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River Corridor Closure Contract

300 Area Remedial Investigation/Feasibility Study Data Quality Assessment Report

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Washington Closure Hanford

Prepared for the U.S. Department of Energy, Richland Operations Office
Office of Assistant Manager for River Corridor

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TABLE OF CONTENTS

1.0 INTRODUCTION 1-1

2.0 LABORATORY QUALITY CONTROL PARAMETERS DISCUSSION 2-1

2.1 HOLDING TIMES 2-8

2.2 METHOD DETECTION LIMITS 2-9

2.3 METHOD BLANK RESULTS 2-9

2.4 FIELD EQUIPMENT BLANK RESULTS 2-10

2.5 FIELD TRIP BLANK RESULTS 2-11

2.6 MATRIX SPIKE RECOVERIES 2-12

2.7 LABORATORY CONTROL SAMPLES 2-13

2.8 MATRIX SPIKE DUPLICATES 2-13

2.9 LABORATORY DUPLICATE RESULTS 2-13

2.10 FIELD DUPLICATE RESULTS 2-13

3.0 DATA USABILITY 3-1

4.0 REFERENCES 4-1

APPENDICES

A 300 AREA REMEDIAL INVESTIGATION RELATIVE PERCENT DIFFERENCE CALCULATIONS ..... A-i

TABLES

1. Analytical Laboratories. 1-1
2. Laboratory Analytical Methods 1-1
3. Summary of Sample Delivery Groups Subject to Data Assessment 2-2
4. Holding Times. 2-8
5. Summary of Field Equipment Blank Results 2-10
6. Field Trip Blank and Field Transfer Blank Volatile Organic Analysis Results 2-11
7. Field Duplicate Laboratory Quality Control Review. 2-14
8. 300 Area Review Qualifiers for Inorganic Analytes 3-3
9. 300 Area Review Qualifiers for Batch Leach Inorganic Analytes 3-7
10. 300 Area Review Qualifiers for Radionuclides 3-11
11. 300 Area Review Qualifiers for Polynuclear Aromatic Hydrocarbons. 3-15

12. 300 Area Review Qualifiers for Total Organic Carbon and Polychlorinated Biphenyls 3-16
13. 300 Area Review Qualifiers for Semivolatile Organic Compounds – Part A 3-21
14. 300 Area Review Qualifiers for Semivolatile Organic Compounds – Part B 3-23
15. 300 Area Review Qualifiers for Volatile Organic Compounds 3-25

1.0 INTRODUCTION

This data quality assessment (DQA) has been prepared to support the vadose zone characterization component of the 300 Area remedial investigation/feasibility study. The DQA was performed in accordance with EPA/240/B-06/002, *Data Quality Assessment: A Reviewer's Guide EPA QA/G-9R*, and EPA/240/B-06/003, *Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S*. The contents of this DQA specifically address laboratory quality control (QC) results. The laboratory QC results were evaluated against the requirements and guidelines provided in the *300 Area Remedial Investigation/Feasibility Study Sampling and Analysis Plan for the 300-FF-1, 300-FF-2 and 300-FF-5 Operable Units* (300 Area SAP) (DOE/RL-2009-45) and the associated Tri-Party Agreement Change Notices (TPA-CN-352 and TPA-CN-374).

Table 1 presents information on the analytical laboratories whose work was reviewed. Table 2 presents a summary of the analytical methods used for the analyses.

Table 1. Analytical Laboratories.

Name	Address
Lionville Laboratory, Inc.	208 Welsh Pond Road, Exton, Pennsylvania 19341
Eberline Analytical Corporation/Eberline Services	2030 Wright Avenue, Richmond, California 94804
Test America Laboratories	2800 George Washington Way, Richland, Washington 99354
	13715 Rider Trail North, Earth City, Missouri 63045

Table 2. Laboratory Analytical Methods. (2 Pages)

Parameter	Analytical Method
Chemicals	
ICP metals	EPA Method 6010[a]
Mercury	EPA Method 7471B
Hexavalent chromium (Cr-VI)	EPA Method 7196A
Anions	EPA Method 300.0
Nitrate/nitrite	EPA Method 353.3
Volatile organic compounds	EPA Method 8260B
Semivolatile organic compounds	EPA Method 8270C
pH	EPA Method 9045 (soil) EPA Method 9040 (water)
Polychlorinated biphenyls	EPA Method 8082
Polynuclear aromatic hydrocarbons	EPA Method 8310

Table 2. Laboratory Analytical Methods. (2 Pages)

Parameter	Analytical Method
Total organic carbon	EPA Method 9060
Radionuclides	
Gamma-emitting radioisotopes	Gamma energy analysis
Tritium	LSC - Tritium
Technetium-99	LSC - Tc-99
Plutonium-238, -239/240	Alpha energy analysis
Uranium-233/234, -235, -238	Alpha energy analysis

[a] Analysis was performed for the expanded list of ICP metals including aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, chromium (total), cobalt, copper, iron, lead, lithium, magnesium, manganese, molybdenum, nickel, phosphorous, potassium, selenium, silicon, silver, sodium, strontium, thallium, tin, vanadium, and zinc.

EPA = U.S. Environmental Protection Agency
ICP = inductively coupled plasma
LSC = liquid scintillation counting

2.0 LABORATORY QUALITY CONTROL PARAMETERS DISCUSSION

A total of 112 sample delivery groups (SDGs) were reviewed with a combined 452 field samples and 1,291 sample analyses between them.

Each SDG reviewed contained at least one, and often several, different analytical methods that were assessed as part of the DQA. Table 3 presents the SDGs that were reviewed, the laboratory analyses performed, and the number of samples per analysis that were performed for each SDG.

Data assessment was not conducted for certain wet chemistry parameters (total solids and percent moisture) or physical property parameters (e.g., particle size distribution, percent moisture, porosity, and bulk density), but these analyses are listed in Table 3 for completeness.

Table 3. Summary of Sample Delivery Groups Subject to Data Assessment. (5 Pages)

Sample Delivery Group	Site (Well Number)	Number of Samples in Sample Delivery Group	Number of Analyses Performed																		
			Tritium	Technetium-99	Isotopic Plutonium	Isotopic Uranium	GEA	Metals	pH	Percent Solids	Percent Moisture	Physical Properties	Special Extraction	Total Carbon	Total Inorganic Carbon	PAH	PCB	Anions	Nitrite/Nitrate	SVOA	VOA
Sample Authorization Form RC-164 (Soil)																					
J00858	C7655	1	1			1	1														
J00862	C7655	8	8			8	8														
J00962	C7658	1		1	1																
J00982	C7662	1						1	1	1	1			1	1			1	1		
J01011	C7662	1	1	1	1	1															
K2191	C7656	6	6	6		6	6														
K2193	C7656	12						6	6	6	3	1	6	6	6	6	6	6	6		11
K2201	C7656	3	3	3		3	3														
K2211	C7656	6						2	1	1	1	1	3	1	1	1	1	1	1		4
K2233	C7654	2	1	1	1	1	2														
K2236	C7654	7	7			7	7														
K2240	C7654	2	2			2	2														
K2247	C7654	1																			1
K2257	C7654	3						2	2	2			1	2	2		2	2	2	2	
K2264	C7654	9						9	9	9	1	2	8	9	9		9	9	9	9	
K2267	C7654	12																			12
K2273	C7654	2	2			2	2														
K2278	C7657	3																			3
K2279	C7654	2						2	2	2			2	2	2		2	2	2		
K2295	C7657	11	11	11	11	11															
K2301	C7657	1	1	1	1	1															
K2315	C7657	1						1	1	1				1	1			1	1		
K2317	C7657	6						1	1	5			1	1	1			1	1		4
K2322	C7657	5						2	3	3			2	2	2			2	2		1

Table 3. Summary of Sample Delivery Groups Subject to Data Assessment. (5 Pages)

Sample Delivery Group	Site (Well Number)	Number of Samples in Sample Delivery Group	Number of Analyses Performed																	
			Tritium	Technetium-99	Isotopic Plutonium	Isotopic Uranium	GEA	Metals	pH	Percent Solids	Percent Moisture	Physical Properties	Special Extraction	Total Carbon	Total Inorganic Carbon	PAH	PCB	Anions	Nitrite/Nitrate	SVOA	VOA
K2327	C7657	6						5	5	5	2	2	6	5	5			5	5		
K2328	C7657	6																			6
K2331	C7657	6						3	3	6			2	3	3			3	3		3
K2344	C7655	1	1			1	1														
K2359	C7655	2																			2
K2360	C7655	1						1	1	1				1	1		1	1	1	1	
K2374	C7655	8																			8
K2379	C7655	8						8	8	8	1	1		8	8		8	8	8	8	
K2396	C7653	1	1			1	1														
K2397	C7653	5	5			5	5	5	5	5	5		4	5	5		5	5	5	5	
K2398	C7653	6																			6
K2399	C7655	7											7								
K2415	C7653	1																			1
K2475	C7660	1	1			1	1														
K2485	C7660	10	10			10	10														
K2498	C7660	2						1	1	2				1	1		1	1	1	1	1
K2500	C7660	1																			1
K2518	C7660	2						2	2	2	1	1		2	2		2	2	2	2	
K2524	C7660	7																			7
K2527	C7660	2											2								
K2553	C7653	1	1			1	1	1	1	1	1			1	1		1	1	1	1	
K2557	C7660	3						3	3	3	3			3	3		3	3	3	3	
K2562	C7660	3											3								
K2568	C7660	2											2								

Table 3. Summary of Sample Delivery Groups Subject to Data Assessment. (5 Pages)

Sample Delivery Group	Site (Well Number)	Number of Samples in Sample Delivery Group	Number of Analyses Performed																	
			Tritium	Technetium-99	Isotopic Plutonium	Isotopic Uranium	GEA	Metals	pH	Percent Solids	Percent Moisture	Physical Properties	Special Extraction	Total Carbon	Total Inorganic Carbon	PAH	PCB	Anions	Nitrite/Nitrate	SVOA	VOA
K2572	C7660	3						3	3	3	3						3	3	3	3	
K2575	C7660	2						2	2	2	2			2	2		2	2	2	2	
K2585	C7660	2											2								
K2642	C7663	1																			1
K2648	C7663	7																			7
K2655	C7663	9	9	7		9	7	9	9	9	9	3	8	9	9	9	9	9	9		
K2658	C7663	1	1	1		1	1														
K2704	C7663	1						1	1	1	1					1	1	1	1		
K2711	C7663	1											1								
K2761	C7659	3	3	3	3	3															
K2762	C7659	3																			3
K2763	C7659	3						3	3	3	3			3	3			3			
K2764	C7659	1											1								
K2766	C7659	12	12	12	12	12															
K2778	C7659	3											3								
K2779	C7659	2											2								
K2781	C7659	7						7	7	7	7	1		7	7						
K2783	C7659	7																			7
K2786	C7659	5																			5
K2788	C7659	1											1								
K2791	C7659	5											5								
K2792	C7659	5						5	5	5	5	1		5	5						
K2833	C7658	1						1	1	1	1			1	1			1	1		
K2837	C7658	1											1								
K2840	C7658	1																			1

Table 3. Summary of Sample Delivery Groups Subject to Data Assessment. (5 Pages)

Sample Delivery Group	Site (Well Number)	Number of Samples in Sample Delivery Group	Number of Analyses Performed																		
			Tritium	Technetium-99	Isotopic Plutonium	Isotopic Uranium	GEA	Metals	pH	Percent Solids	Percent Moisture	Physical Properties	Special Extraction	Total Carbon	Total Inorganic Carbon	PAH	PCB	Anions	Nitrite/Nitrate	SVOA	VOA
K2847	C7658	1						1										1			
K2848	C7658	10																			10
K2850	C7658	3											3								
K2851	C7658	4											4								
K2852	C7658	2											2								
K2858	C7658	10						10	10	10	10	1		10	10			4			
K2860	C7658	2																			2
K2862	C7658	2											2								
K2864	C7658	2						2	2	2	2	1		2	2						
K2867	C7658	13	13	13	13	13															
K2875	C7661	1	1	1	1	1															
	C7658	1	1	1	1	1															
K2877	C7661	8	8	8	8	8															
K2884	C7661	1																			1
K2901	C7661	1						1	1	1	1			1	1						
K2914	C7661	4											4								
K2915	C7661	4											4								
K2916	C7661	7						7	7	7	7			7	7						
K2922	C7661	7																			7
K2941	C8245	5																			5
K2949	C8245	5						5	5	5				5	5						
K2954	C8245	4											4								
K2973	C8245	5	5	5	5	5															
K3011	C7661	2																			2
K3076	C7662	12	12	12	12	12															

Table 3. Summary of Sample Delivery Groups Subject to Data Assessment. (5 Pages)

Sample Delivery Group	Site (Well Number)	Number of Samples in Sample Delivery Group	Number of Analyses Performed																		
			Tritium	Technetium-99	Isotopic Plutonium	Isotopic Uranium	GEA	Metals	pH	Percent Solids	Percent Moisture	Physical Properties	Special Extraction	Total Carbon	Total Inorganic Carbon	PAH	PCB	Anions	Nitrite/Nitrate	SVOA	VOA
K3077	C7662	1											1								
K3078	C7662	3						3	3	3	3			3	3			3	3		
K3079	C7662	13																			13
K3083	C7662	5											5								
K3084	C7662	4											4								
K3087	C7662	9						9	9	9	9	1		9	9			9	9		
K3098	C7662	1	1	1	1	1															
K3116	C7662	1											1								
K3120	C7662	1						1	1	1	1			1	1			1	1		
K3222	C8026	2											2								
K3223	C8026	2											2								
K3224	C8027	3											3								
K3236	C8028	4											4								
K3244	C8029	2											2								
K3250	C8029	2											2								
K3254	C8030	5											5								

GEA = gamma energy analysis
PAH = polynuclear aromatic hydrocarbons
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis
VOA = volatile organic analysis

The QC parameters evaluated for each SDG included the following as appropriate and applicable for each analytical method:

- Holding time
- Method detection limits
- Method blank results
- Field equipment blank results
- Field trip blank results
- Matrix spikes/matrix spike duplicates
- Laboratory control sample (LCS) results
- Laboratory duplicate results
- Field duplicate results
- Field split results.

Each QC parameter was assessed and noncompliant results were summarized on DQA worksheets. Reviewer qualifications applied to the data were also noted on the worksheets. The individual worksheets are Microsoft® Excel® files and are maintained in the project file.

Minor and major deficiencies were identified in the data packages. Minor deficiencies noted by the reviewer resulted in a "J" flag being assigned to the laboratory-reported result. Major deficiencies resulted in an "R" flag being assigned to the laboratory result. In addition to the data qualifiers that have been assigned by the analytical laboratory, the following data qualifiers were assigned during data assessment:

- UJ – The compound or analyte was analyzed for and detected in the sample. However, due to a minor QC deficiency associated with method blank results, the associated results are labeled as estimated quantitation limits. The data are considered usable for decision-making purposes.

- J – Due to a minor QC deficiency identified during the data assessment, the associated concentration is an estimate. The data are considered usable for decision-making purposes.

- UR – Indicates the constituent was analyzed for and not detected. However, due to a major deficiency, the data are not considered usable for decision-making purposes (i.e., rejected).

- R – Due to a major QC deficiency, the data are not considered usable for decision-making purposes (i.e., rejected).

Due to the large volume of data that were reviewed, it is not possible to discuss in detail each of the qualifiers that were applied to the individual results. The following sections provide a general discussion of the data quality issues identified.

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2.1 HOLDING TIMES

Holding times that comply with the established limit are in compliance with the requirement. Holding times between one and two times the limit defined by the method are considered minor deficiencies with all associated sample results qualified as estimated and flagged "J" for detects and "UJ" for nondetects. Holding times greater than two times the limit are considered major deficiencies with all associated detectable sample results qualified as estimates and flagged "J." All nondetects are rejected and flagged "UR." Table 4 lists the holding times applicable to the analytical methods.

Table 4. Sample Holding Times.

Parameter	Method	Soil Holding Time
Chemicals		
ICP metals	EPA Method 6010	6 months
Mercury	EPA Method 7471B	28 days
Anions	EPA Method 300.0	28 days/48 hours [a]
Nitrate/nitrite	EPA Method 353.3	28 days
Volatile organic compounds	EPA Method 8260B	14 days
Semivolatile organic compounds	EPA Method 8270C	14 days/40 days
pH	EPA Method 9045 (soil) EPA Method 9040 (water)	As soon as possible
Polychlorinated biphenyls	EPA Method 8082	1 year/1 year
Polynuclear aromatic hydrocarbons	EPA Method 8310	14 days/40 days
Total organic carbon	EPA Method 9060	28 days
Radionuclides		
Gamma-emitting radioisotopes	Gamma energy analysis	6 months
Tritium	LSC – tritium	6 months
Technetium-99	LSC – Tc-99	6 months
Plutonium isotopes	Alpha energy analysis	6 months
Uranium isotopes	Alpha energy analysis	6 months

[a] Holding time for anions is 28 days except for nitrate, nitrite, and phosphate for which the holding time is 48 hours.
EPA = U.S. Environmental Protection Agency
ICP = inductively coupled plasma
LSC = liquid scintillation counter

Anions and nitrate/nitrite analyses frequently exceeded the 28-day holding time requirement, resulting in the qualification of data as "J" if the result is a detectable concentration or "UJ" if the result is a nondetect.

The pH analyses were analyzed as soon as possible by the laboratory recognizing that there would be a delay between sample collection and analysis because of shipping preparation,

sample screening for radionuclides, and shipping time. Ideally, pH analysis would be performed within 24 hours of sample collection. Because this was never achieved, the pH results for all samples requiring analysis were flagged "J" as estimated quantities.

2.2 METHOD DETECTION LIMITS

Estimated quantitation limits (EQLs) for individual analytes are defined in Section 2.0 of the 300 Area SAP. Tables for specific methods are provided in Appendix A of the 300 Area SAP. Reported analytical detection levels for undetected analytes are compared against the EQLs to ensure that laboratory detection levels met the required criteria.

The EQLs were met for most analytes. However, the EQL was regularly exceeded for several gamma-emitting radionuclides. The EQL being exceeded was minor in absolute terms, with the minimum detectable activity (MDA) achieved for the analyses being below the action levels provided in the 300 Area SAP. No qualification of the gamma-emitting radionuclide results is required for exceeding the EQL, and none were applied.

Similarly, the EQLs for iron, uranium metal, and zinc were frequently exceeded with the quantitation limits achieved by the laboratory being below the action levels provided in the 300 Area SAP. For iron and zinc, the concentrations in the field samples were always at detectable levels; therefore, the fact that the EQLs were exceeded was inconsequential. For field quality assurance samples such as field blanks, the iron and zinc concentrations were frequently below detection, but this does not affect the overall quality of the data generated for the field samples themselves.

For semivolatile organic analyses (SVOAs), six compounds routinely exceeded the EQLs identified in the 300 Area SAP. These included 1,2-dichloroethane, 2-butanone, 2,4-dinitrophenol, 2-nitroaniline, 3,3'-dichlorobenzidine, 3-nitroaniline, 4-nitroaniline, 4-nitrophenol, and pentachlorophenol. No qualifiers have been assigned to the SVOA results exceeding quantitation limits.

For volatile organic analyses (VOAs), six compounds routinely exceeded the EQLs identified in the 300 Area SAP. These included 1,2-dichloroethane, 2-butanone, 4-methyl-2-pentanone, bromodichloromethane, methylene chloride, and vinyl chloride. No qualifiers have been assigned to these VOA results for exceeding quantitation limits.

2.3 METHOD BLANK RESULTS

Method blank samples are analyzed to determine if positive results may be attributed to laboratory reagent, sample container, or detector contamination. At least 1 acceptable method blank analysis must be conducted for every 20 samples. If the method blank analysis results indicate the presence of an analyte above the method detection limit or MDA, 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 EQL or MDA are qualified as undetected and flagged "U"

- Sample results above the EQL or MDA and greater than five times the highest blank concentration are not qualified.

Method blank contamination was occasionally observed in inductively coupled plasma metal analyses, primarily for selenium. Generally, the amount observed in the blank was between the detection level and the reporting level. Because the concentration of selenium detected in the samples was usually low, the method blank contamination usually required applying a "UJ" flag to the results. This method blank issue is considered a minor deficiency.

Occasionally, blank contamination was encountered for other analyses as noted in the worksheets. The analytical data were flagged appropriately in accordance with the above criteria.

2.4 FIELD EQUIPMENT BLANK RESULTS

Field equipment blank samples are analyzed to determine if positive results may be attributed to contaminants introduced as a result of the field sampling process. If the field equipment blank analysis results indicate the presence of an analyte above the method detection limit or MDA, 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 EQL or MDA are qualified as undetected and flagged "U"
- Sample results above the EQL or MDA and greater than five times the highest blank concentration are not qualified.

Sixteen field equipment blanks were collected as a part of the 300 Area RI/FS field work. Table 5 summarizes the sample delivery group, location, and sample number for each field equipment blank. The table also indicates analytes detected at levels above concentrations seen in field samples. For these sample delivery groups, notation was made in the individual worksheets and the data were flagged in accordance with the above criteria. Only those samples in the same analytical group as the offending field equipment blank were qualified because it could not be determined whether the contamination was attributed to field sample collection techniques or laboratory analytical techniques.

Table 5. Summary of Field Equipment Blank Results. (2 Pages)

Sample Delivery Group	Well Number	Interval	Sample Number	Analyte(s) Detected Above Field Concentrations
J00858	C7655	I-005	B27KP2	None
K2233	C7654	I-003	B27F51	None
K2257	C7654	I-003	B27F52	None
K2315	C7657	I-007	B27JK4	None
K2360	C7655	I-005	B27K38	Iron

Table 5. Summary of Field Equipment Blank Results. (2 Pages)

Sample Delivery Group	Well Number	Interval	Sample Number	Analyte(s) Detected Above Field Concentrations
K2475	C7660	I-005	B28CY7	None
K2498	C7660	I-005	B27PP1	None
K2762	C7659	I-008	B27R58	None
K2763	C7659	I-008	B27R59	None
K2847	C7658	I-008	B29H12	Iron, total carbon, total inorganic carbon
K2875	C7661	I-008	B29DX9	None
K2901	C7661	I-008	B29F07	Silicon
K3011	C7661	I-008	B29F08	None
K3076	C7662	I-008	B2B8P4	None
K3078	C7662	I-008	B2BBN6	None
K3079	C7662	I-008	B2B8T3	Acetone

2.5 FIELD TRIP BLANK RESULTS

Field trip blank samples are analyzed to determine if positive results may be attributed to contaminants introduced as a result of the transfer of samples from the field to the laboratory. In addition to field trip blanks, field transfer blanks were collected specifically for VOA samples. Trace amounts of methylene chloride, acetone, 2-hexanone, 2-butanone, and styrene were detected in the field transfer blanks. Low levels of methylene chloride and acetone were also detected in the field trip blanks. These compounds are common laboratory contaminants and are frequently detected in the laboratory method blanks as well. The trace amounts of styrene could result from motor vehicle exhaust at the sample site.

The analytical data have been flagged in accordance with the criteria specified above for the method blank results. The field trip blank and field transfer blank results for VOAs are provided in Table 6.

Table 6. Field Trip Blank and Field Transfer Blank Volatile Organic Analysis Results. (2 Pages)

Well Number	Interval	Sample Number	Concentration (µg/kg)				
			Methylene Chloride	Acetone	2-Hexanone	2-Butanone	Styrene
Field Trip Blanks							
C7661	I-005	B29F03	2.27J	ND	ND	ND	ND
C7662	I-011	B2B8T9	2.2J	7.3J	ND	ND	ND
Field Transfer Blanks							
C7653	I-001	B25C53	4.53BJ	ND	ND	ND	ND
C7656	I-001	B25DP5	ND	ND	ND	ND	1.03J
C7656	I-002	B25DP6	ND	ND	ND	ND	ND

Table 6. Field Trip Blank and Field Transfer Blank Volatile Organic Analysis Results. (2 Pages)

Well Number	Interval	Sample Number	Concentration (µg/kg)				
			Methylene Chloride	Acetone	2-Hexanone	2-Butanone	Styrene
C7656	I-003	B25DP7	ND	ND	ND	ND	ND
C7656	I-004	B25DP8	ND	ND	ND	ND	ND
C7656	I-005	B25DP9	ND	ND	ND	7.39J	ND
C7656	I-006	B25DT7	ND	ND	5.88J	ND	1.01J
C7656	I-007	B25DT8	ND	ND	7.16J	ND	1.06J
C7656	I-008	B25DT9	ND	ND	ND	ND	ND
C7656	I-009	B25DV0	ND	ND	ND	ND	ND
C7663	I-001	B25F29	2.28J	ND	ND	ND	ND
C7657	I-001	B27CN3	ND	ND	ND	ND	ND
C7654	I-001	B27DJ6	ND	ND	ND	ND	ND
C7654	I-008	B27DK3	ND	ND	ND	ND	ND
C7655	I-001	B27KR8	ND	ND	ND	ND	ND
C7657	I-002	B27KR9	ND	ND	ND	ND	ND
C7657	I-011	B27KT7	ND	ND	ND	ND	ND
C7660	I-001	B27PJ8	ND	ND	ND	ND	ND
C7659	I-008	B27R70	ND	ND	ND	ND	ND
C7661	I-008	B29F10	ND	ND	ND	ND	ND
C7658	I-008	B29H21	ND	ND	ND	ND	ND
C7662	I-008	B2B8T4	3.07J	16.4	ND	ND	ND

ND = not detected

2.6 MATRIX SPIKE RECOVERIES

Matrix spike recoveries allow for evaluation of accuracy. Measured concentrations or activities are compared to the known added amounts. The 300 Area SAP defines the acceptable recovery range as 70% to 130%, with data falling outside this range being flagged "J." Results with less than 30% recovery are flagged "R" and rejected.

The accuracy criteria provided in the 300 Area SAP are based on the initial guidance values for percent recoveries as defined in SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. As per SW-846 Method 8000 and applicable to all SW-846 organic analyses, it is essential that laboratories calculate in-house performance criteria for matrix spike recoveries and surrogate recoveries. It may also be useful to calculate such in-house criteria for LCS recoveries and for the initial demonstration of proficiency when experience indicates that the criteria recommended in specific methods are frequently missed for some analytes or matrices. The development of in-house performance criteria and the use of control charts or similar procedures to track laboratory performance cannot be over-emphasized. Many data systems and commercially available software packages support the use of control charts. The SW-846 outlines the procedures for the calculation of in-house performance criteria for matrix spike recovery and surrogate recovery. The procedures may also be applied to the development of in-house criteria for the initial demonstration of proficiency

and for LCS recoveries. For organic analyses where the laboratory has defined acceptance criteria for matrix spike recoveries, these criteria will be used to assess the quality of the data rather than the 70% to 130% limits provided in the 300 Area SAP.

For tritium analyses, matrix spikes are required by the method validation procedure, but are not routinely included by the analytical method. Therefore, the tritium data are flagged "J" as estimated quantities because matrix spikes were not analyzed with the SDGs.

2.7 LABORATORY CONTROL SAMPLES

Laboratory control samples allow for evaluation of accuracy. Measured concentrations or activities are compared to the known added amounts. The acceptable recovery range is 70% to 130%. Results are flagged "R" and rejected when LCS recoveries were less than 30%. Results between 30% and 70% or greater than 130% will be flagged "J" as estimated quantities. As discussed above, laboratory established criteria were used to assess LCS results for organic analyses where such criteria are provided.

2.8 MATRIX SPIKE DUPLICATES

Analytical precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample in the analytical batch. If both the sample and replicate concentrations are greater than five times the EQL and the RPD is less than 30%, no qualification is required. If either concentration is less than five times the EQL, the RPD control limit is less than or equal to two times the EQL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated nondetects and are flagged "J" accordingly. Sample results greater than five times the spike concentration require no qualification.

2.9 LABORATORY DUPLICATE RESULTS

Laboratory duplicate results are a second method used to assess analytical precision. Precision may be assessed using unspiked duplicate analyses performed on a sample in the analytical batch. If both the sample and replicate concentrations are greater than five times the EQL and the RPD is less than 30%, no qualification is required. If either concentration is less than five times the EQL, the RPD control limit is less than or equal to two times the EQL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated nondetects and flagged "J" accordingly.

Out-of-compliance, laboratory duplicate analyses were a common deficiency noted in the reviewed data sets. All of the laboratory duplicates that were out of compliance were minor and required applying a "J" flag to the appropriate results. No results were rejected based on the laboratory duplicates.

2.10 FIELD DUPLICATE RESULTS

Field duplicate results are a method used to assess field precision. Precision is assessed from the analysis of a primary sample and its duplicate collected in the field. If both the sample and

its field duplicate concentrations are greater than five times the EQL and the RPD is less than 30%, no qualification is required. Where direct evaluation of the sample data showed that a given analyte was not detected in the primary, duplicate, or split sample, further evaluation of the RPD was not performed.

When an analyte is detected in the primary or duplicate/split sample, but is quantified at less than five times the EQL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate/split results exceeds a control limit of two times the EQL, further assessment regarding the usability of the data is performed whereby the RPD control limit will be considered as less than or equal to two times the EQL.

If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated nondetects and flagged "J" accordingly.

A calculation brief was prepared to assess the RPD between duplicate and split sample pairs (Calculation No. 0300X-CA-V0143). The calculation brief is presented in Appendix B.

Ten sample pairs were evaluated including 8 field duplicates and 2 split samples. Based on the methodology explained in the calculation, RPDs were calculated for 143 analyte pairs. Of these 143 RPDs, 14 exceeded the 30% guideline. Of the 14 analyte pairs that exceeded the 30% guidance, 4 pairs pertained to analytes that were not identified as contaminants of potential concern in the 300 Area SAP and were not evaluated further. These included potassium-40, calcium, and silicon.

The remaining 10 RPDs were further assessed as required by the method. Further assessment showed that 1 analyte pair (lead in borehole C7662, interval 9) was below the secondary parameter being quantified at less than five times the EQL with the RPD control limit considered to be two times the EQL. The remaining 9 analyte pairs are listed in Table 7. The analyte pairs were further reviewed for laboratory QC issues, such as matrix spikes or duplicate analyses that were out of specification, and were qualified as estimated by the laboratory, the analytical data validator, and/or the DQA reviewer.

Table 7. Field Duplicate Laboratory Quality Control Review.

Well Number, Interval	Analyte	Relative Percent Difference	Laboratory Quality Control Issue
C7655, I-004	Sodium	35.0%	None
C7657, I-005	Chromium	38.4%	Duplicate > 30% RPD
C7658, I-009	Strontium	47.8%	None
C7660, I-004	Chromium Manganese	31.2% 43.6%	Matrix spike recoveries out of specification
C7662, I-009	Copper Sodium	30.7% 34.8%	None
C7662, I-011	Sodium	35.1%	None
C8245, I-009	Chromium	85.9%	None

RPD = relative percent difference

Further assessment showed that three of the nine results were associated with analyte pairs where one or both results had laboratory QC issues, such as matrix spikes or duplicate analyses that were out of specification. Those analytes with laboratory QC issues have been qualified as estimates by the laboratory, the validator, and/or the data reviewer. The remaining 6 analyte pairs have no apparent laboratory QC issues.

Duplicate and split sample pair analyses results that exceed guidelines are considered a minor deficiency. No further qualification of the data is required.

3.0 DATA USABILITY

Based on the results of this DQA, all of the laboratory analytical results that were not qualified as rejected are considered useable for their intended purpose. Table 8 presents the reviewer qualifiers that were applied to the sample results for inorganic analytes including metals, anions, cyanide, and pH. Table 9 presents the qualifiers for the batch leach inorganic analytes. Table 10 presents the qualifiers for radionuclides. Table 11 lists the qualifiers for polynuclear aromatic hydrocarbons. Table 12 provides the reviewer qualifiers for total carbon, total organic carbon, and polychlorinated biphenyls (PCBs). Tables 13 and 14 list the qualifiers for the semivolatile organic compounds. Table 15 lists the qualifiers for the volatile organic compounds.

Table 8. 300 Area Review Qualifiers for Inorganic Analytes. (4 Pages)

Sample Delivery Group Number	Sample Number	Metals																														Anions								
		Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Chromium-total	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Molybdenum	Nickel	Phosphorous	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Thallium	Tin	Vanadium	Zinc	Mercury	Bromide	Chloride	Fluoride	Nitrate	Nitrite	Orthophosphate	Sulfate	Nitrate/Nitrite	pH
Sample Authorization Form RC-164 (Soil)																																									
J00982	B2BBP0				J												J	J			J	J																			J
K2193	B25DN6		UJ								J							J			J																			J
	B25DN7		UJ								J							J			J																			J
	B25DN8		UJ								J							J			J																			J
	B25DN9		UJ								J							J			J																			J
	B25DP0		UJ								J							J			J																			J
	B25DP1		UJ								J							J			J																			J
K2211	B25DP2	J	UJ								J													J																J
	B25DP3	J	J								J													J									NA	NA	NA	NA	NA	NA	NA	NA	NA
K2257	B27F52	J	UJ		J					J		UJ	UJ	J			J	J			UJ	UJ		J			J			J	UJ									J
	B27CW7	J	UJ		J					J		J	J	J			J	J			J	J		J			J			J	J									J
K2264	B27CV4		UJ																		J									J										J
	B27CV5		UJ																		J									J										J
	B27CV6		UJ																		J									J										J
	B27CV7		UJ																		J									J										J
	B27CV8		UJ																		J									J										J
	B27CW0		UJ																		J									J										J
	B27CW1		UJ																		J									J										J
	B27CW2		UJ																		J									J										J
	B27CW4		UJ																		J									J										J
K2279	B27CW5		UJ																		R			J																J
	B27CW6		J																		R			J																J
K2315	B27JK4	J												J										J																J
K2317	B27JP8		UJ								R									J																				J
K2322	B27JN6		J																																					J
	B27JN7		UJ																																					J
K2327	B27JN8		UJ								J													J																J
	B27JP3		UJ								J													J																J
	B27JP5		UJ								J													J																J
	B27JP6		UJ								J													J																J
	B27JP7		UJ								J													J																J
K2331	B27JP0		UJ								J									J				J						J										J
	B27JP1		UJ								J									J				J						J										J
	B27JP2		UJ								J									J				J						J										J
K2360	B27K38	J									J													J																J

Table 8. 300 Area Review Qualifiers for Inorganic Analytes. (4 Pages)

Sample Delivery Group Number	Sample Number	Metals																														Anions								
		Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Chromium-total	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Molybdenum	Nickel	Phosphorous	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Thallium	Tin	Vanadium	Zinc	Mercury	Bromide	Chloride	Fluoride	Nitrate	Nitrite	Orthophosphate	Sulfate	Nitrate/Nitrite	pH
K2379	B27K32		UJ																J					J																	J
	B27K33		UJ																J					J																	J
	B27K34		UJ																J					J																	J
	B27K35		UJ																J					J																	J
	B27K36		UJ																J					J																	J
	B27K37		UJ																J					J																	J
	B27K40		UJ																J					J																	J
	B27K41		UJ																J					J																	J
K2397	B25C44		UJ							J											R			J	UJ																J
	B25C45		UJ							J											R			J	J																J
	B25C47		UJ							J											R			J	UJ																J
	B25C48		UJ							J											R			J	UJ																J
	B25C49-A		UJ							J											R			J	UJ																J
K2498	B27PP1	J								J				J			J							J										J						J	J
K2518	B27PH5		UJ	J							J								J					J	UJ			UJ		J											J
	B27PH6		UJ	J							J								J					J	UJ			UJ		J											J
K2553	B25C51		UJ		J						J											J		J						J			UJ	J	J	UJ	UJ	UJ	J	UJ	J
K2557	B27PH7		UJ		J					J	R		J				J			J		J		J						J	J		UJ	UJ	J	UJ	UJ	UJ	J	J	J
	B27PH8		UJ		J					J	R		J				J			J		J		J						J	J		UJ	J	J	UJ	UJ	UJ	J	J	J
	B27PJ1		UJ		J					J	R		J				J			J		J		J						J	J		UJ	J	J	UJ	UJ	UJ	J	J	J
K2572	B27PH2		UJ							R	J							J															UJ	J	J	J	UJ	UJ	J	J	J
	B27PH3		UJ							R	J							J															UJ	J	J	UJ	UJ	UJ	J	J	J
	B27PH4		UJ							R	J							J															UJ	UJ	J	UJ	UJ	UJ	J	J	J
K2575	B27PH0		J							J	J	J	J				J			J		J		J						J	J		UJ	J	J	UJ	UJ	UJ	J	J	J
	B27PH1		J							J	J	J	J				J			J		J		J						J	J		UJ	J	J	J	UJ	UJ	J	J	J
K2655	B25F13		UJ										J				J				J									J			UJ	J	J	J	UJ	UJ	J	J	J
	B25F14		UJ														J				J						J						UJ	J	J	J	UJ	UJ	J	J	J
	B25F15		UJ														J				J						J						UJ	J	J	J	UJ	J	J	J	J
	B25F16		UJ														J				J						J						UJ	J	J	J	UJ	UJ	J	J	J
	B25F17		UJ										J				J				J									J			UJ	J	J	J	UJ	J	J	J	J
	B25F18		J														J				J						J						UJ	J	J	J	UJ	UJ	J	J	J
	B25F19		UJ										J				J				J									J			UJ	J	J	J	UJ	UJ	J	J	J
	B25F20		UJ														J				J						J						UJ	J	J	J	UJ	UJ	J	J	J
	B25F21		J										J				J				J									J			UJ	J	J	UJ	UJ	UJ	J	UJ	J
K2704	B28JB1	J	UJ		J					J	J		J	J	J		J			J	R	J				J	J			J			UJ	J	J	J	UJ	UJ	J	J	J

Table 8. 300 Area Review Qualifiers for Inorganic Analytes. (4 Pages)

Sample Delivery Group Number	Sample Number	Metals																														Anions								
		Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Chromium-total	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Molybdenum	Nickel	Phosphorous	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Thallium	Tin	Vanadium	Zinc	Mercury	Bromide	Chloride	Fluoride	Nitrate	Nitrite	Orthophosphate	Sulfate	Nitrate/Nitrite	pH
K2763	B27R51		UJ							J	J										J									J			NA	NA	NA	NA	NA	NA	NA	J	J
	B27R59		UJ							J	J										J									J			NA	NA	NA	NA	NA	NA	NA	UJ	J
	B2B1L2		UJ							J	J										J									J			NA	NA	NA	NA	NA	NA	NA	J	J
K2781	B27R39		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B27R40		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B27R41		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B27R42		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B27R43		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B27R44		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B27R45		UJ																					JR									NA	NA	NA	NA	NA	NA	NA	NA	J
K2792	B27R46		UJ							J	R		J							J													NA	NA	NA	NA	NA	NA	NA	NA	J
	B27R47		UJ							J	R		J							J													NA	NA	NA	NA	NA	NA	NA	NA	J
	B27R48		UJ							J	R		J							J													NA	NA	NA	NA	NA	NA	NA	NA	J
	B27R49		UJ							J	R		J							J													NA	NA	NA	NA	NA	NA	NA	NA	J
	B27R50		UJ							J	R		J							J													NA	NA	NA	NA	NA	NA	NA	NA	J
K2833	B29H18		UJ																				UJ										UJ	J	J	J	UJ	UJ	J	J	J
K2847	B29H12													J									J	J									NA	NA	NA	NA	NA	NA	NA	NA	J
K2858	B29H04		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B29H05		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B29H06		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B29H07		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B29H08		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B29H09		UJ																					J									NA	NA	NA	NA	NA	NA	NA	NA	J
	B29H13		UJ																					J									UJ	J	J	J	UJ	UJ	J	NA	J
	B29H14		UJ																					J									UJ	J	J	J	UJ	UJ	J	NA	J
	B29H15		UJ																					J									UJ	J	J	J	UJ	UJ	J	NA	J
	B29H16		UJ																					J									UJ	J	J	J	UJ	UJ	J	NA	J
K2864	B29H10		UJ							J	J												UJ										NA	NA	NA	NA	NA	NA	NA	NA	J
	B29H11		UJ							J	J												UJ										NA	NA	NA	NA	NA	NA	NA	NA	J
K2901	B29F07													J									J	J									NA	NA	NA	NA	NA	NA	NA	NA	J
K2916	B29F52		UJ							J			J											J						R	J		NA	NA	NA	NA	NA	NA	NA	NA	J
	B29F53		UJ							J			J											J						R	J		NA	NA	NA	NA	NA	NA	NA	NA	J
	B29F55		UJ							J			J											J						R	J		NA	NA	NA	NA	NA	NA	NA	NA	J
	B29F56		UJ							J			J											J						R	J		NA	NA	NA	NA	NA	NA	NA	NA	J
	B29F57		UJ							J			J											J						R	J		NA	NA	NA	NA	NA	NA	NA	NA	J
	B29F58		UJ							J			J											J						R	J		NA	NA	NA	NA	NA	NA	NA	NA	J
	B29F59		UJ							J			J											J						R	J		NA	NA	NA	NA	NA	NA	NA	NA	J

Table 8. 300 Area Review Qualifiers for Inorganic Analytes. (4 Pages)

Sample Delivery Group Number	Sample Number	Metals																															Anions								
		Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Chromium-total	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Molybdenum	Nickel	Phosphorous	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Thallium	Tin	Vanadium	Zinc	Mercury	Bromide	Chloride	Fluoride	Nitrate	Nitrite	Orthophosphate	Sulfate	Nitrate/Nitrite	pH
K2949	B29F60		UJ																				UJ										NA	NA	NA	NA	NA	NA	NA	NA	J
	B29F61		UJ																				UJ										NA	NA	NA	NA	NA	NA	NA	NA	J
	B29F63		UJ																				UJ										NA	NA	NA	NA	NA	NA	NA	NA	J
	B29F64		UJ																				J										NA	NA	NA	NA	NA	NA	NA	NA	J
	B29F73		UJ																				UJ										NA	NA	NA	NA	NA	NA	NA	NA	J
K3078	B2BBN6		UR							J			J	J	J		J				J		UJ	J					J				UJ	J	UJ	J	UJ	UJ	J	J	J
	B2BBN7		UR							J			UJ	J	J		J				J		UJ	J					J				UJ	J	UJ	UJ	UJ	UJ	J	J	J
	B2B8Y1		UR							J			J	J	J		J				J		J	J					J				UJ	J	UJ	J	UJ	UJ	J	J	J
K3087	B2B8X3	J	UR										J										UJ	J					J				UJ	J	UJ	UJ	UJ	UJ	J	J	J
	B2B8X4	J	UR										J										UJ	J					J				UJ	J	UJ	UJ	UJ	UJ	J	J	J
	B2B8X5	J	UR										J										UJ	J					J				UJ	J	UJ	UJ	UJ	UJ	J	J	J
	B2B8X6	J	UR										J										UJ	J					J				UJ	J	UJ	UJ	UJ	UJ	J	UJ	J
	B2B8X7	J	UR										J										UJ	J					J				UJ	J	UJ	UJ	UJ	UJ	J	UJ	J
	B2B8X8	J	UR										J										J	J					J				UJ	J	UJ	J	UJ	UJ	J	J	J
	B2B8X9	J	UR										J										UJ	J					J				UJ	J	UJ	J	UJ	UJ	J	J	J
	B2B8Y0	J	UR										J										UJ	J					J				UJ	J	UJ	UJ	UJ	UJ	J	J	J
	B2B8Y2	J	UR										J										UJ	J					J				UJ	J	UJ	UJ	UJ	UJ	J	J	J
K3120	B2B8Y3	J	UR		J						J		J										J										UJ	J	UJ	UJ	UJ	UJ	J	J	J

J = Indicates that the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
NA = not analyzed
R = Indicates that the constituent was analyzed for and detected. The associated value is rejected due to a quality control deficiency identified during data validation. The data are not usable for decision-making purposes.
UJ = The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation, the value reported may not accurately reflect the minimum detection limit. The data should be usable for decision-making purposes.
UR = Indicates that the constituent was analyzed for and not detected; however, due to an identified quality control deficiency, the data are not usable for decision-making purposes.

Table 9. 300 Area Review Qualifiers for Batch Leach Inorganic Analytes. (4 Pages)

Sample Delivery Group Number	Sample Number	Arsenic	Barium	Cadmium	Chromium-Total	Copper	Lead	Molybdenum	Selenium	Silver	Uranium
Sample Authorization Form RC-164 (Soil)											
K2193	B25DN6	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B25DN7	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B25DN8	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B25DN9	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B25DP0	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B25DP1	NA	NA	NA	NA	NA	NA	NA	NA	NA	
K2211	B25DP2	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B25DP3	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B25DP4	NA	NA	NA	NA	NA	NA	NA	NA	NA	
K2257	B27CT3	NA	NA	NA	NA	NA	NA	NA	NA	NA	
K2264	B27CP0	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27CP1	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27CP2	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27CP3	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27CP4	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27CP5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27CP8	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27CT3	NA	NA	NA	NA	NA	NA	NA	NA	NA	
K2279	B27CW5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27CW6	NA	NA	NA	NA	NA	NA	NA	NA	NA	
K2317	B27JL2	NA	NA	NA	NA	NA	NA	NA	NA	NA	
K2322	B27JJ9	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27JK0	NA	NA	NA	NA	NA	NA	NA	NA	NA	
K2327	B27JK1	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27JK2	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27JK6	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27JK9	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27JL0	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27JL1	NA	NA	NA	NA	NA	NA	NA	NA	NA	
K2331	B27JK3	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27JK5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
K2397	B25C44	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B25C45	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B25C47	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B25C48	NA	NA	NA	NA	NA	NA	NA	NA	NA	

Table 9. 300 Area Review Qualifiers for Batch Leach Inorganic Analytes. (4 Pages)

Sample Delivery Group Number	Sample Number	Arsenic	Barium	Cadmium	Chromium-Total	Copper	Lead	Molybdenum	Selenium	Silver	Uranium
K2399	B27K16	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27K17	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27K18	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27K20	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27K21	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27K24	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	B27K25	NA	NA	NA	NA	NA	NA	NA	NA	NA	
K2527	B27PF3				R			J			
	B27PF4				R						
K2562	B27PF5				R						
	B27PF6				R						
	B27PF9				R						
K2568	B27PF0				J	J					
	B27PF1				J	J					
K2585	B27PD8				J	J					
	B27PD9				J	J		J			
K2655	B25F13		J		J		J				
	B25F14		J		J						
	B25F15		J								
	B25F16		J								
	B25F18		J								
	B25F19		J								
	B25F20	J	J		J	J	J				
	B25F21		J		J		J				
K2711	B28J96										
K2764	B27R38	J	J	UJ	J	J	J	J	UJ	UJ	UJ
K2778	B27R26										
	B27R27				J						
	B27R28				J						
K2779	B27R30				J						
	B27R32				J	J					
K2788	B2B1K7	J	J	UJ	J	J	J	J	UJ	UJ	UJ
K2791	B27R33				J			J		UJ	
	B27R34				J			J		UJ	
	B27R35				J			J		UJ	
	B27R36				J			J		UJ	
	B27R37				J			J		UJ	

Table 9. 300 Area Review Qualifiers for Batch Leach Inorganic Analytes. (4 Pages)

Sample Delivery Group Number	Sample Number	Arsenic	Barium	Cadmium	Chromium-Total	Copper	Lead	Molybdenum	Selenium	Silver	Uranium
K2837	B29FX4	J	J	UJ	J	J	J	J	UJ	UJ	UJ
K2850	B29FX0	J	J	UJ	J	J	J	J	UJ	UJ	UJ
	B29FX1	J	J	UJ	J	J	J	J	UJ	UJ	UJ
	B29FX2	J	J	UJ	J	J	J	J	UJ	UJ	UJ
K2851	B29FW2				J		J				
	B29FW3				J		J				
	B29FW6				J		J				
	B29FW7				J		J				
K2852	B29FW4				J			J			
	B29FW5										
K2862	B29FW8				J			J			
	B29FW9				J			J			
K2914	B29F00				J	J	J	J			
	B29F01						J				
	B29F02						J				
	B29F04						J				
K2915	B29F05				J						
	B29F06				J						
	B29DY8										
	B29DY9										
K2954	B29F09				J						
	B29F11										
	B29F13				J						
	B29F14										
K3077	B2B8W4						J				
K3083	B2B8W0				R		J				
	B2B8W1				R		J				
	B2B8W2				R		J				
	B2B8W3				R		J				
	B2B8W5				R		J				
K3084	B2B8V6	J	J	UJ	J	J	J	J	UJ	UJ	UJ
	B2B8V7	J	J	UJ	J	J	J	J	UJ	UJ	UJ
	B2B8V8	J	J	UJ	J	J	J	J	UJ	UJ	UJ
	B2B8V9	J	J	UJ	J	J	J	J	UJ	UJ	UJ
K3116	B2B8W6				J						
K3222	B296N9										
	B296P0										

Table 9. 300 Area Review Qualifiers for Batch Leach Inorganic Analytes. (4 Pages)

Sample Delivery Group Number	Sample Number	Arsenic	Barium	Cadmium	Chromium-Total	Copper	Lead	Molybdenum	Selenium	Silver	Uranium
K3223	B296P1										
	B296P2				J						
K3224	B2BBB8										
	B2BBB9										
	B2BBC0										
K3236	B2BBC4										
	B2BBC5										
	B2BBC6				J						
	B2BBC7										
K3244	B2BCV3										
	B2BCV4										
K3250	B2BCV5										
	B2BCV6										
K3254	B2BCP8				J						
	B2BCP9		J								
	B2BCR0				J						
	B2BCR1	J	J								
	B2BCR2										

J = Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
NA = not analyzed
R = Indicates the constituent was analyzed for and detected. The associated value is rejected due to a quality control deficiency identified during data validation. The data are not usable for decision-making purposes.
UJ = The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation, the value reported may not accurately reflect the minimum detection limit. The data should be usable for decision-making purposes.

Table 10. 300 Area Review Qualifiers for Radionuclides. (4 Pages)

Sample Delivery Group Number	Sample Number	Tritium	Technetium-99	Isotopic Plutonium	Uranium-233/234	Uranium-235	Uranium-238	GEA
Sample Authorization Form RC-164 (Soil)								
J00858	B27KP2	J	NA	NA				
J00862	B27KN6	J	NA	NA				
	B27KN7	J	NA	NA			J	
	B27KN8	J	NA	NA			J	
	B27KN9	J	NA	NA				
	B27KP0	J	NA	NA				
	B27KP1	J	NA	NA				
	B27KP3	J	NA	NA				
	B27KP4	J	NA	NA				
J00962	B29H22	NA			NA	NA	NA	NA
J01011	B2BBN9	J						NA
K2191	B25DM5	J		NA				
	B25DM6	J		NA				
	B25DM7	J		NA				
	B25DM8	J		NA				
	B25DM9	J		NA				
	B25DN0	J		NA				
K2201	B25DN1	J		NA				
	B25DN2	J		NA				
	B25DN3	J		NA				
K2233	B27F50	J	NA	NA				
	B27F51	NA			NA	NA	NA	
K2236	B27F39	J	NA	NA				
	B27F40	J	NA	NA				
	B27F41	J	NA	NA				
	B27F42	J	NA	NA				
	B27F43	J	NA	NA				
	B27F44	J	NA	NA				
	B27F46	J	NA	NA				
K2240	B27F45	J	NA	NA				
	B27F47	J	NA	NA				
K2273	B27F48	J	NA	NA				
	B27F49	J	NA	NA				

Table 10. 300 Area Review Qualifiers for Radionuclides. (4 Pages)

Sample Delivery Group Number	Sample Number	Tritium	Technetium-99	Isotopic Plutonium	Uranium-233/234	Uranium-235	Uranium-238	GEA
K2295	B27K78	J						NA
	B27K79	J						NA
	B27K80	J						NA
	B27K81	J						NA
	B27K82	J						NA
	B27K83	J						NA
	B27K84	J						NA
	B27K85	J						NA
	B27K86	J						NA
	B27K87	J						NA
	B27K88	J						NA
K2301	B27K89	J						NA
K2344	B27K48	J	NA	NA				
K2396	B25C49	J	NA	NA				
K2397	B25C44	J	NA	NA				
	B25C45	J	NA	NA				
	B25C46	J	NA	NA				
	B25C47	J	NA	NA				
	B25C48	J	NA	NA				
K2475	B28CY7	J	NA	NA				
K2485	B27PB4	J	NA	NA				
	B27PB5	J	NA	NA				
	B27PB6	J	NA	NA				
	B27PB7	J	NA	NA				
	B27PB8	J	NA	NA				
	B27PB9	J	NA	NA				
	B27PC0	J	NA	NA				
	B27PC1	J	NA	NA				
	B27PC2	J	NA	NA				
	B27PC5	J	NA	NA				
K2553	B25C51	J	NA	NA				

Table 10. 300 Area Review Qualifiers for Radionuclides. (4 Pages)

Sample Delivery Group Number	Sample Number	Tritium	Technetium-99	Isotopic Plutonium	Uranium-233/234	Uranium-235	Uranium-238	GEA
K2655	B25F13	J		NA				
	B25F14	J		NA				
	B25F15	J		NA				
	B25F16	J		NA				
	B25F17	J	NA	NA				NA
	B25F18	J		NA				
	B25F19	J		NA				
	B25F20	J		NA				
	B25F21	J	NA	NA				NA
K2658	B28J86	J		NA	J			
K2761	B27R12	J						NA
	B27R57	J						NA
	B2B1K0	J						NA
K2766	B27PY2	J						NA
	B27PY3	J						NA
	B27PY4	J						NA
	B27PY5	J						NA
	B27R02	J						NA
	B27R05	J						NA
	B27R06	J						NA
	B27R07	J						NA
	B27R08	J						NA
	B27R09	J						NA
	B27R10	J						NA
	B27R11	J						NA
K2867	B29FT3	J						NA
	B29FT4	J						NA
	B29FT5	J						NA
	B29FT6	J						NA
	B29FT7	J						NA
	B29FT8	J						NA
	B29FT9	J						NA
	B29FV0	J						NA
	B29FV1	J						NA
	B29FV2	J						NA
	B29FV3	J						NA

Table 10. 300 Area Review Qualifiers for Radionuclides. (4 Pages)

Sample Delivery Group Number	Sample Number	Tritium	Technetium-99	Isotopic Plutonium	Uranium-233/234	Uranium-235	Uranium-238	GEA
K2867	B29FV4	J						NA
	B29FV5	J						NA
K2875	B29DX9	J						NA
	B29FV7	J						NA
K2877	B29DX1	J						NA
	B29DX2	J						NA
	B29DX3	J						NA
	B29DX4	J						NA
	B29DX5	J						NA
	B29DX6	J						NA
	B29DX7	J						NA
	B29DX8	J						NA
K2973	B29DY0	J						NA
	B29DY1	J						NA
	B29DY2	J						NA
	B29DY4	J						NA
	B29DY5	J						NA
K3076	B2B8N6	J						NA
	B2B8N7	J						NA
	B2B8N8	J						NA
	B2B8N9	J						NA
	B2B8P0	J						NA
	B2B8P1	J						NA
	B2B8P2	J						NA
	B2B8P3	J						NA
	B2B8P4	J						NA
	B2B8P5	J						NA
	B2B8P6	J						NA
	B2B8P7	J						NA
K3098	B2B8P8	J						NA

GEA = gamma energy analysis
J = Indicates that the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
NA = not analyzed

Table 11. 300 Area Review Qualifiers for Polynuclear Aromatic Hydrocarbons.

Sample Delivery Group Number	Sample Number	Acenapththene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo[b]fluoranthene	Benzo[k\fluoranthene	Benzo[a]pyrene	Benzo[g,h,i]perylene	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene	Phenanthrene	Pyrene
Sample Authorization Form RC-164 (Soil)																	
K2193	B25DN6																
	B25DN7																
	B25DN8																
	B25DN9																
	B25DP0																
	B25DP1																
K2211	B25DP2																
K2655	B25F13																
	B25F14	J	UJ	UJ	UJ	J	UJ	UJ	J	UJ	UJ	J	UJ	J	UJ	J	UJ
	B25F15	UJ	UJ	UJ	J	UJ	UJ	UJ	J	UJ	UJ	UJ	UJ	J	UJ	UJ	UJ
	B25F16	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	J	UJ	J	UJ
	B25F17																
	B25F18	UJ	J	UJ	UJ	UJ	UJ	UJ	J	UJ	UJ	J	UJ	UJ	UJ	J	J
	B25F19																
	B25F20	UJ	UJ	J	UJ	UJ	UJ	UJ	J	UJ	UJ	J	UJ	J	J	J	J
	B25F21																
K2704	B28JB1																

J = Indicates that the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

UJ = The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation, the value reported may not accurately reflect the minimum detection limit. The data should be usable for decision-making purposes.

Table 12. 300 Area Review Qualifiers for Total Organic Carbon and Polychlorinated Biphenyls. (4 Pages)

Sample Delivery Group Number	Sample Number	Total Organic Carbon		PCBs						
		Total Carbon	Total Inorganic Carbon	Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
Sample Authorization Form RC-164 (Soil)										
J00982	B2BBP0			NA	NA	NA	NA	NA	NA	NA
K2193	B25DN6	J	J							
	B25DN7	J	J							
	B25DN8	J	J							
	B25DN9	J	J							
	B25DP0	J	J							
	B25DP1	J	J							
K2211	B25DP2	J	J							
K2257	B27F52									
	B27CW7									
K2264	B27CV4	J	J							
	B27CV5	J	J							
	B27CV6	J	J							
	B27CV7	J	J							
	B27CV8	J	J							
	B27CW0	J	J							
	B27CW1	J	J							
	B27CW2	J	J							
	B27CW4	J	J							
K2279	B27CW5	J	J							
	B27CW6	J	J							
K2315	B27JK4			NA	NA	NA	NA	NA	NA	NA
K2317	B27JP8			NA	NA	NA	NA	NA	NA	NA
K2322	B27JN6	J	J	NA	NA	NA	NA	NA	NA	NA
	B27JN7	J	J	NA	NA	NA	NA	NA	NA	NA
K2327	B27JN8	J	J	NA	NA	NA	NA	NA	NA	NA
	B27JP3	J	J	NA	NA	NA	NA	NA	NA	NA
	B27JP5	J	J	NA	NA	NA	NA	NA	NA	NA
	B27JP6	J	J	NA	NA	NA	NA	NA	NA	NA
	B27JP7	J	J	NA	NA	NA	NA	NA	NA	NA
K2331	B27JP0	J	J	NA	NA	NA	NA	NA	NA	NA
	B27JP1	J	J	NA	NA	NA	NA	NA	NA	NA
	B27JP2	J	J	NA	NA	NA	NA	NA	NA	NA
K2360	B27K38									

Table 12. 300 Area Review Qualifiers for Total Organic Carbon and Polychlorinated Biphenyls. (4 Pages)

Sample Delivery Group Number	Sample Number	Total Organic Carbon		PCBs						
		Total Carbon	Total Inorganic Carbon	Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
K2379	B27K32	J	J	UJ						
	B27K33	J	J	UJ						
	B27K34	J	J	UJ						
	B27K35	J	J	UJ						
	B27K36	J	J	UJ						
	B27K37	J	J	UJ						
	B27K40	J	J	UJ						
	B27K41	J	J	UJ						
K2397	B25C44	J	J							UJ
	B25C45	J	J							UJ
	B25C47	J	J							UJ
	B25C48	J	J							UJ
	B25C49-A	J	J							UJ
K2498	B27PP1			UJ	UJ	UJ	UJ	UJ	UJ	UJ
K2518	B27PH5									
	B27PH6									
K2553	B25C51	J	J							
K2557	B27PH7	J	J							
	B27PH8	J	J							
	B27PJ1	J	J							
K2572	B27PH2									
	B27PH3									
	B27PH4									
K2575	B27PH0									
	B27PH1									
K2655	B25F13									
	B25F14									
	B25F15									
	B25F16									
	B25F17									
	B25F18									
	B25F19									
	B25F20									
	B25F21									
K2704	B28JB1	J	J							

Table 12. 300 Area Review Qualifiers for Total Organic Carbon and Polychlorinated Biphenyls. (4 Pages)

Sample Delivery Group Number	Sample Number	Total Organic Carbon		PCBs						
		Total Carbon	Total Inorganic Carbon	Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
K2763	B27R51	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R59	J	J	NA	NA	NA	NA	NA	NA	NA
	B2B1L2	J	J	NA	NA	NA	NA	NA	NA	NA
K2781	B27R39	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R40	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R41	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R42	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R43	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R44	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R45	J	J	NA	NA	NA	NA	NA	NA	NA
K2792	B27R46	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R47	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R48	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R49	J	J	NA	NA	NA	NA	NA	NA	NA
	B27R50	J	J	NA	NA	NA	NA	NA	NA	NA
K2833	B29H18	J	J	NA	NA	NA	NA	NA	NA	NA
K2858	B29H04	J	J	NA	NA	NA	NA	NA	NA	NA
	B29H05	J	J	NA	NA	NA	NA	NA	NA	NA
	B29H06	J	J	NA	NA	NA	NA	NA	NA	NA
	B29H07	J	J	NA	NA	NA	NA	NA	NA	NA
	B29H08	J	J	NA	NA	NA	NA	NA	NA	NA
	B29H09	J	J	NA	NA	NA	NA	NA	NA	NA
	B29H13	J	J	NA	NA	NA	NA	NA	NA	NA
	B29H14	J	J	NA	NA	NA	NA	NA	NA	NA
	B29H15	J	J	NA	NA	NA	NA	NA	NA	NA
	B29H16	J	J	NA	NA	NA	NA	NA	NA	NA
K2864	B29H10	J	J	NA	NA	NA	NA	NA	NA	NA
	B29H11	J	J	NA	NA	NA	NA	NA	NA	NA
K2901	B29F07			NA	NA	NA	NA	NA	NA	NA
K2916	B29F52			NA	NA	NA	NA	NA	NA	NA
	B29F53			NA	NA	NA	NA	NA	NA	NA
	B29F55			NA	NA	NA	NA	NA	NA	NA
	B29F56			NA	NA	NA	NA	NA	NA	NA
	B29F57			NA	NA	NA	NA	NA	NA	NA
	B29F58			NA	NA	NA	NA	NA	NA	NA
	B29F59			NA	NA	NA	NA	NA	NA	NA

Table 12. 300 Area Review Qualifiers for Total Organic Carbon and Polychlorinated Biphenyls. (4 Pages)

Sample Delivery Group Number	Sample Number	Total Organic Carbon		PCBs						
		Total Carbon	Total Inorganic Carbon	Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
K2949	B29F60			NA	NA	NA	NA	NA	NA	NA
	B29F61			NA	NA	NA	NA	NA	NA	NA
	B29F63			NA	NA	NA	NA	NA	NA	NA
	B29F64			NA	NA	NA	NA	NA	NA	NA
	B29F73			NA	NA	NA	NA	NA	NA	NA
K3078	B2BBN6			NA	NA	NA	NA	NA	NA	NA
	B2BBN7			NA	NA	NA	NA	NA	NA	NA
	B2B8Y1			NA	NA	NA	NA	NA	NA	NA
K3087	B2B8X3			NA	NA	NA	NA	NA	NA	NA
	B2B8X4			NA	NA	NA	NA	NA	NA	NA
	B2B8X5			NA	NA	NA	NA	NA	NA	NA
	B2B8X6			NA	NA	NA	NA	NA	NA	NA
	B2B8X7			NA	NA	NA	NA	NA	NA	NA
	B2B8X8			NA	NA	NA	NA	NA	NA	NA
	B2B8X9			NA	NA	NA	NA	NA	NA	NA
	B2B8Y0			NA	NA	NA	NA	NA	NA	NA
	B2B8Y2			NA	NA	NA	NA	NA	NA	NA
K3120	B2B8Y3			NA	NA	NA	NA	NA	NA	NA

J = Indicates that the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
NA = not analyzed
PCB = polychlorinated biphenyl
UJ = The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation, the value reported may not accurately reflect the minimum detection limit. The data should be usable for decision-making purposes.

Table 13. 300 Area Review Qualifiers for Semivolatile Organic Compounds – Part A. (2 Pages)

Sample Delivery Group Number	Sample Number	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,2,4-Trichlorobenzene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,6-Dinitrotoluene	3-Chloro-3-methylphenol	3-Nitroaniline	3,3'-Dichlorobenzidine	3- and/or 4-Methylphenol	4-Bromophenyl Phenyl Ether	4-Chloroaniline	4-Chlorophenyl Phenyl Ether	4-Chloro-3-methylphenol	4-Methylnaphthalene	4-Nitrophenol	4,6-Dinitro-2-methylphenol	Acenaphthalene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene
Sampling Authorization Form RC-164 (Soil)																																		
K2257	B27F52	UJ	UJ	UJ	UJ				UJ				UJ			UJ	UJ			UJ	UJ	UJ		UJ		UJ		UR						
	B27CW7	UJ	UJ	UJ	UJ				UJ				UJ			UJ	UJ			UJ	UJ	UJ		UJ		UJ		UR						
K2264	B27CV4				UJ											UJ	UJ			UJ				UJ										
	B27CV5				UJ											UJ	UJ			UJ				UJ										
	B27CV6				UJ											UJ	UJ			UJ				UJ										
	B27CV7				UJ											UJ	UJ			UJ				UJ										
	B27CV8				UJ											UJ	UJ			UJ				UJ										
	B27CW0				UJ											UJ	UJ			UJ				UJ										
	B27CW1				UJ											UJ	UJ			UJ				UJ										
	B27CW2				UJ											UJ	UJ			UJ				UJ										
	B27CW4				UJ											UJ	UJ			UJ				UJ										
K2360	B27K38	UJ	UJ	UJ	UJ		UJ	UJ	UJ		UJ	UJ	UJ	UJ				UJ		UJ		UJ	UJ		UJ	UJ			UJ		UJ			UJ
K2379	B27K32												UJ				UJ									UJ		UJ	UJ					
	B27K33												UJ				UJ									UJ		UJ	UJ					
	B27K34												UJ				UJ									UJ		UJ	UJ					
	B27K35												UJ				UJ									UJ		UJ	UJ					
	B27K36												UJ				UJ									UJ		UJ	UJ					
	B27K37												UJ				UJ									UJ		UJ	UJ					
	B27K40												UJ				UJ									UJ		UJ	UJ					
	B27K41												UJ				UJ									UJ		UJ	UJ					
K2397	B25C44										UJ			UJ			UJ							UJ		UJ			UJ					
	B25C45										UJ			UJ			UJ							UJ		UJ			UJ					
	B25C47										UJ			UJ			UJ							UJ		UJ			UJ					
	B25C48										UJ			UJ			UJ							UJ		UJ			UJ					
	B25C49-A										UJ			UJ			UJ							UJ		UJ			UJ					
K2498	B27PP1													UJ																				
K2518	B27PH5																																	
	B27PH6																																	
K2553	B25C51													UJ		UJ	UJ																	
K2557	B27PH7	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
	B27PH8	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
	B27PJ1	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
K2572	B27PH2								UJ	UJ				UJ				UJ				UJ	UJ		UJ			UJ	UJ					
	B27PH3								UJ	UJ				UJ				UJ				UJ	UJ		UJ			UJ	UJ					
	B27PH4								UJ	UJ				UJ				UJ				UJ	UJ		UJ			UJ	UJ					

Table 13. 300 Area Review Qualifiers for Semivolatile Organic Compounds – Part A. (2 Pages)

Sample Delivery Group Number	Sample Number	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,2,4-Trichlorobenzene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Nitroaniline	2-Nitrophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,6-Dinitrotoluene	3-Chloro-3-methylphenol	3-Nitroaniline	3,3'-Dichlorobenzidine	3- and/or 4-Methylphenol	4-Bromophenyl Phenyl Ether	4-Chloroaniline	4-Chlorophenyl Phenyl Ether	4-Chloro-3-methylphenol	4-Methylnaphthalene	4-Nitrophenol	4,6-Dinitro-2-methylphenol	Acenaphthalene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene
K2575	B27PH0				UJ															UJ	UJ			UJ										
	B27PH1				UJ															UJ	UJ			UJ										

UJ = The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation, the value reported may not accurately reflect the minimum detection limit. The data should be usable for decision-making purposes.

UR = Indicates that the constituent was analyzed for and not detected; however, due to an identified quality control deficiency, the data are not usable for decision-making purposes.

Table 14. 300 Area Review Qualifiers for Semivolatile Organic Compounds – Part B. (2 Pages)

Sample Delivery Group Number	Sample Number	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl Benzyl Phthalate	Carbazole	Chrysene	Dibenz[a,h]anthracene	Dibenzofuran	Diethyl Phthalate	Dimethyl Phthalate	Di-n-butyl Phthalate	Di-n-octyl Phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno[1,2,3-cd]pyrene	Isophorone	Naphthalene	Nitrobenzene	N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	SVOA Holding Time Missed
Sample Authorization Form RC-164 (Soil)																																		
K2257	B27F52			UJ																		UJ	UJ		UJ									
	B27CW7			UJ																		UJ	UJ		UJ									
K2264	B27CV4							UJ														UJ	UJ											
	B27CV5							UJ														UJ	UJ											
	B27CV6							UJ														UJ	UJ											
	B27CV7							UJ														UJ	UJ											
	B27CV8							UJ														UJ	UJ											
	B27CW0							UJ														UJ	UJ											
	B27CW1							UJ														UJ	UJ											
	B27CW2							UJ														UJ	UJ											
	B27CW4							UJ														UJ	UJ											
K2360	B27K38	UJ	UJ	UJ	UJ			UJ	UJ		UJ	UJ	UJ			UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ		UJ		
K2379	B27K32																													UJ				
	B27K33																													UJ				
	B27K34																													UJ				
	B27K35																													UJ				
	B27K36																													UJ				
	B27K37																													UJ				
	B27K40																													UJ				
	B27K41																													UJ				
K2397	B25C44				UJ																UJ	UJ								UJ				
	B25C45				UJ																UJ	UJ								UJ				
	B25C47				UJ																UJ	UJ								UJ				
	B25C48				UJ																UJ	UJ								UJ				
	B25C49-A				UJ																UJ	UJ								UJ				
K2498	B27PP1											UJ										UJ												
K2518	B27PH5																																	
	B27PH6																																	
K2553	B25C51																																	
K2557	B27PH7	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	
	B27PH8	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	
	B27PJ1	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	
K2572	B27PH2	UJ					UJ	J					UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ								UJ		UJ				
	B27PH3	UJ					UJ	J					UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ								UJ		UJ				
	B27PH4	UJ					UJ	J					UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ								UJ		UJ				

Table 14. 300 Area Review Qualifiers for Semivolatile Organic Compounds – Part B. (2 Pages)

Sample Delivery Group Number	Sample Number	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Bis(2-chloroethoxy)methane	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl)ether	Bis(2-ethylhexyl)phthalate	Butyl Benzyl Phthalate	Carbazole	Chrysene	Dibenz[a,h]anthracene	Dibenzofuran	Diethyl Phthalate	Dimethyl Phthalate	Di-n-butyl Phthalate	Di-n-octyl Phthalate	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno[1,2,3-cd]pyrene	Isophorone	Naphthalene	Nitrobenzene	N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	SVOA Holding Time Missed
K2575	B27PH0																					UJ								UJ				
	B27PH1																					UJ								UJ				

J = Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
UJ = The constituent wes analyzed for and was not detected. Due to a quality control deficiency identified during data validation, the value reported may not accurately reflect the minimum detection limit. The data should be usable for decision-making purposes.

Table 15. 300 Area Review Qualifiers for Volatile Organic Compounds. (6 Pages)

Sample Delivery Group Number	Sample Number	All VOCs	1,1,2,2-Tetrachloroethane	1,1-Dichloroethene	1,1,2-Trichloroethane	4-Methyl-2-Pentanone	Acetone	Methylene Chloride	Styrene	2-Butanone	2-Hexanone	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloromethane	Cis-1,3-Dichloropropene	Dibromochloromethane	Ethylbenzene	Toluene	Tetrachloroethene	Trans-1,2-Dichloropropene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Chloride	Xylens (total)
Sample Authorization Form RC-164 (Soil)																												
K2193	B25DN6		UJ				J																					
	B25DN8		UJ				UJ			UJ													UJ					
	B25DN9		UJ				UJ																					
	B25DP0		UJ				UJ																					
	B25DP1		UJ				UJ																					
	B25DP5		UJ				UJ																					
	B25DP6		UJ				UJ																					
	B25DP7		UJ				UJ																					
	B25DP8		UJ				UJ																					
	B25DP9		UJ				UJ																					
	B25DT7		UJ				UJ			UJ													UJ					
K2211	B25DP2		UJ				UJ			UJ	UJ										UJ		UJ			UJ		UJ
	B25DT8		UJ				UJ			J	J										UJ		UJ			UJ		UJ
	B25DT9		UJ				UJ			UJ	UJ										UJ		UJ			UJ		UJ
	B25DV0		UJ				UJ			UJ	UJ										UJ		UJ			UJ		UJ
K2247	B27DJ6						UJ																					
K2267	B27F75								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27DK3								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27CM6								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27CM7								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27CM8								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27CM9								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27CN0								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27CN1								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27CN2								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27CN4								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27CN6								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ
	B27CN9								UJ			UJ	UJ			UJ	UJ				UJ		UJ			UJ	UJ	UJ

Table 15. 300 Area Review Qualifiers for Volatile Organic Compounds. (6 Pages)

Sample Delivery Group Number	Sample Number	All VOCs	1,1,2,2-Tetrachloroethane	1,1-Dichloroethene	1,1,2-Trichloroethane	4-Methyl-2-Pentanone	Acetone	Methylene Chloride	Styrene	2-Butanone	2-Hexanone	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloromethane	Cis-1,3-Dichloropropene	Dibromochloromethane	Ethylbenzene	Toluene	Tetrachloroethene	Trans-1,2-Dichloropropene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Chloride	Xylens (total)
K2278	B27CN3																											
	B27CN7																											
	B27CN8																											
K2317	B27KR9																											
	B27KT7																											
	B27JN1																											
	B27JN5																											
K2322	B27JM4																											
K2328	B27JN0																											
	B27JN2																											
	B27JN3																											
	B27JN4																											
	B27JM3																											
	B27JM5																											
K2331	B27JM7																											
	B27JM8																											
	B27JM9																											
K2359	B27K06																											
	B27KR8																											
K2374	B27K00																		UJ									
	B27K01																		UJ									
	B27K02																		UJ									
	B27K03																		UJ									
	B27K04																		UJ									
	B27K05																		UJ									
	B27K08																		UJ									
	B27K09																		UJ									

Table 15. 300 Area Review Qualifiers for Volatile Organic Compounds. (6 Pages)

Sample Delivery Group Number	Sample Number	All VOCs	1,1,2,2-Tetrachloroethane	1,1-Dichloroethene	1,1,2-Trichloroethane	4-Methyl-2-Pentanone	Acetone	Methylene Chloride	Styrene	2-Butanone	2-Hexanone	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloromethane	Cis-1,3-Dichloropropene	Dibromochloromethane	Ethylbenzene	Toluene	Tetrachloroethene	Trans-1,2-Dichloropropene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Chloride	Xylens (total)
K2398	B277Y8						UJ	J										UJ										
	B277Y9						UJ	J										UJ										
	B27846						UJ	J										UJ										
	B27932						UJ	J										UJ										
	B27934						UJ	J										UJ										
	B27935						UJ	J										UJ										
K2415	B25C53																											
K2498	B27PP0						UJ																					
K2500	B27PJ8						UJ																					
K2524	B27PC7																											
	B27PC9																											
	B27PD0																											
	B27PD1																											
	B27PD2																											
	B27PD3																											
	B27PD7																											
K2642	B25F29						UJ	J																				
K2648	B25F71							J																				
	B25F72							J																				
	B25F73							J																				
	B25F74							J																				
	B25F76							J																				
	B25F77							J																				
	B25F78							J																				
K2762	B25R25																											
	B25R58																											
	B25R70																											

Table 15. 300 Area Review Qualifiers for Volatile Organic Compounds. (6 Pages)

Sample Delivery Group Number	Sample Number	All VOCs	1,1,2,2-Tetrachloroethane	1,1-Dichloroethene	1,1,2-Trichloroethane	4-Methyl-2-Pentanone	Acetone	Methylene Chloride	Styrene	2-Butanone	2-Hexanone	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloromethane	Cis-1,3-Dichloropropene	Dibromochloromethane	Ethylbenzene	Toluene	Tetrachloroethene	Trans-1,2-Dichloropropene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Chloride	Xylens (total)
K2783	B25R13																											
	B25R14																											
	B25R15																											
	B25R16																											
	B25R17																											
	B25R18																											
	B25R19																											
K2786	B25R20																											
	B25R21																											
	B25R22																											
	B25R23																											
	B25R24																											
K2840	B29H01																											
K2848	B29H21																											
	B29FX7																											
	B29FX8																											
	B29FX9																											
	B29FY0																											
	B29FY1																											
	B29FY2																											
	B29FY5																											
	B29FY6																											
	B29FY7																											

Table 15. 300 Area Review Qualifiers for Volatile Organic Compounds. (6 Pages)

Sample Delivery Group Number	Sample Number	All VOCs	1,1,2,2-Tetrachloroethane	1,1-Dichloroethene	1,1,2-Trichloroethane	4-Methyl-2-Pentanone	Acetone	Methylene Chloride	Styrene	2-Butanone	2-Hexanone	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloromethane	Cis-1,3-Dichloropropene	Dibromochloromethane	Ethylbenzene	Toluene	Tetrachloroethene	Trans-1,2-Dichloropropene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Chloride	Xylens (total)
K2860	B29FY3																											
	B29FY4																											
K2884	B29F03																											
K2922	B29F37							J																				
	B29F38							J																				
	B29F40							J																				
	B29F41							J																				
	B29F42							J																				
	B29F43							J																				
	B29F44							J																				
K2941	B29F45																											
	B29F46																											
	B29F48																											
	B29F49																											
	B29F72																											
K3011	B29F08																											
	B29F10																											

Table 15. 300 Area Review Qualifiers for Volatile Organic Compounds. (6 Pages)

Sample Delivery Group Number	Sample Number	All VOCs	1,1,2,2-Tetrachloroethane	1,1-Dichloroethene	1,1,2-Trichloroethane	4-Methyl-2-Pentanone	Acetone	Methylene Chloride	Styrene	2-Butanone	2-Hexanone	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloromethane	Cis-1,3-Dichloropropene	Dibromochloromethane	Ethylbenzene	Toluene	Tetrachloroethene	Trans-1,2-Dichloropropene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Chloride	Xylens (total)
K3079	B2B8R5						J					UJ																
	B2B8R6						J					UJ																
	B2B8R7						J					UJ																
	B2B8R8						J					UJ																
	B2B8R9						J					UJ																
	B2B8T0						J					UJ																
	B2B8T1						J					UJ																
	B2B8T2						J					UJ																
	B2B8T3						J					UJ																
K3079	B2B8T4																											
	B2B8T5																											
	B2B8T6																											
	B2B8T9																											

J = Indicates that the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

UJ = The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation, the value reported may not accurately reflect the minimum detection limit. The data should be usable for decision-making purposes.

4.0 REFERENCES

DOE/RL-2009-45, 2010, *300 Area Remedial Investigation/Feasibility Study Sampling and Analysis Plan for the 300-FF-1 300-FF-2, and 300-FF-5 Operable Units*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA/240/B-06/002, 2006, *Data Quality Assessment: A Reviewer's Guide EPA QA/G-9R*, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C.

EPA/240/B-06/003, 2006, *Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S*, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C.

SW-846, 1990, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* Final Update IV of the Third Edition, U.S. Environmental Protection Agency, Washington, D.C.

APPENDIX A

300 AREA REMEDIAL INVESTIGATION RELATIVE PERCENT DIFFERENCE CALCULATION

Acrobat 8.0

CALCULATION COVER SHEET

Project Title: 300 Area Remedial Investigation **Job No. 14655**

Area: 300 Area

Discipline: Environmental *Calculation No: 0300X-CA-V0143

Subject: 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Computer Program: Excel Program No: Excel 2007

The attached calculations have been generated for a specific purpose and task. Use of the calculations by persons who do not have access to all pertinent facts may lead to incorrect conclusions and/or results. Before applying these calculations to your work, the underlying basis, rationale, and other pertinent information relevant to these calculations must be thoroughly reviewed with appropriate Washington Closure Hanford LLC (WCH) officials or other authorized personnel. WCH is not responsible for the use of a calculation not under its direct control.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 13 Total = 14	P. L. Benjamin	H. M. Sullaway	NA	J. M. Capron	10/17/11

SUMMARY OF REVISION

WCH-DE-019 (05/08/2007) *Obtain Calc. No. from Document Control and Form from Intranet

CALCULATION SHEET

Washington Closure Hanford

Originator P. L. Benjamin PB	**Date** 10/11/2011	**Calc. No.** 0300X-CA-V0143	**Rev. No.** 0
Project 300 Area Remedial Investigation	**Job No.** 14655	**Checked** H. M. Sulloway HMS	**Date** 10/12/2011
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculation			**Sheet No.** 1 of 13

Summary

PURPOSE:

Provide documentation to support the calculation of the relative percent difference (RPD) for primary-duplicate and primary-split sample pairs from 300 Area remedial investigation sample results, as necessary.

TABLE OF CONTENTS:

Sheets 1 to 3 - Summary
Sheet 4 - C7654 Interval 10 Soil Samples
Sheet 5 - C7655 Interval 4 Soil Samples
Sheet 6 - C7655 Interval 5 Soil Samples
Sheet 7 - C7657 Interval 5 Soil Samples
Sheet 8 - C7658 Interval 9 Soil Samples
Sheet 9 - C7659 Interval 5 Soil Samples
Sheet 10 - C7660 Interval 4 Soil Samples
Sheet 11 - C7662 Interval 9 Soil Samples
Sheet 12 - C7662 Interval 11 Soil Samples
Sheet 13 - C8245 Interval 9 Soil Samples

GIVEN/REFERENCES:

1) DOE-RL, 2010, *300 Area Remedial Investigation/Feasibility Study Sampling and Analysis Plan for the 300-FF-1, 300-FF-2 and 300-FF-5 Operable Units*, DOE/RL-2009-45, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

SOLUTION:

1) Use data obtained from remedial investigation soil, aquifer sediment, and groundwater samples to perform the RPD calculations for primary-duplicate and primary-split sample pairs, as required.

METHODOLOGY:

The RPD is calculated when both the primary sample value and either the duplicate or split sample value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method. The 300 Area SAP lists laboratory performance standards as estimated quantitation limits (EQLs) for soil/aquifer sediment samples from sampling targets in Tablels 2-2 and 2-3 of the SAP (DOE-RL 2010) for selected constituents. Where TDL values lower than those listed in the SAP were available, the lower values were used.

Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary, duplicate, and/or split sample, further evaluation of the RPD value was not performed.

CALCULATION SHEET

Washington Closure Hanford

Originator	P. L. Benjamin PB	**Date**	10/11/2011	**Calc. No.** 0300X-CA-V0143	**Rev. No.** 0
Project	300 Area Remedial Investigation	**Job No.**	14655	**Checked** H. M. Sulloway HMS	**Date** 10/12/2011
Subject	300 Area Remedial Investigation Relative Percent Difference (RPD) Calculation				**Sheet No.** 2 of 13

Summary

METHODOLOGY CONTINUED:

The RPD calculations use the following formula:

$$RPD = [\,|M-D|/((M+D)/2)]*100$$

where, M = main sample value D = duplicate (or split) sample value

When an analyte is detected in the primary or duplicate/split sample, but is quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate/split results exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed as part of the overall quality assessment.

For quality assurance/quality control (QA/QC) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. If the RPD is greater than 30%, further investigation regarding the usability of the data is performed. Additional discussion is provided in the data quality assessment.

RESULTS:

The results presented in the tables that follow include the summary of the results of the RPD calculations and are for use in data quality assessment of the remedial investigation sampling.

Washington Closure Hanford **CALCULATION SHEET**

Originator P. L. Benjamin PB **Date** 10/11/2011 **Calc. No.** 0300X-CA-V0143 **Rev. No.** 0
Project 300 Area Remedial Investigation **Job No.** 14655 **Checked** H. M Sulloway **Date** 10/12/2011
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculation **Sheet No.** 3 of 13

Summary (continued)

Relative Percent Difference Results and QA/QC Analysis

Analyte	C7654, Soil, Interval 10	C7655, Soil, Interval 4	C7655, Soil, Interval 5	C7657, Soil, Interval 5	C7658, Soil, Interval 9	C7659, Soil, Interval 5	C7660, Soil, Interval 4	C7662, Soil, Interval 9	C7662, Soil, Interval 11	C8245, Soil, Interval 9
	Duplicate Analysis	Duplicate Analysis	Split Analysis	Duplicate Analysis	Duplicate Analysis	Duplicate Analysis	Duplicate Analysis	Duplicate Analysis	Duplicate Analysis	Split Analysis
Potassium-40	7.1%	2.0%	31.3%	--	--	--	2.3%	--	--	--
Radium-226	--	7.3%	--	--	--	--	--	--	--	--
Uranium-233/234	22.2%	13.6%	--	--	--	--	--	--	--	--
Uranium-238	12.7%	--	--	--	--	--	--	--	--	--
Aluminum	2.1%	20.2%	--	12.2%	8.1%	12.3%	9.6%	12.2%	6.7%	9.9%
Barium	3.2%	13.6%	--	13.2%	9.1%	11.7%	29.4%	9.7%	23.0%	9.1%
Calcium	5.4%	3.2%	--	6.9%	74.9%	42.0%	6.6%	20.9%	11.2%	14.6%
Chromium	26.9%	22.2%	--	36.4%	2.6%	13.9%	31.2%	14.1%	5.8%	85.9%
Copper	2.8%	14.1%	--	9.7%	17.9%	1.5%	9.5%	30.7%	21.4%	20.4%
Iron	9.8%	15.5%	--	6.8%	1.8%	7.7%	10.7%	16.8%	6.8%	14.0%
Lead	--	9.7%	--	--	0.4%	3.8%	7.4%	44.1%	--	--
Magnesium	11.0%	5.0%	--	13.2%	9.8%	25.5%	12.8%	16.4%	15.4%	0.8%
Manganese	4.2%	0.8%	--	8.6%	7.9%	14.2%	43.6%	1.2%	5.6%	10.6%
Phosphorus	0.0%	28.1%	--	1.9%	1.8%	10.7%	3.9%	10.2%	6.6%	10.5%
Silicon	3.5%	20.2%	--	6.3%	23.3%	7.7%	17.5%	0.8%	42.3%	16.3%
Silver	--	6.5%	--	--	--	--	--	--	--	--
Sodium	14.9%	35.0%	--	11.8%	6.1%	2.2%	10.5%	34.8%	35.1%	1.2%
Strontium	1.4%	10.0%	--	11.3%	47.8%	19.7%	8.3%	27.2%	21.5%	15.0%
Vanadium	22.1%	12.0%	--	3.0%	0.9%	1.6%	24.5%	22.9%	2.4%	15.3%
Zinc	4.0%	11.6%	--	5.9%	3.4%	6.7%	8.3%	13.8%	19.7%	3.0%
Chloride	--	--	--	--	--	--	--	2.8%	--	--
Nitrate	--	5.3%	--	--	--	--	--	--	--	--
Nitrogen in Nitrite and Nitrate	--	5.4%	--	--	--	--	--	--	--	--
Sulfate	--	--	--	4.2%	--	--	--	--	--	--

-- = RPD analysis not required

CALCULATION SHEET

Washington Closure Hanford

Originator P. L. Benjamin PB
Project 300 Area Remedial Investigation
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Date 10/11/2011
Job No. 14655

Calc. No. 0300X-CA-V0143
Checked H. M. Sullowey HMS

Rev. No. 0
Date 10/12/2011
Sheet No. 4 of 13

Duplicate Analysis - C7654 Interval 10 Soil Samples

Sampling Area	Sample Number	Sample Date	Potassium-40			Radium-226			Radium-228			Uranium-233/234			Uranium-235			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
C7654; I-010	B27F49	8/23/10	7.99		0.337	0.404		0.077	0.473		0.164	14.8		0.066	1.10		0.023	14.7		0.079
C7654; I-010 DUP	B27F45	8/23/10	8.58		0.717	0.316		0.108	0.479		0.267	18.5		0.352	1.37		0.243	16.7		0.323

Analysis:

	TDL	0.5	0.1	0.2	1	1	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	7.1%			22.2%		12.7%
	Difference > 2 TDL?	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable

Sampling Area	HEIS Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	MDA	mg/kg	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
C7654; I-010	B27CW6	8/23/10	6180		4.48	1.58		0.90	88.7		0.45	0.262		0.18	0.617	B	1.79	0.148	B	0.18	4780		89.5	8.39		0.18	7.22		1.79
C7654; I-010 DUP	B27CW0	8/23/10	6050		4.31	2.24		0.86	91.6		0.43	0.272		0.17	0.595	B	1.72	0.154	B	0.17	4530		86.2	11.0		0.17	7.24		1.72

Analysis:

	TDL	5	1	0.5	0.2	2	0.2	100	0.2	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)			Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	2.1%		3.2%				5.4%	26.9%	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Copper			Iron			Lead			Lithium			Magnesium			Manganese			Mercury			Molybdenum			Nickel		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	MDA	mg/kg	Q	PQL	mg/kg	Q	PQL
C7654; I-010	B27CW6	8/23/10	14.6		0.90	24700		17.9	2.55		0.45	4.00		2.24	3850		67.1	316		4.48	0.036		0.03	0.723	B	1.79	8.01		3.58
C7654; I-010 DUP	B27CW0	8/23/10	14.2		0.86	22400		17.2	2.48		0.43	3.77		2.16	3450		64.7	303		4.31	0.014	B	0.03	0.462	B	1.72	8.68		3.45

Analysis:

	TDL	1	5	0.5	2.5	75	5	0.2	2	4
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)			No-Stop (acceptable)
	RPD	2.8%	9.8%			11.0%	4.2%			
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable

Sampling Area	Sample Number	Sample Date	Phosphorus			Potassium			Silicon			Sodium			Strontium			Tin			Vanadium			Zinc			Chloride		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
C7654; I-010	B27CW6	8/23/10	1060		44.8	376		358	425		1.79	369		44.8	29.4		0.90	3.39	B	8.95	74.4		2.24	43.7		8.95	3.5	B	4.9
C7654; I-010 DUP	B27CW0	8/23/10	1080		43.1	559		345	440		1.72	335		43.1	29.0		0.86	2.22	B	8.62	59.6		2.16	42.0		8.62	3.1	B	5.1

Analysis:

	TDL	100	400	2	50	1	10	2.5	1	2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	No-Stop (acceptable)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)		Yes (calc RPD)	Yes (calc RPD)	
	RPD	0.0%		3.5%	14.9%	1.4%		22.1%	4.0%	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable

Sampling Area	Sample Number	Sample Date	Fluoride			Nitrate			Nitrogen in Nitrite and Nitrate			Sulfate		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
C7654; I-010	B27CW6	8/23/10	2.6	B	4.9	2.4	B	4.9	0.68		0.49	8.7		4.9
C7654; I-010 DUP	B27CW0	8/23/10	3.6	B	5.1	2.5	B	5.1	0.81		0.51	9.0		5.1

Analysis:

	TDL	5	2.5	0.75	5
Duplicate Analysis	Both > PQL?	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	Yes (continue)
	Both >5xTDL?			No-Stop (acceptable)	No-Stop (acceptable)
	RPD				
	Difference > 2 TDL?	No - acceptable	No - acceptable	No - acceptable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator P. L. Benjamin PB
Project 300 Area Remedial Investigation
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Date 10/11/2011
Job No. 14655

Calc. No. 0300X-CA-V0143
Checked H. M. Sullowey

Rev. No. 0
Date 10/12/2011
Sheet No. 5 of 13

Duplicate Analysis - C7655 Interval 4 Soil Samples

Sampling Area	Sample Number	Sample Date	Cesium-137 pCi/g	Q	MDA	Potassium-40 pCi/g	Q	MDA	Radium-226 pCi/g	Q	MDA	Radium-228 pCi/g	Q	MDA	Uranium-234 pCi/g	Q	MDA	Uranium-235 pCi/g	Q	MDA	Uranium-238 pCi/g	Q	MDA
C7655; I-004	B27KP0	9/13/10	0.318		0.0424	15.0		0.367	0.582		0.0838	0.899		0.156	5.19		0.0625	0.563		0.0451	3.81		0.0451
C7655; I-004 DUP	B27KN9	9/13/10	0.356		0.0402	16.3		0.324	0.626		0.0808	0.578		0.155	5.95		0.0469	0.380		0.0318	4.58		0.0469

Analysis:

		Cesium-137	Potassium-40	Radium-226	Radium-228	Uranium-234	Uranium-235	Uranium-238
TDL		0.1	0.5	0.1	0.2	1	1	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		2.0%	7.3%		13.6%		
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Aluminum mg/kg	Q	PQL	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	MDA	Cadmium mg/kg	Q	MDA	Calcium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Iron mg/kg	Q	PQL
C7655; I-004	B27K36	9/13/10	7560		4.31	1.43		0.86	61.4		0.43	0.330		0.17	0.693	B	1.72	0.784		0.17	4180		86.2	8.00		0.17	7.20		1.72	44.1		0.86	20800		17.2
C7655; I-004 DUP	B27K35	9/13/10	9260		5.14	1.13		1.03	93.3		0.51	0.362		0.21	0.704	B	2.05	0.839		0.21	4050		103	10.0		0.21	6.68		2.05	38.3		1.03	17800		20.5

Analysis:

		Aluminum	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron
TDL		5	1	0.5	0.2	2	0.2	100	0.2	2	1	5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)		No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD	20.2%		13.6%				3.2%	22.2%		14.1%	15.5%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Lead mg/kg	Q	PQL	Lithium mg/kg	Q	PQL	Magnesium mg/kg	Q	PQL	Manganese mg/kg	Q	PQL	Mercury mg/kg	Q	MDA	Molybdenum mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Phosphorus mg/kg	Q	PQL	Potassium mg/kg	Q	PQL	Silicon mg/kg	Q	PQL	Silver mg/kg	Q	PQL
C7655; I-004	B27K36	9/13/10	3.52		0.43	5.12		2.15	3310		64.6	239		4.31	0.096		0.03	0.610	B	1.72	11.4		3.45	788		43.1	725		345	404		1.72	2.24		0.17
C7655; I-004 DUP	B27K35	9/13/10	3.88		0.51	5.80		2.57	3180		77.0	237		5.14	0.087		0.03	0.811	B	2.05	11.6		4.11	579		51.4	784		411	495		2.05	2.10		0.21

Analysis:

		Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Phosphorus	Potassium	Silicon	Silver
TDL		0.5	2.5	75	5	0.2	2	4	100	400	2	0.2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)		No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD	9.7%		5.0%	0.8%				28.1%		20.2%	6.5%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	Sample Number	Sample Date	Sodium mg/kg	Q	PQL	Strontium mg/kg	Q	PQL	Tin mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Chloride mg/kg	Q	PQL	Fluoride mg/kg	Q	PQL	Nitrate mg/kg	Q	PQL	Nitrogen in Nitrite and Nitrate mg/kg	Q	PQL	Sulfate mg/kg	Q	PQL	Bis (2-ethylhexyl) phthalate µg/kg	Q	PQL
C7655; I-004	B27K36	9/13/10	309		43.1	21.8		0.86	6.86	B	8.62	50.3		2.15	59.1		8.62	1.6	B	5.4	1.1	B	5.4	56.3	0	5.4	13.2	D	1.08	8.0		5.4	326	J	364
C7655; I-004 DUP	B27K35	9/13/10	440		51.4	24.1		1.03	6.20	B	10.3	44.6		2.57	62.6		10.3	1.6	B	5.2	1.3	B	5.2	62.9	0	5.2	12.5	D	1.03	7.5		5.2	508		380

Analysis:

		Sodium	Strontium	Tin	Vanadium	Zinc	Chloride	Fluoride	Nitrate	Nitrogen in Nitrite and Nitrate	Sulfate	Bis (2-ethylhexyl) phthalate
TDL		50	1	10	2.5	1	2	5	2.5	0.75	5	330
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)		Yes (calc RPD)	Yes (calc RPD)			Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	
	RPD	35.0%	10.0%		12.0%	11.0%			5.3%	5.4%		
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable

Sampling Area	Sample Number	Sample Date	Methylene chloride µg/kg	Q	PQL
C7655; I-004	B27K04	9/13/10	2.86	BJ	6.21
C7655; I-004 DUP	B27K03	9/13/10	3.26	BJ	6.38

Analysis:

		Methylene chloride
TDL		5
Duplicate Analysis	Both > PQL?	No-Stop (acceptable)
	Both >5xTDL?	
	RPD	
	Difference > 2 TDL?	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator P. L. Benjamin PB
Project 300 Area Remedial Investigation
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Date 10/11/2011
Job No. 14655

Calc. No. 0300X-CA-V0143
Checked H. Sulloway

Rev. No. 0
Date 10/12/2011
Sheet No. 6 of 13

1 **Split Analysis - C7655 Interval 5 Soil Samples**

2	Sampling	Sample	Sample	Cesium-137			Potassium-40			Radium-226			Radium-228			Uranium-233/234			Uranium-235			Uranium-238		
3	Area	Number	Date	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
4	C7655; I-005	B27KP1	9/13/10	0.243		0.0321	14.8		0.306	0.486		0.0567	0.803		0.115	5.32		0.0426	0.640		0.0332	4.51		0.0609
5	C7655; I-005 SPLIT	B27K48	9/13/10	0.249		0.108	10.8		1.12	0.612		0.222	0.990		0.417	3.82		0.304	0.366		0.254	3.43		0.210

6 **Analysis:**

7	TDL		0.1			0.5			0.1			0.2			1			1			1		
8	Split Analysis	Both > PQL?	Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
9		Both >5xTDL?	No-Stop (acceptable)			Yes (calc RPD)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)		
10		RPD				*31.3%*																		
11		Difference > 2 TDL?	No - acceptable			Not applicable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			No - acceptable		

CALCULATION SHEET

Washington Closure Hanford PB
Originator P. L. Benjamin
Project 300 Area Remedial Investigation
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Date 10/11/2011
Job No. 14655

Calc. No. 0300X-CA-V0143
Checked H. M. Sullaway

Rev. No. 0
Date 10/12/2011
Sheet No. 7 of 13

1 **Duplicate Analysis - C7657 Interval 5 Soil Samples**

Sampling Area	Sample Number	Sample Date	Uranium-233/234 pCi/g	Q	MDA	Uranium-238 pCi/g	Q	MDA
C7657; I-005	B27K81	8/30/10	0.317		0.242	0.444		0.242
C7657; I-005 DUP	B27K82	8/30/10	0.367		0.234	0.336		0.234

Analysis:

	TDL	1	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		
	Difference > 2 TDL?	No - acceptable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Aluminum mg/kg	Q	PQL	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	MDA	Cadmium mg/kg	Q	MDA	Calcium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL
C7657; I-005	B27JP0	8/30/10	6100		3.88	1.56		0.78	87.2		0.39	0.210		0.16	0.508	B	1.55	0.117	B	0.16	6860		77.6	17.4		0.16	8.06		1.55	16.2		0.78
C7657; I-005 DUP	B27JP1	8/30/10	5400		3.46	1.52		0.69	76.4		0.35	0.195		0.14	0.454	B	1.38	0.113	B	0.14	6400		69.2	11.8		0.14	7.40		1.38	14.7		0.69

Analysis:

	TDL	5			1			0.5			0.2			2			0.2			100			0.2			2			1		
Duplicate Analysis	Both > PQL?	Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
	Both >5xTDL?	Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)			No-Stop (acceptable)									Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)		
	RPD	12.2%						13.2%												6.9%			38.4%						9.7%		
	Difference > 2 TDL?	Not applicable			No - acceptable			Not applicable			No - acceptable			No - acceptable			No - acceptable			Not applicable			Not applicable			No - acceptable			Not applicable		

Sampling Area	HEIS Number	Sample Date	Iron mg/kg	Q	PQL	Lead mg/kg	Q	PQL	Lithium mg/kg	Q	PQL	Magnesium mg/kg	Q	PQL	Manganese mg/kg	Q	PQL	Molybdenum mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Phosphorus mg/kg	Q	PQL	Potassium mg/kg	Q	PQL	Silicon mg/kg	Q	PQL
C7657; I-005	B27JP0	8/30/10	24400		15.5	1.91		0.39	4.55		1.94	4040		58.2	303		3.88	2.24		1.55	10.9		3.10	1070		38.8	786		310	359		1.55
C7657; I-005 DUP	B27JP1	8/30/10	22800		13.8	1.82		0.35	4.16		1.73	3540		51.9	278		3.46	1.88		1.38	7.22		2.77	1050		34.6	706		277	337		1.38

Analysis:

	TDL	5			0.5			2.5			75			5			2			4			100			400			2		
Duplicate Analysis	Both > PQL?	Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
	Both >5xTDL?	Yes (calc RPD)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (calc RPD)			No-Stop (acceptable)			Yes (calc RPD)		
	RPD	6.8%									13.2%			8.6%									1.9%						6.3%		
	Difference > 2 TDL?	Not applicable			No - acceptable			No - acceptable			Not applicable			Not applicable			No - acceptable			No - acceptable			Not applicable			No - acceptable			Not applicable		

Sampling Area	Sample Number	Sample Date	Sodium mg/kg	Q	PQL	Strontium mg/kg	Q	PQL	Tin mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Chloride mg/kg	Q	PQL	Fluoride mg/kg	Q	PQL	Nitrate mg/kg	Q	PQL	Nitrogen in Nitrite and Nitrate mg/kg	Q	PQL	Sulfate mg/kg	Q	PQL
C7657; I-005	B27JP0	8/30/10	729		38.8	30.6		0.78	2.8	B	7.76	63.3		1.94	49.1		7.76	2.4	B	4.6	1.2	B	4.6	4.5	B	4.6	1.22		0.46	77.1		4.6
C7657; I-005 DUP	B27JP1	8/30/10	648		34.6	27.5		0.69	2.7	B	6.92	60.8		1.73	46.3		6.92	2.6	B	4.8	1.3	B	4.8	5.0		4.8	1.30		0.48	73.9		4.8

Analysis:

	TDL	50			1			10			2.5			1			2			5			2.5			0.75			5		
Duplicate Analysis	Both > PQL?	Yes (continue)			Yes (continue)			No-Stop (acceptable)			Yes (continue)			Yes (continue)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (continue)			Yes (continue)		
	Both >5xTDL?	Yes (calc RPD)			Yes (calc RPD)						Yes (calc RPD)			Yes (calc RPD)												No-Stop (acceptable)			Yes (calc RPD)		
	RPD	11.6%			11.3%						3.0%			5.9%															4.2%		
	Difference > 2 TDL?	Not applicable			Not applicable			No - acceptable			Not applicable			Not applicable			No - acceptable			No - acceptable			No - acceptable			No - acceptable			Not applicable		

CALCULATION SHEET

Washington Closure Hanford

Originator P. L. Benjamin PB
Project 300 Area Remedial Investigation
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Date 10/11/2011
Job No. 14655

Calc. No. 0300X-CA-V0143
Checked H. M. Sullowey HMS

Rev. No. 0
Date 10/12/2011
Sheet No. 8 of 13

Duplicate Analysis - C7658 Interval 9 Soil Samples

Sampling Area	Sample Number	Sample Date	Uranium-233/234 pCi/g	Q	MDA	Uranium-238 pCi/g	Q	MDA
C7658; I-009	B29FV2	12/21/10	0.339		0.185	0.557		0.185
C7658; I-009 DUP	B29FV3	12/21/10	0.480		0.204	0.560		0.204

Analysis:

		Uranium-233/234	Uranium-238
Duplicate Analysis	TDL	1	1
	Both > PQL?	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		
	Difference > 2 TDL?	No - acceptable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Aluminum mg/kg	Q	PQL	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Calcium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Iron mg/kg	Q	PQL	Lead mg/kg	Q	PQL
C7658; I-009	B29H13	12/21/10	6700		11.0	2.83		2.19	87.9		1.10	0.219	B	0.44	7330		219	18.8		0.44	8.89		4.39	20.1		2.19	28300		43.9	2.71		1.10
C7658; I-009 DUP	B29H14	12/21/10	6180		12.7	2.70		2.55	96.3		1.27	0.209	B	0.51	16100		255	19.3		0.51	9.15		5.10	16.8		2.55	28800		51.0	2.70		1.27

Analysis:

		Aluminum	Arsenic	Barium	Beryllium	Calcium	Chromium	Cobalt	Copper	Iron	Lead
Duplicate Analysis	TDL	5	1	0.5	0.2	100	0.2	2	1	5	0.5
	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)		Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	8.1%		9.1%		74.9%	2.6%		17.9%	1.8%	0.4%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Lithium mg/kg	Q	PQL	Magnesium mg/kg	Q	PQL	Manganese mg/kg	Q	PQL	Molybdenum mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Phosphorus mg/kg	Q	PQL	Potassium mg/kg	Q	PQL	Silicon mg/kg	Q	PQL	Sodium mg/kg	Q	PQL	Strontium mg/kg	Q	PQL
C7658; I-009	B29H13	12/21/10	5.93		5.49	4380		165	354		11.0	2.48	B	4.39	9.92		8.78	1100		110	873	B	878	390		4.39	576		110	27.2		2.19
C7658; I-009 DUP	B29H14	12/21/10	4.93	B	6.37	4830		191	383		12.7	3.01	B	5.10	9.86	B	10.2	1120		127	874	B	1020	493		5.10	612		127	44.3		2.55

Analysis:

		Lithium	Magnesium	Manganese	Molybdenum	Nickel	Phosphorus	Potassium	Silicon	Sodium	Strontium
Duplicate Analysis	TDL	2.5	75	5	2	4	100	400	2	50	1
	Both > PQL?	No-Stop (acceptable)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?		Yes (calc RPD)	Yes (calc RPD)			Yes (calc RPD)		Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD		9.8%	7.9%			1.8%		23.3%	6.1%	47.8%
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable

Sampling Area	Sample Number	Sample Date	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Chloride mg/kg	Q	PQL	Fluoride mg/kg	Q	PQL	Nitrate mg/kg	Q	PQL	Sulfate mg/kg	Q	PQL
C7658; I-009	B29H13	12/21/10	77.0		5.49	48.1		21.9	7.8		4.7	1.6	B	4.7	2.1	B	4.7	20.4		4.7
C7658; I-009 DUP	B29H14	12/21/10	76.3		6.37	46.5		25.5	7.8		5.0	1.8	B	5.0	1.9	B	5.0	19.8		5.0

Analysis:

		Vanadium	Zinc	Chloride	Fluoride	Nitrate	Sulfate
Duplicate Analysis	TDL	2.5	1	2	5	2.5	5
	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)			No-Stop (acceptable)
	RPD	0.9%	3.4%				
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

Sampling Area	Sample Number	Sample Date	Acetone µg/kg	Q	PQL
C7658; I-009	B29FY6	12/21/10	4.10	J	12.0
C7658; I-009 DUP	B29FY7	12/21/10	4.31	J	12.8

Analysis:

		Acetone
Duplicate Analysis	TDL	20
	Both > PQL?	No-Stop (acceptable)
	Both >5xTDL?	
	RPD	
	Difference > 2 TDL?	No - acceptable

CALCULATION SHEET

Washington Closure Hanford
Originator P. L. Benjamin PB
Project 300 Area Remedial Investigation
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Date 10/11/2011
Job No. 14655

Calc. No. 0300X-CA-V0143
Checked H. M. Sulloway

Rev. No. 0
Date 10/12/2011
Sheet No. 9 of 13

1 **Duplicate Analysis - C7659 Interval 5 Soil Samples**

2	Sampling Area	Sample Number	Sample Date	Uranium-233/234			Uranium-238		
3				pCi/g	Q	MDA	pCi/g	Q	MDA
4	C7659; I-005	B27R02	12/9/10	0.578		0.147	0.674		0.147
5	C7659; I-005 DUP	B27R05	12/9/10	0.504		0.184	0.360		0.184

6 **Analysis:**

7		TDL	1	1
8	Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)
9		Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)
10		RPD		
11		Difference > 2 TDL?	No - acceptable	No - acceptable

12

13	Sampling Area	HEIS Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium			Cobalt			Copper		
14				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
15	C7659; I-005	B27R43	12/9/10	5510		5.39	1.91		1.08	74.5		0.54	0.213	B	0.22	0.651	B	2.16	0.123	B	0.22	5780		108	23.9		0.22	8.36		2.16	13.8		1.08
16	C7659; I-005 DUP	B27R44	12/9/10	6230		4.65	2.38		0.93	83.8		0.47	0.230		0.19	0.666	B	1.86	0.104	B	0.19	6850		92.9	20.8		0.19	7.24		1.86	13.6		0.93

17 **Analysis:**

18		TDL	5	1	0.5	0.2	2	0.2	100	0.2	2	1
19	Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
20		Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)				Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
21		RPD	12.3%		11.7%				42.0%	13.9%		1.5%
22		Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable

23

24	Sampling Area	HEIS Number	Sample Date	Iron			Lead			Lithium			Magnesium			Manganese			Molybdenum			Nickel			Phosphorus			Potassium			Silicon		
25				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
26	C7659; I-005	B27R43	12/9/10	24400		21.6	3.07		0.54	6.18		2.69	4140		80.8	332		5.39	0.884	B	2.16	16.0		4.31	968		53.9	875		431	622		2.16
27	C7659; I-005 DUP	B27R44	12/9/10	22600		18.6	3.19		0.47	7.41		2.32	5350		69.7	288		4.65	0.773	B	1.86	13.0		3.72	1100		46.5	979		372	672		1.86

28 **Analysis:**

29		TDL	5	0.5	2.5	75	5	2	4	100	400	2
30	Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
31		Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
32		RPD	7.7%	3.8%		25.5%	14.2%			10.7%		7.7%
33		Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable

34

35	Sampling Area	Sample Number	Sample Date	Sodium			Strontium			Tin			Vanadium			Zinc		
36				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
37	C7659; I-005	B27R43	12/9/10	464		53.9	24.3		1.08	2.92	B	10.8	62.6		2.69	43.4		10.8
38	C7659; I-005 DUP	B27R44	12/9/10	454		46.5	29.5		0.93	2.34	B	9.29	61.6		2.32	40.6		9.29

39 **Analysis:**

40		TDL	50	1	10	2.5	1
41	Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)
42		Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)		Yes (calc RPD)	Yes (calc RPD)
43		RPD	2.2%	19.7%		1.6%	6.7%
44		Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable

45

46	Sampling Area	Sample Number	Sample Date	Acetone			Methylene chloride		
47				µg/kg	Q	PQL	µg/kg	Q	PQL
48	C7659; I-005	B27R17	12/9/10	4.17	J	9.34	2.27	BJ	4.67
49	C7659; I-005 DUP	B27R18	12/9/10	5.71	J	12.3	2.37	BJ	6.14

50 **Analysis:**

51		TDL	20	5
52	Duplicate Analysis	Both > PQL?	No-Stop (acceptable)	No-Stop (acceptable)
53		Both >5xTDL?		
54		RPD		
55		Difference > 2 TDL?	No - acceptable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator P. L. Benjamin PB
Project 300 Area Remedial Investigation
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Date 10/11/2011
Job No. 14655

Calc. No. 0300X-CA-V0143
Checked H. M. Sulloway HMS

Rev. No. 0
Date 10/12/2011
Sheet No. 10 of 13

1 **Duplicate Analysis - C7660 Interval 4 Soil Samples**

	Sampling Area	Sample Number	Sample Date	Potassium-40			Radium-226			Radium-228			Thorium-232			Uranium-233/234			Uranium-238		
3				pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
4	C7660; I-004	B27PB7	11/2/2010	8.50		0.637	0.322		0.116	0.500		0.257	0.500		0.257	2.26		0.597	1.72		0.597
5	C7660; I-004 DUP	B27PB8	11/2/2010	8.31		0.630	0.383		0.079	0.661		0.185	0.661		0.185	1.59		0.368	1.73		0.368

6 **Analysis:**

7	TDL	0.5	0.1	0.2	1	1	1
8	Duplicate Analysis: Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
9	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
10	RPD	2.3%					
11	Difference > 2 TDL?	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

12

	Sampling Area	HEIS Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Calcium			Chromium			Cobalt			Copper			Iron		
14				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
15	C7660; I-004	B27PH3	11/2/10	5780		4.69	2.07		0.94	93.9		0.47	0.28		0.19	4870		93.8	11.9		0.19	6.31		1.88	14.3		0.94	24600		18.8
16	C7660; I-004 DUP	B27PH4	11/2/10	5250		3.77	1.87		0.75	69.8		0.38	0.27		0.15	4560		75.4	8.69		0.15	6.56		1.51	13.0		0.75	22100		15.1

17 **Analysis:**

18	TDL	5	1	0.5	0.2	100	0.2	2	1	5
19	Duplicate Analysis: Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
20	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
21	RPD	9.6%		29.4%		6.6%	31.2%		9.5%	10.7%
22	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable

23

	Sampling Area	HEIS Number	Sample Date	Lead			Lithium			Magnesium			Manganese			Molybdenum			Nickel			Phosphorus			Potassium			Silicon		
25				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
26	C7660; I-004	B27PH3	11/2/10	3.50		0.47	4.82		2.35	3830		70.4	430		4.69	0.697	B	1.88	10.3		3.75	1050		46.9	670		375	242		1.88
27	C7660; I-004 DUP	B27PH4	11/2/10	3.25		0.38	4.20		1.88	3370		56.5	276		3.77	1.05	B	1.51	7.33		3.01	1010		37.7	596		301	203		1.51

28 **Analysis:**

29	TDL	0.5	2.5	75	5	2	4	100	400	2
30	Duplicate Analysis: Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
31	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)
32	RPD	7.4%		12.8%	43.6%			3.9%		17.5%
33	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable

34

	Sampling Area	Sample Number	Sample Date	Sodium			Strontium			Tin			Vanadium			Zinc			Fluoride			Nitrogen in Nitrite and Nitrate			Sulfate			Bis (2-ethylhexyl) phthalate		
36				mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	µg/kg	Q	PQL
37	C7660; I-004	B27PH3	11/2/10	332		46.9	20.1		0.94	3.82	B	9.38	68.7		2.35	43.7		9.38	1.1	B	2.4	0.31	B	0.49	9.9		2.4	140	J	345
38	C7660; I-004 DUP	B27PH4	11/2/10	299		37.7	18.5		0.75	2.87	B	7.54	53.7		1.88	40.2		7.54	1.2	B	2.6	0.27	B	0.52	6.5		2.6	323	J	350

39 **Analysis:**

40	TDL	50	1	10	2.5	1	5	0.75	5	330
41	Duplicate Analysis: Both > PQL?	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	No-Stop (acceptable)
42	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)		Yes (calc RPD)	Yes (calc RPD)			No-Stop (acceptable)	
43	RPD	10.5%	8.3%		24.5%	8.3%				
44	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator P. L. Benjamin PB
Project 300 Area Remedial Investigation
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Date 10/11/2011
Job No. 14855

Calc. No. 0300X-CA-V0143
Checked H. M. Sulloway HMS

Rev. No. 0
Date 10/12/2011
Sheet No. 11 of 13

Duplicate Analysis - C7662 Interval 9 Soil Samples

Sampling Area	Sample Number	Sample Date	Uranium-233/234 pCi/g	Q	MDA	Uranium-238 pCi/g	Q	MDA
C7662; I-009	B2B8P5	1/27/11	0.598		0.254	0.299		0.254
C7662; I-009 DUP	B2B8P6	1/27/11	0.704		0.224	0.470		0.224

Analysis:

	TDL	1	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		
	Difference > 2 TDL?	No - acceptable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Aluminum mg/kg	Q	PQL	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Calcium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Iron mg/kg	Q	PQL	Lead mg/kg	Q	PQL
C7662; I-009	B2B8Y1	1/27/11	5560		4.70	2.73		0.94	62.7		0.47	0.281		0.19	5820		94.0	7.58		0.19	8.10		1.88	13.5		0.94	24500		18.8	2.67		0.47
C7662; I-009 DUP	B2BBN7	1/27/11	4920		4.25	2.78		0.85	56.9		0.43	0.263		0.17	7180		84.9	6.58		0.17	7.05		1.70	18.4		0.85	20700		17.0	4.18		0.43

Analysis:

		Aluminum	Arsenic	Barium	Beryllium	Calcium	Chromium	Cobalt	Copper	Iron	Lead
	TDL	5	1	0.5	0.2	100	0.2	2	1	5	0.5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD	12.2%		9.7%		20.9%	14.1%		30.7%	16.8%	44.1%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Lithium mg/kg	Q	PQL	Magnesium mg/kg	Q	PQL	Manganese mg/kg	Q	PQL	Molybdenum mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Phosphorus mg/kg	Q	PQL	Potassium mg/kg	Q	PQL	Silicon mg/kg	Q	PQL	Sodium mg/kg	Q	PQL	Strontium mg/kg	Q	PQL
C7662; I-009	B2B8Y1	1/27/11	4.15		2.35	3430		70.5	325		4.70	0.807	B	1.88	6.13		3.76	1070		47.0	774		376	352		1.88	620		47.0	22.9		0.94
C7662; I-009 DUP	B2BBN7	1/27/11	5.33		2.12	2910		63.7	321		4.25	0.790	B	1.70	5.99		3.40	966		42.5	711		340	355		1.70	436		42.5	30.1		0.85

Analysis:

		Lithium	Magnesium	Manganese	Molybdenum	Nickel	Phosphorus	Potassium	Silicon	Sodium	Strontium
	TDL	2.5	75	5	2	4	100	400	2	50	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)
	RPD		16.4%	1.2%			10.2%		0.8%	34.8%	27.2%
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable

Sampling Area	Sample Number	Sample Date	Tin mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Chloride mg/kg	Q	PQL	Nitrate mg/kg	Q	PQL	Nitrogen in Nitrite and Nitrate mg/kg	Q	PQL	Sulfate mg/kg	Q	PQL
C7662; I-009	B2B8Y1	1/27/11	1.85	B	9.40	66.2		2.35	44.3		9.40	11.0		5.1	1.1	B	5.1	0.34	B	0.51	11.9		5.1
C7662; I-009 DUP	B2BBN7	1/27/11	1.22	B	8.49	54.2		2.12	38.6		8.49	10.7		5.2	1.1	B	5.2	0.28	B	0.52	11.3		5.2

Analysis:

		Tin	Vanadium	Zinc	Chloride	Nitrate	Nitrogen in Nitrite and Nitrate	Sulfate
	TDL	10	2.5	1	2	2.5	0.75	5
Duplicate Analysis	Both > PQL?	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)
	Both >5xTDL?		Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)			No-Stop (acceptable)
	RPD		22.9%	13.8%	2.8%			
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable

Sampling Area	Sample Number	Sample Date	Acetone ug/kg	Q	PQL
C7662; I-009	B2B8T5	1/27/11	7.88	J	12.5
C7662; I-009 DUP	B2B8T6	1/27/11	7.50	J	11.1

Analysis:

		Acetone
	TDL	20
Duplicate Analysis	Both > PQL?	No-Stop (acceptable)
	Both >5xTDL?	
	RPD	
	Difference > 2 TDL?	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator P. L. Benjamin PB
Project 300 Area Remedial Investigation
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Date 10/11/2011
Job No. 14655

Calc. No. 0300X-CA-V0143
Checked H. Sulloway

Rev. No. 0
Date 10/12/2011
Sheet No. 12 of 13

Split Analysis - C7662 Interval 11 Soil Samples

Sampling Area	Sample Number	Sample Date	Uranium-233/234 pCi/g	Q	MDA	Uranium-238 pCi/g	Q	MDA
C7662; I-011	B2B8P8	1/28/11	0.375		0.179	0.516		0.179
C7662; I-011 SPLIT	B2B8N9	1/28/11	0.858		0.0727	0.808		0.0782

Analysis:

	TDL	1	1
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		
	Difference > 2 TDL?	No - acceptable	No - acceptable

Split Analysis - C7662 Interval 11 Soil Samples

Sampling Area	Sample Number	Sample Date	Aluminum mg/kg	Q	MDA	Barium mg/kg	Q	MDA	Calcium mg/kg	Q	MDA	Chromium mg/kg	Q	MDA	Cobalt mg/kg	Q	MDA	Copper mg/kg	Q	MDA	Iron mg/kg	Q	MDA	Lead mg/kg	Q	MDA
C7662; I-011	B2B8Y3	1/28/11	5310		4.04	115		0.40	5830		80.7	6.57		0.16	8.21		1.61	15.4		0.81	27300		16.1	2.5		0.40
C7662; I-011 SPLIT	B2B8P0	1/28/11	5660		30.8	91.3		0.55	5210		29.3	6.20		0.68	16.5		2.10	19.1		1.60	25500		32.7	3.0		0.38

Analysis:

	TDL	5	0.5	100	0.2	2	1	5	0.5
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	6.7%	23.0%	11.2%	5.8%		21.4%	6.8%	
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	Not applicable	Yes - assess further	Not applicable	Not applicable	No - acceptable

Split Analysis - C7662 Interval 11 Soil Samples

Sampling Area	Sample Number	Sample Date	Lithium mg/kg	Q	MDA	Magnesium mg/kg	Q	MDA	Manganese mg/kg	Q	MDA	Nickel mg/kg	Q	MDA	Phosphorus mg/kg	Q	MDA	Potassium mg/kg	Q	MDA	Silicon mg/kg	Q	MDA	Sodium mg/kg	Q	MDA
C7662; I-011	B2B8Y3	1/28/11	4.55		2.02	3920		60.5	310		4.04	6.15		3.23	1180		40.4	754		323	341		1.61	583		40.4
C7662; I-011 SPLIT	B2B8P0	1/28/11	4.30	B	1.40	3360		18.3	328		0.34	8.50	B	0.60	1260		1.50	932	B	742	524		110	409		104

Analysis:

	TDL	2.5	75	5	4	100	400	2	50
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD		15.4%	5.6%		6.6%		42.3%	35.1%
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Split Analysis - C7662 Interval 11 Soil Samples

Sampling Area	Sample Number	Sample Date	Strontium mg/kg	Q	MDA	Vanadium mg/kg	Q	MDA	Zinc mg/kg	Q	MDA	Chloride mg/kg	Q	MDA	Nitrogen in Nitrite and Nitrate mg/kg	Q	MDA	Sulfate mg/kg	Q	MDA
C7662; I-011	B2B8Y3	1/28/11	24.7		0.81	71.2		2.02	43.5		8.07	5.1	B	5.3	0.15	B	0.53	9.6		5.3
C7662; I-011 SPLIT	B2B8P0	1/28/11	19.9		0.55	72.9		2.80	35.7		4.40	6.4		0.22	0.44	BC	0.052	9.9		0.58

Analysis:

	TDL	1	2.5	1	2	0.75	5
Split Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)			No-Stop (acceptable)
	RPD	21.5%	2.4%	19.7%			
	Difference > 2 TDL?	Not applicable	Not applicable	Not applicable	No - acceptable	No - acceptable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford PB

Originator P. L. Benjamin
Project 300 Area Remedial Investigation
Subject 300 Area Remedial Investigation Relative Percent Difference (RPD) Calculations

Date 10/11/2011
Job No. 14655

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Checked H. M. Sulloway

Rev. No. 0
Date 10/12/2011
Sheet No. 13 of 13

Duplicate Analysis - C8245 Interval 9 Soil Samples

Sampling Area	Sample Number	Sample Date	Uranium-233/234 pCi/g	Q	MDA	Uranium-238 pCi/g	Q	MDA
C8245; I-009	B29DY0	1/5/11	0.337		0.184	0.313		0.184
C8245; I-009 DUP	B29DY1	1/5/11	0.326		0.208	0.435		0.208

Analysis:

	TDL	1	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)
	RPD		
	Difference > 2 TDL?	No - acceptable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Aluminum mg/kg	Q	PQL	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Cadmium mg/kg	Q	PQL	Calcium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Iron mg/kg	Q	PQL
C8245; I-009	B29F60	1/5/11	4890		4.15	2.18		0.83	65.3		0.42	0.203		0.17	0.060	B	0.17	5130		83.1	9.82		0.17	7.48		1.66	12.3		0.83	23000		16.6
C8245; I-009 DUP	B29F73	1/5/11	4430		3.66	2.05		0.73	59.6		0.37	0.185		0.15	0.067	B	0.15	4430		73.2	24.6		0.15	6.18		1.46	15.1		0.73	20000		14.6

Analysis:

	TDL	5	1	0.5	0.2	0.2	100	0.2	2	1	5
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)		Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD	9.9%		9.1%			14.6%	85.9%		20.4%	14.0%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	HEIS Number	Sample Date	Lead mg/kg	Q	PQL	Lithium mg/kg	Q	PQL	Magnesium mg/kg	Q	PQL	Manganese mg/kg	Q	PQL	Molybdenum mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Phosphorus mg/kg	Q	PQL	Potassium mg/kg	Q	PQL	Silicon mg/kg	Q	PQL	Sodium mg/kg	Q	PQL
C8245; I-009	B29F60	1/5/11	2.46		0.42	5.14		2.08	3590		62.3	288		4.15	1.16	B	1.66	6.90		3.32	934		41.5	718		332	438		1.66	423		41.5
C8245; I-009 DUP	B29F73	1/5/11	2.50		0.37	4.79		1.83	3620		54.9	259		3.66	0.888	B	1.46	6.63		2.93	841		36.6	607		293	372		1.46	418		36.6

Analysis:

	TDL	0.5	2.5	75	5	2	4	100	400	2	50
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD			0.8%	10.6%			10.5%		16.3%	1.2%
	Difference > 2 TDL?	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

Sampling Area	Sample Number	Sample Date	Strontium mg/kg	Q	PQL	Tin mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL
C8245; I-009	B29F60	1/5/11	19.4		0.83	1.50	B	8.31	65.5		2.08	40.2		8.31
C8245; I-009 DUP	B29F73	1/5/11	16.7		0.73	1.45	B	7.32	56.2		1.83	39.0		7.32

Analysis:

	TDL	1	10	2.5	1
Duplicate Analysis	Both > PQL?	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)		Yes (calc RPD)	Yes (calc RPD)
	RPD	15.0%		15.3%	3.0%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	Not applicable

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