

ORP-114 (02/02)		ORP - REVIEW COMMENT RECORD (RCR)		1. Date March 31, 2005	2. Review No. N/A
				3. Project No. 200-LW-1 & 2	4. Page 1 of 1
5. Document Number(s)/Title(s) Data Package SDG 41462		6. Program/Project/Building Number GRP/200-LW-1 & 2, Characterization - soil		7. Reviewer Bill Thackaberry	8. Organization/Group Env & Science Assurance (QA)
				9. Location/Phone E6-35 372-0742	
17. Comment Submittal Approval		10. Agreement with indicated comment/disposition(s)		11. CLOSED	
Organization Manager (optional)		<i>Bill Thackaberry</i> Reviewer/Point of Contact 4/14/05 Date Requester		<i>Bill Thackaberry</i> Reviewer/Point of Contact 4/14/05 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	Volatiles, Pg 25, The sample number(B191F3) is not shown in the sample/matrix section.		<i>can K</i>	✓	
2	PCBs pg 23, an erroneous sample number is shown in the sample/matrix section.		<i>can</i>	✓	
3	Inorganics, pg 23, an erroneous sample number is shown in the sample/matrix section.		<i>can M</i>	✓	
	radiochemistry, Semivolatiles, wet chemistry - No comment				

**RECEIVED**  
 OCT 27 2005  
**EDMC**

0067325

## REVIEW COMMENT RECORD (RCR)

1. Date 04/05/05

2. Review No.

3. Project No.

4. Page 1 of 1

200-LW-1/LW-2

 5. Document Number(s)/Title(s)  
 Validation Package for SDG WSCF20041462

 6. Program/Project/Building Number  
 Borehole Soil Sampling

 7. Reviewer  
 RL Weiss

 8. Organization/Group  
 ERC - S&DM

 9. Location/Phone  
 Sigma 1  
 372-9631

17. Comment Submittal Approval:

Organization Manager (Optional)

10. Agreement with indicated comment disposition(s)

04/05/2005

Date

R. L. Weiss

Reviewer/Point of Contract

R. L. Weiss

Author/Originator

11. Closed

4-15-05

Date

Reviewer/Point of Contact

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	PCB & Rad - No Comments.			OK ALL 4-15-05
2	Wet Chemistry, Page 10; Fluoride result should be <-1.15.		Concur	OK ALL 4-15-05
3	Inorganic, Page 1; Metals analysis method is ICP 6010B and ICP/MS 200.8.		Concur	OK ALL 4-15-05
4	Inorganic, Page 10; Values shown do not match values on page 11.		Concur	OK ALL 4-15-05
5	Inorganic, Pages 3, 4, 10 & 27; If Hg value on page 11 is correct, then Hg (detect) does not fail CRDL evaluation.		Mercury was not concurred change and	OK ALL 4-15-05
6	Volatile, Pages 4 & 28; Acetone meets CRDL evaluation, text should state "analytes except TPH-G and Acetone".		Concur	OK ALL 4-15-05
7	Volatile, Page 25; Need the sample number on the form.		Concur	OK ALL 4-15-05
8	Semivolatile, No lab report page for Diesel and Kerosene results.		Concur	OK ALL 4-15-05

F02-025

Date: 28 March 2005  
To: Fluor Hanford Inc. (technical representative)  
From: TechLaw, Inc.  
Project: 200-LW-1/LW-2 Characterization - Soil  
Subject: Wet Chemistry - Data Package No. WSCF20041462 (SDG No. 41462)

**INTRODUCTION**

This memo presents the results of data validation on Data Package No. 41462 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
B191F3	8/18/04	Soil	C	See note 1 & 2

- 1 - Anions by 300.0, ammonia by 300.7, cyanide by 335.2 and pH by 150.1
- 2 - Nitrate, nitrite and phosphate not validated or reported per FHI.

Data validation was conducted in accordance with the FHI validation statement of work and the 200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan (DOE/RL-2001-66, Draft A, Redline, May 2002). 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



**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".

000001

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.

All 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.

Due to MS and MSD recoveries outside QC limits (67.2% and 64.5%), the cyanide result was qualified as an estimate and flagged "J".

All other 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

000002

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.

All 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 required target quantitation limits (RTQLs) to ensure that laboratory detection levels meet the required criteria. All results met the RTQL.

- **Completeness**

Data package No. 41462 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%.

000003

## **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 MS and MSD recoveries outside QC limits (67.2% and 64.5%), the cyanide result was qualified as an estimate 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-2001-66, Draft A, Redline, *200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan*, May 2002.

**Appendix 1**

**Glossary of Data Reporting Qualifiers**

**000.005**

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).

000006

**Appendix 2**

**Summary of Data Qualification**

**000007**

**WET CHEMISTRY DATA QUALIFICATION SUMMARY\***

SDG: 41462	REVIEWER: TLI	DATE: 3/28/05	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Cyanide	J	All	MS and MSD recovery
pH	J	All	Holding time

\* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

000008

**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

**000009**

Project: FLUOR-HANFORD					
Laboratory: WSCF					
Case		SDG: WSCF20041462			
Sample Number		B191F3			
Remarks					
Sample Date		8/18/04			
General Chemistry	RTQ	Result	Q	Result	Q
Chloride	2	15.7			
Fluoride	5	<1.15	U		
Sulfate	5	10.2			
Ammonia	0.5	<0.200			
Cyanide	0.5	<0.200	UJ		
pH**		9.35	J		

\* - RTQL exceeded  
 \*\* - Units are pH units

000010

# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent  
Project: F03-025: F03-025

Group #: WSCF20041462

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
<b>Inorganic</b>													
WO40001537	B191F3	TRENT	57-12-5	Cyanide	SOIL	LA-695-402	EU J < 0.200	mg/kg	1.00	0.20	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	NH4-N	Nitrogen in ammonium	SOIL	LA-503-401	U < 0.200	mg/kg	50.00	0.20	08/30/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	TS	Total solids	SOIL	LA-519-412	93.7	%	1.00	0.0	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	PH	pH Measurement	SOIL	LA-212-411	J 9.35	pH	1.00	0.010	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	18984-48-8	Fluoride	SOIL	LA-533-410	U < 1.15	mg/kg	50.00	1.2	09/03/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	18887-00-6	Chloride	SOIL	LA-533-410	15.7	mg/kg	50.00	2.6	09/03/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	NO2-N	Nitrogen in Nitrite	SOIL	LA-533-410	U < 0.950	mg/kg	50.00	0.95	09/03/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	NO3-N	Nitrogen in Nitrate	SOIL	LA-533-410	B 3.48	mg/kg	50.00	0.65	09/03/04	08/18/04	08/24/04
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>14266-44-2</del>	<del>Phosphate</del>	<del>SOIL</del>	<del>LA-533-410</del>	<del>U &lt; 2.70</del>	<del>mg/kg</del>	<del>50.00</del>	<del>2.7</del>	<del>09/03/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>14806-79-8</del>	<del>Sulfate</del>	<del>SOIL</del>	<del>LA-533-410</del>	<del>B 10.2</del>	<del>mg/kg</del>	<del>50.00</del>	<del>5.0</del>	<del>09/03/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-89-9</del>	<del>Bismuth</del>	<del>SOIL</del>	<del>LA-506-411</del>	<del>U &lt; 5.00</del>	<del>mg/kg</del>	<del>1.00</del>	<del>5.0</del>	<del>09/07/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-02-0</del>	<del>Nickel</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>10.0</del>	<del>mg/kg</del>	<del>9.65</del>	<del>4.8</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-22-4</del>	<del>Silver</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>U &lt; 1.93</del>	<del>mg/kg</del>	<del>9.65</del>	<del>1.9</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-36-0</del>	<del>Antimony</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>U &lt; 4.82</del>	<del>mg/kg</del>	<del>9.65</del>	<del>4.8</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-39-8</del>	<del>Barium</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>136</del>	<del>mg/kg</del>	<del>9.65</del>	<del>1.9</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-41-7</del>	<del>Beryllium</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>U &lt; 2.90</del>	<del>mg/kg</del>	<del>9.65</del>	<del>2.9</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-43-9</del>	<del>Cadmium</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>U &lt; 0.965</del>	<del>mg/kg</del>	<del>9.65</del>	<del>0.96</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-47-3</del>	<del>Chromium</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>14.8</del>	<del>mg/kg</del>	<del>9.65</del>	<del>2.9</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-50-8</del>	<del>Copper</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>29.1</del>	<del>mg/kg</del>	<del>9.65</del>	<del>4.8</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7439-92-1</del>	<del>Lead</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>U &lt; 11.6</del>	<del>mg/kg</del>	<del>9.65</del>	<del>12</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7439-97-6</del>	<del>Mercury</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>1.80</del>	<del>mg/kg</del>	<del>9.65</del>	<del>0.96</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-61-1</del>	<del>Uranium</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>852</del>	<del>mg/kg</del>	<del>9.65</del>	<del>0.96</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7440-38-2</del>	<del>Arsenic</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>5.65</del>	<del>mg/kg</del>	<del>9.65</del>	<del>2.9</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
<del>WO40001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>7782-49-2</del>	<del>Selenium</del>	<del>SOIL</del>	<del>LA-505-412</del>	<del>U &lt; 2.90</del>	<del>mg/kg</del>	<del>9.65</del>	<del>2.9</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>

000011

*3/25/05*

*3/25/05*

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  
X - Other flags and notes described in the comments/narrative.

DF = Dilution Factor

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

Report WGPP/ver. 1

Groundwater Remediation Program

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**000012**

<b>Sample Delivery Group</b>	<b>WSCF20041462, Rev. 3</b>
<b>Sample Matrix</b>	<b>Soil</b>
<b>Sample Visual</b>	<b>N/A</b>
<b>SAF Number</b>	<b>F03-025</b>
<b>Data Deliverable</b>	<b>Summary Report</b>

### **Introduction**

One (1) 100-LW-1/LW-2 Characterization – Soil, 32.5' to 35', sample (B191F3) was received at the WSCF Laboratory on August 24, 2004. The sample was analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Groundwater Remediation Program – Letter of Instruction*, referenced in the cover letter.

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

### **Analytical Methodology for Requested Analyses**

- ICP-MS Metals by EPA Method 200.8. Analytical work was performed with no deviations to the approved method.
- Alcohols/Glycols by EPA Method 8015. Analytical work was performed with no deviations to the approved method.
- ICP-AES Metals by EPA Method 6010. Analytical work was performed with no deviations to the approved method.
- Anions by EPA Method 300. Analytical work was performed with no deviations to the approved method.
- PCB by EPA Method 8082. Analytical work was performed with no deviations to the approved method.
- Semi-VOA by EPA Method 8270. Analytical work was performed with no deviations to the approved method.
- TPH Diesel Range by WDOE Method NWTPH-Dx. Analytical work was performed with no deviations to the approved method.

- TPH Gas Range by WDOE Method NWTHPH-Gx. Analytical work was performed with no deviations to the approved method.
- VOA by EPA Method 8260A. Analytical work was performed with no deviations to the approved method.
- Cyanide by EPA Method 335.2. Analytical work was performed with no deviations to the approved method.
- pH by EPA Method 150.1. Analytical work was performed with no deviations to the approved method.
- Ammonia by EPA Method 300.7. 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.
- All RadChem analyses (AEA (Americium, Uranium and Plutonium), GEA) except Neptunium-237 were run by internal WDOE accredited WSCF procedures. Analytical work was performed with no deviations to the approved method.

### Comments

**General Comments** – The sample was sampled on 8/18/04, 11:25 and received by WSCF laboratory on 8/24/04 9:42. All holding times were met.

**ICP-MS Metals** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-15 through 2-20 for QC details. Analytical Note:

- A matrix/matrix spike duplicate samples were not analyzed on B191F3. B191F0 (SDG# 20041392), B191F2 (SDG# 20041748) and B190V5 (SDG#20041417) GRP samples were spiked. Cadmium matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Alcohols/Glycols**- The hold time for this analysis was met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-35 for QC details. Analytical Notes:

- Sample results are moisture corrected and reported on dry weight basis.
- 2-Bromoethanol (surrogate) – duplicate relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate recoveries were within established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**ICP-AES Metals (Bismuth only)** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-28 for QC details. All QC controls are within the established limits.

**Anions** - The hold times for this analysis were met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See pages 2-23 through 2-24 for QC details. Analytical Notes:

- Nitrate - the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.
- Phosphate – the matrix spike recovery was below established laboratory limits. The matrix spike duplicate recovery was within limits. Sample result was less than the detection limit and not flagged.
- Sulfate Duplicate Relative Percent Difference exceeded established laboratory limits. The RPD criterion did not apply since the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.

All other QC controls are within the established limits.

**PCB** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-26 through 2-27 for QC details. Analytical Notes:

- Decachlorobiphenyl (surrogate) spike relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate were within established limits, the sample result was not flagged.
- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**Semi-VOA** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-30 through 2-34 for QC details. Analytical Notes:

- Preparation Date: 30-august-2004.
- Pentachlorophenol laboratory control sample recovery was below established laboratory limits.
- Pentachlorophenol - matrix/matrix spike duplicate samples were not analyzed on B191F3. B17N67 (SDG# 20041457) and B191F5 (SDG#20041476) GRP samples were

spiked and the Pentachlorophenol matrix spike and/or matrix spike duplicate recoveries were below established laboratory limits. B191F3 sample result was below the detection limit and not flagged.

- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**TPH Diesel Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-25 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**TPH Gasoline Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-39 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**VOA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-36 through 2-38 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**Cyanide** - The hold time for this analysis was met. A Blank, Preparation Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-21 for QC details. Analytical Note:

- Matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Ammonia** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-22 for QC details. All QC controls are within the established limits.

**Percent Solids** - Analyzed for organic analyses moisture correction only.

**pH** - The hold time for this analysis was met. All laboratory controls were within established limits.

**RadChem** - There are no hold times associated with these WDOE accredited methods. A Blank, Laboratory Control Sample and Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page(s) 2-29, 2-40, 2-41, 2-42 and 2-43 for QC details.

Analytical Notes:

- Americium-241 - the duplicate relative percent difference exceeded established laboratory limits. All other QC controls were within limits; sample result was not flagged.
- Uranium-234, Uranium-235 and Plutonium-238 Additional Batch QC Data for Group 20042230:

<b>Radiochemical Isotopic Results</b>					
Batch ID	Associated Samples (Customer ID)	Lab Sample ID	QC Sample	Isotope	Result
23338			Blank U ISO	U-234	4.95e-01 pCi/g
				U-235	1.93e-02 pCi/g
	B191F3	W040001537	Duplicate U ISO on W040001537	U-234	2.39e+02 pCi/g (6.1%)
				U-235	1.42e+01 pCi/g (13%)
23337			Blank Pu ISO	Pu-238	1.70e-01 pCi/g
	B191F3	W040001537	Duplicate Pu ISO on W040001537	Pu-238	3.43e+00 pCi/g (27%)

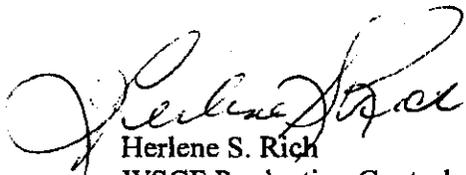
<b>Radiochemical Tracer Recovery</b>			
Sample Number	Lab Sample ID	Isotope	Tracer Recovery (Percent)
BLANK		Pu-242	78.7
LCS		Pu-242	83.2
B191F3	W040001537	Pu-242	76.1
DUPLICATE	W040001537	Pu-242	81.2

<b>Radiochemical Tracer Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Tracer Recovery (Percent)</b>
BLANK		Am-243	73.5
LCS		Am-243	78.1
B191F3	W040001537	Am-243	82.2
DUPLICATE	W040001537	Am-243	74.3
BLANK		U-232	82.1
LCS		U-232	75.4
B191F3	W040001537	U-232	34.2
DUPLICATE	W040001537	U-232	37.9

- Neptunium-237 – Spike (Np-237) recoveries for each sample are listed below. Laboratory control sample recovery was below established limits and may be attributed to a slight excess of ascorbic acid which occurs due to low iron levels in the matrix and causes retention of the Neptunium during separation. The solid matrix sample spike recoveries were within established laboratory limits. The duplicate relative percent difference exceeded established laboratory limits. Sample result was X (estimate) flagged.

<b>Radiochemical Matrix Spike Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Matrix Spike Recovery (Percent)</b>
LCS		Np-237	45.0
B191F3	W040001537	Np-237	93.5
DUPLICATE	W040001537	Np-237	104.0

All other QC controls are within the established limits.

  
Herlene S. Rich  
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

FLUOR Hanford Inc. 9/25

COLLECTOR: Pope/Moser/Wiberg/Tyr

COMPANY CONTACT: TRENT, STEVE

TELEPHONE NO.: 373-5669

PROJECT COORDINATOR: TRENT, SJ

PRICE CODE: 8N

DATA TURNOVER: 45 Days / 45 Days

SAMPLING LOCATION: 200-LIN-1/JIN-2 Characterization - Soil

PROJECT DESIGNATION: 200-LIN-1/JIN-2 Characterization - Soil

FIELD LOGBOOK NO.: HWF-N-395-1

COA: 119143ES10

METHOD OF SHIPMENT: Government Vehicle

ICE CHEST NO.:

BILL OF LADING/AIR BILL NO.:

SHIPMENT TO	Waste Sampling & Characterization	OPPOSITE PROPERTY NO.:	N/A
MATRIX*	None	Cool 4C	None
Av-Ale	60°	60°	60°
D1-Uran	3	1	1
Liquids	40mL	120mL	250mL
D5-Uran			
Solids			
L-Liquid			
O-Oil			
S-Solids			
Te-Therm			
Ve-Vegetation			
W-Water			
WT-Wraps			
X-Other			

Possible Sample Hazards/Remarks	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None
N/A		60°	60°	60°	60°	60°	60°	60°
		3	1	1	3	1	1	1
		40mL	120mL	120mL	40mL	300mL	250mL	120mL

Special Handling and/or Storage	Sample Date	Sample Time	See Item (1) in Special Instructions	See Item (2) in Special Instructions	See Item (3) in Special Instructions	See Item (4) in Special Instructions	See Item (5) in Special Instructions
N/A	8/18/04	1125	X	X	X	X	X

20041462

019143

SOIL

W040001537

CHAIN OF POSSESSION

RECEIVED BY/TITLED IN: R. P. FRIE 5-20 8/18/04 1200

RECEIVED BY/TITLED IN: R. P. FRIE 5-20 8/24/04 0920

RECEIVED BY/TITLED IN: R. P. FRIE 5-20 8/24/04 0942

RECEIVED BY/TITLED IN:

RECEIVED BY/TITLED IN:

RECEIVED BY/TITLED IN:

RECEIVED BY/TITLED IN:

LABORATORY SECTION

RECEIVED BY:

FINAL SAMPLE DISPOSITION

DISPOSAL METHOD:

DATE/TIME

DATE/TIME

DATE/TIME

DATE/TIME

DATE/TIME

DATE/TIME

000020

FLUOR Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		PG-025-095	PAGE 2 OF 2
COLLECTOR Popo/Tracy/Wieg/Tray	COMPANY CONTACT TRENT, STEVE	TELEPHONE NO. 373-5689	PROJECT COORDINATOR TRENT, SJ	PRICE CODE SN	DATA TURNOVER
SAMPLING LOCATION 216-S-20; 85-00-00-32-S-1-35'	PROJECT DESIGNATION 200-LW-1/LW-2 Characterization - Soil	COA 119143ES10	SAM NO. PG-025	AIR QUALITY <input type="checkbox"/>	45 Days
ICE CHEST NO.	FIELD LOGBOOK NO. HWF-N-338 1		METHOD OF SHIPMENT Government Vehicle		
SHIPPED TO Waste Sampling & Characterization	OFFSITE PROPERTY NO. N/A		BILL OF LADING/AIR BILL NO. N/A		

**SPECIAL INSTRUCTIONS**

The lab is to analyze pH within 24 hours of sample receipt. The lab is to report benzene range organics from the WTPH-D analysis. FH acknowledges that the analytical holding time for Nitrate, Nitrite and Phosphate by EPA Method 300.0 will not be met.

(1) VOA - 8260A (TCL); VOA - 8260A (Add-On) (1-8260A)  
 (2) Semi-VOA - 8270A (TCL) (Phenol) Semi-VOA - 8270A (Add-On) (Tributyl phosphate) THH-Diesel Range - WTPH-D (Total petroleum hydrocarbons - diesel range, Total petroleum hydrocarbons - benzene range) THH-Gasoline Range - WTPH-G  
 (3) Metals, Glycols, & Ketones - 8015 (Ethylene glycol)  
 (4) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155) Gamma Spec - Add-on (Polymethylene Glycol) Isotopic (Strontium, Isotopic Uranium; Neobutyl-237; Americium-241); (5) COPMS - 200.8 (TAL) (Vanadium, Barium, Cadmium, Chromium, Copper, Nickel, Silver) IC/MS - 200.8 (Add-on) (Arsenic, Beryllium, Lead, Mercury, Selenium, Uranium) ICP Metals - 6010A (Add-on) (Elemental)  
 (6) 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;

7/10/84-4-04

A-000-6110000

**Appendix 5**

**Data Validation Supporting Documentation**

**GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	200-LW-1/LW-2		DATA PACKAGE: WSCF20041462		
VALIDATOR:	TLI	LAB:	WSCF	DATE:	3/13/05
		SDG:	41462		
ANALYSES PERFORMED					
Anions/IC	TOC	TOX	TPH-418.1	Oil and Grease	Alkalinity
Ammonia	BOD/COD	Chloride	Chromium-VI	pH	NO <sub>3</sub> /NO <sub>2</sub>
Sulfate	TDS	TKN	Phosphate	Cyanide	
SAMPLES/MATRIX					
B191F3					
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 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)

Spike samples analyzed? ..... Yes No N/A  
Spike recoveries acceptable? ..... Yes No N/A  
Spike 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: Cyanide - 67+6470 MS/MSD - Jell  
phosphate - 6790 MS - Jell  
7/25/05  
NO PAT

**GENERAL CHEMISTRY 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. HOLDING TIMES (all levels)**

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST**

**7. RESULT QUANTITATION AND DETECTION LIMITS (all levels)**

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

**000027**

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: Anions by Ion Chromatography

SAF Number: F03-025  
 Sample Date: 08/18/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
---------	---------	-------	----------	----------	-------	---------------	-------------	-------------	----

### Lab ID: W040001537 BATCH QC ASSOCIATED WITH SAMPLE

DUP	Chloride	16887-00-6	1.06e+01	5.573	RPD	09/03/04	0.000	20.000	
DUP	Fluoride	16884-48-8	<1.15e0	n/a	RPD	09/03/04	0.000	20.000	U
DUP	Nitrogen in Nitrate	NO3-N	<8.50e-1	n/a	RPD	09/03/04	0.000	20.000	U
DUP	Nitrogen in Nitrate	NO3-N	3.44e+00	1.156	RPD	09/03/04	0.000	20.000	
DUP	Phosphate	14265-44-2	<2.70e0	n/a	RPD	09/03/04	0.000	20.000	U
DUP	Sulfate	14808-79-8	7.99e+00	24.288	RPD	09/03/04	0.000	20.000	
MS	Chloride	16887-00-6	8.34e-01	88.400	% Recov	09/03/04	75.000	125.000	
MS	Fluoride	16884-48-8	4.25e-01	88.032	% Recov	09/03/04	75.000	125.000	
MS	Nitrogen in Nitrate	NO3-N	4.41e-01	88.300	% Recov	09/03/04	75.000	125.000	
MS	Nitrogen in Nitrate	NO3-N	3.80e-01	84.257	% Recov	09/03/04	75.000	125.000	
MS	Phosphate	14265-44-2	8.50e-01	87.078	% Recov	09/03/04	75.000	125.000	
MS	Sulfate	14808-79-8	1.85e+00	92.500	% Recov	09/03/04	75.000	125.000	
MSD	Chloride	16887-00-6	9.95e-01	99.500	% Recov	09/03/04	75.000	125.000	
MSD	Fluoride	16884-48-8	4.51e-01	91.296	% Recov	09/03/04	75.000	125.000	
MSD	Nitrogen in Nitrate	NO3-N	4.87e-01	97.400	% Recov	09/03/04	75.000	125.000	
MSD	Nitrogen in Nitrate	NO3-N	4.11e-01	91.131	% Recov	09/03/04	75.000	125.000	
MSD	Phosphate	14265-44-2	7.34e-01	75.748	% Recov	09/03/04	75.000	125.000	
MSD	Sulfate	14808-79-8	2.08e+00	104.000	% Recov	09/03/04	75.000	125.000	

### BATCH QC

BLANK	Chloride	16887-00-6	<5.20e-2	n/a	mg/L	09/03/04	0.000	300.000	U
BLANK	Chloride	16887-00-6	<5.20e-2	n/a	mg/L	09/03/04	0.000	300.000	U
BLANK	Fluoride	16884-48-8	<2.30e-2	n/a	mg/L	09/03/04	0.000	300.000	U
BLANK	Fluoride	16884-48-8	<2.30e-2	n/a	mg/L	09/03/04	0.000	300.000	U
BLANK	Nitrogen in Nitrate	NO3-N	<1.90e-2	n/a	mg/L	09/03/04	0.000	300.000	U
BLANK	Nitrogen in Nitrate	NO3-N	<1.90e-2	n/a	mg/L	09/03/04	0.000	300.000	U

000028

# WSCF ANALYTICAL LABORATORY QC REPORT

SAF Number: F03-025  
 Sample Date:  
 Receive Date:

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: Anions by Ion Chromatography

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	09/03/04	0.000	300.000	U
BLANK	Nitrogen in Nitrate	NO3-N	<1.30e-2	n/a	mg/L	09/03/04	0.000	300.000	U
BLANK	Phosphate	14285-44-2	<5.40e-2	n/a	mg/L	09/03/04	0.000	300.000	U
BLANK	Phosphate	14285-44-2	<5.40e-2	n/a	mg/L	09/03/04	0.000	300.000	U
BLANK	Sulfate	14808-79-8	<1.00e-1	n/a	mg/L	09/03/04	0.000	300.000	U
BLANK	Sulfate	14808-79-8	<1.00e-1	n/a	mg/L	09/03/04	0.000	300.000	U
LCS	Chloride	16887-00-8	1.984 +02	99.000	% Recov	09/03/04	80.000	120.000	
LCS	Fluoride	18884-48-8	9.01e +01	91.287	% Recov	09/03/04	80.000	120.000	
LCS	Nitrogen in Nitrate	NO3-N	9.55e +01	95.500	% Recov	09/03/04	80.000	120.000	
LCS	Nitrogen in Nitrate	NO3-N	8.12e +01	80.122	% Recov	09/03/04	80.000	120.000	
LCS	Phosphate	14285-44-2	1.83e +02	94.427	% Recov	09/03/04	80.000	120.000	
LCS	Sulfate	14808-79-8	4.07e +02	102.005	% Recov	09/03/04	80.000	120.000	

000029

0000039

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: Ammonia (N) by IC

SAF Number: F03-025  
 Sample Date: 08/10/04  
 Receive Date: 08/10/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
---------	---------	-------	----------	----------	-------	---------------	-------------	-------------	----

Lab ID: W040001442  
**BATCH QC ASSOCIATED WITH SAMPLE**

DUP	Ammonia (N) by IC	7664-41-7	<2.00e-1	n/a	RPD	08/30/04	0.000	20.000	U
MS	Ammonia (N) by IC	7664-41-7	3.72e-01	90.281	% Recov	08/30/04	75.000	125.000	
MSD	Ammonia (N) by IC	7664-41-7	3.65e-01	88.592	% Recov	08/30/04	75.000	125.000	

**BATCH QC**

BLANK	Ammonia (N) by IC	7664-41-7	<4.00e-3	n/a	mg/L	08/30/04	0.000	30.000	U
BLANK	Ammonia (N) by IC	7664-41-7	<4.00e-3	n/a	mg/L	08/30/04	0.000	30.000	U
LCS	Ammonia (N) by IC	7664-41-7	8.73e+01	106.204	% Recov	08/30/04	80.000	120.000	

000030

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: Cyanide by Midi/Spectrophotom

SAF Number: F03-025  
 Sample Date: 08/18/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
---------	---------	-------	----------	----------	-------	---------------	-------------	-------------	----

Lab ID: W040001537  
**BATCH QC ASSOCIATED WITH SAMPLE**

MS	Cyanide by Midi/Spectrophotom	57-12-5	67.2	67.200	% Recov	09/01/04	75.000	125.000	*
MSD	Cyanide by Midi/Spectrophotom	57-12-5	64.5	64.500	% Recov	09/01/04	75.000	125.000	*
SPK-RPD	Cyanide by Midi/Spectrophotom	57-12-5	64.500	4.100	RPD	09/01/04	0.000	20.000	

**BATCH QC**

BLANK	Cyanide by Midi/Spectrophotom	57-12-5	1	1.000	ug/L	09/01/04	-4.000	4.000	
BLNK PREP	Cyanide by Midi/Spectrophotom	57-12-5	1	1.000	ug/L	09/01/04	-4.000	4.000	
LCS	Cyanide by Midi/Spectrophotom	57-12-5	97.1	97.100	% Recov	09/01/04	85.000	115.000	

000031



Date: 28 March 2005  
To: Fluor Hanford Inc. (technical representative)  
From: TechLaw, Inc.  
Project: 200-LW-1/LW-2 Characterization - Soil  
Subject: Volatiles - Data Package No. WSCF20041462 (SDG No. 41462)

## **INTRODUCTION**

This memo presents the results of data validation on Data Package No. 41462 prepared by WSCF. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

<b>Sample ID</b>	<b>Sample</b>	<b>Media</b>	<b>Validation</b>	<b>Analysis</b>
B191F3	8/18/04	Soil	C	See note 1

1 - Volatile by 8260 and TPH-G by NWTPH-G.

Data validation was conducted in accordance with the FHI validation statement of work and the 200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan (DOE/RL-2001-66, Draft A, Redline, May 2002). 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

## **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: Soil samples must be analyzed within 14 days of the date of sample collection.

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

**000001**

limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holing times were acceptable.

- **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 of a given matrix. 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 project quantitation limit (MDL) and is less than five times (or less than ten times for laboratory contaminants) the highest associated blank result, the sample result value is raised to the MDL, qualified as undetected and flagged "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 analyses are used to assess the analytical accuracy of the reported data. The matrix spike/matrix spike duplicate 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 the target compounds for which percent recoveries must be within 70-130%. 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 MS/MSD and blank spike results were acceptable.

000002

### Surrogate Recovery

The analysis of surrogate compounds provides a measure of system performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory program. When a surrogate compound recovery is out of the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Undetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Samples with surrogate recoveries less than ten percent are qualified as estimates and flagged "J" for detects, and rejected and flagged "UR" for nondetects. Undetected compounds with surrogate recoveries greater than the upper control limit require no qualification. Surrogates are not required for formaldehyde analysis.

Due to the lack of a surrogate analysis, all TPH-G results were qualified as estimates and flagged "J".

All other surrogate recovery results were acceptable.

- **Precision**

### Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate 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. Sample 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 sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. 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 duplicates were submitted for analysis.

000003

- **Detection Limits**

Reported analytical detection levels are compared against the required target quantitation limits (RTQLs) to ensure that laboratory detection levels meet the required criteria. All analytes except TPH-G and acetone exceeded the RTQL. Under the FHI statement of work, no qualification is required.

- **Completeness**

Data package No. 41462 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 lack of a surrogate analysis, all TPH-G 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.

All analytes except TPH-G and acetone exceeded the RTQL. Under the FHI statement of work, no qualification is required.

### **REFERENCES**

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

DOE/RL-2001-66, Draft A, Redline, *200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan*, May 2002.

000004

**Appendix 1**

**Glossary of Data Reporting Qualifiers**

**000005**

Qualifiers which may be applied by data validator in compliance with the BHI 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 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 ( i.e., usable for decision-making purposes).

000006

**Appendix 2**

**Summary of Data Qualification**

**000007**

VOLATILE DATA QUALIFICATION SUMMARY\*

SDG: 41462	REVIEWER: TLI	DATE: 3/28/05	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Gasoline	J	All	No surrogate analysis

\* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

000008

**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

**000009**

Project: FLUOR-HANFORD							
Laboratory: WSCF							
Case:		SDG: WSCF20041462					
Sample Number		B191F3					
Remarks							
Sample Date		8/18/04					
VOA/TPH-G	RTQL	Result	Q	Result	Q	Result	Q
1,1-Dichloroethene		<11.0	U				
Trichloroethene		<11.0	U				
Benzene	5	<11.0	U				
Toluene		<11.0	U				
Chlorobenzene	5	<11.0	U				
1,1-Dichloroethane	10	<11.0	U				
Ethylbenzene	5	<11.0	U				
Styrene		<11.0	U				
cis-1,3-Dichloropropene		<11.0	U				
trans-1,3-Dichloropropene		<11.0	U				
1,2-Dichloroethane	5	<11.0	U				
4-Methyl-2-pentanone		<11.0	U				
Dibromochloromethane		<11.0	U				
Tetrachloroethene		<11.0	U				
Xylenes (total)		<11.0	U				
1,2-Dichloroethene (total)		<11.0	U				
Carbon Tetrachloride	5	<11.0	U				
2-Hexanone		<11.0	U				
Acetone	20	<11.0	U				
Chloroform	5	<11.0	U				
1,1,1-Trichloroethane	5	<11.0	U				
Bromomethane		<11.0	U				
Chloromethane		<11.0	U				
Chloroethane		<11.0	U				
Vinyl Chloride		<11.0	U				
Methylene Chloride	5	<11.0	U				
Carbon Disulfide		<11.0	U				
Bromoform		<11.0	U				
Dibromochloromethane		<11.0	U				
1,2-Dichloropropane		<11.0	U				
2-Butanone		<11.0	U				
1,1,2-Trichloroethane	5	<11.0	U				
1,1,2,2-Tetrachloroethane		<11.0	U				
1-Butanol		<210	U				
TPH-G	5000	<2500	UJ				

000010

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

# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent  
Project: F03-025: F03-025

Group #: WSCF20041462

Sample #	Client ID	CAS #	Test Performed	Matrix	Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
<b>Organic</b>													
WO40001537	B191F3	TRENT	107-21-1 Ethylene glycol	SOIL	Organics	U	< 5.00e+03	ug/kg	1.00	5.0e+03	08/30/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	TPH GASOLINE Total Pet. Hydrocarbons Gas	SOIL	LA-523-443	U	< 2.50e+03	ug/kg	1.00	2.5e+03	08/31/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	12674-11-2 Aroclor-1010	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	11104-28-2 Aroclor-1221	SOIL	LA-523-427	U	< 100	ug/kg	1.00	1.0e+02	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	11141-16-5 Aroclor-1232	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	53489-21-9 Aroclor-1242	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	12672-29-6 Aroclor-1248	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	11067-89-1 Aroclor-1254	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	11096-82-6 Aroclor-1260	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	37324-23-5 Aroclor-1262	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	11100-14-4 Aroclor-1268	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	100-02-7 4-Nitrophenol	SOIL	LA-523-456	U	< 690	ug/kg	1.00	6.9e+02	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	106-46-7 1,4-Dichlorobenzene	SOIL	LA-523-456	U	< 330	ug/kg	1.00	3.3e+02	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	106-95-2 Phenol	SOIL	LA-523-456	U	< 110	ug/kg	1.00	1.1e+02	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	120-82-1 1,2,4-Trichlorobenzene	SOIL	LA-523-456	U	< 310	ug/kg	1.00	3.1e+02	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	121-14-2 2,4-Dinitrotoluene	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	129-00-0 Pyrene	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	59-50-7 4-Chloro-3-methylphenol	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	621-64-7 N-Nitrosodi-n-dipropylamine	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	83-32-9 Acenaphthene	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	87-86-5 Pentachlorophenol	SOIL	LA-523-456	U	< 320	ug/kg	1.00	3.2e+02	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	95-57-9 2-Chlorophenol	SOIL	LA-523-456	U	< 160	ug/kg	1.00	1.6e+02	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	124-73-8 Tributyl phosphate	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	75-35-4 1,1-Dichloroethene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	79-01-6 Trichloroethene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
WO40001537	B191F3	TRENT	71-43-2 Benzene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04

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

X - Other flags and notes described in the comments/narrative.

DF = Dilution Factor

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

Report WGRPP/ver. 1

Groundwater Remediation Program

*Handwritten:* K 3/25/07

000011

# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent  
Project: F03-025: F03-025

Group #: WSCF20041462

Sample #	Client ID	CAS #	Test Performed	Matrix	Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive	
W040001537	B191F3	TRENT	108-88-3	Toluene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	108-90-7	Chlorobenzene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	75-34-3	1,1-Dichloroethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	100-41-4	Ethylbenzene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	100-42-5	Styrene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	10061-01-5	cis-1,3-Dichloropropene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	10061-02-6	trans-1,3-Dichloropropene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	107-08-2	1,2-Dichloroethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	108-10-1	4-Methyl-2-Pentanone	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	124-48-1	Dibromochloromethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	127-18-4	Tetrachloroethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	1330-20-7	Xylenes (total)	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	540-59-0	1,2-Dichloroethane Total	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	56-23-5	Carbon tetrachloride	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	591-78-8	2-Hexanone	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	67-64-1	Acetone	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	67-68-3	Chloroform	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	71-55-6	1,1,1-Trichloroethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	74-83-9	Bromomethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	74-87-3	Chloromethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	75-00-3	Chloroethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	75-01-4	Vinyl chloride	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	75-09-2	Methylenechloride	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	75-15-0	Carbon disulfide	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	75-25-2	Bromoform	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	75-27-4	Bromodichloromethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	78-87-5	1,2-Dichloropropane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04

MDL=Minimum Detection Limit

RQ=Result Qualifier

DF=Dilution Factor

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

Report WGRP/ver. 1

Groundwater Remediation Program

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

X - Other flags and notes described in the comments/narrative.

*Handwritten signature/initials: K 3/25/05*

2-4

1111

# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent  
Project: F03-025: F03-025

Group #: WSCF20041462

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF		Result	Unit	DF	MDL	Analyze	Sample	Receive
					Method	RQ							
W040001537	B191F3 TRENT	78-93-3	2-Butanone	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3 TRENT	79-00-5	1,1,2-Trichloroethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3 TRENT	79-34-5	1,1,2,2-Tetrachloroethane	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3 TRENT	71-36-3	1-Butanol	SOIL	LA-523-455	U	< 210	ug/kg	1.00	2.1e+02	08/30/04	08/18/04	08/24/04
W040001537	B191F3 TRENT	TPHDIESEL	Total Pet. Hydrocarbons Diesel	SOIL	NWTPH	U	< 4.00e+03	ug/kg	1.00	4.0e+03	09/07/04	08/18/04	08/24/04
W040001537	B191F3 TRENT	TPHKEROSENE	Kerosene	SOIL	NWTPH	U	< 4.00e+03	ug/kg	1.00	4.0e+03	09/07/04	08/18/04	08/24/04

3/25/07

*[Handwritten signature]*  
3/25/07

000013

**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  
X - Other flags and notes described in the comments/narrative.

**DF=Dilution Factor**

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

Report WQPP/ver. 1

Groundwater Remediation Program

2-5

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**000014**

<b>Sample Delivery Group</b>	<b>WSCF20041462, Rev. 3</b>
<b>Sample Matrix</b>	<b>Soil</b>
<b>Sample Visual</b>	<b>N/A</b>
<b>SAF Number</b>	<b>F03-025</b>
<b>Data Deliverable</b>	<b>Summary Report</b>

**Introduction**

One (1) 100-LW-1/LW-2 Characterization – Soil, 32.5' to 35', sample (B191F3) was received at the WSCF Laboratory on August 24, 2004. The sample was analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Groundwater Remediation Program – Letter of Instruction*, referenced in the cover letter.

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

**Analytical Methodology for Requested Analyses**

- ICP-MS Metals by EPA Method 200.8. Analytical work was performed with no deviations to the approved method.
- Alcohols/Glycols by EPA Method 8015. Analytical work was performed with no deviations to the approved method.
- ICP-AES Metals by EPA Method 6010. Analytical work was performed with no deviations to the approved method.
- Anions by EPA Method 300. Analytical work was performed with no deviations to the approved method.
- PCB by EPA Method 8082. Analytical work was performed with no deviations to the approved method.
- Semi-VOA by EPA Method 8270. Analytical work was performed with no deviations to the approved method.
- TPH Diesel Range by WDOE Method NWTPH-Dx. Analytical work was performed with no deviations to the approved method.

- TPH Gas Range by WDOE Method NWTHPH-Gx. Analytical work was performed with no deviations to the approved method.
- VOA by EPA Method 8260A. Analytical work was performed with no deviations to the approved method.
- Cyanide by EPA Method 335.2. Analytical work was performed with no deviations to the approved method.
- pH by EPA Method 150.1. Analytical work was performed with no deviations to the approved method.
- Ammonia by EPA Method 300.7. 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.
- All RadChem analyses (AEA (Americium, Uranium and Plutonium), GEA) except Neptunium-237 were run by internal WDOE accredited WSCF procedures. Analytical work was performed with no deviations to the approved method.

### Comments

**General Comments** – The sample was sampled on 8/18/04, 11:25 and received by WSCF laboratory on 8/24/04 9:42. All holding times were met.

**ICP-MS Metals** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-15 through 2-20 for QC details. Analytical Note:

- A matrix/matrix spike duplicate samples were not analyzed on B191F3. B191F0 (SDG# 20041392), B191F2 (SDG# 20041748) and B190V5 (SDG#20041417) GRP samples were spiked. Cadmium matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Alcohols/Glycols**- The hold time for this analysis was met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-35 for QC details. Analytical Notes:

- Sample results are moisture corrected and reported on dry weight basis.
- 2-Bromoethanol (surrogate) – duplicate relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate recoveries were within established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**ICP-AES Metals (Bismuth only)** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-28 for QC details. All QC controls are within the established limits.

**Anions** - The hold times for this analysis were met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See pages 2-23 through 2-24 for QC details. Analytical Notes:

- Nitrate - the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.
- Phosphate – the matrix spike recovery was below established laboratory limits. The matrix spike duplicate recovery was within limits. Sample result was less than the detection limit and not flagged.
- Sulfate Duplicate Relative Percent Difference exceeded established laboratory limits. The RPD criterion did not apply since the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.

All other QC controls are within the established limits.

**PCB** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-26 through 2-27 for QC details. Analytical Notes:

- Decachlorobiphenyl (surrogate) spike relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate were within established limits, the sample result was not flagged.
- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**Semi-VOA** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-30 through 2-34 for QC details. Analytical Notes:

- Preparation Date: 30-august-2004.
- Pentachlorophenol laboratory control sample recovery was below established laboratory limits.
- Pentachlorophenol - matrix/matrix spike duplicate samples were not analyzed on B191F3. B17N67 (SDG# 20041457) and B191F5 (SDG#20041476) GRP samples were

spiked and the Pentachlorophenol matrix spike and/or matrix spike duplicate recoveries were below established laboratory limits. B191F3 sample result was below the detection limit and not flagged.

- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**TPH Diesel Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-25 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**TPH Gasoline Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-39 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**VOA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-36 through 2-38 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**Cyanide** - The hold time for this analysis was met. A Blank, Preparation Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-21 for QC details. Analytical Note:

- Matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Ammonia** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-22 for QC details. All QC controls are within the established limits.

**Percent Solids** - Analyzed for organic analyses moisture correction only.

**pH** - The hold time for this analysis was met. All laboratory controls were within established limits.

**RadChem** - There are no hold times associated with these WDOE accredited methods. A Blank, Laboratory Control Sample and Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page(s) 2-29, 2-40, 2-41, 2-42 and 2-43 for QC details.

Analytical Notes:

- Americium-241 - the duplicate relative percent difference exceeded established laboratory limits. All other QC controls were within limits; sample result was not flagged.
- Uranium-234, Uranium-235 and Plutonium-238 Additional Batch QC Data for Group 20042230:

<b>Radiochemical Isotopic Results</b>					
Batch ID	Associated Samples (Customer ID)	Lab Sample ID	QC Sample	Isotope	Result
23338			Blank U ISO	U-234	4.95e-01 pCi/g
				U-235	1.93e-02 pCi/g
	B191F3	W040001537	Duplicate U ISO on W040001537	U-234	2.39e+02 pCi/g (6.1%)
				U-235	1.42e+01 pCi/g (13%)
23337			Blank Pu ISO	Pu-238	1.70e-01 pCi/g
	B191F3	W040001537	Duplicate Pu ISO on W040001537	Pu-238	3.43e+00 pCi/g (27%)

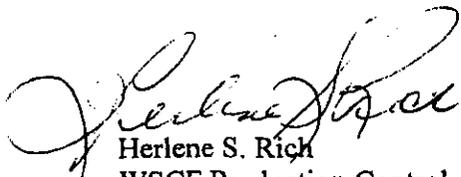
<b>Radiochemical Tracer Recovery</b>			
Sample Number	Lab Sample ID	Isotope	Tracer Recovery (Percent)
BLANK		Pu-242	78.7
LCS		Pu-242	83.2
B191F3	W040001537	Pu-242	76.1
DUPLICATE	W040001537	Pu-242	81.2

<b>Radiochemical Tracer Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Tracer Recovery (Percent)</b>
BLANK		Am-243	73.5
LCS		Am-243	78.1
B191F3	W040001537	Am-243	82.2
DUPLICATE	W040001537	Am-243	74.3
BLANK		U-232	82.1
LCS		U-232	75.4
B191F3	W040001537	U-232	34.2
DUPLICATE	W040001537	U-232	37.9

- Neptunium-237 – Spike (Np-237) recoveries for each sample are listed below. Laboratory control sample recovery was below established limits and may be attributed to a slight excess of ascorbic acid which occurs due to low iron levels in the matrix and causes retention of the Neptunium during separation. The solid matrix sample spike recoveries were within established laboratory limits. The duplicate relative percent difference exceeded established laboratory limits. Sample result was X (estimate) flagged.

<b>Radiochemical Matrix Spike Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Matrix Spike Recovery (Percent)</b>
LCS		Np-237	45.0
B191F3	W040001537	Np-237	93.5
DUPLICATE	W040001537	Np-237	104.0

All other QC controls are within the established limits.

  
Herlene S. Rich  
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



FLUOR Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		PGS-025-095	PAGE 2 OF 2
COLLECTOR Popo/Trisler/Wiberg/Tyre	COMPANY CONTACT TRENT, STEVE	TELEPHONE NO. 373-5689	PROJECT COORDINATOR TRENT, SJ	PRICE CODE SN	DATA TURNOAROUND
SAMPLING LOCATION 216-5-20; 28-48-25-28-32.5' - 35'	PROJECT DESIGNATION 200-LW-1/LW-2 Characterization - Soil		SAF NO. PGS-025	AIR QUALITY <input type="checkbox"/>	45 Days
ICE CHEST NO.	FIELD LOGBOOK NO. HNF-N-356 1	COA 119143ES10	METHOD OF SHIPMENT Government Vehicle		
SHIPPED TO Waste Sampling & Characterization	OPPOSITE PROPERTY NO. N/A		BILL OF LADING/AIR BILL NO. N/A		

**SPECIAL INSTRUCTIONS**

The lab is to analyze pH within 24 hours of sample receipt. The lab is to report kerene range organics from the WTH-D analysis. PH acknowledges that the analytical holding time for Nitrate, Nitrite and Phosphate by EPA Method 300.0 will not be met.

(1) VOA - 8260A (TOL); VOA - 8260A (Add-On) (1-Subtotal)  
 (2) Semi-VOA - 8270A (TOL) (Phenol) Semi-VOA - 8270A (Add-On) (Triethyl phosphine) THH-Diesel Range - WTH-D (Total petroleum hydrocarbons - diesel range, Total petroleum hydrocarbons - kerene range) THH-Gasoline Range - WTH-G  
 (3) Metals, Glycols, & Ketones - 8015 (Ethylene glycol)  
 (4) Metals Spectroscopy (Cadmium-112, Europium-152, Europium-157, Gamma Spec - Add-on-for-ethylene-glycol-249) Isotopic Phosphorus; Isotopic Uranium; Neptunium-237; Americium-241;  
 (5) ICP/MS - 200.8 (TAL) (Antimony, Barium, Calcium, Chromium, Copper, Nickel, Silver) ICP/MS - 200.8 (Add-on) (Arsenic, Beryllium, Lead, Mercury, Selenium, Uranium) ICP Metals - 6030A (Add-on) (Bismuth)  
 (6) C Anions - 300.0 (Chloride, Fluoride, Nitrogen in Nitrate, Phosphate, Sulfate) Cations (SC) - 300.7 (Nitrogen in ammonium) Cyanide (Total) - 335.2; pH (Soil) - 9045;

PHS-V-04

00000000000000000000

4-0000-01000000

**Appendix 5**

**Data Validation Supporting Documentation**



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 blank (Field)  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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 TPH-G Surrogate - I cell no Pat  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**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  
Internal 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? .....	<input checked="" type="radio"/> Yes	No	N/A
Results 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	<input checked="" type="radio"/> No	N/A
Transcription/calculation errors? (Levels D, E) .....	Yes	No	N/A

Comments: all but TPH-A run  
a acetone

---



---



---

**9. SAMPLE CLEANUP (Levels D and E)**

GPC cleanup performed? .....	Yes	No	N/A
GPC check performed? .....	Yes	No	N/A
GPC check recoveries acceptable? .....	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**

**000029**

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: VOA Ground Water Protection

SAF Number: F03-025  
 Sample Date: 08/18/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W040001537 BATCH QC ASSOCIATED WITH SAMPLE									
MS	1,1-Dichloroethene	75-35-4	281.80	106.000	% Recov	08/30/04	63.000	117.000	
MS	Benzene	71-43-2	293.90	110.000	% Recov	08/30/04	75.000	129.000	
MS	4-Bromofluorobenzene	480-00-4	528.50	99.000	% Recov	08/30/04	84.000	118.000	
MS	Chlorobenzene	108-90-7	297.40	111.000	% Recov	08/30/04	79.000	119.000	
MS	1,2-Dichloroethane-d4	17060-07-0	831.60	118.000	% Recov	08/30/04	82.000	136.000	
MS	Toluene-d8	2037-26-5	598.70	112.000	% Recov	08/30/04	89.000	119.000	
MS	Toluene	108-88-3	302.80	113.000	% Recov	08/30/04	76.000	120.000	
MS	Trichloroethene	79-01-6	290.00	109.000	% Recov	08/30/04	73.000	123.000	
MSD	1,1-Dichloroethene	75-35-4	285.10	107.000	% Recov	08/30/04	63.000	117.000	
MSD	Benzene	71-43-2	298.60	111.000	% Recov	08/30/04	75.000	129.000	
MSD	4-Bromofluorobenzene	480-00-4	538.10	101.000	% Recov	08/30/04	84.000	118.000	
MSD	Chlorobenzene	108-90-7	302.90	114.000	% Recov	08/30/04	79.000	119.000	
MSD	1,2-Dichloroethane-d4	17060-07-0	814.80	115.000	% Recov	08/30/04	82.000	136.000	
MSD	Toluene-d8	2037-26-5	595.00	112.000	% Recov	08/30/04	89.000	119.000	
MSD	Toluene	108-88-3	299.20	112.000	% Recov	08/30/04	76.000	120.000	
MSD	Trichloroethene	79-01-6	294.80	110.000	% Recov	08/30/04	73.000	123.000	
SPK-RPD	1,1-Dichloroethene	75-35-4	107.000	0.939	RPD	08/30/04	0.000	25.000	
SPK-RPD	Benzene	71-43-2	111.000	0.905	RPD	08/30/04	0.000	25.000	
SPK-RPD	4-Bromofluorobenzene	480-00-4	101.000	2.000	RPD	08/30/04	0.000	25.000	
SPK-RPD	Chlorobenzene	108-90-7	114.000	2.667	RPD	08/30/04	0.000	25.000	
SPK-RPD	1,2-Dichloroethane-d4	17060-07-0	115.000	2.675	RPD	08/30/04	0.000	25.000	
SPK-RPD	Toluene-d8	2037-26-5	112.000	0.000	RPD	08/30/04	0.000	25.000	
SPK-RPD	Toluene	108-88-3	112.000	0.889	RPD	08/30/04	0.000	25.000	
SPK-RPD	Trichloroethene	79-01-6	110.000	0.913	RPD	08/30/04	0.000	25.000	
SURR	4-Bromofluorobenzene	480-00-4	438.80	82.200	% Recov	08/30/04	71.000	125.000	
SURR	1,2-Dichloroethane-d4	17060-07-0	548.10	102.000	% Recov	08/30/04	80.000	134.000	

000030

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: VOA Ground Water Protection

SAF Number: F03-025  
 Sample Date: 08/18/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
SURR	Toluene-d8	2037-26-5	578.58	100.000	% Recov	08/30/04	80.000	120.000	
<b>BATCH QC</b>									
BLANK	1,1-Dichloroethane	75-34-3	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	1,1,1-Trichloroethane	71-55-6	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	1,1,2-Trichloroethane	79-00-5	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	1,1,2,2-Tetrachloroethane	79-34-5	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	1,1-Dichloroethene	75-35-4	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	1,2-Dichloroethane	107-06-2	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	1,2-Dichloroethane(Total)	540-59-0	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	1-Butanol	71-36-3	< 40	n/a	ug/Kg	08/30/04			U
BLANK	2-Hexanone	591-78-6	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	4-Methyl-2-Pentanone	108-10-1	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Acetone	67-64-1	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Dibromochloromethane	75-27-4	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Benzene	71-43-2	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	4-Bromofluorobenzene	490-00-4	49.000	98.200	% Recov	08/30/04	71.000	125.000	
BLANK	Bromoform	75-25-2	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Carbon disulfide	75-15-0	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Carbon tetrachloride	56-23-5	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Dibromochloromethane	124-48-1	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Chloroform	67-68-3	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Chlorobenzene	108-90-7	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	cis-1,3-Dichloropropene	10061-01-5	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Chloroethane	75-00-3	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	1,2-Dichloroethane-d4	17060-07-0	57.020	114.000	% Recov	08/30/04	80.000	134.000	
BLANK	1,2-Dichloropropane	78-87-5	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Ethylbenzene	100-41-4	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Bromomethane	74-83-9	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Chloromethane	74-87-3	< 2.0	n/a	ug/Kg	08/30/04			U

000031

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: VOA Ground Water Protection

SAF Number: F03-025  
 Sample Date:  
 Receive Date:

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
BLANK	2-Butanone	78-93-3	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Methylenechloride	75-09-2	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Tetrachloroethane	127-18-4	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Styrene	100-42-5	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Xylenes (total)	1330-20-7	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Toluene-d8	2037-26-5	54.290	109.000	% Recov	08/30/04	80.000	126.000	
BLANK	Toluene	106-98-3	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	trans-1,3-Dichloropropene	10061-02-6	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Trichloroethane	78-01-6	< 2.0	n/a	ug/Kg	08/30/04			U
BLANK	Vinyl chloride	75-01-4	< 2.0	n/a	ug/Kg	08/30/04			U
LCS	1,1-Dichloroethane	75-35-4	25.550	102.000	% Recov	08/30/04	70.000	130.000	
LCS	Benzene	71-43-2	27.860	111.000	% Recov	08/30/04	70.000	130.000	
LCS	4-Bromobromobenzene	800-00-4	50.010	109.000	% Recov	08/30/04	71.000	126.000	
LCS	Chlorobenzene	108-90-7	28.050	112.000	% Recov	08/30/04	70.000	130.000	
LCS	1,2-Dichloroethane-d4	17060-07-0	59.710	119.000	% Recov	08/30/04	80.000	134.000	
LCS	Toluene-d8	2037-26-5	56.150	112.000	% Recov	08/30/04	80.000	126.000	
LCS	Toluene	106-98-3	29.170	113.000	% Recov	08/30/04	70.000	130.000	
LCS	Trichloroethane	79-01-6	27.010	108.000	% Recov	08/30/04	70.000	130.000	

000032

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: NWTPH-GX TPH Gasoline Range

SAF Number: F03-025  
 Sample Date: 08/25/04  
 Receive Date: 08/25/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
<b>Lab ID: W040001540</b>									
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>									
DUP	Total Pet. Hydrocarbons Gas	TPHGASOLINE	<250	n/a	RPD	08/31/04	0.000	20.000	U
MS	Total Pet. Hydrocarbons Gas	TPHGASOLINE	8100	112.500	% Recov	08/31/04	50.000	150.000	
MSD	Total Pet. Hydrocarbons Gas	TPHGASOLINE	8200	113.889	% Recov	08/31/04	50.000	150.000	
SPK-RPD	Total Pet. Hydrocarbons Gas	TPHGASOLINE	113.889	1.227	RPD	08/31/04	0.000	20.000	
<b>BATCH QC</b>									
REANW	Total Pet. Hydrocarbons Gas	TPHGASOLINE	<250	n/a	mg/L	08/31/04	0.000	300.000	U
LCS	Total Pet. Hydrocarbons Gas	TPHGASOLINE	7500	108.896	% Recov	08/31/04	85.000	115.000	

000033



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.

Due to MS/MSD recoveries outside QC limits (52.2% and 53.8%), the pentachlorophenol result was qualified as an estimate and flagged "J".

000002

Due to an LCS recovery outside QC limits (50.7%), the pentachlorophenol result was qualified as an estimate and flagged "J".

All other 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 duplicates were submitted for analysis.

- **Analytical Detection Levels**

000003

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

- **Completeness**

Data package No. 41462 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 MS/MSD recoveries outside QC limits (52.2% and 53.8%), the pentachlorophenol result was qualified as an estimate and flagged "J". Due to an LCS recovery outside QC limits (50.7%), the pentachlorophenol result was qualified as an estimate 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-2001-66, Draft A, Redline, *200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan*, May 2002.

000004

**Appendix 1**

**Glossary of Data Reporting Qualifiers**

**000005**

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).

000006

**SEMIVOLATILE DATA QUALIFICATION SUMMARY\***

SDG: 41462	REVIEWER: TLI	DATE: 3/28/05	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Pentachlorophenol	J	All	MS, MSD and LCS recovery

\* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

000008

# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent  
Project: F03-025: F03-025

Group #: WSCF20041462

Sample #	Client ID	CAS #	Test Performed	Matrix	Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive	
<b>Organic</b>														
W040001537	B191F3	TRENT	107-21-1	Ethylene glycol	SOIL	Organics	U	< 5.00e+03	ug/kg	1.00	5.0e+03	08/30/04	08/18/04	08/24/04
<del>W040001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>TPH GASOLINE</del>	<del>Total Pet. Hydrocarbons Gas</del>	<del>SOIL</del>	<del>LA-523-443</del>	<del>U</del>	<del>&lt; 2.5e+03</del>	<del>ug/kg</del>	<del>1.00</del>	<del>2.5e+03</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
W040001537	B191F3	TRENT	12674-11-2	Aroclor-1016	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	<del>11104-28-2</del>	<del>Aroclor-1221</del>	<del>SOIL</del>	<del>LA-523-427</del>	<del>U</del>	<del>&lt; 100</del>	<del>ug/kg</del>	<del>1.00</del>	<del>1.0e+02</del>	<del>09/01/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
W040001537	B191F3	TRENT	11141-16-5	Aroclor-1232	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	53489-21-8	Aroclor-1242	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	12672-29-6	Aroclor-1248	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	11087-89-1	Aroclor-1254	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	11096-82-5	Aroclor-1260	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	37324-23-5	Aroclor-1262	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	08/31/04	08/18/04	08/24/04
<del>W040001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>11100-14-4</del>	<del>Aroclor-1268</del>	<del>SOIL</del>	<del>LA-523-427</del>	<del>U</del>	<del>&lt; 52.0</del>	<del>ug/kg</del>	<del>1.00</del>	<del>52</del>	<del>09/01/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
W040001537	B191F3	TRENT	100-02-7	4-Nitrophenol	SOIL	LA-523-456	U	< 690	ug/kg	1.00	8.9e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	106-46-7	1,4-Dichlorobenzene	SOIL	LA-523-456	U	< 330	ug/kg	1.00	3.3e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	106-95-2	Phenol	SOIL	LA-523-456	U	< 110	ug/kg	1.00	1.1e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	120-82-1	1,2,4-Trichlorobenzene	SOIL	LA-523-456	U	< 310	ug/kg	1.00	3.1e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	121-14-3	2,4-Dinitrotoluene	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	129-00-0	Pyrene	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	59-50-7	4-Chloro-3-methylphenol	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	621-64-7	N-Nitrosodi-n-dipropylamine	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	83-32-9	Acenaphthene	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	87-86-5	Pentachlorophenol	SOIL	LA-523-456	U	< 320	ug/kg	1.00	3.2e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	95-57-8	2-Chlorophenol	SOIL	LA-523-456	U	< 160	ug/kg	1.00	1.6e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	126-73-8	Tributyl phosphate	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
<del>W040001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>75-35-4</del>	<del>1,1-Dichloroethane</del>	<del>SOIL</del>	<del>LA-523-455</del>	<del>U</del>	<del>&lt; 11.0</del>	<del>ug/kg</del>	<del>1.00</del>	<del>11</del>	<del>08/30/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
W040001537	B191F3	TRENT	79-01-6	Trichloroethene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	71-43-2	Benzene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04

000011

*R*  
3/25/04

*J*

*R*  
3/25/04

MDL=Minimum Detection Limit

RQ=Result Qualifier

DF=Dilution Factor

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

Report WQPP/ver. 1

Groundwater Remediation Program

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

X - Other flags and notes described in the comments/narrative.

2-3

# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent  
Project: F03-025: F03-025

Group #: WSCF20041462

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF		Result	Unit	DF	MDL	Analyze Sample Receive			
					Method	RQ								
W040001537	B191F3	TRENT	78-93-3	2-Butanone	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	79-06-5	1,1,2-Trichloroethane	SOIL	LA-523-455	U	47/11/0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	79-34-5	1,1,2,2-Tetrachloroethane	SOIL	LA-523-455	U	47/11/0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	71-36-3	1-Butanol	SOIL	LA-523-455	U	< 210	ug/kg	1.00	2.1e+02	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	TPHDIESEL	Total Pet. Hydrocarbons Diesel	SOIL	NWTPH	U	< 4.00e+03	ug/kg	1.00	4.0e+03	09/07/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	TPHKEROSENE	Kerosene	SOIL	NWTPH	U	< 4.00e+03	ug/kg	1.00	4.0e+03	09/07/04	08/18/04	08/24/04

W  
4/11/0

000011A

**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  
X - Other flags and notes described in the comments/narrative.

**DF=Dilution Factor**

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

Report WQPP/ver. 1

Groundwater Remediation Program

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**000012**

**Appendix 5**

**Data Validation Supporting Documentation**

**000013**

<b>Sample Delivery Group</b>	<b>WSCF20041462, Rev. 3</b>
<b>Sample Matrix</b>	<b>Soil</b>
<b>Sample Visual</b>	<b>N/A</b>
<b>SAF Number</b>	<b>F03-025</b>
<b>Data Deliverable</b>	<b>Summary Report</b>

### **Introduction**

One (1) 100-LW-1/LW-2 Characterization – Soil, 32.5' to 35', sample (B191F3) was received at the WSCF Laboratory on August 24, 2004. The sample was analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Groundwater Remediation Program – Letter of Instruction*, referenced in the cover letter.

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

### **Analytical Methodology for Requested Analyses**

- ICP-MS Metals by EPA Method 200.8. Analytical work was performed with no deviations to the approved method.
- Alcohols/Glycols by EPA Method 8015. Analytical work was performed with no deviations to the approved method.
- ICP-AES Metals by EPA Method 6010. Analytical work was performed with no deviations to the approved method.
- Anions by EPA Method 300. Analytical work was performed with no deviations to the approved method.
- PCB by EPA Method 8082. Analytical work was performed with no deviations to the approved method.
- Semi-VOA by EPA Method 8270. Analytical work was performed with no deviations to the approved method.
- TPH Diesel Range by WDOE Method NWTPH-Dx. Analytical work was performed with no deviations to the approved method.

- TPH Gas Range by WDOE Method NWTPH-Gx. Analytical work was performed with no deviations to the approved method.
- VOA by EPA Method 8260A. Analytical work was performed with no deviations to the approved method.
- Cyanide by EPA Method 335.2. Analytical work was performed with no deviations to the approved method.
- pH by EPA Method 150.1. Analytical work was performed with no deviations to the approved method.
- Ammonia by EPA Method 300.7. 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.
- All RadChem analyses (AEA (Americium, Uranium and Plutonium), GEA) except Neptunium-237 were run by internal WDOE accredited WSCF procedures. Analytical work was performed with no deviations to the approved method.

### Comments

**General Comments** – The sample was sampled on 8/18/04, 11:25 and received by WSCF laboratory on 8/24/04 9:42. All holding times were met.

**ICP-MS Metals** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-15 through 2-20 for QC details. Analytical Note:

- A matrix/matrix spike duplicate samples were not analyzed on B191F3. B191F0 (SDG# 20041392), B191F2 (SDG# 20041748) and B190V5 (SDG#20041417) GRP samples were spiked. Cadmium matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Alcohols/Glycols**- The hold time for this analysis was met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-35 for QC details. Analytical Notes:

- Sample results are moisture corrected and reported on dry weight basis.
- 2-Bromoethanol (surrogate) – duplicate relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate recoveries were within established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**ICP-AES Metals (Bismuth only)** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-28 for QC details. All QC controls are within the established limits.

**Anions** - The hold times for this analysis were met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See pages 2-23 through 2-24 for QC details. Analytical Notes:

- Nitrate - the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.
- Phosphate – the matrix spike recovery was below established laboratory limits. The matrix spike duplicate recovery was within limits. Sample result was less than the detection limit and not flagged.
- Sulfate Duplicate Relative Percent Difference exceeded established laboratory limits. The RPD criterion did not apply since the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.

All other QC controls are within the established limits.

**PCB** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-26 through 2-27 for QC details. Analytical Notes:

- Decachlorobiphenyl (surrogate) spike relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate were within established limits, the sample result was not flagged.
- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**Semi-VOA** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-30 through 2-34 for QC details. Analytical Notes:

- Preparation Date: 30-august-2004.
- Pentachlorophenol laboratory control sample recovery was below established laboratory limits.
- Pentachlorophenol - matrix/matrix spike duplicate samples were not analyzed on B191F3. B17N67 (SDG# 20041457) and B191F5 (SDG#20041476) GRP samples were

spiked and the Pentachlorophenol matrix spike and/or matrix spike duplicate recoveries were below established laboratory limits. B191F3 sample result was below the detection limit and not flagged.

- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**TPH Diesel Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-25 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**TPH Gasoline Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-39 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**VOA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-36 through 2-38 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**Cyanide** - The hold time for this analysis was met. A Blank, Preparation Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-21 for QC details. Analytical Note:

- Matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Ammonia** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-22 for QC details. All QC controls are within the established limits.

**Percent Solids** - Analyzed for organic analyses moisture correction only.

**pH** - The hold time for this analysis was met. All laboratory controls were within established limits.

**RadChem** - There are no hold times associated with these WDOE accredited methods. A Blank, Laboratory Control Sample and Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page(s) 2-29, 2-40, 2-41, 2-42 and 2-43 for QC details.

Analytical Notes:

- Americium-241 - the duplicate relative percent difference exceeded established laboratory limits. All other QC controls were within limits; sample result was not flagged.
- Uranium-234, Uranium-235 and Plutonium-238 Additional Batch QC Data for Group 20042230:

<b>Radiochemical Isotopic Results</b>					
Batch ID	Associated Samples (Customer ID)	Lab Sample ID	QC Sample	Isotope	Result
23338			Blank U ISO	U-234	4.95e-01 pCi/g
				U-235	1.93e-02 pCi/g
	B191F3	W040001537	Duplicate U ISO on W040001537	U-234	2.39e+02 pCi/g (6.1%)
				U-235	1.42e+01 pCi/g (13%)
23337			Blank Pu ISO	Pu-238	1.70e-01 pCi/g
	B191F3	W040001537	Duplicate Pu ISO on W040001537	Pu-238	3.43e+00 pCi/g (27%)

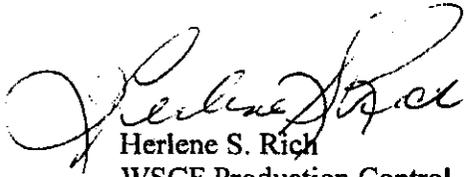
<b>Radiochemical Tracer Recovery</b>			
Sample Number	Lab Sample ID	Isotope	Tracer Recovery (Percent)
BLANK		Pu-242	78.7
LCS		Pu-242	83.2
B191F3	W040001537	Pu-242	76.1
DUPLICATE	W040001537	Pu-242	81.2

<b>Radiochemical Tracer Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Tracer Recovery (Percent)</b>
BLANK		Am-243	73.5
LCS		Am-243	78.1
B191F3	W040001537	Am-243	82.2
DUPLICATE	W040001537	Am-243	74.3
BLANK		U-232	82.1
LCS		U-232	75.4
B191F3	W040001537	U-232	34.2
DUPLICATE	W040001537	U-232	37.9

- Neptunium-237 – Spike (Np-237) recoveries for each sample are listed below. Laboratory control sample recovery was below established limits and may be attributed to a slight excess of ascorbic acid which occurs due to low iron levels in the matrix and causes retention of the Neptunium during separation. The solid matrix sample spike recoveries were within established laboratory limits. The duplicate relative percent difference exceeded established laboratory limits. Sample result was X (estimate) flagged.

<b>Radiochemical Matrix Spike Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Matrix Spike Recovery (Percent)</b>
LCS		Np-237	45.0
B191F3	W040001537	Np-237	93.5
DUPLICATE	W040001537	Np-237	104.0

All other QC controls are within the established limits.



Herlene S. Rich  
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





GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<u>C</u>	D	E
PROJECT:	200-LW-1/LW-2		DATA PACKAGE: WSCF20041262		
VALIDATOR:	TLI	LAB:	WSCF	DATE: 3/12/05	
			SDG:	41262	
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	<u>SW-846 8270</u>	<u>TPH-D</u>	SW-846 8270 (TCLP)
			<u>ethols 8015</u>		
SAMPLES/MATRIX					
B191F3					
501					

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 FR

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 7.45

~~8.4.3 - no surrogates - 3/3/02~~  
 pentachlorophthal - MS/MSD - I all assoc  
 pentachlorophthal - LCS - I all assoc  
~~no other glycol surr - I all~~  
 3/23/02

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  
Internal 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
- Results 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 acceptable? ..... 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**

**000027**



# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: SW-846 8270B Semi-Vols

SAF Number: F03-025  
 Sample Date: 08/25/04  
 Receive Date: 08/25/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
MS	Nitrobenzene-d5	4185-80-0	2826.0	75.500	% Recov	08/08/04	64.000	111.000	
MS	4-Nitrophenol	100-02-7	3138.8	60.000	% Recov	09/08/04	32.000	118.000	
MS	Pentachlorophenol	87-86-5	2732.2	52.200	% Recov	09/08/04	62.000	114.000	
MS	Phenol-d5	4185-82-2	2582.0	73.500	% Recov	09/08/04	54.000	120.000	
MS	Pyrene	129-00-0	2743.8	78.700	% Recov	09/08/04	66.000	118.000	
MS	2,4,6-Tribromophenol	118-79-8	2301.9	66.000	% Recov	09/08/04	24.000	122.000	
MS	Terphenyl-d14 (7Cl)	98904-43-9	2826.8	81.000	% Recov	09/08/04	35.000	150.000	
MSD	1,2,4-Trichlorobenzene	120-82-1	2648.8	76.200	% Recov	09/08/04	46.000	107.000	
MSD	1,4-Dichlorobenzene	106-46-7	2665.4	76.700	% Recov	09/08/04	30.000	96.000	
MSD	2,4-Dinitrotoluene	121-14-2	2328.7	67.000	% Recov	09/08/04	59.000	106.000	
MSD	2-Fluorophenol	367-12-4	3969.3	85.400	% Recov	08/08/04	42.000	105.000	
MSD	Acenaphthene	83-32-9	2388.4	68.700	% Recov	08/08/04	61.000	118.000	
MSD	4-Chloro-3-methylphenol	59-50-7	3765.8	72.200	% Recov	09/08/04	81.000	106.000	
MSD	2-Chlorophenol	95-57-8	4349.2	83.400	% Recov	09/08/04	66.000	108.000	
MSD	N,N-Dimethyl-p-aminopyrimidine	521-84-7	3752.3	79.200	% Recov	09/08/04	71.000	114.000	
MSD	2-Fluorobiphenyl	321-80-8	2629.8	75.700	% Recov	09/08/04	56.000	122.000	
MSD	Phenol	106-95-2	4219.3	80.900	% Recov	09/08/04	42.000	111.000	
MSD	Nitrobenzene-d5	4185-80-0	2672.2	76.900	% Recov	09/08/04	64.000	111.000	
MSD	4-Nitrophenol	100-02-7	3104.8	59.800	% Recov	08/08/04	32.000	118.000	
MSD	Pentachlorophenol	87-86-5	2805.6	53.800	% Recov	09/08/04	62.000	114.000	
MSD	Phenol-d5	4185-82-2	2738.7	76.800	% Recov	09/08/04	54.000	120.000	
MSD	Pyrene	129-00-0	2797.9	80.500	% Recov	09/08/04	66.000	118.000	
MSD	2,4,6-Tribromophenol	118-79-8	2394.6	68.900	% Recov	09/08/04	24.000	122.000	
MSD	Terphenyl-d14 (7Cl)	98904-43-9	2889.7	83.100	% Recov	09/08/04	35.000	150.000	
SPK-RPD	1,2,4-Trichlorobenzene	120-82-1	76.200	2.929	RPD	08/08/04	0.000	20.000	
SPK-RPD	1,4-Dichlorobenzene	106-46-7	76.700	13.500	RPD	09/08/04	0.000	20.000	
SPK-RPD	2,4-Dinitrotoluene	121-14-2	67.000	0.298	RPD	08/08/04	0.000	20.000	
SPK-RPD	2-Fluorophenol	367-12-4	85.400	12.308	RPD	09/08/04	0.000	20.000	
SPK-RPD	Acenaphthene	83-32-9	68.700	1.318	RPD	08/08/04	0.000	20.000	
SPK-RPD	4-Chloro-3-methylphenol	59-50-7	72.200	2.383	RPD	09/08/04	0.000	20.000	

000029

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: SW-846 8270B Semi-Vols

SAF Number: F03-025  
 Sample Date: 08/25/04  
 Receive Date: 08/25/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
SPK-RPD	2-Chlorophenol	95-57-8	83.400	11.541	RPD	09/08/04	0.000	20.000	
SPK-RPD	N-Nitrosodi-n-dipropylamine	621-64-7	79.200	8.971	RPD	09/08/04	0.000	20.000	
SPK-RPD	2-Fluorobiphenyl	321-60-8	75.700	3.495	RPD	09/08/04	0.000	20.000	
SPK-RPD	Phenol	108-95-2	80.900	6.773	RPD	09/08/04	0.000	20.000	
SPK-RPD	Nitrobenzene-d5	4165-60-0	76.900	1.637	RPD	09/08/04	0.000	20.000	
SPK-RPD	4-Nitrophenol	100-02-7	59.800	0.669	RPD	09/08/04	0.000	20.000	
SPK-RPD	Pentachlorophenol	87-86-5	53.900	3.019	RPD	09/08/04	0.000	20.000	
SPK-RPD	Phenol-d5	4165-62-2	78.800	6.960	RPD	09/08/04	0.000	20.000	
SPK-RPD	Pyrene	129-00-0	66.500	2.261	RPD	09/08/04	0.000	20.000	
SPK-RPD	2,4,6-Tribromophenol	118-79-6	68.900	4.299	RPD	09/08/04	0.000	20.000	
SPK-RPD	Tarphent-d14-17Cl	98904-43-9	63.100	2.559	RPD	09/08/04	0.000	20.000	

## BATCH QC

000030

BLANK	1,2,4-Trichlorobenzene	120-82-1	< 290	n/a	ug/Kg	09/08/04			U
BLANK	1,4-Dichlorobenzene	106-46-7	< 310	n/a	ug/Kg	09/08/04			U
BLANK	2,4-Dinitrotoluene	121-14-2	< 67	n/a	ug/Kg	09/08/04			U
BLANK	2-Fluorophenol	367-12-4	2818.5	84.600	% Recov	09/08/04	62.000	105.000	
BLANK	Acenaphthene	83-32-9	< 67	n/a	ug/Kg	09/08/04			U
BLANK	4-Chloro-3-methylphenol	59-50-7	< 67	n/a	ug/Kg	09/08/04			U
BLANK	2-Chlorophenol	95-57-8	< 150	n/a	ug/Kg	09/08/04			U
BLANK	N-Nitrosodi-n-dipropylamine	621-64-7	< 67	n/a	ug/Kg	09/08/04			U
BLANK	2-Fluorobiphenyl	321-60-8	2635.4	79.100	% Recov	09/08/04	56.000	122.000	
BLANK	Phenol	108-95-2	< 100	n/a	ug/Kg	09/08/04			U
BLANK	Nitrobenzene-d5	4165-60-0	2689.2	80.700	% Recov	09/08/04	64.000	111.000	
BLANK	4-Nitrophenol	100-02-7	< 850	n/a	ug/Kg	09/08/04			U
BLANK	Pentachlorophenol	87-86-5	< 300	n/a	ug/Kg	09/08/04			U
BLANK	Phenol-d5	4165-62-2	2555.9	76.700	% Recov	09/08/04	54.000	120.000	
BLANK	Pyrene	129-00-0	< 67	n/a	ug/Kg	09/08/04			U
BLANK	Tributyl phosphate	128-73-8	< 67	n/a	ug/Kg	09/08/04			U
BLANK	2,4,6-Tribromophenol	118-79-6	2374.3	71.200	% Recov	09/08/04	24.000	122.000	

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: SW-846 8270B Semi-Vols

SAF Number: F03-025  
 Sample Date:  
 Receive Date:

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
BLANK	Terphenyl-d14 (7Cl)	98904-43-9	2872.8	88.200	% Recov	09/08/04	35.000	150.000	
LCS	1,2,4-Trichlorobenzene	120-82-1	2380.8	71.400	% Recov	09/08/04	48.000	107.000	
LCS	1,4-Dichlorobenzene	106-46-7	2230.0	68.900	% Recov	09/08/04	42.000	111.000	
LCS	2,4-Dinitrotoluene	121-14-2	2123.8	63.700	% Recov	09/08/04	59.000	108.000	
LCS	2-Fluorophenol	367-12-4	2782.8	82.900	% Recov	09/08/04	50.000	110.000	
LCS	Acanaphthene	83-32-9	2158.8	64.800	% Recov	09/08/04	61.000	116.000	
LCS	4-Chloro-3-methylphenol	59-50-7	3399.8	88.000	% Recov	09/08/04	61.000	108.000	
LCS	2-Chlorophenol	95-57-8	3660.8	73.200	% Recov	09/08/04	68.000	108.000	
LCS	3-Nitroacetyl-L-proprylamine	621-04-7	2386.5	71.000	% Recov	09/08/04	71.000	114.000	
LCS	2-Fluorobiphenyl	321-80-8	2381.1	71.400	% Recov	09/08/04	58.000	109.000	
LCS	Phenol	108-95-2	3623.8	72.500	% Recov	09/08/04	67.000	105.000	
LCS	Nitrobenzene-d5	4165-60-0	2573.5	77.200	% Recov	09/08/04	60.000	118.000	
LCS	4-Nitrophenol	100-02-7	3628.8	80.500	% Recov	09/08/04	82.000	118.000	
LCS	Pentachlorophenol	87-86-5	2535.5	50.700	% Recov	09/08/04	62.000	114.000	
LCS	Phenol-d5	4165-82-2	2531.8	76.000	% Recov	09/08/04	59.000	118.000	
LCS	Pyrene	129-00-0	2642.2	79.300	% Recov	09/08/04	68.000	118.000	
LCS	2,4,6-Trichlorophenol	118-79-8	2170.8	65.100	% Recov	09/08/04	60.000	120.000	
LCS	Terphenyl-d14 (7Cl)	98904-43-9	2773.8	83.200	% Recov	09/08/04	60.000	120.000	

000031

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: Alcohols, Glycols - 8015

SAF Number: F03-025  
 Sample Date: 08/19/04  
 Receive Date: 08/20/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W040001529									
BATCH QC ASSOCIATED WITH SAMPLE									
DUP	2-Bromoethanol	540-51-2	15000	28.571	ppd	08/30/04	0.000	25.000	
DUP	Ethylene glycol	107-21-1	<5000	n/a	RPD	08/30/04	0.000	25.000	U
MS	2-Bromoethanol	540-51-2	18000	80.000	% Recov	08/30/04	70.000	125.000	
MS	Ethylene glycol	107-21-1	11000	110.000	% Recov	08/30/04	75.000	125.000	
MSD	2-Bromoethanol	540-51-2	15000	90.000	% Recov	08/30/04	70.000	125.000	
MSD	Ethylene glycol	107-21-1	11000	110.000	% Recov	08/30/04	75.000	125.000	
SPK-RPD	2-Bromoethanol	540-51-2	90.000	0.000	RPD	08/30/04	0.000	20.000	
SPK-RPD	Ethylene glycol	107-21-1	110.000	0.000	RPD	08/30/04	0.000	20.000	

## BATCH QC

BLANK	2-Bromoethanol	540-51-2	15000	0.750	ug/Kg	08/30/04	0.000	10.000	
BLANK	Ethylene glycol	107-21-1	<5000	n/a	ug/Kg	08/30/04	0.000	5.000	U
LCS	2-Bromoethanol	540-51-2	18000	80.000	% Recov	08/30/04	70.000	130.000	
LCS	Ethylene glycol	107-21-1	10000	100.000	% Recov	08/30/04	70.000	130.000	

000032

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: WTPH-D TPH Diesel Range (Wa)

SAF Number: F03-025  
 Sample Date: 08/18/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
---------	---------	-------	----------	----------	-------	---------------	-------------	-------------	----

Lab ID: W040001537  
 BATCH QC ASSOCIATED WITH SAMPLE

BURR	ortho-Terphenyl	Surr	84-15-1	23275	93.100	% Recov	09/07/04	70.000	130.000
------	-----------------	------	---------	-------	--------	---------	----------	--------	---------

Lab ID: W040001540  
 BATCH QC ASSOCIATED WITH SAMPLE

MS	Kerosene		TPHKEROSENE	114780	87.900	% Recov	09/07/04	70.000	130.000
MS	ortho-Terphenyl	Surr	84-15-1	24318	93.100	% Recov	09/07/04	70.000	130.000
MSD	Kerosene		TPHKEROSENE	118730	86.000	% Recov	09/07/04	70.000	130.000
MSD	ortho-Terphenyl	Surr	84-15-1	23008	82.000	% Recov	09/07/04	70.000	130.000
SPC-RPD	ortho-Terphenyl	Surr	84-15-1	92.000	1.168	RPD	09/07/04	0.000	70.000

## BATCH QC

BLANK	Kerosene		TPHKEROSENE	< 3800	n/a	ug/Kg	09/07/04		U
BLANK	ortho-Terphenyl	Surr	84-15-1	23563	94.300	% Recov	09/07/04	70.000	130.000
BLANK	Total Pet. Hydrocarbons Diesel		TPHDIESEL	< 3800	n/a	ug/Kg	09/07/04		U
LCS	ortho-Terphenyl	Surr	84-15-1	24928	99.700	% Recov	09/07/04	70.000	130.000
LCS	Total Pet. Hydrocarbons Diesel		TPHDIESEL	108680	86.900	% Recov	09/07/04	80.000	120.000

000033

000033



Date: 28 March 2005  
To: Fluor Hanford Inc. (technical representative)  
From: TechLaw, Inc.  
Project: 200-LW-1/LW-2 Characterization - Soil  
Subject: Radiochemistry - Data Package No. WSCF20041462 (SDG No. 41462)

## **INTRODUCTION**

This memo presents the results of data validation on Data Package No. 41462 prepared by WSCF. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

<b>Sample ID</b>	<b>Sample</b>	<b>Media</b>	<b>Validation</b>	<b>Analysis</b>
B191F3	8/18/04	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 200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan (DOE/RL-2001-66, Draft A, Redline, May 2002). 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

## **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.

000001

- **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.

All laboratory blank results were acceptable.

#### Field Blanks

No field blanks were submitted for analysis.

- **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 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 an LCS recovery of 45%, all neptunium-237 results were qualified as estimates and flagged "J".

Due to the lack of an LCS analysis, all plutonium-238, uranium-234 and uranium-235 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

000002

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 than 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.

All duplicate results were acceptable.

#### Field Duplicate Samples

No field duplicates were submitted for analysis.

- **Detection Levels**

Reported analytical detection levels are compared against the required target quantitation limits (RTQLs) to ensure that laboratory detection levels meet the required criteria. One analyte exceeded the RTQL. Under the FHI statement of work, no qualification is required. All other reported laboratory detection levels met the analyte specific RTQL.

- **Completeness**

Data package SDG No. 41462 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 of 45%, all neptunium-237 results were qualified as estimates and flagged "J". Due to the lack of an LCS analysis, all plutonium-238, uranium-234 and uranium-235 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.

One analyte exceeded the RTQL. Under the FHI statement of work, no qualification is required.

## REFERENCES

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

DOE/RL-2001-66, Draft A, Redline, *200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan*, May 2002.

**Appendix 1**

**Glossary of Data Reporting Qualifiers**

**000005**

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.

000006

**Appendix 2**

**Summary of Data Qualification**

**000007**

**RADIOCHEMISTRY DATA QUALIFICATION SUMMARY\***

SDG: 41462	REVIEWER: TLI	DATE: 3/28/05	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Neptunium-237	J	All	LCS recovery
Uranium-234 Uranium235 Plutonium-238	J	All	No LCS analysis

\* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

000008

**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

**000009**

Project: FLUOR-HANFORD							
Laboratory: WSCF							
Case		SDG: WSCF20041462					
Sample Number		B191F3					
Remarks							
Sample Date		8/18/04					
Radiochemistry	RTQ	Result	Q	Result	Q	Result	Q
Americium-241	1	25.0					
Cobalt-60	0.05	2.00					
Cesium-137	0.1	813					
Europium 152	0.1	0.252	U*				
Europium 154	0.1	0.711					
Europium 155	0.1	-2.42	U				
Neptunium-237	1	0.0840	J				
Plutonium-238	1	2.60	J				
Plutonium-239/240	1	78.0					
Uranium-234	1	250.0	J				
Uranium-235	1	16.0	J				
Uranium-238	1	270					

000010

\* - 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

Attention: Steve Trent  
Project: F03-025: F03-025

Group #: WSCF20041462

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
<b>Radiochemistry</b>													
W040001537	B191F3	TRENT	14596-10-2	Americium-241	SOIL	LA-508-471	25.0	pCi/g	1.00	0.58	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	Am-241 by AEA Total Cntg Error	SOIL	LA-508-471	+ 6.5	pCi/g	1.00	0.0	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	10198-40-0	Cobalt-60	SOIL	LA-508-481	2.00	pCi/g	1.00	0.021	09/02/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	Co-60 Ref. Count Error (GEA)	SOIL	LA-508-481	+ 0.18	pCi/g	1.00	0.0	09/02/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	10045-97-3	Cesium-137	SOIL	LA-508-481	813	pCi/g	1.00	0.14	09/02/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	Cs-137 Ref. Count Error (GEA)	SOIL	LA-508-481	+ 1.1e+02	pCi/g	1.00	0.0	09/02/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	14883-23-9	Europium-152	SOIL	LA-508-481 U	0.252	pCi/g	1.00	0.61	09/02/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	Eu-152 Ref. Count Error (GEA)	SOIL	LA-508-481	+ 0.48	pCi/g	1.00	0.0	09/02/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	15585-10-1	Europium-154	SOIL	LA-508-481	0.711	pCi/g	1.00	0.083	09/02/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	Eu-154 Ref. Count Error (GEA)	SOIL	LA-508-481	+ 0.11	pCi/g	1.00	0.0	09/02/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	14391-18-3	Europium-155	SOIL	LA-508-481 U	-2.42	pCi/g	1.00	0.96	09/02/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	Eu-155 Ref. Count Error (GEA)	SOIL	LA-508-481	+ 2.4	pCi/g	1.00	0.0	09/02/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	13994-20-2	Neptunium-237	SOIL	LA-508-471 X J	0.0840	pCi/g	1.00	0.058	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	Np-237 by AEA Total Cntg Error	SOIL	LA-508-471	+ 0.063	pCi/g	1.00	0.0	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	13961-16-3	Plutonium-238	SOIL	LA-508-471 J	2.60	pCi/g	1.00	0.59	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	Pu-238 by AEA Total Cntg Error	SOIL	LA-508-471	+ 0.86	pCi/g	1.00	0.0	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	PU-239/240	Pu-239/240 by AEA	SOIL	LA-508-471	78.0	pCi/g	1.00	0.21	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	Pu-239/240 AEA Total Cntg Err	SOIL	LA-508-471	+ 20	pCi/g	1.00	0.0	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	U-233/234	Uranium-233/234	SOIL	LA-508-471 J	250	pCi/g	1.00	0.38	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	U-233/234 AEA Total Cntg Error	SOIL	LA-508-471	+ 85	pCi/g	1.00	0.0	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	15117-96-1	Uranium-235	SOIL	LA-508-471 J	16.0	pCi/g	1.00	0.12	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	U-235 by AEA Total Cntg Error	SOIL	LA-508-471	+ 4.6	pCi/g	1.00	0.0	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	U-238	Uranium-238	SOIL	LA-508-471	270	pCi/g	1.00	0.30	09/26/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	E.T.C	U-238 by AEA Total Cntg Error	SOIL	LA-508-471	+ 70	pCi/g	1.00	0.10	09/26/04	08/18/04	08/24/04

000011

K  
3/29/04

**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  
X - Other flags and notes described in the comments/narrative.

**DF=Dilution Factor**

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

Report WGPP/ver. 1

Groundwater Remediation Program

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**000012**

<b>Sample Delivery Group</b>	<b>WSCF20041462, Rev. 3</b>
<b>Sample Matrix</b>	<b>Soil</b>
<b>Sample Visual</b>	<b>N/A</b>
<b>SAF Number</b>	<b>F03-025</b>
<b>Data Deliverable</b>	<b>Summary Report</b>

### Introduction

One (1) 100-LW-1/LW-2 Characterization – Soil, 32.5' to 35', sample (B191F3) was received at the WSCF Laboratory on August 24, 2004. The sample was analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Groundwater Remediation Program – Letter of Instruction*, referenced in the cover letter.

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

### Analytical Methodology for Requested Analyses

- ICP-MS Metals by EPA Method 200.8. Analytical work was performed with no deviations to the approved method.
- Alcohols/Glycols by EPA Method 8015. Analytical work was performed with no deviations to the approved method.
- ICP-AES Metals by EPA Method 6010. Analytical work was performed with no deviations to the approved method.
- Anions by EPA Method 300. Analytical work was performed with no deviations to the approved method.
- PCB by EPA Method 8082. Analytical work was performed with no deviations to the approved method.
- Semi-VOA by EPA Method 8270. Analytical work was performed with no deviations to the approved method.
- TPH Diesel Range by WDOE Method NWTPH-Dx. Analytical work was performed with no deviations to the approved method.

- TPH Gas Range by WDOE Method NWTHPH-Gx. Analytical work was performed with no deviations to the approved method.
- VOA by EPA Method 8260A. Analytical work was performed with no deviations to the approved method.
- Cyanide by EPA Method 335.2. Analytical work was performed with no deviations to the approved method.
- pH by EPA Method 150.1. Analytical work was performed with no deviations to the approved method.
- Ammonia by EPA Method 300.7. 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.
- All RadChem analyses (AEA (Americium, Uranium and Plutonium), GEA) except Neptunium-237 were run by internal WDOE accredited WSCF procedures. Analytical work was performed with no deviations to the approved method.

### Comments

**General Comments** – The sample was sampled on 8/18/04, 11:25 and received by WSCF laboratory on 8/24/04 9:42. All holding times were met.

**ICP-MS Metals** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-15 through 2-20 for QC details. Analytical Note:

- A matrix/matrix spike duplicate samples were not analyzed on B191F3. B191F0 (SDG# 20041392), B191F2 (SDG# 20041748) and B190V5 (SDG#20041417) GRP samples were spiked. Cadmium matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Alcohols/Glycols**- The hold time for this analysis was met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-35 for QC details. Analytical Notes:

- Sample results are moisture corrected and reported on dry weight basis.
- 2-Bromoethanol (surrogate) – duplicate relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate recoveries were within established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**ICP-AES Metals (Bismuth only)** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-28 for QC details. All QC controls are within the established limits.

**Anions** - The hold times for this analysis were met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See pages 2-23 through 2-24 for QC details. Analytical Notes:

- Nitrate - the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.
- Phosphate – the matrix spike recovery was below established laboratory limits. The matrix spike duplicate recovery was within limits. Sample result was less than the detection limit and not flagged.
- Sulfate Duplicate Relative Percent Difference exceeded established laboratory limits. The RPD criterion did not apply since the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.

All other QC controls are within the established limits.

**PCB** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-26 through 2-27 for QC details. Analytical Notes:

- Decachlorobiphenyl (surrogate) spike relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate were within established limits, the sample result was not flagged.
- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**Semi-VOA** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-30 through 2-34 for QC details. Analytical Notes:

- Preparation Date: 30-august-2004.
- Pentachlorophenol laboratory control sample recovery was below established laboratory limits.
- Pentachlorophenol - matrix/matrix spike duplicate samples were not analyzed on B191F3. B17N67 (SDG# 20041457) and B191F5 (SDG#20041476) GRP samples were

spiked and the Pentachlorophenol matrix spike and/or matrix spike duplicate recoveries were below established laboratory limits. B191F3 sample result was below the detection limit and not flagged.

- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**TPH Diesel Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-25 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**TPH Gasoline Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-39 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**VOA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-36 through 2-38 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**Cyanide** - The hold time for this analysis was met. A Blank, Preparation Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-21 for QC details. Analytical Note:

- Matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Ammonia** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-22 for QC details. All QC controls are within the established limits.

**Percent Solids** - Analyzed for organic analyses moisture correction only.

**pH** - The hold time for this analysis was met. All laboratory controls were within established limits.

**RadChem** - There are no hold times associated with these WDOE accredited methods. A Blank, Laboratory Control Sample and Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page(s) 2-29, 2-40, 2-41, 2-42 and 2-43 for QC details.

Analytical Notes:

- Americium-241 - the duplicate relative percent difference exceeded established laboratory limits. All other QC controls were within limits; sample result was not flagged.
- Uranium-234, Uranium-235 and Plutonium-238 Additional Batch QC Data for Group 20042230:

<b>Radiochemical Isotopic Results</b>					
Batch ID	Associated Samples (Customer ID)	Lab Sample ID	QC Sample	Isotope	Result
23338			Blank U ISO	U-234	4.95e-01 pCi/g
				U-235	1.93e-02 pCi/g
	B191F3	W040001537	Duplicate U ISO on W040001537	U-234	2.39e+02 pCi/g (6.1%)
				U-235	1.42e+01 pCi/g (13%)
23337			Blank Pu ISO	Pu-238	1.70e-01 pCi/g
	B191F3	W040001537	Duplicate Pu ISO on W040001537	Pu-238	3.43e+00 pCi/g (27%)

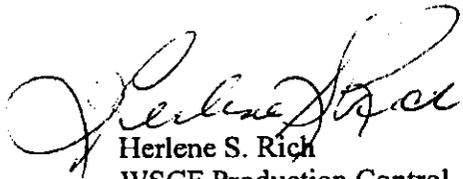
<b>Radiochemical Tracer Recovery</b>			
Sample Number	Lab Sample ID	Isotope	Tracer Recovery (Percent)
BLANK		Pu-242	78.7
LCS		Pu-242	83.2
B191F3	W040001537	Pu-242	76.1
DUPLICATE	W040001537	Pu-242	81.2

<b>Radiochemical Tracer Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Tracer Recovery (Percent)</b>
BLANK		Am-243	73.5
LCS		Am-243	78.1
B191F3	W040001537	Am-243	82.2
DUPLICATE	W040001537	Am-243	74.3
BLANK		U-232	82.1
LCS		U-232	75.4
B191F3	W040001537	U-232	34.2
DUPLICATE	W040001537	U-232	37.9

- Neptunium-237 – Spike (Np-237) recoveries for each sample are listed below. Laboratory control sample recovery was below established limits and may be attributed to a slight excess of ascorbic acid which occurs due to low iron levels in the matrix and causes retention of the Neptunium during separation. The solid matrix sample spike recoveries were within established laboratory limits. The duplicate relative percent difference exceeded established laboratory limits. Sample result was X (estimate) flagged.

<b>Radiochemical Matrix Spike Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Matrix Spike Recovery (Percent)</b>
LCS		Np-237	45.0
B191F3	W040001537	Np-237	93.5
DUPLICATE	W040001537	Np-237	104.0

All other QC controls are within the established limits.



Herlene S. Rich  
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





**Appendix 5**

**Data Validation Supporting Documentation**

**000022**



3. Continuing Calibration (Levels D, E)

~~Y~~ 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)

~~Y~~ 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: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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: ~~NO U234, U235, PU238 blank J all P. F. B.~~   
 3/25/01

NO FB

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:   
 NO U234, U235 or PU238 LCS - J all   
 Mp-237 - 4570 J all

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

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: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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: EU-152 over

---

---

---

---

**Appendix 6**

**Additional Documentation Requested by Client**

**000029**

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: Gamma Energy Analysis-grd H2O

SAF Number: F03-025  
 Sample Date: 08/18/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
---------	---------	-------	----------	----------	-------	---------------	-------------	-------------	----

## Lab ID: W040001537 BATCH QC ASSOCIATED WITH SAMPLE

DUP	Cobalt-60	10138-40-0	1.96e+00	2.020	RPD	09/07/04	0.000	20.000	
DUP	Cesium-137	10045-87-3	8.13e+02	0.000	RPD	09/07/04	0.000	20.000	
DUP	Europium-152	14683-23-9	U-8.19e-1	n/a	RPD	09/07/04	0.000	20.000	
DUP	Europium-154	15585-10-1	6.84e-01	6.836	RPD	09/07/04	0.000	20.000	
DUP	Europium-155	14391-16-3	U-2.30e-0	n/a	RPD	09/07/04	0.000	20.000	

## BATCH QC

BLANK	Cobalt-60	10138-40-0	U-2.6e-3	n/a	pCi/g	09/07/04	-10.000	1000.000	
BLANK	Cesium-137	10045-87-3	U1.87e-3	n/a	pCi/g	09/07/04	-10.000	1000.000	
BLANK	Europium-152	14683-23-9	U1.58e-3	n/a	pCi/g	09/07/04	-10.000	1000.000	
BLANK	Europium-154	15585-10-1	U-3.9e-3	n/a	pCi/g	09/07/04	-10.000	1000.000	
BLANK	Europium-155	14391-16-3	U2.44e-3	n/a	pCi/g	09/07/04	-10.000	1000.000	
LCS	Cobalt-60	10138-40-0	4.43e+03	105.728	% Recov	09/07/04	80.000	120.000	
LCS	Cesium-137	10045-87-3	3.76e+03	105.028	% Recov	09/07/04	80.000	120.000	

000030

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: Uranium Isotopics by AEA

SAF Number: F03-025  
 Sample Date: 08/18/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
Lab ID: W040001537									
BATCH QC ASSOCIATED WITH SAMPLE									
DUP	Uranium-238	U-238	2.5e+02	7.892	RFD	09/28/04	0.000	20.000	
BATCH QC									
BLANK	Uranium-238	24678-82-8	4.2e-01	0.420	pCi/g	09/28/04	-10.000	1000.000	
LCS	Uranium-238	24678-82-8	2.1e+01	110.788	% Recov	09/28/04	75.000	125.000	

000031

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: Americium by AEA

SAF Number: F03-025  
 Sample Date: 08/18/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
---------	---------	-------	----------	----------	-------	---------------	-------------	-------------	----

Lab ID: W040001537  
**BATCH QC ASSOCIATED WITH SAMPLE**

DSP	Americium-241	14596-10-2	3.1e+01	21.429	RFD	08/26/04	0.000	20.000	
-----	---------------	------------	---------	--------	-----	----------	-------	--------	--

**BATCH QC**

BLANK	Americium-241	14596-10-2	-1.1e-01	-0.110	pCi/g	08/26/04	-10.000	1000.000	
LCS	Americium-241	14596-10-2	12.63	98.048	% Recov	08/26/04	75.000	125.000	

0000332

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: Plutonium Isotopics by AEA

SAF Number: F03-025  
 Sample Date: 08/18/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
<b>Lab ID: W040001537</b>									
<b>BATCH QC ASSOCIATED WITH SAMPLE</b>									
DUP	Pu-239/240 by AEA	PU-239/240	2.5e+01	19.853	RFD	09/26/04	0.000	20.000	
<b>BATCH QC</b>									
BLANK	Pu-239/240 by AEA	PU-239/240	2.3e-01	0.230	pCi/g	09/26/04	-10.000	1000.000	
LCS	Pu-239/240 by AEA	PU-239/240	11.31	91.951	% Recovery	09/26/04	75.000	125.000	

000033

000033

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: Neptunium by AEA

SAF Number: F03-025  
 Sample Date: 08/18/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
---------	---------	-------	----------	----------	-------	---------------	-------------	-------------	----

Lab ID: W040001537  
 BATCH QC ASSOCIATED WITH SAMPLE

DUP	Neptunium-237	13994-20-2	3.1e-02	92.174	RPD	09/27/04	0.000	25.000	*
BATCH QC									
BLANK	Neptunium-237	13994-20-2	8.3e-03	0.008	pCi/g	09/28/04	-10.000	1000.000	
LES	Neptunium-237	13994-20-2	4.5e+01	45.000	% Recov	09/28/04	75.000	125.000	*

000034

Date: 28 March 2005  
To: Fluor Hanford Inc. (technical representative)  
From: TechLaw, Inc.  
Project: 200-LW-1/LW-2 Characterization - Soil  
Subject: PCB - Data Package No. WSCF20041462 (SDG No. 41462)



## **INTRODUCTION**

This memo presents the results of data validation on Data Package No. 41462 prepared by WSCF. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

<b>Sample ID</b>	<b>Sample</b>	<b>Media</b>	<b>Validation</b>	<b>Analysis</b>
B191F3	8/18/04	Soil	C	PCBs by 8082

Data validation was conducted in accordance with the FHI validation statement of work and the 200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan (DOE/RL-2001-66, Draft A, Redline, May 2002). 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 the Client

## **DATA QUALITY OBJECTIVES**

- **Holding Times/Sample Preservation**

Sample data were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil 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 by less 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 detected sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

000001

All holding times were acceptable.

- **Method Blank**

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation or analysis. At least one method blank analysis must be conducted for every 20 samples. Method blanks should not contain target compounds at a concentration greater than practical quantitation limit (PQL). If target compounds are present, sample results less than five times the blank concentration are qualified as undetected and flagged "U". If the sample result is less than five times the blank concentration and less than PQL, the result is qualified as undetected and elevated to the PQL.

All method blank target compound results were acceptable.

#### Field Blanks

No equipment blanks were submitted for analysis.

- **Accuracy**

#### Matrix Spike/Blank Spike

Matrix spike and blank spike 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 and is done in duplicate. Matrix spike and blank spike analyses must be within control limits of 70% to 130%. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Non-detected 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 MS/blank spike results were acceptable.

#### Surrogate Recovery

The analysis of surrogate compounds provides a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory. When a surrogate compound recovery is outside the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Non-detected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Non-detected

000002

compounds with surrogate recoveries above the upper control limit require no qualification.

All surrogate results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed as the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. For soil samples, results must be within RPD limits of plus/minus 30%. 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 precision results were acceptable.

Field Duplicate Samples

No field duplicates were submitted for analysis.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the required target quantitation limits to ensure that laboratory detection levels meet the required criteria. All undetected results exceeded the analyte specific RTQL. Under the FHI statement of work, no qualification is required.

- **Completeness**

Data Package No. 41462 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.

000003

## **MINOR DEFICIENCIES**

All undetected results exceeded the analyte specific RTQL. Under the FHI statement of work, no qualification is required.

## **REFERENCES**

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

DOE/RL-2001-66, Draft A, Redline, *200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan*, May 2002.

**Appendix 1**

**Glossary of Data Reporting Qualifiers**

**000005**

Qualifiers which may be applied by data validators in compliance with the procedures herein 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 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 (i.e., usable for decision-making purposes).

000006

**Appendix 2**

**Summary of Data Qualification**

000007

PCB DATA QUALIFICATION SUMMARY\*

SDG: 41462	REVIEWER: TLI	DATE: 3/28/05	PAGE <u>1</u> OF <u>1</u>
COMMENTS: No qualifiers assigned			

\* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

000008

# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent  
Project: F03-025: F03-025

Group #: WSCF20041462

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive	
<b>Organic</b>														
W040001537	B191F3	TRENT	107-21-1	Ethylene <i>WCS</i>	SOIL	Organics	U	< 5.00e+03	ug/kg	1.00	5.0e+03	08/30/04	08/18/04	08/24/04
<del>W040001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>11985-00-0</del>	<del>Total Pet. Hydrocarbons Gas</del>	<del>SOIL</del>	<del>LA-523-443</del>	<del>U</del>	<del>&lt; 2.50e+03</del>	<del>ug/kg</del>	<del>1.00</del>	<del>2.5e+03</del>	<del>08/31/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
W040001537	B191F3	TRENT	12674-11-2	Aroclor-1016	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	11104-28-2	Aroclor-1221	SOIL	LA-523-427	U	< 100	ug/kg	1.00	1.0e+02	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	11141-16-5	Aroclor-1232	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	53469-21-8	Aroclor-1242	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	12672-28-6	Aroclor-1248	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	11087-89-1	Aroclor-1254	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	11096-82-5	Aroclor-1260	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	37324-23-5	Aroclor-1262	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	08/01/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	11100-14-4	Aroclor-1268	SOIL	LA-523-427	U	< 52.0	ug/kg	1.00	52	09/01/04	08/18/04	08/24/04
<del>W040001537</del>	<del>B191F3</del>	<del>TRENT</del>	<del>100-02-7</del>	<del>4-Nitrophenol</del>	<del>SOIL</del>	<del>LA-523-456</del>	<del>U</del>	<del>&lt; 500</del>	<del>ug/kg</del>	<del>1.00</del>	<del>5.0e+02</del>	<del>09/08/04</del>	<del>08/18/04</del>	<del>08/24/04</del>
W040001537	B191F3	TRENT	106-46-7	1,4-Dichlorobenzene	SOIL	LA-523-456	U	< 330	ug/kg	1.00	3.3e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	106-96-2	Phenol	SOIL	LA-523-456	U	< 110	ug/kg	1.00	1.1e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	120-82-1	1,2,4-Trichlorobenzene	SOIL	LA-523-456	U	< 310	ug/kg	1.00	3.1e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	121-18-2	2,4-Dinitrotoluene	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	129-00-0	Pyrene	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	59-50-7	4-Chloro-3-methylphenol	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	621-64-7	N-Nitrosodi-n-dipropylamine	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	83-32-9	Acanaphthene	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	87-86-5	Pentachlorophenol	SOIL	LA-523-456	U	< 320	ug/kg	1.00	3.2e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	95-57-8	2-Chlorophenol	SOIL	LA-523-456	U	< 160	ug/kg	1.00	1.6e+02	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	126-73-8	Tributyl phosphate	SOIL	LA-523-456	U	< 71.0	ug/kg	1.00	71	09/08/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	75-35-4	1,1-Dichloroethene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	78-01-6	Trichloroethene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04
W040001537	B191F3	TRENT	71-43-2	Benzene	SOIL	LA-523-455	U	< 11.0	ug/kg	1.00	11	08/30/04	08/18/04	08/24/04

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  
X - Other flags and notes described in the comments/narrative.

DF=Dilution Factor

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

Report WGGP/ver. 1

Groundwater Remediation Program

000011

N-3

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**000012**

<b>Sample Delivery Group</b>	<b>WSCF20041462, Rev. 3</b>
<b>Sample Matrix</b>	<b>Soil</b>
<b>Sample Visual</b>	<b>N/A</b>
<b>SAF Number</b>	<b>F03-025</b>
<b>Data Deliverable</b>	<b>Summary Report</b>

### **Introduction**

One (1) 100-LW-1/LW-2 Characterization – Soil, 32.5' to 35', sample (B191F3) was received at the WSCF Laboratory on August 24, 2004. The sample was analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Groundwater Remediation Program – Letter of Instruction*, referenced in the cover letter.

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

### **Analytical Methodology for Requested Analyses**

- ICP-MS Metals by EPA Method 200.8. Analytical work was performed with no deviations to the approved method.
- Alcohols/Glycols by EPA Method 8015. Analytical work was performed with no deviations to the approved method.
- ICP-AES Metals by EPA Method 6010. Analytical work was performed with no deviations to the approved method.
- Anions by EPA Method 300. Analytical work was performed with no deviations to the approved method.
- PCB by EPA Method 8082. Analytical work was performed with no deviations to the approved method.
- Semi-VOA by EPA Method 8270. Analytical work was performed with no deviations to the approved method.
- TPH Diesel Range by WDOE Method NWTPH-Dx. Analytical work was performed with no deviations to the approved method.

- TPH Gas Range by WDOE Method NWTHPH-Gx. Analytical work was performed with no deviations to the approved method.
- VOA by EPA Method 8260A. Analytical work was performed with no deviations to the approved method.
- Cyanide by EPA Method 335.2. Analytical work was performed with no deviations to the approved method.
- pH by EPA Method 150.1. Analytical work was performed with no deviations to the approved method.
- Ammonia by EPA Method 300.7. 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.
- All RadChem analyses (AEA (Americium, Uranium and Plutonium), GEA) except Neptunium-237 were run by internal WDOE accredited WSCF procedures. Analytical work was performed with no deviations to the approved method.

### Comments

**General Comments** – The sample was sampled on 8/18/04, 11:25 and received by WSCF laboratory on 8/24/04 9:42. All holding times were met.

**ICP-MS Metals** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-15 through 2-20 for QC details. Analytical Note:

- A matrix/matrix spike duplicate samples were not analyzed on B191F3. B191F0 (SDG# 20041392), B191F2 (SDG# 20041748) and B190V5 (SDG#20041417) GRP samples were spiked. Cadmium matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Alcohols/Glycols**- The hold time for this analysis was met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-35 for QC details. Analytical Notes:

- Sample results are moisture corrected and reported on dry weight basis.
- 2-Bromoethanol (surrogate) – duplicate relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate recoveries were within established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**ICP-AES Metals (Bismuth only)** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-28 for QC details. All QC controls are within the established limits.

**Anions** - The hold times for this analysis were met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See pages 2-23 through 2-24 for QC details. Analytical Notes:

- Nitrate - the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.
- Phosphate – the matrix spike recovery was below established laboratory limits. The matrix spike duplicate recovery was within limits. Sample result was less than the detection limit and not flagged.
- Sulfate Duplicate Relative Percent Difference exceeded established laboratory limits. The RPD criterion did not apply since the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.

All other QC controls are within the established limits.

**PCB** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-26 through 2-27 for QC details. Analytical Notes:

- Decachlorobiphenyl (surrogate) spike relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate were within established limits, the sample result was not flagged.
- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**Semi-VOA** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-30 through 2-34 for QC details. Analytical Notes:

- Preparation Date: 30-august-2004.
- Pentachlorophenol laboratory control sample recovery was below established laboratory limits.
- Pentachlorophenol - matrix/matrix spike duplicate samples were not analyzed on B191F3. B17N67 (SDG# 20041457) and B191F5 (SDG#20041476) GRP samples were

spiked and the Pentachlorophenol matrix spike and/or matrix spike duplicate recoveries were below established laboratory limits. B191F3 sample result was below the detection limit and not flagged.

- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**TPH Diesel Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-25 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**TPH Gasoline Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-39 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**VOA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-36 through 2-38 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**Cyanide** - The hold time for this analysis was met. A Blank, Preparation Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-21 for QC details. Analytical Note:

- Matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Ammonia** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-22 for QC details. All QC controls are within the established limits.

**Percent Solids** - Analyzed for organic analyses moisture correction only.

**pH** - The hold time for this analysis was met. All laboratory controls were within established limits.

**RadChem** – There are no hold times associated with these WDOE accredited methods. A Blank, Laboratory Control Sample and Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page(s) 2-29, 2-40, 2-41, 2-42 and 2-43 for QC details.

Analytical Notes:

- Americium-241 – the duplicate relative percent difference exceeded established laboratory limits. All other QC controls were within limits; sample result was not flagged.
- Uranium-234, Uranium-235 and Plutonium-238 Additional Batch QC Data for Group 20042230:

<b>Radiochemical Isotopic Results</b>					
Batch ID	Associated Samples (Customer ID)	Lab Sample ID	QC Sample	Isotope	Result
23338			Blank U ISO	U-234	4.95e-01 pCi/g
				U-235	1.93e-02 pCi/g
	B191F3	W040001537	Duplicate U ISO on W040001537	U-234	2.39e+02 pCi/g (6.1%)
				U-235	1.42e+01 pCi/g (13%)
23337			Blank Pu ISO	Pu-238	1.70e-01 pCi/g
	B191F3	W040001537	Duplicate Pu ISO on W040001537	Pu-238	3.43e+00 pCi/g (27%)

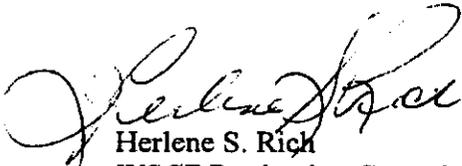
<b>Radiochemical Tracer Recovery</b>			
Sample Number	Lab Sample ID	Isotope	Tracer Recovery (Percent)
BLANK		Pu-242	78.7
LCS		Pu-242	83.2
B191F3	W040001537	Pu-242	76.1
DUPLICATE	W040001537	Pu-242	81.2

<b>Radiochemical Tracer Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Tracer Recovery (Percent)</b>
BLANK		Am-243	73.5
LCS		Am-243	78.1
B191F3	W040001537	Am-243	82.2
DUPLICATE	W040001537	Am-243	74.3
BLANK		U-232	82.1
LCS		U-232	75.4
B191F3	W040001537	U-232	34.2
DUPLICATE	W040001537	U-232	37.9

- Neptunium-237 – Spike (Np-237) recoveries for each sample are listed below. Laboratory control sample recovery was below established limits and may be attributed to a slight excess of ascorbic acid which occurs due to low iron levels in the matrix and causes retention of the Neptunium during separation. The solid matrix sample spike recoveries were within established laboratory limits. The duplicate relative percent difference exceeded established laboratory limits. Sample result was X (estimate) flagged.

<b>Radiochemical Matrix Spike Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Matrix Spike Recovery (Percent)</b>
LCS		Np-237	45.0
B191F3	W040001537	Np-237	93.5
DUPLICATE	W040001537	Np-237	104.0

All other QC controls are within the established limits.



Herlene S. Rich  
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





**Appendix 5**

**Data Validation Supporting Documentation**

**000022**

PCB DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT: 200-LW-1/LW-2			DATA PACKAGE: WSCF2004/462		
VALIDATOR: TLT		LAB: WSCF		DATE:	
			SDG: 41462		
ANALYSES PERFORMED					
SW-846 8081	SW-846 8081 (TCLP)	<b>SW-846 8082</b>	SW-846 8081 (TCLP)		
SAMPLES/MATRIX					
<del>BIBIF</del> 34/1/1-					
<del>BIBIF</del>					
B19IP3					
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 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  
 DDT and endrin breakdowns acceptable? ..... Yes No  N/A

Comments: \_\_\_\_\_  
 \_\_\_\_\_

PCB 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 analyzed? ..... Yes No N/A  
Surrogate 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 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: MS 2/26/87 NO DAS

PCB 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: duplicate RPD values -

6. SYSTEM PERFORMANCE (Levels D and E)

Chromatographic performance acceptable? ..... Yes No N/A  
Positive results resolved acceptably? ..... 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: \_\_\_\_\_

PCB 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  
Results 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 ok

9. SAMPLE CLEANUP (Levels D and E)

Fluorilic ® (or other absorbent) cleanup performed? ..... Yes No N/A  
Lot check performed? ..... Yes No N/A  
Check recoveries acceptable? ..... Yes No N/A  
GPC cleanup performed? ..... Yes No N/A  
GPC check performed? ..... Yes No N/A  
GPC check recoveries acceptable? ..... 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**

000027

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462

Matrix: SOLID

Test: PCBs complete list

SAF Number: F03-025

Sample Date: 08/23/04

Receive Date: 08/23/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
---------	---------	-------	----------	----------	-------	---------------	-------------	-------------	----

## Lab ID: W040001533 BATCH QC ASSOCIATED WITH SAMPLE

MS	Aroclor-1254	11097-89-1	741.89	75.259	% Recov	09/01/04	75.000	125.000	
MS	Decachlorobiphenyl	2051-24-3	759.85	77.100	% Recov	09/01/04	50.000	150.000	
MS	Tetrachloro-m-xylene	877-09-8	889.74	90.300	% Recov	09/01/04	50.000	150.000	
MSD	Aroclor-1254	11097-89-1	784.88	77.500	% Recov	09/01/04	75.000	125.000	
MSD	Decachlorobiphenyl	2051-24-3	827.0	101.500	% Recov	09/01/04	50.000	150.000	
MSD	Tetrachloro-m-xylene	877-09-8	851.91	84.200	% Recov	09/01/04	50.000	150.000	

## Lab ID: W040001537 BATCH QC ASSOCIATED WITH SAMPLE

MS	Aroclor-1254	11097-89-1	496.22	102.000	% Recov	09/01/04	75.000	125.000	
MS	Decachlorobiphenyl	2051-24-3	716.30	73.700	% Recov	09/01/04	50.000	150.000	
MS	Tetrachloro-m-xylene	877-09-8	828.85	85.300	% Recov	09/01/04	50.000	150.000	
MSD	Aroclor-1254	11097-89-1	518.07	108.000	% Recov	09/01/04	75.000	125.000	
MSD	Decachlorobiphenyl	2051-24-3	903.47	94.300	% Recov	09/01/04	50.000	150.000	
MSD	Tetrachloro-m-xylene	877-09-8	814.57	85.000	% Recov	09/01/04	50.000	150.000	
SPK-RPD	Aroclor-1254	11097-89-1	108.000	5.714	RPD	09/01/04	0.000	25.000	
SPK-RPD	Decachlorobiphenyl	2051-24-3	94.300	25.868	RPD	09/01/04	0.000	20.000	
SPK-RPD	Tetrachloro-m-xylene	877-09-8	85.000	0.352	RPD	09/01/04	0.000	20.000	
SURR	Decachlorobiphenyl	2051-24-3	784.79	79.900	% Recov	09/01/04	50.000	150.000	
SURR	Tetrachloro-m-xylene	877-09-8	862.77	87.900	% Recov	09/01/04	50.000	150.000	

## BATCH QC

BLANK	Aroclor-1018	12674-11-2	< 50	n/a	UGAG	09/01/04			U
BLANK	Aroclor-1221	11104-28-2	< 100	n/a	ug/kg	09/01/04			U
BLANK	Aroclor-1222	11141-18-5	< 50	n/a	ug/kg	09/01/04			U
BLANK	Aroclor-1242	53469-21-9	< 50	n/a	ug/kg	09/01/04			U

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: PCBs complete list

SAF Number: F03-025  
 Sample Date:  
 Receive Date:

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
BLANK	Aroclor-1248	12071-28-6	< 50	n/a	ug/Kg	09/01/04			U
BLANK	Aroclor-1254	11087-68-1	< 50	n/a	ug/Kg	09/01/04			U
BLANK	Aroclor-1260	11086-62-5	< 50	n/a	ug/Kg	09/01/04			U
BLANK	Aroclor-1262	37324-73-5	< 50	n/a	ug/Kg	09/01/04			U
BLANK	Aroclor-1268	11100-14-4	< 50	n/a	ug/Kg	09/01/04			U
BLANK	Decachlorobiphenyl	2061-24-3	804.25	80.400	% Recov	09/01/04	50.000	150.000	
BLANK	Tetrachloro-m-xylene	877-09-8	921.74	92.200	% Recov	09/01/04	50.000	150.000	
LCS	Aroclor-1254	11087-68-1	902.61	90.300	% Recov	09/01/04	70.000	130.000	
LCS	Decachlorobiphenyl	2061-24-3	825.89	85.600	% Recov	09/01/04	50.000	150.000	
LCS	Tetrahydro-m-xylene	877-08-8	886.69	88.700	% Recov	09/01/04	50.000	150.000	

000029

Date: 28 March 2005  
To: Fluor Hanford Inc. (technical representative)  
From: TechLaw, Inc.  
Project: 200-LW-1/LW-2 Characterization - Soil  
Subject: Inorganics - Data Package No. WSCF20041462 (SDG No. 41462)



**INTRODUCTION**

This memo presents the results of data validation on Data Package No. 41462 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
B191F3	8/18/04	Soil	C	See note 1

1 - ICP by 6010B (bismuth) and ICP/MS metals by 200.8.

Data validation was conducted in accordance with the FHI validation statement of work and the 200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan (DOE/RL-2001-66, Draft A, Redline, May 2002). 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

**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 70% to 130% (75-125% for 6010) 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.

Due to a chromium MS recovery outside QC limits (68.6%) and a MSD recovery outside QC limits (68.3%), all chromium results were qualified as estimates and

000002

flagged "J".

All other 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.

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 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  $\pm 35\%$ , 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 duplicate results were submitted for analysis.

- **Analytical Detection Limits**

Reported analytical detection levels are compared against the required target quantitation limits (RTQLs) to ensure that laboratory detection levels meet the required criteria. The lead, silver, beryllium and cadmium were reported above the RTQL. Under the FHI statement of work, no qualification is required. All other undetected results met the analyte specific RTQL.

000003

- **Completeness**

Data package No. 41462 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 a chromium MS recovery outside QC limits (68.6%) and a MSD recovery outside QC limits (68.3%), 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.

The lead, silver, beryllium and cadmium were reported above the RTQL. Under the FHI statement of work, no qualification is required.

### **REFERENCES**

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

DOE/RL-2001-66, Draft A, Redline, *200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan*, May 2002.

**Appendix 1**

**Glossary of Data Reporting Qualifiers**

**000005**

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).

000006

**Appendix 2**

**Summary of Data Qualification**

000007

METAL DATA QUALIFICATION SUMMARY\*

SDG: 41462	REVIEWER: TLI	DATE: 3/28/05	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Chromium	J	All	MS/MSD recovery

\* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

000008

**Appendix 3**

**Qualified Data Summary and Annotated Laboratory Reports**

**000009**

Project: FLUOR-HANFORD					
Laboratory: WSCF					
Case		SDG: WSCF20041462			
Sample Number		B191F3			
Remarks					
Sample Date		8/18/04			
Inorganics	RTQL	Result	Q	Result	Q
Bismuth	10	<5.00	U		
Nickel	4	10.0			
Silver	0.5	<1.93	U		
Antimony	6	<4.82	U		
Barium	20	136			
Beryllium*	0.5	<2.90	U		
Cadmium*	0.5	<0.965	U		
Chromium	0.5	14.8	J		
Copper	2.5	29.1			
Lead*	10	<11.6	U		
Mercury*	0.2	1.80			
Uranium	1	652			
Arsenic	10	5.65			
Selenium	10	<2.90	U		
* - RTQL exceeded					

000010  
 pc/4-28-05

# WSCF ANALYTICAL RESULTS REPORT

Attention: Steve Trent  
Project: F03-025: F03-025

Group #: WSCF20041462

Sample #	Client ID	CAS #	Test Performed	Matrix	WSCF Method	RQ	Result	Unit	DF	MDL	Analyze	Sample	Receive
<b>Inorganic</b>													
W040001537	B191F3	TRENT	57-12-5	Cyanide	SOIL	LA-695-402	EU	< 0.200	mg/kg	1.00	0.20	09/01/04	08/18/04 / 08/24/04
W040001537	B191F3	TRENT	NH4-N	Nitrogen in ammonium	SOIL	LA-503-401	U	< 0.200	mg/kg	50.00	0.20	08/30/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	TS	Total solids	SOIL	LA-519-412		93.7	%	1.00	0.0	09/01/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	PH	pH Measurement	SOIL	LA-212-411		9.35	pH	1.00	0.010	09/01/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	16984-48-8	Fluoride	SOIL	LA-533-410	U	< 1.15	mg/kg	50.00	1.2	09/03/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	16887-00-6	Chloride	SOIL	LA-533-410		15.7	mg/kg	50.00	2.6	09/03/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	NO2-N	Nitrogen in Nitrite	SOIL	LA-533-410	U	< 0.950	mg/kg	50.00	0.95	09/03/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	NO3-N	Nitrogen in Nitrate	SOIL	LA-533-410	B	3.48	mg/kg	50.00	0.85	09/03/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	14265-44-2	Phosphate	SOIL	LA-533-410	U	< 2.70	mg/kg	50.00	2.7	09/03/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	14265-78-8	Sulfate	SOIL	LA-522-410	B	10.2	mg/kg	50.00	5.0	09/03/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-89-9	Bismuth	SOIL	LA-505-411	U	< 5.00	mg/kg	1.00	5.0	08/07/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-02-0	Nickel	SOIL	LA-505-412		10.0	mg/kg	9.65	4.8	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-22-4	Silver	SOIL	LA-505-412	U	< 1.93	mg/kg	9.65	1.9	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-36-0	Antimony	SOIL	LA-505-412	U	< 4.82	mg/kg	9.65	4.8	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-39-3	Barium	SOIL	LA-505-412		136	mg/kg	9.65	1.9	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-41-7	Beryllium	SOIL	LA-505-412	U	< 2.90	mg/kg	9.65	2.9	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-43-9	Cadmium	SOIL	LA-505-412	U	< 0.965	mg/kg	9.65	0.96	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-47-3	Chromium	SOIL	LA-505-412	J	14.8	mg/kg	9.65	2.9	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-50-8	Copper	SOIL	LA-505-412		29.1	mg/kg	9.65	4.8	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7439-92-1	Lead	SOIL	LA-505-412	U	< 11.6	mg/kg	9.65	12	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7439-97-6	Mercury	SOIL	LA-505-412		1.80	mg/kg	9.65	0.96	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-61-1	Uranium	SOIL	LA-505-412		852	mg/kg	9.65	0.96	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7440-38-2	Arsenic	SOIL	LA-505-412		5.65	mg/kg	9.65	2.9	08/31/04	08/18/04 08/24/04
W040001537	B191F3	TRENT	7782-49-2	Selenium	SOIL	LA-505-412	U	< 2.90	mg/kg	9.65	2.9	08/31/04	08/18/04 08/24/04

000011

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  
X - Other flags and notes described in the comments/narrative.

DF=Dilution Factor

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

Report WGPP/ver. 1

Groundwater Remediation Program

*Yes*  
*3/25/02*

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**000012**

<b>Sample Delivery Group</b>	<b>WSCF20041462, Rev. 3</b>
<b>Sample Matrix</b>	<b>Soil</b>
<b>Sample Visual</b>	<b>N/A</b>
<b>SAF Number</b>	<b>F03-025</b>
<b>Data Deliverable</b>	<b>Summary Report</b>

**Introduction**

One (1) 100-LW-1/LW-2 Characterization – Soil, 32.5' to 35', sample (B191F3) was received at the WSCF Laboratory on August 24, 2004. The sample was analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Groundwater Remediation Program – Letter of Instruction*, referenced in the cover letter.

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

**Analytical Methodology for Requested Analyses**

- ICP-MS Metals by EPA Method 200.8. Analytical work was performed with no deviations to the approved method.
- Alcohols/Glycols by EPA Method 8015. Analytical work was performed with no deviations to the approved method.
- ICP-AES Metals by EPA Method 6010. Analytical work was performed with no deviations to the approved method.
- Anions by EPA Method 300. Analytical work was performed with no deviations to the approved method.
- PCB by EPA Method 8082. Analytical work was performed with no deviations to the approved method.
- Semi-VOA by EPA Method 8270. Analytical work was performed with no deviations to the approved method.
- TPH Diesel Range by WDOE Method NWTPH-Dx. Analytical work was performed with no deviations to the approved method.

- TPH Gas Range by WDOE Method NWTHPH-Gx. Analytical work was performed with no deviations to the approved method.
- VOA by EPA Method 8260A. Analytical work was performed with no deviations to the approved method.
- Cyanide by EPA Method 335.2. Analytical work was performed with no deviations to the approved method.
- pH by EPA Method 150.1. Analytical work was performed with no deviations to the approved method.
- Ammonia by EPA Method 300.7. 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.
- All RadChem analyses (AEA (Americium, Uranium and Plutonium), GEA) except Neptunium-237 were run by internal WDOE accredited WSCF procedures. Analytical work was performed with no deviations to the approved method.

### Comments

**General Comments** – The sample was sampled on 8/18/04, 11:25 and received by WSCF laboratory on 8/24/04 9:42. All holding times were met.

**ICP-MS Metals** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-15 through 2-20 for QC details. Analytical Note:

- A matrix/matrix spike duplicate samples were not analyzed on B191F3. B191F0 (SDG# 20041392), B191F2 (SDG# 20041748) and B190V5 (SDG#20041417) GRP samples were spiked. Cadmium matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Alcohols/Glycols**- The hold time for this analysis was met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-35 for QC details. Analytical Notes:

- Sample results are moisture corrected and reported on dry weight basis.
- 2-Bromoethanol (surrogate) – duplicate relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate recoveries were within established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**ICP-AES Metals (Bismuth only)** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-28 for QC details. All QC controls are within the established limits.

**Anions** - The hold times for this analysis were met. A Blank, Duplicate, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See pages 2-23 through 2-24 for QC details. Analytical Notes:

- Nitrate - the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.
- Phosphate – the matrix spike recovery was below established laboratory limits. The matrix spike duplicate recovery was within limits. Sample result was less than the detection limit and not flagged.
- Sulfate Duplicate Relative Percent Difference exceeded established laboratory limits. The RPD criterion did not apply since the result was less than the reportable detection limit, but greater than or equal to the method detection limit. The sample result was B flagged.

All other QC controls are within the established limits.

**PCB** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-26 through 2-27 for QC details. Analytical Notes:

- Decachlorobiphenyl (surrogate) spike relative percent difference exceeded established laboratory limits. Both the matrix spike and matrix spike duplicate were within established limits, the sample result was not flagged.
- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**Semi-VOA** – The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-30 through 2-34 for QC details. Analytical Notes:

- Preparation Date: 30-august-2004.
- Pentachlorophenol laboratory control sample recovery was below established laboratory limits.
- Pentachlorophenol - matrix/matrix spike duplicate samples were not analyzed on B191F3. B17N67 (SDG# 20041457) and B191F5 (SDG#20041476) GRP samples were

spiked and the Pentachlorophenol matrix spike and/or matrix spike duplicate recoveries were below established laboratory limits. B191F3 sample result was below the detection limit and not flagged.

- Sample results are moisture corrected and reported on dry weight basis.

All other QC controls are within the established limits.

**TPH Diesel Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-25 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**TPH Gasoline Range-WA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per GRP Letter of Instruction. See page 2-39 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**VOA** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See pages 2-36 through 2-38 for QC details. Analytical Note:

- Sample results are moisture corrected and reported on dry weight basis.

All QC controls are within the established limits.

**Cyanide** - The hold time for this analysis was met. A Blank, Preparation Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-21 for QC details. Analytical Note:

- Matrix spike and matrix spike duplicate recoveries were below established laboratory limits. Sample result was not flagged.

All other QC controls are within the established limits.

**Ammonia** - The hold time for this analysis was met. A Blank, Laboratory Control Sample, Matrix Spike and Matrix Spiked Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page 2-22 for QC details. All QC controls are within the established limits.

**Percent Solids** - Analyzed for organic analyses moisture correction only.

**pH** - The hold time for this analysis was met. All laboratory controls were within established limits.

**RadChem** - There are no hold times associated with these WDOE accredited methods. A Blank, Laboratory Control Sample and Duplicate were analyzed with each delivery group per the GRP Letter of Instruction. See page(s) 2-29, 2-40, 2-41, 2-42 and 2-43 for QC details.

Analytical Notes:

- Americium-241 - the duplicate relative percent difference exceeded established laboratory limits. All other QC controls were within limits; sample result was not flagged.
- Uranium-234, Uranium-235 and Plutonium-238 Additional Batch QC Data for Group 20042230:

<b>Radiochemical Isotopic Results</b>					
Batch ID	Associated Samples (Customer ID)	Lab Sample ID	QC Sample	Isotope	Result
23338			Blank U ISO	U-234	4.95e-01 pCi/g
				U-235	1.93e-02 pCi/g
	B191F3	W040001537	Duplicate U ISO on W040001537	U-234	2.39e+02 pCi/g (6.1%)
				U-235	1.42e+01 pCi/g (13%)
23337			Blank Pu ISO	Pu-238	1.70e-01 pCi/g
	B191F3	W040001537	Duplicate Pu ISO on W040001537	Pu-238	3.43e+00 pCi/g (27%)

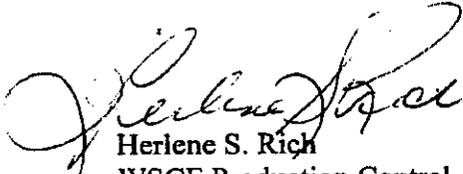
<b>Radiochemical Tracer Recovery</b>			
Sample Number	Lab Sample ID	Isotope	Tracer Recovery (Percent)
BLANK		Pu-242	78.7
LCS		Pu-242	83.2
B191F3	W040001537	Pu-242	76.1
DUPLICATE	W040001537	Pu-242	81.2

<b>Radiochemical Tracer Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Tracer Recovery (Percent)</b>
BLANK		Am-243	73.5
LCS		Am-243	78.1
B191F3	W040001537	Am-243	82.2
DUPLICATE	W040001537	Am-243	74.3
BLANK		U-232	82.1
LCS		U-232	75.4
B191F3	W040001537	U-232	34.2
DUPLICATE	W040001537	U-232	37.9

- Neptunium-237 – Spike (Np-237) recoveries for each sample are listed below. Laboratory control sample recovery was below established limits and may be attributed to a slight excess of ascorbic acid which occurs due to low iron levels in the matrix and causes retention of the Neptunium during separation. The solid matrix sample spike recoveries were within established laboratory limits. The duplicate relative percent difference exceeded established laboratory limits. Sample result was X (estimate) flagged.

<b>Radiochemical Matrix Spike Recovery</b>			
<b>Sample Number</b>	<b>Lab Sample ID</b>	<b>Isotope</b>	<b>Matrix Spike Recovery (Percent)</b>
LCS		Np-237	45.0
B191F3	W040001537	Np-237	93.5
DUPLICATE	W040001537	Np-237	104.0

All other QC controls are within the established limits.



Herlene S. Rich  
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

FLUOR Hanford Inc. 9/23		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		PG-025-095		PAGE 1 OF 2	
COLLECTOR Pope/Hsiao/Wiberg/Tyn		COMPANY CONTACT TREAT, STEVE		PROJECT COORDINATOR TREAT, SJ		PRICE CODE SN	
SAMPLING LOCATION 216-S-20; SEC-032AR 77.5' 55'		PROJECT DESCRIPTION 200-LW-JAN-2 Characterization - Sol		SAF NO. PG-025		AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO.		FIELD LOGBOOK NO. HW-4-396 I		METHOD OF EQUIPMENT Government Vehicle		DATA TURNOVER 45 Days / 45 Days	
SHIPPED TO Waste Sampling & Characterization		OFFSITE PROPERTY NO. N/A		TITLE OF LADINGS/AIR BILL NO. N/A			
MATRIX A-Air L-Liquid S-Solid D-Dust G-Gas O-Oil S-Sediment T-Tissue V-Vegetation W-Water M-Metal X-Other		PRESERVATION		Cooler		None	
POSSIBLE SAMPLE HAZARDOUS/ REBARDS N/A		TYPE OF CONTAINER		Cooler		None	
NO. OF CONTAINERS(S)		VOLUME		Cooler		None	
SPECIAL HANDLING AND/OR STORAGE N/A		SAMPLE ANALYSES		Cooler		None	
SAMPLE NO.		SAMPLE DATE		Cooler		None	
8191F3		8/18/04		Cooler		None	
1404001537		1125		Cooler		None	
CHAIN OF POSSESSION		SERIAL / PORT NAMES		SPECIAL INSTRUCTIONS		SEE PAGE 2 FOR ALL SPECIAL INSTRUCTIONS	
RECEIVED BY / REMOVED FROM		RECEIVED BY / STORED IN		DATE/TIME			
R. P. FOSTER / Puffly 5-20		SITE F216 5-20		8/18/04 1200			
RECEIVED BY / REMOVED FROM		RECEIVED BY / STORED IN		DATE/TIME			
R. P. FOSTER / Puffly 5-20		R. P. FOSTER / Puffly		8/24/04 0920			
RECEIVED BY / REMOVED FROM		RECEIVED BY / STORED IN		DATE/TIME			
R. P. FOSTER / Puffly 5-20		R. P. FOSTER / Puffly		8/24/04 0942			
RECEIVED BY / REMOVED FROM		RECEIVED BY / STORED IN		DATE/TIME			
RECEIVED BY / REMOVED FROM		RECEIVED BY / STORED IN		DATE/TIME			
RECEIVED BY / REMOVED FROM		RECEIVED BY / STORED IN		DATE/TIME			
LABORATORY SECTION		RECEIVED BY		TITLE		DATE/TIME	
FINAL SAMPLE DISPOSITION		DISPOSAL METHOD		DEPOSED BY		DATE/TIME	

000020



**Appendix 5**

**Data Validation Supporting Documentation**

**000022**

**INORGANIC ANALYSIS DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT: 200-LW-1/LW 2			DATA PACKAGE: WSCF 2004 1467		
VALIDATOR: TCI		LAB: WSCF		DATE: 3/12/09	
			SDG: 414162		
ANALYSES PERFORMED					
<b>SW-846/ICP</b>	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide		
SAMPLES/MATRIX					
<del>B19 BF 3/11/09</del>					
B19 IF3					
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: CR - 681670 - J MS  
11 683000 - J MSD NO PAC

**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  
Results 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: Silver, beryllium, cadmium, lead, ~~mercury~~  
4/1/15

---

---

---

---

---

---

**Appendix 6**

**Additional Documentation Requested by Client**

**000028**

# WSCF ANALYTICAL LABORATORY QC REPORT

SAF Number: F03-025  
 Sample Date: 08/10/04  
 Receive Date: 08/10/04

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: ICP-2008 MS All possible metal

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
MS	Silver	7440-22-4	351.9	97.975	% Recov	08/31/04	70.000	130.000	
MS	Arsenic	7440-38-2	397.7	99.425	% Recov	08/31/04	70.000	130.000	
MS	Sodium	7440-39-3	359.5	98.875	% Recov	08/31/04	70.000	130.000	
MS	Beryllium	7440-41-7	418.3	104.575	% Recov	08/31/04	70.000	130.000	
MS	Cadmium	7440-43-9	405.8	101.400	% Recov	08/31/04	70.000	130.000	
MS	Chromium	7440-47-3	398.16	99.540	% Recov	08/31/04	70.000	130.000	
MS	Copper	7440-50-8	405.1	101.275	% Recov	08/31/04	70.000	130.000	
MS	Mercury	7439-97-6	22.06	110.300	% Recov	08/31/04	70.000	130.000	
MS	Nickel	7440-02-0	403.84	106.710	% Recov	08/31/04	70.000	130.000	
MS	Lead	7439-92-1	398.9	99.975	% Recov	08/31/04	70.000	130.000	
MS	Antimony	7440-36-3	398.4	99.600	% Recov	08/31/04	70.000	130.000	
MS	Selenium	7782-49-2	426.7	106.675	% Recov	08/31/04	70.000	130.000	
MS	Uranium	7440-61-1	394.1	98.525	% Recov	08/31/04	70.000	130.000	
MSD	Silver	7440-22-4	363.6	90.900	% Recov	08/31/04	70.000	130.000	
MSD	Arsenic	7440-38-2	402.3	100.575	% Recov	08/31/04	70.000	130.000	
MSD	Barium	7440-39-3	366.1	91.525	% Recov	08/31/04	70.000	130.000	
MSD	Beryllium	7440-41-7	492.5	109.625	% Recov	08/31/04	70.000	130.000	
MSD	Cadmium	7440-43-9	426.3	106.575	% Recov	08/31/04	70.000	130.000	
MSD	Chromium	7440-47-3	393.56	98.390	% Recov	08/31/04	70.000	130.000	
MSD	Copper	7440-50-8	410.6	102.650	% Recov	08/31/04	70.000	130.000	
MSD	Mercury	7439-97-6	22.91	114.550	% Recov	08/31/04	70.000	130.000	
MSD	Nickel	7440-02-0	393.64	98.410	% Recov	08/31/04	70.000	130.000	
MSD	Lead	7439-92-1	414.1	103.525	% Recov	08/31/04	70.000	130.000	
MSD	Antimony	7440-36-0	411	102.750	% Recov	08/31/04	70.000	130.000	
MSD	Selenium	7782-49-3	427.5	106.875	% Recov	08/31/04	70.000	130.000	
MSD	Uranium	7440-61-1	408	102.000	% Recov	08/31/04	70.000	130.000	

Lab ID: W040001442  
 BATCH QC ASSOCIATED WITH SAMPLE

0000029

# WSCF ANALYTICAL LABORATORY QC REPORT

SAF Number: F03-025  
 Sample Date: 08/10/04  
 Receive Date: 08/10/04

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: ICP-2008 MS All possible metal

QC Type      Analyte      CAS #      QC Found      QC Yield      Units      Analysis Date      Lower Limit      Upper Limit      RQ

**Lab ID: W040001462**  
**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	385.3	81.325	% Recov	08/31/04	70.000	130.000	
MS	Arsenic	7440-39-2	434.8	108.700	% Recov	08/31/04	70.000	130.000	
MS	Barium	7440-39-3	414.74	103.685	% Recov	08/31/04	70.000	130.000	
MS	Beryllium	7440-41-7	434.6	108.650	% Recov	08/31/04	70.000	130.000	
MS	Cadmium	7440-43-9	423.8	105.950	% Recov	08/31/04	70.000	130.000	
MS	Chromium	7440-47-9	274.6	89.650	% Recov	08/31/04	70.000	130.000	
MS	Copper	7440-50-8	432.13	108.032	% Recov	08/31/04	70.000	130.000	
MS	Mercury	7439-97-8	22.74	119.700	% Recov	08/31/04	70.000	130.000	
MS	Nickel	7440-02-0	353.8	88.450	% Recov	08/31/04	70.000	130.000	
MS	Lead	7439-92-1	411.1	102.775	% Recov	08/31/04	70.000	130.000	
MS	Antimony	7440-36-0	427.8	106.950	% Recov	08/31/04	70.000	130.000	
MS	Selenium	7782-49-2	444.1	111.025	% Recov	08/31/04	70.000	130.000	
MS	Uranium	7440-61-1	408.9	102.225	% Recov	08/31/04	70.000	130.000	
MSD	Silver	7440-22-4	355.2	88.800	% Recov	08/31/04	70.000	130.000	
MSD	Arsenic	7440-39-2	420.8	105.150	% Recov	08/31/04	70.000	130.000	
MSD	Barium	7440-39-3	407.04	101.780	% Recov	08/31/04	70.000	130.000	
MSD	Beryllium	7440-41-7	441.7	110.425	% Recov	08/31/04	70.000	130.000	
MSD	Calcium	7440-33-8	419.6	104.800	% Recov	08/31/04	70.000	130.000	
MSD	Chromium	7440-47-3	273.4	68.350	% Recov	08/31/04	70.000	130.000	
MSD	Copper	7440-50-8	423.73	105.933	% Recov	08/31/04	70.000	130.000	
MSD	Mercury	7439-97-8	23.19	115.950	% Recov	08/31/04	70.000	130.000	
MSD	Nickel	7440-02-0	341.6	85.400	% Recov	08/31/04	70.000	130.000	
MSD	Lead	7439-92-1	407.5	101.875	% Recov	08/31/04	70.000	130.000	
MSD	Antimony	7440-36-0	422.6	105.850	% Recov	08/31/04	70.000	130.000	
MSD	Selenium	7782-49-2	448.1	112.025	% Recov	08/31/04	70.000	130.000	
MSD	Uranium	7440-61-1	402.1	100.525	% Recov	08/31/04	70.000	130.000	

000030

# WSCF ANALYTICAL LABORATORY QC REPORT

SAF Number: F03-025  
 Sample Date: 08/19/04  
 Receive Date: 08/20/04

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: ICP-2008 MS All possible metal

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
MS	Silver	7440-22-4	358.1	89.525	% Recov	08/31/04	70.000	130.000	
MS	Arsenic	7440-38-2	428.3	107.075	% Recov	08/31/04	70.000	130.000	
MS	Barium	7440-39-3	413.83	103.465	% Recov	08/31/04	70.000	130.000	
MS	Beryllium	7440-41-7	442.5	110.625	% Recov	08/31/04	70.000	130.000	
MS	Cadmium	7440-43-9	431.5	107.875	% Recov	08/31/04	70.000	130.000	
MS	Chromium	7440-47-3	401.22	100.305	% Recov	08/31/04	70.000	130.000	
MS	Copper	7440-50-8	420.5	105.125	% Recov	08/31/04	70.000	130.000	
MS	Mercury	7439-97-6	22.67	113.350	% Recov	08/31/04	70.000	130.000	
MS	Nickel	7440-33-0	412.4	103.105	% Recov	08/31/04	70.000	130.000	
MS	Lead	7439-92-1	420.3	106.075	% Recov	08/31/04	70.000	130.000	
MS	Antimony	7440-36-0	457.3	101.825	% Recov	08/31/04	70.000	130.000	
MS	Selenium	7782-49-2	457.9	114.475	% Recov	08/31/04	70.000	130.000	
MS	Uranium	7440-61-1	418.04	104.010	% Recov	08/31/04	70.000	130.000	
MSD	Silver	7440-22-4	360.3	90.075	% Recov	08/31/04	70.000	130.000	
MSD	Arsenic	7440-38-2	441.7	110.425	% Recov	08/31/04	70.000	130.000	
MSD	Barium	7440-39-3	428.23	107.058	% Recov	08/31/04	70.000	130.000	
MSD	Beryllium	7440-41-7	458.9	114.725	% Recov	08/31/04	70.000	130.000	
MSD	Cadmium	7440-43-9	430.5	107.625	% Recov	08/31/04	70.000	130.000	
MSD	Chromium	7440-47-3	408.62	102.155	% Recov	08/31/04	70.000	130.000	
MSD	Copper	7440-50-8	432.9	108.225	% Recov	08/31/04	70.000	130.000	
MSD	Mercury	7439-97-6	23.43	117.150	% Recov	08/31/04	70.000	130.000	
MSD	Nickel	7440-02-0	424.8	106.200	% Recov	08/31/04	70.000	130.000	
MSD	Lead	7439-92-1	423.5	105.875	% Recov	08/31/04	70.000	130.000	
MSD	Antimony	7440-36-0	399.7	99.925	% Recov	08/31/04	70.000	130.000	
MSD	Selenium	7782-49-2	458	114.000	% Recov	08/31/04	70.000	130.000	
MSD	Uranium	7440-61-1	419.24	104.810	% Recov	08/31/04	70.000	130.000	
SPK-RPD	Silver	7440-22-4	99.075	0.812	RPD	08/31/04	0.000	20.000	
SPK-RPD	Arsenic	7440-38-2	110.425	3.080	RPD	08/31/04	0.000	20.000	

000031

# WSCF ANALYTICAL LABORATORY QC REPORT

SAF Number: F03-025  
 Sample Date: 08/19/04  
 Receive Date: 08/20/04

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: ICP-2008 MS All possible metal

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
SPK-RPD	Bismuth	7440-38-3	107.058	3.396	RPD	08/31/04	0.000	20.000	
SPK-RPD	Beryllium	7440-41-7	114.725	3.639	RPD	08/31/04	0.000	20.000	
SPK-RPD	Cadmium	7440-49-9	107.625	0.232	RPD	08/31/04	0.000	20.000	
SPK-RPD	Chromium	7440-47-3	102.155	1.828	RPD	08/31/04	0.000	20.000	
SPK-RPD	Copper	7440-50-9	106.225	2.908	RPD	08/31/04	0.000	20.000	
SPK-RPD	Nickel	7440-02-0	106.200	2.902	RPD	08/31/04	0.000	20.000	
SPK-RPD	Lead	7439-92-1	105.675	0.758	RPD	08/31/04	0.000	20.000	
SPK-RPD	Antimony	7440-36-0	98.925	1.884	RPD	08/31/04	0.000	20.000	
SPK-RPD	Selenium	7782-49-2	114.000	0.418	RPD	08/31/04	0.000	20.000	

## Lab ID: W040001533 BATCH QC ASSOCIATED WITH SAMPLE

MS	Mercury	7439-97-6	22.37	110.850	% Recov	08/31/04	70.000	130.000	
MS	Uranium	7440-61-1	414.5	103.625	% Recov	08/31/04	70.000	130.000	
MSD	Mercury	7439-97-6	22.32	111.600	% Recov	08/31/04	70.000	130.000	
MSD	Uranium	7440-61-1	408.7	102.425	% Recov	08/31/04	70.000	130.000	
SPK-RPD	Mercury	7439-97-6	111.600	0.674	RPD	08/31/04	0.000	20.000	
SPK-RPD	Uranium	7440-61-1	102.425	1.165	RPD	08/31/04	0.000	20.000	

## Lab ID: W04DC00147 BATCH QC ASSOCIATED WITH SAMPLE

MS	Silver	7440-22-4	320.2	80.050	% Recov	08/31/04	70.000	130.000	
MS	Arsenic	7440-38-2	430.01	107.502	% Recov	08/31/04	75.000	125.000	
MS	Barium	7440-39-3	458.67	114.668	% Recov	08/31/04	70.000	130.000	
MS	Cadmium	7440-49-9	424.58	106.145	% Recov	08/31/04	75.000	125.000	
MS	Chromium	7440-47-3	NA	n/a	% Recov	08/31/04	75.000	125.000	
MS	Mercury	7439-97-6	38.78	148.900	% Recov	08/31/04	70.000	130.000	*
MS	Lead	7439-92-1	701.6	175.400	% Recov	08/31/04	75.000	125.000	*
MS	Selenium	7782-49-2	454.4	113.600	% Recov	08/31/04	75.000	125.000	
MSD	Silver	7440-22-4	303.1	75.775	% Recov	08/31/04	70.000	130.000	

000032

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF20041462  
 Matrix: SOLID  
 Test: ICP-2008 MS All possible metal

SAF Number: F03-025  
 Sample Date: 08/24/04  
 Receive Date: 08/24/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
MSD	Arsenic	7440-39-2	407.81	101.953	% Recov	08/31/04	75.000	125.000	
MSD	Barium	7440-39-3	387.87	91.988	% Recov	08/31/04	70.000	130.000	
MSD	Cadmium	7440-43-9	408.08	101.720	% Recov	08/31/04	75.000	125.000	
MSD	Chromium	7440-47-3	NA	n/a	% Recov	08/31/04	75.000	125.000	
MSD	Mercury	7439-97-6	23.35	116.750	% Recov	08/31/04	70.000	130.000	
MSD	Lead	7439-92-1	348.1	86.525	% Recov	08/31/04	75.000	125.000	
MSD	Selenium	7782-49-2	442.8	110.700	% Recov	08/31/04	75.000	125.000	

## BATCH QC

BLANK	Silver	7440-22-4	<0.2	n/a	ug/L	08/31/04	-0.440	0.440	U
BLANK	Arsenic	7440-39-2	<0.3	n/a	ug/L	08/31/04	-0.860	0.860	U
BLANK	Barium	7440-39-3	<0.2	n/a	ug/L	08/31/04	-0.440	0.440	U
BLANK	Beryllium	7440-41-7	<0.3	n/a	ug/L	08/31/04	-0.860	0.860	U
BLANK	Cadmium	7440-43-9	<0.1	n/a	ug/L	08/31/04	-0.220	0.220	U
BLANK	Chromium	7440-47-3	<0.3	n/a	ug/L	08/31/04	-0.860	0.860	U
BLANK	Copper	7440-50-8	<0.5	n/a	ug/L	08/31/04	-1.100	1.100	U
BLANK	Mercury	7439-97-6	0.12	0.120	ug/L	08/31/04	-0.220	0.220	U
BLANK	Nickel	7440-02-0	<0.5	n/a	ug/L	08/31/04	-1.100	1.100	U
BLANK	Lead	7439-92-1	<1.2	n/a	ug/L	08/31/04	-2.840	2.840	U
BLANK	Antimony	7440-36-0	0.53	0.530	ug/L	08/31/04	-1.100	1.100	U
BLANK	Selenium	7782-49-2	<0.3	n/a	ug/L	08/31/04	-0.860	0.860	U
BLANK	Uranium	7440-61-1	<0.1	n/a	ug/L	08/31/04	-0.220	0.220	U
LCS	Silver	7440-22-4	186.4	139.832	% Recov	08/31/04	110.000	170.000	
LCS	Arsenic	7440-39-2	203.2	104.205	% Recov	08/31/04	82.000	142.000	
LCS	Barium	7440-39-3	386.2	101.071	% Recov	08/31/04	70.000	123.000	
LCS	Beryllium	7440-41-7	83.95	111.487	% Recov	08/31/04	82.000	128.000	
LCS	Cadmium	7440-43-9	75.36	109.854	% Recov	08/31/04	88.000	127.000	
LCS	Chromium	7440-47-3	83.85	98.936	% Recov	08/31/04	50.000	128.000	
LCS	Copper	7440-50-8	131.5	103.543	% Recov	08/31/04	81.000	134.000	
LCS	Mercury	7439-97-6	10.37	110.202	% Recov	08/31/04	75.000	114.000	

000033

# WSCF ANALYTICAL LABORATORY QC REPORT

SDG Number: WSCF2004146Z  
 Matrix: SOLID  
 Test: ICP Metals Analysis, Grd H2O P

SAF Number: F03-025  
 Sample Date: 08/06/04  
 Receive Date: 08/06/04

QC Type	Analyte	CAS #	QC Found	QC Yield	Units	Analysis Date	Lower Limit	Upper Limit	RQ
---------	---------	-------	----------	----------	-------	---------------	-------------	-------------	----

**Lab ID: W040001421**  
**BATCH QC ASSOCIATED WITH SAMPLE**

MS	Bismuth	7440-89-9	475	100.423	% Recov	09/07/04	75.000	125.000	
MSD	Bismuth	7440-89-9	482	102.075	% Recov	09/07/04	75.000	125.000	

**Lab ID: W040001537**  
**BATCH QC ASSOCIATED WITH SAMPLE**

MS	Bismuth	7440-89-9	485	97.980	% Recov	09/07/04	75.000	125.000	
MSD	Bismuth	7440-89-9	490	95.391	% Recov	09/07/04	75.000	125.000	
SPK-RPD	Bismuth	7440-89-9	99.381	1.430	RPD	09/07/04	0.000	20.000	

**BATCH QC**

BLANK	Bismuth	7440-89-9	<5	n/a	ng/L	09/07/04	1.000	0.065	U
LCS	Bismuth	7440-89-9	505	101.000	% Recov	09/07/04	80.000	120.000	

000035