05/04	66.000	118.000	
LCS	2,4,6-Tribromophenol	118-79-6	3274.5	98.200	% Recov	01/05/04	60.000	120.000	
LCS	Terphenyl-d14 (7Cl)	98904-43-9	2885.3	86.600	% Recov	01/05/04	60.000	120.000	

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Date: 18 May 2004
To: Fluor Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 216-B-26 Characterization Sampling - Soil Sampling
Subject: Radiochemistry - Data Package No. WSCF20031684 (SDG No. 31684)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. 31684 which was prepared by WSCF. A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B183N2	12/17/03	Soil	C	See note 1

1 - Gamma spectroscopy, neptunium-237, isotopic uranium, isotopic plutonium and americium-241.

Data validation was conducted in accordance with the FHI validation statement of work and the BC Cribs and Trenches 200-TW-1 Operable Unit Borehole Sampling and Analysis Plan (DOE/RL-2003-44, Rev. 0). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. Additional Documentation Requested by Client

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JUN 29 2004

DATA QUALITY OBJECTIVES

- **Holding Times**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months.

All holding times were acceptable.

- **Laboratory (Method) Blanks**

Laboratory Blanks

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the required detection limit (RDL), the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the minimum detectable activity (MDA) are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

Due to laboratory blank contamination, the neptunium-237 result was qualified as an estimate and flagged "J".

Due to the lack of a blank analysis, all plutonium-238, uranium-234 and uranium-235 results were qualified as estimates and flagged "J".

Trace amounts of uranium-238, plutonium-239/240 and americium-241 were detected in laboratory blanks. Under the FHI statement of work, no qualification is required.

All other laboratory blank results were acceptable.

Field Blanks

No field blanks were submitted for analysis, therefore, no field blank data was available for review.

- **Accuracy**

Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample (LCS) and matrix spike (MS) recovery range is 70-130% or 65-135%. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

Due to a tracer recovery outside QC limits (18.8%), all plutonium results were qualified as estimates and flagged "J".

Due to the lack of a tracer analysis, the neptunium-237 result was qualified as an estimate and flagged "J".

Due to an LCS recovery outside QC limits, all neptunium-237 results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the contract required detection limit (CRDL) and the RPD is less than +/- 35 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

Due to the lack of a duplicate analysis, all plutonium-238, uranium-234 and uranium-235 results were qualified as estimates and flagged "J".

All other duplicate results were acceptable.

<u>Field Duplicate Samples</u>

No field duplicate results were submitted for analysis.

- **Detection Levels**

Reported analytical detection levels are compared against the target required quanitiation limits (TRQLs) to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific TQL.

- **Completeness**

Data package SDG No. 31684 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to laboratory blank contamination, the neptunium-237 result was qualified as an estimate and flagged "J". Due to the lack of a blank analysis, all plutonium-238, uranium-234 and uranium-235 results were qualified as estimates and flagged "J". Due to the lack of a duplicate analysis, all plutonium-238, uranium-234 and uranium-235 results were qualified as estimates and flagged "J". Due to a tracer recovery outside QC limits (18.8%), all plutonium results were qualified as estimates and flagged "J". Due to the lack of a tracer analysis, the neptunium-237 result was qualified as an estimate and flagged "J". Due to an LCS recovery outside QC limits, all neptunium-237 results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the FHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

FHI, Contract #20266, *Validation Statement of Work*, Fluor Hanford Incorporated, July 7, 2003.

DOE/RL-2003-44, Rev. 0, *BC Cribs and Trenches 200-TW-1 Operable Unit Borehole Sampling and Analysis Plan*, November 2003.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the FHI statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

Appendix 2

Summary of Data Qualification

RADIOCHEMISTRY DATA QUALIFICATION SUMMARY

SDG: 31684	REVIEWER: TLI	DATE: 5/18/04	PAGE_1_OF_1_
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Neptunium-237	J	All	Blank contamination
Neptunium-237	J	All	LCS recovery
Plutonium-238 Uranium-234 Uranium-235	J	All	No blank analysis
Plutonium-238 Uranium-234 Uranium-235	J	All	No duplicate analysis
Neptunium-237	J	All	No tracer analysis
Plutonium-238 Plutonium-239/240	J	All	Tracer recovery

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: FLUOR-HANFORD									
Laboratory: WSCF									
Case	SDG: WSCF20031684								
Sample Number		B183N2							
Remarks									
Sample Date		12/17/04							
Radiochemistry	TRQL	Result	Q	Result	Q	Result	Q	Result	Q
Neptunium-237	1	0.0230	J						
Americium-241	1	0.0410							
Antimony-125		-0.0177	U						
Cobalt-60	0.05	0.0693							
Cesium-134		0.0366	U						
Cesium-137	0.1	0.0510							
Europium 152	0.1	-0.0347	U						
Europium 154	0.1	0.00563	U						
Europium 155	0.1	0.0238	U						
Tin-126		0.167	U						
Plutonium-238	1	-0.0250	UJ						
Plutonium-239/240	1	0.0250	J						
Uranium-234	1	0.190	J						
Uranium-235	1	0.00620	J						
Uranium-238	1	0.160							

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* - TDL exceeded

Laboratory applied non-detect qualifiers "U" have been included in this table to minimize potential miss-interpretation of results. All other qualifiers shown were applied during validation.

WSCF
ANALYTICAL RESULTS REPORT

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

Group #: WSCF20031684

Sample #	Client ID		CAS #	Test Performed	Matrix	WSCF Method	RQ		Result	Unit	DF	MDL	Analyze	Sample	Receive
Radiochemistry															
W030001217	B183N2	GPP	13994-20-2	Neptunium-237	SOIL	LA-508-471	J		0.0230	pCi/g	1.00	0.014	01/12/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Np-237 by AEA Total Ctng Error	SOIL	LA-508-471		+-	0.020	pCi/g	1.00	0.0	01/12/04	12/17/03	12/18/03
W030001217	B183N2	GPP	14596-10-2	Americium-241	SOIL	LA-508-471			0.0410	pCi/g	1.00	8.5e-03	01/15/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Am-241 by AEA Total Cntg Error	SOIL	LA-508-471		+-	0.023	pCi/g	1.00	0.0	01/15/04	12/17/03	12/18/03
W030001217	B183N2	GPP	14234-35-6	Antimony-125	SOIL	LA-508-462	U		-0.0177	pCi/g	1.00	0.030	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Sb-125 Rel. Count Error (GEA)	SOIL	LA-508-462		+-	0.019	pCi/g	1.00	0.0	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	10198-40-0	Cobalt-60	SOIL	LA-508-462			0.0693	pCi/g	1.00	0.011	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Co-60 Rel. Count Error (GEA)	SOIL	LA-508-462		+-	0.015	pCi/g	1.00	0.0	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	13967-70-9	Cesium-134	SOIL	LA-508-462	U		0.0366	pCi/g	1.00	0.040	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Cs-134 Rel. Count Error (GEA)	SOIL	LA-508-462		+-	0.010	pCi/g	1.00	0.0	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	10045-97-3	Cesium-137	SOIL	LA-508-462			0.0510	pCi/g	1.00	0.012	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Cs-137 Rel. Count Error (GEA)	SOIL	LA-508-462		+-	0.012	pCi/g	1.00	0.0	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	14683-23-9	Europium-152	SOIL	LA-508-462	U		-0.0347	pCi/g	1.00	0.034	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Eu-152 Rel. Count Error (GEA)	SOIL	LA-508-462		+-	0.035	pCi/g	1.00	0.0	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	15585-10-1	Europium-154	SOIL	LA-508-462	U		5.63e-03	pCi/g	1.00	0.037	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Eu-154 Rel. Count Error (GEA)	SOIL	LA-508-462		+-	0.025	pCi/g	1.00	0.0	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	14391-16-3	Europium-155	SOIL	LA-508-462	U		0.0238	pCi/g	1.00	0.051	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Eu-155 Rel. Count Error (GEA)	SOIL	LA-508-462		+-	0.035	pCi/g	1.00	0.0	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	15832-50-5	Tin-126	SOIL	LA-508-462	U		0.167	pCi/g	1.00	0.20	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Sn-126 Rel. Count Error (GEA)	SOIL	LA-508-462		+-	0.039	pCi/g	1.00	0.0	01/07/04	12/17/03	12/18/03
W030001217	B183N2	GPP	13981-16-3	Plutonium-238	SOIL	LA-508-471	U J		-0.0250	pCi/g	1.00	0.16	01/15/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Pu-238 by AEA Total Cntg Error	SOIL	LA-508-471		+-	0.080	pCi/g	1.00	0.0	01/15/04	12/17/03	12/18/03
W030001217	B183N2	GPP	PU-239/240	Pu-239/240 by AEA	SOIL	LA-508-471	J		0.0250	pCi/g	1.00	0.022	01/15/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	Pu-239/240 AEA Total Cntg Err	SOIL	LA-508-471		+-	0.030	pCi/g	1.00	0.0	01/15/04	12/17/03	12/18/03
W030001217	B183N2	GPP	U-233/234	Uranium-233/234	SOIL	LA-508-471	J		0.190	pCi/g	1.00	0.025	01/16/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	U-233/234 AEA Total Cntg Error	SOIL	LA-508-471		+-	0.063	pCi/g	1.00	0.0	01/16/04	12/17/03	12/18/03

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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

5/15/04

WSCF
ANALYTICAL RESULTS REPORT

2-7

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

Group #: WSCF20031684

Sample #	Client ID		CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
W030001217	B183N2	GPP	15117-96-1	Uranium-235	SOIL	LA-508-471	J	6.20e-03	pCi/g	1.00	5.6e-03	01/16/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	U-235 by AEA Total Cntg Error	SOIL	LA-508-471		+- 7.4e-03	pCi/g	1.00	0.0	01/16/04	12/17/03	12/18/03
W030001217	B183N2	GPP	U-238	Uranium-238	SOIL	LA-508-471		0.160	pCi/g	1.00	0.014	01/16/04	12/17/03	12/18/03
W030001217	B183N2	GPP	E,T,C	U-238 by AEA Total Cntg Error	SOIL	LA-508-471		+- 0.054	pCi/g	1.00	0.10	01/16/04	12/17/03	12/18/03
W030001219	B183N5	GPP	13994-20-2	Neptunium-237	SOIL	LA-508-471	U	3.30e-03	pCi/g	1.00	0.014	01/12/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Np-237 by AEA Total Ctng Error	SOIL	LA-508-471		+- 7.9e-03	pCi/g	1.00	0.0	01/12/04	12/18/03	12/18/03
W030001219	B183N5	GPP	14596-10-2	Americium-241	SOIL	LA-508-471		0.0290	pCi/g	1.00	0.013	01/15/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Am-241 by AEA Total Cntg Error	SOIL	LA-508-471		+- 0.024	pCi/g	1.00	0.0	01/15/04	12/18/03	12/18/03
W030001219	B183N5	GPP	14234-35-6	Antimony-125	SOIL	LA-508-462	U	6.90e-04	pCi/g	1.00	0.034	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Sb-125 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 6.9e-03	pCi/g	1.00	0.0	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	10198-40-0	Cobalt-60	SOIL	LA-508-462	U	2.42e-03	pCi/g	1.00	0.014	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Co-60 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 8.2e-03	pCi/g	1.00	0.0	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	13967-70-9	Cesium-134	SOIL	LA-508-462	U	0.0274	pCi/g	1.00	0.030	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Cs-134 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.012	pCi/g	1.00	0.0	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	10045-97-3	Cesium-137	SOIL	LA-508-462		0.0133	pCi/g	1.00	0.014	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Cs-137 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 8.7e-03	pCi/g	1.00	0.0	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	14683-23-9	Europium-152	SOIL	LA-508-462	U	-7.34e-03	pCi/g	1.00	0.039	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Eu-152 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.026	pCi/g	1.00	0.0	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	15585-10-1	Europium-154	SOIL	LA-508-462	U	-0.0161	pCi/g	1.00	0.045	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Eu-154 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.027	pCi/g	1.00	0.0	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	14391-16-3	Europium-155	SOIL	LA-508-462	U	0.0477	pCi/g	1.00	0.058	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Eu-155 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.044	pCi/g	1.00	0.0	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	15832-50-5	Tin-126	SOIL	LA-508-462	U	0.183	pCi/g	1.00	0.20	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Sn-126 Rel. Count Error (GEA)	SOIL	LA-508-462		+- 0.044	pCi/g	1.00	0.0	01/07/04	12/18/03	12/18/03
W030001219	B183N5	GPP	13981-16-3	Plutonium-238	SOIL	LA-508-471	U	0.0480	pCi/g	1.00	0.067	01/15/04	12/18/03	12/18/03
W030001219	B183N5	GPP	E,T,C	Pu-238 by AEA Total Cntg Error	SOIL	LA-508-471		+- 0.046	pCi/g	1.00	0.0	01/15/04	12/18/03	12/18/03
W030001219	B183N5	GPP	PU-239/240	Pu-239/240 by AEA	SOIL	LA-508-471	U	4.00e-03	pCi/g	1.00	0.029	01/15/04	12/18/03	12/18/03

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

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Sample Delivery Group	**WSCF20031684**
Sample Matrix	**Soil**
Sample Visual	**Brown**
SAF Number	**F03-020**
Data Deliverable	**Summary Report**

Introduction

Two (2) soil samples (B183N2 and B183N5) from GPP were received at the WSCF Laboratory on December 18, 2003. The samples were 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 and ICP-AES Metals by EPA SW-846 Method 6010A. 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.

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- 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) 2-25 and 2-26 for QC details. Analytical Note: Estimated Chromium results due to low preparation Blank result and low LCS recovery. High Cadmium LCS recovery but no flag issued because sample results were not detectable. All other LCS recoveries are within manufacturers specifications.

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 2-24 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) 2-18 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) 2-27 and 2-28 for QC details. Analytical Note: B183N5 Chloride detected but at level less than lowest calibration standard.

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) 2-19 for QC details. Analytical Note: Potential sodium interference with Ammonium-N for B183N2.

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) 2-17 for QC details.

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) 2-29 through 2-33 for QC details. Analytical Note: The Duplicates for U, Pu, and Am high RPD's, but RPD does not apply to low level samples. The Np LCS recovery is low at 65.7%. 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 B183N2MS, B183N5MS and B183N2MSD with recoveries of 79.9%, 89.5% and

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91.3% respectively, limits for the spike are 75-125%.). All other QC was acceptable (the Np Duplicate RPD is high, but sample activity is below detection level) therefore no flags will be issued for Np. See page(s) 3-4, 3-5 and 3-6 for more detailed information on the Np issue.

Radiochemical Tracer Percent Recovery					
Sample Number	**Isotope**	**Blank**	**LCS**	**Sample**	**Duplicate**
B183N2	U	81.40%	86.78%	76.68%	85.80%
	Pu	71.85%	65.44%	18.80%	18.59%
	Am	85.42%	86.54%	45.34%	37.15%
B183N5	U	81.40%	86.78%	75.24%	N/A
	Pu	71.85%	65.44%	41.20%	N/A
	Am	85.42%	86.54%	30.65%	N/A

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

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Appendix 5

Data Validation Supporting Documentation

APPENDIX A

RADIOCHEMICAL DATA VALIDATION CHECKLIST

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 216-B-26			DATA PACKAGE: WSCF 20031684		
VALIDATOR: TCI		LAB: WSCF		DATE: 5/15/04	
CASE:			SDG: 1684		
ANALYSES PERFORMED					
Gross Alpha/Beta	Strontium-90	Technetium-99	Alpha Spectroscopy	Gamma Spectroscopy	
Total Uranium	Radium-22	Tritium			
SAMPLES/MATRIX					
B183N2					
					Soil

1. Completeness ..... ☒ N/A

Technical verification forms present? ..... Yes No N/A

Comments: _____

2. Initial Calibration (Levels D, E) ..... ☒ N/A

Instruments/detectors calibrated? ..... Yes No N/A

Initial calibration acceptable? ..... Yes No N/A

Standards NIST traceable? ..... Yes No N/A

Appendix A – Radiochemical Data Validation Checklist

Standards Expired? ..... Yes No N/A

Calculation check acceptable? ..... Yes No N/A

Comments: _____

3. Continuing Calibration (Levels D, E) ..... ☒ N/A

Calibration checked within required frequency? ..... Yes No N/A

Calibration check acceptable? ..... Yes No N/A

Calibration check standards traceable? ..... Yes No N/A

Calibration check standards expired? ..... Yes No N/A

Calculation check acceptable? ..... Yes No N/A

Comments: _____

4. Background Counts (Levels D, E) ..... ☒ N/A

Background Counts checked within required frequency? ..... Yes No N/A

Background Counts acceptable? ..... Yes No N/A

Calculation check acceptable? ..... Yes No N/A

Comments: _____

Appendix A – Radiochemical Data Validation Checklist

5. Blanks (Levels B, C, D, E) ..... ☐ N/A

Method blank analyzed within required frequency? ..... Yes No N/A

Method blank results acceptable? ..... Yes No N/A

Analytes detected in method blank? ..... Yes No N/A

Field blank(s) analyzed? ..... Yes No N/A

Field blank results acceptable? ..... Yes No N/A

Analytes detected in field blank(s)? ..... Yes No N/A

Transcription/Calculation Errors? (Levels D, E) ..... Yes No N/A

Comments: NP-237 – blank cont. – J

~~U235 blank cont.~~

No ~~U235~~ pu-238, U-234 or U235 blank – J all

NOFB

6. Laboratory Control Samples or Blank Spike Samples (Levels C, D, E) ..... ☐ N/A

LCS /BSS analyzed within required frequency? ..... Yes No N/A

LCS/BSS recoveries acceptable? ..... Yes No N/A

LCS/BSS traceable? (Levels D,E) ..... Yes No N/A

LCS/BSS expired? (Levels D,E) ..... Yes No N/A

LCS/BSS levels correct? (Levels D,E) ..... Yes No N/A

Transcription/Calculation Errors? (Levels D, E) ..... Yes No N/A

Comments: ~~U-234, U235 + U238 – LCS – J all~~ 5/10/05

~~NCP 237 – R (8.2%) am241 (12%) – R~~ PU239/40 – (12.7%) – R

Np237 6.6% – J all ~~Pu239~~ – R

7. Chemical Carrier Recovery (Levels C, D, E) ..... ☐ N/A

Chemical carrier added? ..... Yes No N/A

Chemical recovery acceptable? ..... Yes No N/A

Chemical carrier traceable? (Levels D, E) ..... Yes No N/A

Appendix A – Radiochemical Data Validation Checklist

Chemical carrier expired? (Levels D, E) ..... Yes No N/A

Transcription/Calculation errors? (Levels D, E) ..... Yes No N/A

Comments: _____

8. Tracer Recovery (Levels C, D, E) ..... ☐ N/A

Tracer added? ..... Yes No N/A

Tracer recovery acceptable? ..... Yes No N/A

Tracer traceable? (Levels D, E) ..... Yes No N/A

Tracer expired? (Levels D, E) ..... Yes No N/A

Transcription/Calculation errors? (Levels D, E) ..... Yes No N/A

Comments: plutonium 238, 239/40 – J all (18.87d)
NP-237 no tracer J all

9. Matrix Spikes (Levels C, D, E) ..... ☐ N/A

Matrix spike analyzed? ..... Yes No N/A

Spike recoveries acceptable? ..... Yes No N/A

Spike source traceable? (Levels D, E) ..... Yes No N/A

Spike source expired? Levels D, E) ..... Yes No N/A

Transcription/Calculation Errors? (Levels D, E) ..... Yes No N/A

Comments: _____

Appendix A – Radiochemical Data Validation Checklist

10. Duplicates (Levels C, D, E) ..... ☐ N/A

Duplicates Analyzed at required frequency? ..... Yes No N/A

RPD Values Acceptable? ..... Yes No N/A

Transcription/Calculation Errors? (Levels D, E) ..... Yes No N/A

Comments: pu238, U234 + U235 – No duplicate

11. Field QC Samples (Levels C, D E) ..... ☐ N/A

Field duplicate sample(s) analyzed? ..... Yes No N/A

Field duplicate RPD values acceptable? ..... Yes No N/A

Field split sample(s) analyzed? ..... Yes No N/A

Field split RPD values acceptable? ..... Yes No N/A

Performance audit sample(s) analyzed? ..... Yes No N/A

Performance audit sample results acceptable? ..... Yes No N/A

Comments:

12. Holding Times (All levels)

Are sample holding times acceptable? ..... Yes No N/A

Comments:

Appendix A – Radiochemical Data Validation Checklist

13. Results and Detection Limits (All Levels) ☐ N/A

Results reported for all required sample analyses? Yes No N/A

Results supported in raw data?(Levels D, E) Yes No N/A

Results Acceptable? (Levels D, E) Yes No N/A

Transcription/Calculation errors? (Levels D, E) Yes No N/A

MDA's meet required detection limits? Yes No N/A

Transcription/calculation errors? (Levels D, E) Yes No N/A

Comments: ~~(O ko/ [illegible]~~

Appendix 6

Additional Documentation Requested by Client

WSCF ANALYTICAL LABORATORY QC REPORT

2-32

SDG Number: WSCF20031684
Matrix: SOLID
Test: Plutonium Isotopics by AEA

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date: 12/18/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W030001217									
BATCH QC ASSOCIATED WITH SAMPLE									
DUP	Pu-239/240 by AEA	PU-239/240	8.9e-03	94.985	RPD	01/15/04	0.000	20.000	*
BATCH QC									
BLANK	Pu-239/240 by AEA	PU-239/240	2.0e-03	0.002	pCi/g	01/15/04	0.000	1000.000	
LCS	Pu-239/240 by AEA	PU-239/240	12.72	103.415	% Recov	01/18/04	75.000	125.000	

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WSCF ANALYTICAL LABORATORY QC REPORT

2 - 31

SDG Number: WSCF20031684
Matrix: SOLID
Test: Americium by AEA

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date:12/18/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W030001217									
BATCH QC ASSOCIATED WITH SAMPLE									
DUP	Americium-241	14596-10-2	9.4e-02	78.519	RPD	01/15/04	0.000	20.000	
BATCH QC									
BLANK	Americium-241	14596-10-2	5.2e-03	0.005	pCi/g	01/15/04	0.000	1000.000	
LCS	Americium-241	14596-10-2	12.25	93.156	% Recov	01/15/04	75.000	125.000	

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WSCF ANALYTICAL LABORATORY QC REPORT

2 - 30

SDG Number: WSCF20031684
Matrix: SOLID
Test: & Neptunium by AEA

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date: 12/18/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W030001217									
BATCH QC ASSOCIATED WITH SAMPLE									
DUP	Neptunium-237	13994-20-2	1.8e-03	170.968	RPD	01/12/04	0.000	25.000	
BATCH QC									
BLANK	Neptunium-237	13994-20-2	8.4e-03	0.008	pCi/g	01/11/04	0.000	1000.000	
LCS	Neptunium-237	13994-20-2	8.278	65.698	%Recove	01/11/04	75.000	125.000	

000027

WSCF ANALYTICAL LABORATORY QC REPORT

2-29

SDG Number: WSCF20031684
Matrix: SOLID
Test: Gamma Energy Analysis-grd H2O

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date:12/18/03

Lab ID: W030001217

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	5.98e-02	14.717	RPD	01/07/04	0.000	20.000	
DUP	Cesium-134	13967-70-9	U4.57e-02	n/a	RPD	01/07/04	0.000	20.000	
DUP	Cesium-137	10045-97-3	4.61e-02	10.093	RPD	01/07/04	0.000	20.000	
DUP	Europium-152	14683-23-9	U-2.2e-2	n/a	RPD	01/07/04	0.000	20.000	
DUP	Europium-154	15585-10-1	U-2.5e-3	n/a	RPD	01/07/04	0.000	20.000	
DUP	Europium-155	14391-16-3	U4.77e-2	n/a	RPD	01/07/04	0.000	20.000	
DUP	Antimony-125	14234-35-6	U-3.6e-4	n/a	RPD	01/07/04	0.000	20.000	
DUP	Tin-126	15832-50-5	U1.76e-01	n/a	RPD	01/07/04	0.000	20.000	

BATCH QC

BLANK	Cobalt-60	10198-40-0	U2.23e-3	n/a	pCi/g	01/07/04	-10000.000	1000.000	
BLANK	Cesium-134	13967-70-9	U2.07e-4	n/a	pCi/g	01/07/04	-10000.000	1000.000	
BLANK	Cesium-137	10045-97-3	U-9.5e-4	n/a	pCi/g	01/07/04	-10000.000	1000.000	
BLANK	Europium-152	14683-23-9	U-1.3e-3	n/a	pCi/g	01/07/04	-10000.000	1000.000	
BLANK	Europium-154	15585-10-1	U-1.4e-2	n/a	pCi/g	01/07/04	-10000.000	1000.000	
BLANK	Europium-155	14391-16-3	U-1.3e-3	n/a	pCi/g	01/07/04	-10000.000	1000.000	
BLANK	Antimony-125	14234-35-6	U2.99e-3	n/a	pCi/g	01/07/04	-10000.000	1000.000	
BLANK	Tin-126	15832-50-5	U-4.1e-3	n/a	pCi/g	01/07/04	-10000.000	1000.000	
LCS	Cobalt-60	10198-40-0	4.25e+03	101.432	% Recov	01/07/04	80.000	120.000	
LCS	Cesium-137	10045-97-3	3.70e+03	103.352	% Recov	01/07/04	80.000	120.000	

000028

WSCF ANALYTICAL LABORATORY QC REPORT

2-33

SDG Number: WSCF20031684
Matrix: SOLID
Test: Uranium Isotopics by AEA

SAF Number: F03-020
Sample Date: 12/17/03
Receive Date: 12/18/03

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W030001217									
BATCH QC ASSOCIATED WITH SAMPLE									
DUP	Uranium-238	U-238	1.2e-01	28.571	RPD	01/16/04	0.000	20.000	
BATCH QC									
BLANK	Uranium-238	24678-82-8	6.9e-03	0.007	pCi/g	01/16/04	0.000	1000.000	
LCS	Uranium-238	24678-82-8	36.88	97.283	% Recov	01/16/04	75.000	125.000	

000029

Date: 18 May 2004
To: Fluor Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 216-B-26 Characterization Sampling - Soil Sampling
Subject: Inorganics - Data Package No. WSCF20031684 (SDG No. 31684)

INTRODUCTION

This memo presents the results of data validation on Data Package No. 31684 prepared by WSCF. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B183N2	12/17/03	Soil	C	See note 1

1 - ICP metals by 200.8.

Data validation was conducted in accordance with the FHI validation statement of work and the BC Cribs and Trenches 200-TW-1 Operable Unit Borehole Sampling and Analysis Plan (DOE/RL-2003-44, Rev. 0). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. Additional Documentation Requested by Client

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DATA QUALITY PARAMETERS

- **Holding Times**

Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within 6 months for ICP metals.

All holding times were acceptable.

- **Preparation (Method) Blanks**

Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the contract required detection limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the instrument detection limit (IDL) and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

All preparation blank results were acceptable.

Field (Equipment) Blank

No field blanks were submitted for analysis.

- **Accuracy**

Matrix Spike & Matrix Spike Duplicate

Matrix spike (MS), matrix spike duplicate (MSD) and laboratory control sample (LCS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike is used to assess effect of the matrix on the ability to accurately quantify sample concentrations. Recoveries must fall within the range of 75% to 125% for matrix spike analysis. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 125% or less than 74% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 125% and a sample result less than the IDL, no qualification is required.

All MS/MSD results were acceptable.

Laboratory Control Sample

The LCS is used to monitor the overall performance of all steps in the analysis. Recoveries must fall within the range of 80% to 120% for LCS analysis. Samples

with a recovery of less than 50% are rejected and flagged "UR". Samples with a recovery of 50% to 79% and a sample recovery below the IDL are qualified "UJ". Samples with a recovery of greater than 120% or less than 80% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a recovery greater than 120% and a sample result less than the IDL, no qualification is required.

Due to an LCS recovery outside QC limits (69%), all chromium results were qualified as estimates and flagged "J".

All other LCS results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Analytical precision is expressed by the relative percent differences (RPD) between the recoveries of matrix spike and matrix spike duplicate (MSD) analyses performed on a sample in the analytical batch. Precision may alternatively be assessed using unspiked duplicate analyses performed on a sample in the analytical batch. If both sample and replicate activities (concentrations) are greater than five times the CRDL and the RPD is less than +/- 35%, no qualification is required. If either activity (concentration) is less than five times the CRDL, the RPD control limit is less than or equal to two times the CRDL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All laboratory duplicate results were acceptable.

Field Duplicate

No field duplicates were submitted for analysis.

- **Analytical Detection Limits**

Reported analytical detection levels are compared against the 200-TW-1 target required quanitiation limits (TRQLs) to ensure that laboratory detection levels meet the required criteria. The mercury, silver , lead, copper, chromium and cadmium were reported above the TRQL. Under the FHI statement of work, no qualification is required. All other undetected results met the analyte specific TRQL.

- **Completeness**

Data package No. 31684 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be

valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to an LCS recovery outside QC limits (69%), all chromium results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the FHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

FHI, Contract #20266, *Validation Statement of Work*, Fluor Hanford Incorporated, July 7, 2003.

DOE/RL-2003-44, Rev. 0, *BC Cribs and Trenches 200-TW-1 Operable Unit Borehole Sampling and Analysis Plan*, November 2003.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with FHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

INORGANIC DATA QUALIFICATION SUMMARY

SDG: 31684	REVIEWER: TLI	DATE: 5/18/04	PAGE_1_OF_1_
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Chromium	J	All	LCS

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: FLUOR HANFORD											
Laboratory: WSCF											
Case	SDG: WSCF20036184										
Sample Number		B183n2									
Remarks											
Sample Date		12/4/03									
Inorganics	TRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Cadmium	0.5	<0.957	U								
Chromium	1	<2.87	UJ								
Copper	2.5	<4.78	U								
Lead	1	<11.5	U								
Nickel	4	10.7									
Silver	0.5	<1.91	U								
Uranium	1	<0.957	U								
Mercury	0.2	<0.957	U								

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Laboratory applied non-detect qualifiers "U" have been included in this table to minimize miss-interpretation of results. All other qualifiers shown were applied during validation.

WSCF
ANALYTICAL RESULTS REPORT

2-4

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

Group #: WSCF20031684

Sample #	Client ID		CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
Inorganic														
W030001217	B183N2	GPP	57-12-5	Cyanide	SOIL	LA-695-402		2.14	mg/kg	1.00	0.20	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	NH4-N	Nitrogen in ammonium	SOIL	LA-503-401	E	5.13	mg/kg	49.00	0.20	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	TS	Total solids	SOIL	LA-519-412		94.6	%	1.00	0.0	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	PH	pH Measurement	SOIL	LA-212-411		8.23	pH	1.00	0.010	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	16984-48-8	Fluoride	SOIL	LA-533-410	U	< 1.13	mg/kg	49.00	1.1	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	16887-00-6	Chloride	SOIL	LA-533-410		24.4	mg/kg	49.00	2.5	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	NO2-N	Nitrogen in Nitrite	SOIL	LA-533-410	U	< 0.931	mg/kg	49.00	0.93	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	NO3-N	Nitrogen in Nitrate	SOIL	LA-533-410		924	mg/kg	1.97e+003	26	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	14265-44-2	Phosphate	SOIL	LA-533-410	U	< 2.65	mg/kg	49.00	2.6	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	14808-79-8	Sulfate	SOIL	LA-533-410		137	mg/kg	49.00	4.9	12/31/03	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-43-9	Cadmium	SOIL	LA-505-412	U	< 0.957	mg/kg	9.57	0.96	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-47-3	Chromium	SOIL	LA-505-412	EU J	< 2.87	mg/kg	9.57	2.9	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-50-8	Copper	SOIL	LA-505-412	U	< 4.78	mg/kg	9.57	4.8	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7439-92-1	Lead	SOIL	LA-505-412	U	< 11.5	mg/kg	9.57	12	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-02-0	Nickel	SOIL	LA-505-412		10.7	mg/kg	9.57	4.8	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-22-4	Silver	SOIL	LA-505-412	U	< 1.91	mg/kg	9.57	1.9	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7440-61-1	Uranium	SOIL	LA-505-412	U	< 0.957	mg/kg	9.57	0.96	01/10/04	12/17/03	12/18/03
W030001217	B183N2	GPP	7439-97-6	Mercury	SOIL	LA-505-412	U	< 0.957	mg/kg	9.57	0.96	01/10/04	12/17/03	12/18/03
W030001219	B183N5	GPP	57-12-5	Cyanide	SOIL	LA-695-402		0.260	mg/kg	1.00	0.20	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	NH4-N	Nitrogen in ammonium	SOIL	LA-503-401	U	< 0.192	mg/kg	48.00	0.19	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	TS	Total solids	SOIL	LA-519-412		97.3	%	1.00	0.0	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	PH	pH Measurement	SOIL	LA-212-411		8.47	pH	1.00	0.010	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	16984-48-8	Fluoride	SOIL	LA-533-410	U	< 1.10	mg/kg	48.00	1.1	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	16887-00-6	Chloride	SOIL	LA-533-410	B	2.68	mg/kg	48.00	2.5	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	NO2-N	Nitrogen in Nitrite	SOIL	LA-533-410	U	< 0.912	mg/kg	48.00	0.91	12/31/03	12/18/03	12/18/03
W030001219	B183N5	GPP	NO3-N	Nitrogen in Nitrate	SOIL	LA-533-410		41.8	mg/kg	48.00	0.62	12/31/03	12/18/03	12/18/03

6/27/04

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

5/13/04

DF=Dilution Factor

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

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Sample Delivery Group	**WSCF20031684**
Sample Matrix	**Soil**
Sample Visual	**Brown**
SAF Number	**F03-020**
Data Deliverable	**Summary Report**

Introduction

Two (2) soil samples (B183N2 and B183N5) from GPP were received at the WSCF Laboratory on December 18, 2003. The samples were 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 and ICP-AES Metals by EPA SW-846 Method 6010A. 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.

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3/31/04

- 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) 2-25 and 2-26 for QC details. Analytical Note: Estimated Chromium results due to low preparation Blank result and low LCS recovery. High Cadmium LCS recovery but no flag issued because sample results were not detectable. All other LCS recoveries are within manufacturers specifications.

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 2-24 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) 2-18 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) 2-27 and 2-28 for QC details. Analytical Note: B183N5 Chloride detected but at level less than lowest calibration standard.

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) 2-19 for QC details. Analytical Note: Potential sodium interference with Ammonium-N for B183N2.

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) 2-17 for QC details.

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) 2-29 through 2-33 for QC details. Analytical Note: The Duplicates for U, Pu, and Am high RPD's, but RPD does not apply to low level samples. The Np LCS recovery is low at 65.7%. 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 B183N2MS, B183N5MS and B183N2MSD with recoveries of 79.9%, 89.5% and

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91.3% respectively, limits for the spike are 75-125%.). All other QC was acceptable (the Np Duplicate RPD is high, but sample activity is below detection level) therefore no flags will be issued for Np. See page(s) 3-4, 3-5 and 3-6 for more detailed information on the Np issue.

Radiochemical Tracer Percent Recovery					
Sample Number	**Isotope**	**Blank**	**LCS**	**Sample**	**Duplicate**
B183N2	U	81.40%	86.78%	76.68%	85.80%
	Pu	71.85%	65.44%	18.80%	18.59%
	Am	85.42%	86.54%	45.34%	37.15%
B183N5	U	81.40%	86.78%	75.24%	N/A
	Pu	71.85%	65.44%	41.20%	N/A
	Am	85.42%	86.54%	30.65%	N/A

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

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FLUOR Hanford Inc.	CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-020-020	Page 1 of 1

Collector Pope/Hughes/Pfister	Company Contact Steve Trent	Telephone No. 373-5869	Project Coordinator TRENT, SJ
Project Designation 216-B-26 Characterization Sampling - Soil Sampling	Sampling Location C3245 (97.5-100 ft)		SAF No. F03-020
Ice Chest No.	Field Logbook No. HNF-N-351(0-1	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

Price Code ~~8N~~ 8H | Air Quality ☐ | Data Turnaround ~~45 Days~~ 30 DAYS

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~~		

~~[illegible]~~ 20031684

Sample No.	Matrix *	Sample Date	Sample Time	(1)	(2)	(3)	(4)	Activity Scan
B183N2 W030001217	SOIL	12/17/03	1219	X	X	X	X	

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By/Removed From JS Pope/[illegible]	12/18/03 1245	Received By/Stored In [illegible]	12/18/03 1245
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~~
Unable to do TOC, customer notified 12-18-03

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)

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Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

ALIDATION LEVEL:	A	B	C	D	E
PROJECT: 216-B-24			DATA PACKAGE: WSCF20031684		
VALIDATOR: TCI		LAB: WSCF		DATE: 5/11/05	
CASE:			SDG: 31684		
ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide		
SAMPLES/MATRIX					
B183N2					
					Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? ..... Yes No N/A

Comments:

2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)

Initial calibrations performed on all instruments? ..... Yes No N/A

Initial calibrations acceptable? ..... Yes No N/A

ICP interference checks acceptable? ..... Yes No N/A

ICV and CCV checks performed on all instruments? ..... Yes No N/A

ICV and CCV checks acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

Calculation check acceptable? ..... Yes No N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. BLANKS (Levels B, C, D, and E)

ICB and CCB checks performed for all applicable analyses? (Levels D, E) ..... Yes No N/A

ICB and CCB results acceptable? (Levels D, E) ..... Yes No N/A

Laboratory blanks analyzed? ..... Yes No N/A

Laboratory blank results acceptable? ..... Yes No N/A

Field blanks analyzed? (Levels C, D, E) ..... Yes No N/A

Field blank results acceptable? (Levels C, D, E) ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: NO FB

4. ACCURACY (Levels C, D, and E)

MS/MSD samples analyzed? ..... Yes No N/A

MS/MSD results acceptable? ..... Yes No N/A

MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A

MS/MSD standards expired? (Levels D, E) ..... Yes No N/A

LCS/BSS samples analyzed? ..... Yes No N/A

LCS/BSS results acceptable? ..... Yes No N/A

Standards traceable? (Levels D, E) ..... Yes No N/A

Standards expired? (Levels D, E) ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Performance audit sample(s) analyzed? ..... Yes No N/A

Performance audit sample results acceptable? ..... Yes No N/A

Comments: NO PAS

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

5. PRECISION (Levels C, D, and E)

Duplicate RPD values acceptable? ..... Yes No N/A

Duplicate results acceptable? ..... Yes No N/A

MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A

MS/MSD standards expired? (Levels D, E) ..... Yes No N/A

Field duplicate RPD values acceptable? ..... Yes No N/A

Field split RPD values acceptable? ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: _____

6. ICP QUALITY CONTROL (Levels D and E)

ICP serial dilution samples analyzed? ..... Yes No N/A

ICP serial dilution %D values acceptable? ..... Yes No N/A

ICP post digestion spike required? ..... Yes No N/A

ICP post digestion spike values acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

Transcription/calculation errors? ..... Yes No N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

7. FURNACE AA QUALITY CONTROL (Levels D and E)

Duplicate injections performed as required? ..... Yes No N/A

Duplicate injection %RSD values acceptable? ..... Yes No N/A

Analytical spikes performed as required? ..... Yes No N/A

Analytical spike recoveries acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

MSA performed as required? ..... Yes No N/A

MSA results acceptable? ..... Yes No N/A

Transcription/calculation errors? ..... Yes No N/A

Comments: _____

8. HOLDING TIMES (all levels)

Samples properly preserved? ..... Yes No N/A

Sample holding times acceptable? ..... Yes No N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

9. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

Results reported for all requested analyses? ..... Yes No N/A

Rresults supported in the raw data? (Levels D, E) ..... Yes No N/A

Samples properly prepared? (Levels D, E) ..... Yes No N/A

Detection limits meet RDL? ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: all but nickel + uranium ok

Appendix 6

Additional Documentation Requested by Client

WSCF ANALYTICAL LABORATORY QC REPORT

000031
2-25

SDG Number: WSCF20031684
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	

000024

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: WSCF20031684
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	

000032

2-26

000025