

**Data Summary Report  
IHSS Group 800-5**

**UBC 887 – Process and Sanitary Waste Tanks  
and PAC 800-177 – Building 885 Drum Storage**

**July 2004**

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Approval received from the Colorado Department of Public Health and Environment

June 21, 2004.

Approval letter contained in the Administrative Record.

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**ENCLOSURE**

Compact Disc Containing Standardized Real and Quality Control Data

## **ACRONYMS**

AAESE	Accelerated Action Ecological Screening Evaluation
AL	action level
AR	Administrative Record
ASD	Analytical Services Division
bgs	below ground surface
CAS	Chemical Abstract Service
CD	compact disc
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CPIR	Contingency Plan Implementation Report
COC	contaminant of concern
CRA	Comprehensive Risk Assessment
DOE	U.S. Department of Energy
DQA	Data Quality Assessment
DQO	data quality objective
EB	equipment blank
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FB	field blank
ft	foot
FY	Fiscal Year
HPGe	high-purity germanium
HRR	Historical Release Report
IA	Industrial Area
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
IMP	Integrated Monitoring Program
K-H	Kaiser-Hill Company, L.L.C.
LCS	laboratory control sample
ug/kg	micrograms per kilogram
ug/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
NFAA	No Further Accelerated Action
OPWL	Original Process Waste Lines
PAC	Potential Area of Concern
PAH	polyaromatic hydrocarbon
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity

**ACRONYMS**

pCi/g	picocuries per gram
pCi/L	picocuries per liter
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS or Site	Rocky Flats Environmental Technology Site
RIN	report identification number
RL	reporting limit
RNS	rinse blank
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SBD	sample beginning depth
SID	South Interceptor Ditch
SED	sample ending depth
SOR	sum of ratios
SSRS	Subsurface Soil Risk Screen
SVOC	semivolatile organic compound
SWD	Soil Water Database
TB	trip blank
UBC	Under Building Contamination
V&V	verification and validation
VOC	volatile organic compound
WRW	wildlife refuge worker

## **1.0 INTRODUCTION**

This Data Summary Report summarizes accelerated action characterization conducted at Individual Hazardous Substance Site (IHSS) Group 800-5 at the Rocky Flats Environmental Technology Site (RFETS or Site) in Golden, Colorado. These activities were planned and executed in accordance with the Industrial Area (IA) Sampling and Analysis Plan (SAP) (IASAP) (DOE 2001) and IASAP Addendum #IA-02-04 (DOE 2002a). Results are compared to wildlife refuge worker (WRW) action levels (ALs) described in the Rocky Flats Cleanup Agreement (RFCA) Modification (DOE et al. 2003). Potential ecological risk associated with the results will be evaluated in the Accelerated Action Ecological Screening Evaluation (AAESE) and the ecological portion of the Sitewide Comprehensive Risk Assessment (CRA). The location of IHSS Group 800-5 (UBC 887 and PAC 800-177) is shown on Figure 1.

This IHSS Group consists of one Potential Area of Concern (PAC) and one Under Building Contamination (UBC) Site:

- UBC 887 – Process and Sanitary Waste Tanks; and
- PAC 800-177 – Building 885 Drum Storage.

Approval of this Data Summary Report constitutes regulatory agency concurrence that IHSS Group 800-5 is a No Further Accelerated Action (NFAA) Site. This information and NFAA determination will be documented in the Fiscal Year (FY) 2004 (04) Historical Release Report (HRR).

## **2.0 SITE CHARACTERIZATION**

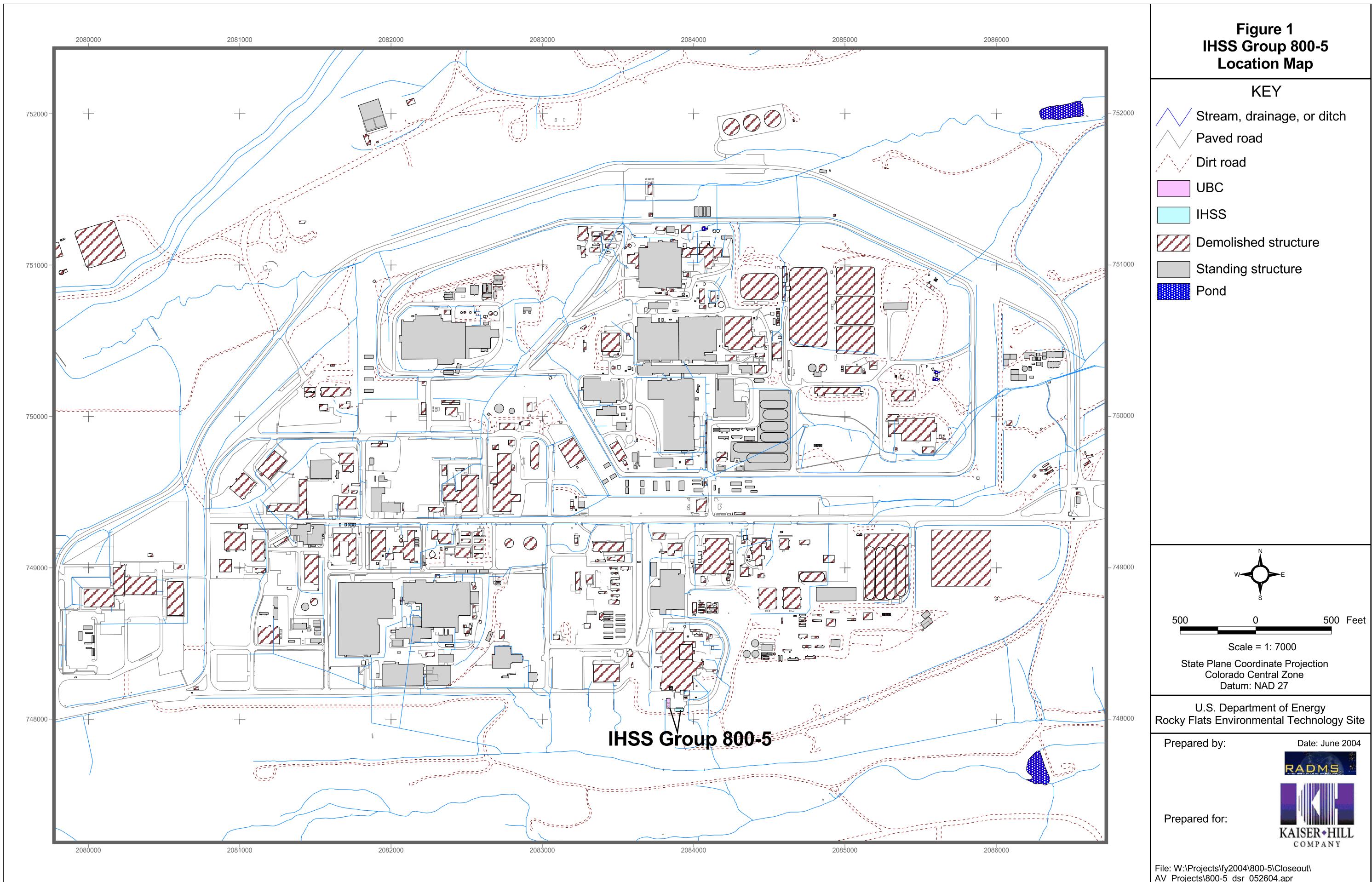
IHSS Group 800-5 information consists of historical knowledge (DOE 1992-2003), historical sampling data, and recent sampling data. Historical information and data are summarized in Section 2.1. Characterization data collected in accordance with IASAP Addendum #IA-02-04 (DOE 2002a) are presented in Section 2.2.

### **2.1 Historical Information and Data**

Building 887 housed process waste and sanitary waste holding tanks. In 1989, a worker discovered that the process waste tanks had overflowed onto the floor with excess water from the acid scrubbers in room 266. This incident resulted in the filing of a Resource Conservation and Recovery Act (RCRA) Contingency Plan Implementation Report (CPIR).

PAC 800-177 consists of the Building 885 drum and paint storage. The Building 885 Drum Storage Area was first used in 1953 when Building 881 was first occupied. Drums contained waste oil, waste paints, waste solvents, and low-level radioactive waste. In 1972, the drain water from the sump that drains the floor of Building 885 was found to have a temperature of 150 degrees Fahrenheit. The cause of the elevated temperature, as well as the source and destination of the liquid, is unknown. A Summary of Events (DOE 1992) indicated an inadvertent dumping of radioactive-contaminated oil sludge into an open-top dumpster located at Building 885. It is not clear whether there was a release to the environment.

**Figure 1**  
**IHSS Group 800-5**  
**Location Map**



Historical information and data for this IHSS are available in Appendix C of the IASAP (DOE 2001) and the HRRs (DOE 1992-2003).

## **2.2 Accelerated Action Characterization Data**

Accelerated action characterization of IHSS Group 800-5 included 16 sampling locations. Sampling and analysis specifications for 11 of these locations were described in IASAP Addendum #IA-02-04 (DOE 2002a). A summary of planned and actual sampling and analysis, as well as additional sampling and analysis, is presented in Table 1. Deviations from these specifications are summarized in Table 2.

**Table 1**  
**IHSS Group 800-5 Sampling and Analysis Summary**

<b>IHSS Group</b>	<b>Category</b>	<b>Planned Total</b>	<b>Actual Total</b>
800-5	Number of Sampling Locations	11	16
	Number of Samples	13	19
	Number of Metal Analyses	13	19
	Number of Radionuclide Analyses	13	19
	Number of SVOC Analyses	13	19
	Number of VOC Analyses	11	19

A total of 11 sampling locations (CF33-000, CF33-001, CF33-002, CF33-003, CF33-004, CF33-007, CF33-008, CF33-009, CF33-010, CF34-021, and CG33-000) were planned for IHSS Group 800-5 as part of IASAP Addendum #IA-02-04 (DOE 2002a). Six additional sampling locations (CF33-011, CF33-012, CF33-013, CF34-022, CF34-23, and CF34-024) were added later to target the Original Process Waste Lines (OPWL) in this area. Sampling location CF33-009 was replaced with sampling location CF33-013 for better areal coverage. Sampling location CG33-000 targeted the sump for the Building 881 footing drain outfall. The actual location and depth of the sump was measured in the field. One sampling interval was planned; however, samples from two intervals were collected: one sample from the bottom of the sump, and one sample from the next deeper interval. This deviation was documented and approved in an Environmental Restoration (ER) Regulatory Contact Record dated March 19, 2004 (Appendix A).

Accelerated action soil sampling locations and analytical results for IHSS Group 800-5 are summarized in Table 3, and shown on Figure 2. Only results greater than background means plus two standard deviations or reporting limits (RLs) are presented. Data indicate that all contaminant activities and concentrations are less than RFCA WRW ALs except for benzo(a)pyrene and arsenic. Benzo(a)pyrene was detected at IHSS 800-177 surface soil sampling location CF33-007 at a concentration of 3,700 micrograms per kilogram (ug/kg). This is only slightly greater than the WRW AL of 3,490 ug/kg. Benzo(a)pyrene was not detected above the RL at PAC 800-177 surface soil sampling location CF33-008, also collected directly beneath the concrete slab. Additionally, all other semivolatile organic compounds (SVOCs), including benzo(a)pyrene, detected at the 16 sampling locations for PAC Group 800-5 were at least two times below the

**Table 2**  
**IHSS Group 800-5 Characterization Sampling Deviations**

IHSS/PAC/UBC Site	Location	Proposed Northing	Proposed Easting	Actual Northing	Actual Easting	Actual Media	Actual Depth (ft)	Actual Analyte	Comments
UBC 887	CF33-000	748124.840	2083824.359	748123.827	2083816.862	Subsurface soil	16.5 - 18.5	Metals Radionuclides SVOCs VOCs	Moved to outside of building because of concerns with groundwater beneath the building.
	CF33-001	748121.103	2083853.010	748120.254	2083846.079	Subsurface soil	16.5 - 18.5	Metals Radionuclides SVOCs VOCs	Moved to outside of building because of concerns with groundwater beneath the building.
	CF33-002	748075.013	2083850.518	748067.871	2083844.474	Subsurface soil	16.5 - 18.5	Metals Radionuclides SVOCs VOCs	Moved to outside of building because of concerns with groundwater beneath the building.
	CF33-003	748073.768	2083824.359	748068.358	2083818.272	Subsurface soil	16.5 - 18.5	Metals Radionuclides SVOCs VOCs	Moved to outside of building because of concerns with groundwater beneath the building.
	CF33-004	748101.172	2083838.062	748098.540	2083832.870	Subsurface soil	16.9 - 17.4	Metals Radionuclides SVOCs VOCs	Location and depth interval were changed due to actual location of the OPWL.
	CF33-009	748139.505	2083848.784	Not sampled					CF33-009 was replaced by CF33-013, which is one of the six additional sampling locations.
	CF33-010	748131.956	2083867.655	748131.956	2083867.655	Subsurface soil	5.0 - 5.01	Metals Radionuclides SVOCs VOCs	Sample collected at "D" interval instead of "E" interval to target the actual depth of OPWL. Depth interval represents a grab sample.
	CF33-011	NA	NA	748143.538	2083807.896	Subsurface soil	5.0 - 5.5	Metals Radionuclides SVOCs VOCs	Additional sampling location targeting OPWL.
	CF33-012	NA	NA	748147.120	2083846.837	Subsurface soil	3.0 - 3.01	Metals Radionuclides SVOCs VOCs	Additional sampling location targeting OPWL. Depth interval represents a grab sample.

IHSS/PAC/UBC Site	Location	Proposed Northing	Proposed Easting	Actual Northing	Actual Easting	Actual Media	Actual Depth (ft)	Actual Analyte	Comments
	CF33-013	NA	NA	748142.720	2083856.448	Subsurface soil	3.0 - 3.01	Metals Radionuclides SVOCs VOCs	Additional sampling location targeting OPWL. Depth interval represents a grab sample.
	CF34-021	748189.865	2083861.231	748189.865	2083861.231	Subsurface soil	30.0 - 30.01	Metals Radionuclides SVOCs VOCs	Sample interval was changed because of location of OPWL near hillside. Depth interval represents a grab sample.
	CF34-022	NA	NA	748188.610	2083796.230	Subsurface soil	25.0 - 25.5	Metals Radionuclides SVOCs VOCs	Additional sampling location targeting OPWL.
	CF34-023	NA	NA	748186.595	2083845.586	Subsurface soil	3.0 - 3.01	Metals Radionuclides SVOCs VOCs	Additional sampling location targeting OPWL. Depth interval represents a grab sample.
	CF34-024	NA	NA	748185.698	2083855.306	Subsurface soil	3.0-3.01	Metals Radionuclides SVOCs VOCs	Additional sampling location targeting OPWL. Depth interval represents a grab sample.
	CG33-000	748023.148	2083943.716	748017.059	2083938.488	Subsurface soil	17.0 - 19.0	Metals Radionuclides SVOCs VOCs	Sample targeting sump outside Building 887. Location and depth changed to target the actual depth and location of sump. See Contact Record dated March 19, 2004 (Appendix A).
							19.0 - 21.0	Metals Radionuclides SVOCs VOCs	Sample targeting sump outside Building 887. Second depth interval collected as per the Contact Record dated March 19, 2004 (Appendix A).
PAC 800-177	CF33-007	748059.006	2083889.478	748059.003	2083889.449	Surface soil	0.6 - 1.1	Metals Radionuclides SVOCs VOCs	No deviations in sampling location from planned. Sampling interval reflects depth under concrete pad and fill but represents the "A" and "B" intervals. VOCs added to the analysis because samples were collected beneath the slab.
						Subsurface soil	1.1 - 3.3	Metals Radionuclides SVOCs VOCs	

IHSS/PAC/UBC Site	Location	Proposed Northing	Proposed Easting	Actual Northing	Actual Easting	Actual Media	Actual Depth (ft)	Actual Analyte	Comments
	CF33-008	748059.683	2083919.698	748059.631	2083919.676	Surface soil	0.6 - 1.1	Metals Radionuclides SVOCs VOCs	No deviations in sampling location from planned. Sampling interval reflects depth under concrete pad and fill but represents the "A" and "B" intervals. VOCs added to the analysis because samples were collected beneath the slab.
						Subsurface soil	1.1 - 3.1	Metals Radionuclides SVOCs VOCs	

**Table 3**  
**IHSS Group 800-5 Results Greater Than Background Means Plus Two Standard Deviations or RLs**

IHSS/PAC/UBC Site	Location Code	Actual Easting	Actual Northing	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus Two Standard Deviations	Reporting Limit	Unit
UBC 887	CF33-000	748123.827	2083816.862	16.50	18.50	Uranium-235	0.140	8.000	0.120	-	pCi/g
	CF33-000	748123.827	2083816.862	16.50	18.50	Uranium-238	2.562	351.000	1.490	-	pCi/g
	CF33-001	748120.254	2083846.079	16.50	18.50	Uranium-235	0.217	8.000	0.120	-	pCi/g
	CF33-001	748120.254	2083846.079	16.50	18.50	Uranium-238	2.433	351.000	1.490	-	pCi/g
	CF33-002	748067.871	2083844.474	16.50	18.50	Tetrachloroethene	82.300	615000.000	-	6.790	ug/kg
	CF33-002	748067.871	2083844.474	16.50	18.50	Trichloroethene	35.600	19600.000	-	6.790	ug/kg
	CF33-002	748067.871	2083844.474	16.50	18.50	Uranium-238	2.181	351.000	1.490	-	pCi/g
	CF33-003	748068.358	2083818.272	16.50	18.50	Arsenic	14.000	22.200	13.140	-	mg/kg
	CF33-003	748068.358	2083818.272	16.50	18.50	Uranium-235	0.182	8.000	0.120	-	pCi/g
	CF33-003	748068.358	2083818.272	16.50	18.50	Uranium-238	1.908	351.000	1.490	-	pCi/g
	CF33-003	748068.358	2083818.272	16.50	18.50	Zinc	160.000	307000.000	139.100	-	mg/kg
	CF33-004	748098.540	2083832.870	16.90	17.40	Barium	700.000	26400.000	289.380	-	mg/kg
	CF33-004	748098.540	2083832.870	16.90	17.40	Uranium-238	2.117	351.000	1.490	-	pCi/g
	CF33-004	748098.540	2083832.870	16.90	17.40	Xylene	16.900	2040000.000	-	12.000	ug/kg
	CF33-010	748131.956	2083867.655	5.00	5.01	Arsenic	25.500	22.200	13.140	-	mg/kg

IHSS/PAC/ UBC Site	Location Code	Actual Easting	Actual Northing	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus Two Standard Deviations	Reporting Limit	Unit
	CF33-010	748131.956	2083867.655	5.00	5.01	Barium	753.000	26400.000	289.380	-	mg/kg
	CF33-010	748131.956	2083867.655	5.00	5.01	Copper	93.900	40900.000	38.210	-	mg/kg
	CF33-010	748131.956	2083867.655	5.00	5.01	Fluoranthene	64.000	27200000.000	-	46.000	ug/kg
	CF33-010	748131.956	2083867.655	5.00	5.01	Lead	30.900	1000.000	24.970	-	mg/kg
	CF33-010	748131.956	2083867.655	5.00	5.01	Uranium-234	4.224	300.000	2.640	-	pCi/g
	CF33-010	748131.956	2083867.655	5.00	5.01	Uranium-235	0.260	8.000	0.120	-	pCi/g
	CF33-010	748131.956	2083867.655	5.00	5.01	Uranium-238	4.224	351.000	1.490	-	pCi/g
	CF33-011	748143.538	2083807.896	5.00	5.50	Barium	703.000	26400.000	289.380	-	mg/kg
	CF33-011	748143.538	2083807.896	5.00	5.50	Benzo(a)anthracene	160.000	34900.000	-	46.000	ug/kg
	CF33-011	748143.538	2083807.896	5.00	5.50	Benzo(a)pyrene	150.000	3490.000	-	60.000	ug/kg
	CF33-011	748143.538	2083807.896	5.00	5.50	Benzo(b)fluoranthene	110.000	34900.000	-	74.000	ug/kg
	CF33-011	748143.538	2083807.896	5.00	5.50	Benzo(k)fluoranthene	160.000	349000.000	-	80.000	ug/kg
	CF33-011	748143.538	2083807.896	5.00	5.50	Chrysene	180.000	3490000.000	-	40.000	ug/kg
	CF33-011	748143.538	2083807.896	5.00	5.50	Copper	178.000	40900.000	38.210	-	mg/kg
	CF33-011	748143.538	2083807.896	5.00	5.50	Fluoranthene	390.000	27200000.000	-	46.000	ug/kg
	CF33-011	748143.538	2083807.896	5.00	5.50	Indeno(1,2,3-cd)pyrene	90.000	34900.000	-	51.000	ug/kg
	CF33-011	748143.538	2083807.896	5.00	5.50	Pyrene	390.000	22100000.000	-	65.000	ug/kg
	CF33-011	748143.538	2083807.896	5.00	5.50	Uranium-234	4.256	300.000	2.640	-	pCi/g
	CF33-011	748143.538	2083807.896	5.00	5.50	Uranium-235	0.292	8.000	0.120	-	pCi/g
	CF33-011	748143.538	2083807.896	5.00	5.50	Uranium-238	4.256	351.000	1.490	-	pCi/g
	CF33-011	748143.538	2083807.896	5.00	5.50	Vanadium	166.000	7150.000	88.490	-	mg/kg
	CF33-012	748147.120	2083846.837	3.00	3.01	Barium	419.000	26400.000	289.380	-	mg/kg
	CF33-012	748147.120	2083846.837	3.00	3.01	Benzo(a)anthracene	82.000	34900.000	-	43.000	ug/kg
	CF33-012	748147.120	2083846.837	3.00	3.01	Benzo(a)pyrene	70.000	3490.000	-	56.000	ug/kg
	CF33-012	748147.120	2083846.837	3.00	3.01	Benzo(k)fluoranthene	85.000	349000.000	-	75.000	ug/kg
	CF33-012	748147.120	2083846.837	3.00	3.01	Chrysene	99.000	3490000.000	-	37.000	ug/kg
	CF33-012	748147.120	2083846.837	3.00	3.01	Copper	59.800	40900.000	38.210	-	mg/kg

IHSS/PAC/ UBC Site	Location Code	Actual Easting	Actual Northing	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus Two Standard Deviations	Reporting Limit	Unit
	CF33-012	748147.120	2083846.837	3.00	3.01	Fluoranthene	230.000	27200000.000	-	43.000	ug/kg
	CF33-012	748147.120	2083846.837	3.00	3.01	Pyrene	210.000	22100000.000	-	61.000	ug/kg
	CF33-012	748147.120	2083846.837	3.00	3.01	Uranium-234	3.848	300.000	2.640	-	pCi/g
	CF33-012	748147.120	2083846.837	3.00	3.01	Uranium-235	0.252	8.000	0.120	-	pCi/g
	CF33-012	748147.120	2083846.837	3.00	3.01	Uranium-238	3.848	351.000	1.490	-	pCi/g
	CF33-012	748147.120	2083846.837	3.00	3.01	Vanadium	134.000	7150.000	88.490	-	mg/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Acenaphthene	57.000	40800000.000	-	50.000	ug/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Barium	460.000	26400.000	289.380	-	mg/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Benzo(a)anthracene	140.000	34900.000	-	43.000	ug/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Benzo(a)pyrene	140.000	3490.000	-	57.000	ug/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Benzo(b)fluoranthene	110.000	34900.000	-	70.000	ug/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Benzo(k)fluoranthene	140.000	349000.000	-	75.000	ug/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Chrysene	160.000	3490000.000	-	38.000	ug/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Copper	90.100	40900.000	38.210	-	mg/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Fluoranthene	360.000	27200000.000	-	43.000	ug/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Indeno(1,2,3-cd)pyrene	76.000	34900.000	-	49.000	ug/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Lead	26.400	1000.000	24.970	-	mg/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Pyrene	360.000	22100000.000	-	62.000	ug/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Toluene	8.000	31300000.000	-	5.300	ug/kg
	CF33-013	748142.720	2083856.448	3.00	3.01	Uranium-234	3.928	300.000	2.640	-	pCi/g
	CF33-013	748142.720	2083856.448	3.00	3.01	Uranium-238	3.928	351.000	1.490	-	pCi/g
	CF33-013	748142.720	2083856.448	3.00	3.01	Vanadium	108.000	7150.000	88.490	-	mg/kg
	CF34-021	748189.865	2083861.231	30.00	30.01	Barium	1300.000	26400.000	289.380	-	mg/kg
	CF34-021	748189.865	2083861.231	30.00	30.01	Copper	150.000	40900.000	38.210	-	mg/kg
	CF34-021	748189.865	2083861.231	30.00	30.01	Uranium-234	4.471	300.000	2.640	-	pCi/g
	CF34-021	748189.865	2083861.231	30.00	30.01	Uranium-235	0.259	8.000	0.120	-	pCi/g
	CF34-021	748189.865	2083861.231	30.00	30.01	Uranium-238	4.471	351.000	1.490	-	pCi/g

IHSS/PAC/ UBC Site	Location Code	Actual Easting	Actual Northing	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus Two Standard Deviations	Reporting Limit	Unit
CF34-021	CF34-021	748189.865	2083861.231	30.00	30.01	Vanadium	114.000	7150.000	88.490	-	mg/kg
	CF34-022	748188.610	2083796.230	25.00	25.50	Barium	719.000	26400.000	289.380	-	mg/kg
	CF34-022	748188.610	2083796.230	25.00	25.50	Copper	47.400	40900.000	38.210	-	mg/kg
	CF34-022	748188.610	2083796.230	25.00	25.50	Uranium-234	3.824	300.000	2.640	-	pCi/g
	CF34-022	748188.610	2083796.230	25.00	25.50	Uranium-235	0.229	8.000	0.120	-	pCi/g
	CF34-022	748188.610	2083796.230	25.00	25.50	Uranium-238	3.824	351.000	1.490	-	pCi/g
	CF34-022	748188.610	2083796.230	25.00	25.50	Vanadium	168.000	7150.000	88.490	-	mg/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Acenaphthene	360.000	40800000.000	-	46.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Anthracene	560.000	204000000.000	-	67.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Benzo(a)anthracene	1600.000	34900.000	-	40.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Benzo(a)pyrene	1500.000	3490.000	-	53.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Benzo(b)fluoranthene	1300.000	34900.000	-	65.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Benzo(k)fluoranthene	1300.000	349000.000	-	70.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Chrysene	1900.000	3490000.000	-	35.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Dibenz(a,h)anthracene	420.000	3490.000	-	64.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Dibenzofuran	130.000	2950000.000	-	51.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Fluoranthene	3300.000	27200000.000	-	40.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Fluorene	270.000	40800000.000	-	56.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Indeno(1,2,3-cd)pyrene	860.000	34900.000	-	45.000	ug/kg
	CF34-023	748186.595	2083845.586	3.00	3.01	Pyrene	3400.000	22100000.000	-	58.000	ug/kg
CF34-024	748185.698	2083855.306	3.00	3.01	Barium	320.000	26400.000	289.380	-	mg/kg	
	CF34-024	748185.698	2083855.306	3.00	3.01	Uranium-234	6.510	300.000	2.640	-	pCi/g
	CF34-024	748185.698	2083855.306	3.00	3.01	Uranium-235	0.918	8.000	0.120	-	pCi/g
	CG33-000	748017.059	2083938.488	17.00	19.00	Uranium-234	4.301	300.000	2.640	-	pCi/g
CG33-000	748017.059	2083938.488	17.00	19.00	Uranium-235	0.256	8.000	0.120	-	pCi/g	
CG33-000	748017.059	2083938.488	17.00	19.00	Uranium-238	4.301	351.000	1.490	-	pCi/g	
CG33-000	748017.059	2083938.488	19.00	21.00	Uranium-234	5.110	300.000	2.640	-	pCi/g	

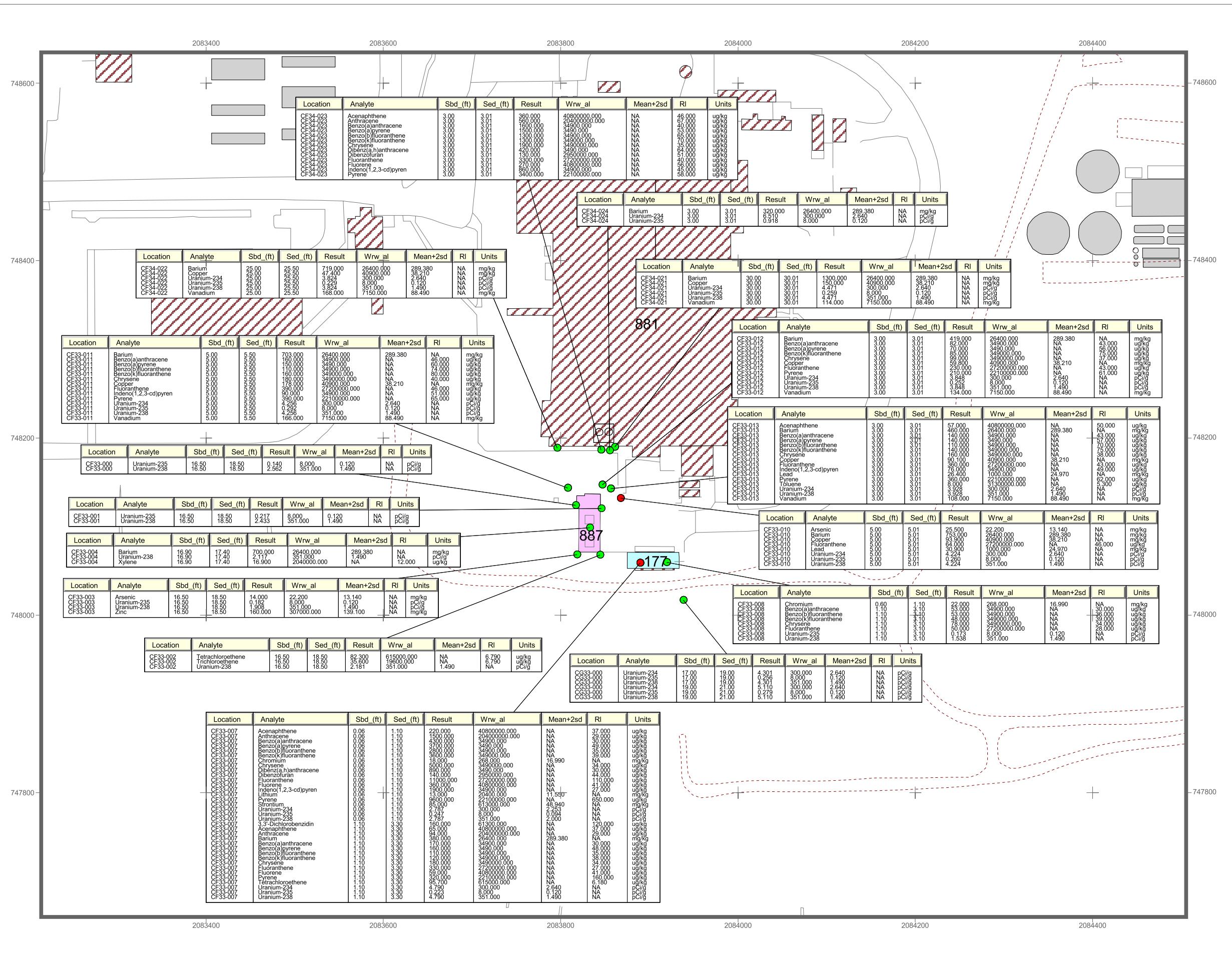
IHSS/PAC/UBC Site	Location Code	Actual Easting	Actual Northing	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus Two Standard Deviations	Reporting Limit	Unit
	CG33-000	748017.059	2083938.488	19.00	21.00	Uranium-235	0.279	8.000	0.120	-	pCi/g
	CG33-000	748017.059	2083938.488	19.00	21.00	Uranium-238	5.110	351.000	1.490	-	pCi/g
IHSS 800-177	CF33-007	748059.003	2083889.449	0.06	1.10	Acenaphthene	220.000	40800000.000	-	37.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Anthracene	1500.000	204000000.000	-	29.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Benzo(a)anthracene	4300.000	34900.000	-	30.000	ug/kg
	<b>CF33-007</b>	<b>748059.003</b>	<b>2083889.449</b>	<b>0.06</b>	<b>1.10</b>	<b>Benzo(a)pyrene</b>	<b>3700.000</b>	<b>3490.000</b>	-	<b>49.000</b>	<b>ug/kg</b>
	CF33-007	748059.003	2083889.449	0.06	1.10	Benzo(b)fluoranthene	2800.000	34900.000	-	35.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Benzo(k)fluoranthene	3600.000	349000.000	-	39.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Chromium	18.000	268.000	16.990	-	mg/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Chrysene	5000.000	3490000.000	-	34.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Dibenz(a,h)anthracene	890.000	3490.000	-	30.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Dibenzofuran	140.000	2950000.000	-	44.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Fluoranthene	11000.000	27200000.000	-	110.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Fluorene	360.000	40800000.000	-	41.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Indeno(1,2,3-cd)pyrene	1900.000	34900.000	-	27.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Lithium	13.000	20400.000	11.550	-	mg/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Pyrene	9600.000	22100000.000	-	650.000	ug/kg
	CF33-007	748059.003	2083889.449	0.06	1.10	Strontium	85.000	613000.000	48.940	-	mg/kg
	<b>CF33-007</b>	<b>748059.003</b>	<b>2083889.449</b>	<b>0.06</b>	<b>1.10</b>	<b>Uranium-234</b>	<b>2.787</b>	<b>300.000</b>	<b>2.253</b>	-	<b>pCi/g</b>
	CF33-007	748059.003	2083889.449	0.06	1.10	Uranium-235	0.247	8.000	0.094	-	pCi/g
	CF33-007	748059.003	2083889.449	0.06	1.10	Uranium-238	2.787	351.000	2.000	-	pCi/g
	CF33-007	748059.003	2083889.449	1.10	3.30	3,3'-Dichlorobenzidine	160.000	61300.000	-	120.000	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Acenaphthene	65.000	40800000.000	-	37.000	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Anthracene	94.000	204000000.000	-	29.000	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Barium	380.000	26400.000	289.380	-	mg/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Benzo(a)anthracene	170.000	34900.000	-	30.000	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Benzo(a)pyrene	160.000	3490.000	-	48.000	ug/kg

IHSS/PAC/ UBC Site	Location Code	Actual Easting	Actual Northing	Starting Depth (ft)	Ending Depth (ft)	Analyte	Result	WRW AL	Background Mean Plus Two Standard Deviations	Reporting Limit	Unit
CF33-007	CF33-007	748059.003	2083889.449	1.10	3.30	Benzo(b)fluoranthene	110.000	34900.000	-	35.000	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Benzo(k)fluoranthene	120.000	349000.000	-	38.000	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Chrysene	180.000	3490000.000	-	34.000	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Fluoranthene	330.000	27200000.000	-	27.000	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Fluorene	59.000	40800000.000	-	41.000	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Pyrene	320.000	22100000.000	-	160.000	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	Tetrachloroethene	95.700	615000.000	-	6.180	ug/kg
	CF33-007	748059.003	2083889.449	1.10	3.30	<i>Uranium-234</i>	4.790	300.000	2.640	-	pCi/g
	CF33-007	748059.003	2083889.449	1.10	3.30	Uranium-235	0.223	8.000	0.120	-	pCi/g
	CF33-007	748059.003	2083889.449	1.10	3.30	Uranium-238	4.790	351.000	1.490	-	pCi/g
	CF33-008	748059.631	2083919.676	0.60	1.10	Chromium	22.000	268.000	16.990	-	mg/kg
	CF33-008	748059.631	2083919.676	1.10	3.10	Benzo(a)anthracene	53.000	34900.000	-	30.000	ug/kg
	CF33-008	748059.631	2083919.676	1.10	3.10	Benzo(b)fluoranthene	53.000	34900.000	-	36.000	ug/kg
	CF33-008	748059.631	2083919.676	1.10	3.10	Benzo(k)fluoranthene	48.000	349000.000	-	39.000	ug/kg
	CF33-008	748059.631	2083919.676	1.10	3.10	Chrysene	78.000	3490000.000	-	34.000	ug/kg
	CF33-008	748059.631	2083919.676	1.10	3.10	Fluoranthene	50.000	27200000.000	-	28.000	ug/kg
	CF33-008	748059.631	2083919.676	1.10	3.10	Uranium-235	0.173	8.000	0.120	-	pCi/g
	CF33-008	748059.631	2083919.676	1.10	3.10	Uranium-238	1.538	351.000	1.490	-	pCi/g

*Italic* type denotes values derived from HPGe measurement.

**Bold** type denotes WRW exceedance.

**Figure 2**  
**IHSS Group 800-5**  
**Soil Results**  
**Greater than Background Means  
Plus Two Standard Deviations  
or Reporting Limits**



**KEY**

**Sampling Location**

- Detected above WRW AL
- Detected Above Background or RL

**Paved road**

**Dirt road**

**UBC**

**IHSS**

**Demolished structure**

**Standing structure**

N  
E  
S  
W

75 0 75 Feet

Scale = 1: 1,300

State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD 27

U.S. Department of Energy  
Rocky Flats Environmental Technology Site

Prepared by: Date: June 2004  
**RADMS**

Prepared for:  
**KAIser+HILL COMPANY**

associated RFCA WRW ALs. No action was taken to remove soil with the elevated benzo(a)pyrene concentrations because this contaminant of concern (COC) was detected at a concentration less than three times the associated WRW AL. The exceedance of this COC appears to be an anomaly, most likely due to asphaltic materials mixed in with the soil throughout the area.

Arsenic was detected at UBC 887 sampling location CF33-010 (5.0 to 5.01 feet [ft] below ground surface [bgs]) at a concentration of 25.5 milligrams per kilogram (mg/kg), which is slightly greater than the WRW AL of 22.2 mg/kg. This COC was detected in only one other sample at a concentration of 14.0 mg/kg, which is only slightly greater than the background mean plus two standard deviations (13.140 mg/kg). Subsurface soil results are evaluated as part of the Subsurface Soil Risk Screen (SSRS) in Section 3.0.

The data retrieved from the RFETS Soil Water Database (SWD) are provided on the enclosed compact disc (CD). The CD contains standardized real and quality control (QC) data, including Chemical Abstract Service (CAS) numbers, analyte names, and units.

### 2.3 Sums of Ratios

RFCA sums of ratios (SORs) were calculated for the IHSS Group 800-5 surface soil sampling locations (to 3 ft). SOR calculations were based on accelerated action analytical data for the radionuclides of concern (americium-241, plutonium-239/240, uranium-234, uranium-235, and uranium-238) with activities greater than background means plus two standard deviations. Table 4 presents the SORs. All radionuclide SORs are less than 1.

**Table 4**  
**RFCA SORs Based on IHSS Group 800-5 Radionuclide Activities**

Location	Start Depth (ft)	End Depth (ft)	SOR
CF33-007	0.06	1.10	0.048
CF33-007	1.10	3.30	0.057
CF33-008	1.10	3.10	0.026
CF33-012	3.00	3.01	0.055
CF33-013	3.00	3.01	0.024
CF34-024	3.00	3.01	0.136

SORs for non-radionuclides were not calculated because the only analytes detected at 10 percent or greater than the associated WRWs were polycyclic aromatic hydrocarbons (PAHs) and arsenic which are not required to be reported. Subsurface soil SORs for nonradionuclides were not calculated because subsurface soil concentrations are evaluated as part of the SSRS in Section 3.0.

### 2.4 Summary Statistics

Summary statistics for analytes detected above background means plus two standard deviations or RLs were calculated by analyte for the IHSS Group 800-5 sampling locations, as presented in Tables 5 and 6 for surface and subsurface soil, respectively.

**Table 5**  
Surface Soil Summary Statistics

Analyte	Total Number of Samples	Detection Frequency (Greater Than Background or RL)	Mean Concentration	Maximum Concentration	WRW AL	Background Mean Plus Two Standard Deviations	RL	Unit
Acenaphthene	2	50.00%	220.000	220.000	40800000.000	-	37.000	ug/kg
Anthracene	2	50.00%	1500.000	1500.000	204000000.000	-	29.000	ug/kg
Benzo(a)anthracene	2	50.00%	4300.000	4300.000	34900.000	-	30.000	ug/kg
<b>Benzo(a)pyrene</b>	<b>2</b>	<b>50.00%</b>	<b>3700.000</b>	<b>3700.000</b>	<b>3490.000</b>	-	<b>49.000</b>	<b>ug/kg</b>
Benzo(b)fluoranthene	2	50.00%	2800.000	2800.000	34900.000	-	35.000	ug/kg
Benzo(k)fluoranthene	2	50.00%	3600.000	3600.000	349000.000	-	39.000	ug/kg
Chromium	2	100.00%	20.000	22.000	268.000	16.990	-	mg/kg
Chrysene	2	50.00%	5000.000	5000.000	3490000.000	-	34.000	ug/kg
Dibenz(a,h)anthracene	2	50.00%	890.000	890.000	3490.000	-	30.000	ug/kg
Dibenzofuran	2	50.00%	140.000	140.000	2950000.000	-	44.000	ug/kg
Fluoranthene	2	50.00%	11000.000	11000.000	27200000.000	-	110.000	ug/kg
Fluorene	2	50.00%	360.000	360.000	40800000.000	-	41.000	ug/kg
Indeno(1,2,3-cd)pyrene	2	50.00%	1900.000	1900.000	34900.000	-	27.000	ug/kg
Lithium	2	50.00%	13.000	13.000	20400.000	11.550	-	mg/kg
Pyrene	2	50.00%	9600.000	9600.000	22100000.000	-	650.000	ug/kg
Strontium	2	50.00%	85.000	85.000	613000.000	48.940	-	mg/kg
Uranium-234	2	50.00%	2.787	2.787	300.000	2.253	-	pCi/g
Uranium-235	2	50.00%	0.247	0.247	8.000	0.094	-	pCi/g
Uranium-238	2	50.00%	2.787	2.787	351.000	2.000	-	pCi/g

**Table 6**  
Subsurface Soil Summary Statistics

Analyte	Total Number of Samples	Detection Frequency (Greater Than Background or RL)	Mean Concentration	Maximum Concentration	WRW AL	Background Mean Plus Two Standard Deviations	RL	Unit
3,3'-Dichlorobenzidine	17	5.88%	160.000	160.000	61300.000	-	120.000	ug/kg
Acenaphthene	17	17.65%	160.667	360.000	40800000.000	-	44.333	ug/kg
Anthracene	17	11.76%	327.000	560.000	204000000.000	-	48.000	ug/kg
<b>Arsenic</b>	<b>17</b>	<b>11.76%</b>	<b>19.750</b>	<b>25.500</b>	<b>22.200</b>	<b>13.140</b>	-	<b>mg/kg</b>
Barium	17	52.94%	639.333	1300.000	26400.000	289.380	-	mg/kg
Benzo(a)anthracene	17	35.29%	367.500	1600.000	34900.000	-	38.667	ug/kg
Benzo(a)pyrene	17	29.41%	404.000	1500.000	3490.000	-	54.800	ug/kg
Benzo(b)fluoranthene	17	29.41%	336.600	1300.000	34900.000	-	56.000	ug/kg
Benzo(k)fluoranthene	17	35.29%	308.833	1300.000	349000.000	-	62.833	ug/kg
Chrysene	17	35.29%	432.833	1900.000	3490000.000	-	36.333	ug/kg
Copper	17	35.29%	103.200	178.000	40900.000	38.210	-	mg/kg

Analyte	Total Number of Samples	Detection Frequency (Greater Than Background or RL)	Mean Concentration	Maximum Concentration	WRW AL	Background Mean Plus Two Standard Deviations	RL	Unit
Dibenz(a,h)anthracene	17	5.88%	420.000	420.000	3490.000	-	64.000	ug/kg
Dibenzofuran	17	5.88%	130.000	130.000	2950000.000	-	51.000	ug/kg
Fluoranthene	17	41.18%	674.857	3300.000	27200000.000	-	39.000	ug/kg
Fluorene	17	11.76%	164.500	270.000	40800000.000	-	48.500	ug/kg
Indeno(1,2,3-cd)pyrene	17	17.65%	342.000	860.000	34900.000	-	48.333	ug/kg
Lead	17	11.76%	28.650	30.900	1000.000	24.970	-	mg/kg
Pyrene	17	29.41%	936.000	3400.000	22100000.000	-	81.200	ug/kg
Tetrachloroethene	17	11.76%	89.000	95.700	6150000.000	-	6.485	ug/kg
Toluene	17	5.88%	8.000	8.000	31300000.000	-	5.300	ug/kg
Trichloroethene	17	5.88%	35.600	35.600	19600.000	-	6.790	ug/kg
Uranium-234	17	58.82%	4.526	6.510	300.000	2.640	-	pCi/g
Uranium-235	17	76.47%	0.283	0.918	8.000	0.120	-	pCi/g
Uranium-238	17	88.24%	3.433	5.110	351.000	1.490	-	pCi/g
Vanadium	17	29.41%	138.000	168.000	7150.000	88.490	-	mg/kg
Xylene	17	5.88%	16.900	16.900	2040000.000	-	12.000	ug/kg
Zinc	17	5.88%	160.000	160.000	307000.000	139.100	-	mg/kg

### **3.0 SUBSURFACE SOIL RISK SCREEN**

The SSRS follows the steps identified on Figure 3 in Attachment 5 of the RFCA Modification (DOE et al. 2003).

#### **Screen 1 – Are the COC concentrations below RFCA Table 3 WRW soil ALs?**

All subsurface COC concentrations are less than the WRW ALs, except for a subsurface soil arsenic concentration of 25.5 mg/kg at sampling location CF33-010 (5 ft bgs), which was only slightly higher than the RFCA WRW AL of 22.2 mg/kg.

#### **Screen 2 – Is there a potential for subsurface soil to become surface soil (landslide and erosion areas identified on Figure 1)?**

IHSS Group 800-5 is located within an area of high erosion. However, this area will be regraded as part of the land reconfiguration. It is anticipated that approximately 3 feet of soil will be added to this area; therefore reducing the potential for erosion.

#### **Screen 3 – Does subsurface soil radiological contamination exceed criteria in Section 5.3 and Attachment 14?**

No. All radiological activities in this IHSS Group were below criteria specified in Section 5.3 and Attachment 14.

#### **Screen 4 – Is there an environmental pathway and sufficient quantity of COCs that would cause an exceedance of the surface water standard?**

Contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated by IHSS Group 800-5 COCs. This

IHSS Group is located within an area of high erosion. However, this area will be regraded as part of the land reconfiguration. It is anticipated that approximately 3 feet of soil will be added to this area; therefore reducing the potential for erosion. Potential impacts from the anticipated land reconfiguration will be addressed in the CRA.

Surface water runoff from IHSS Group 800-5 flows to the South Interceptor Ditch (SID), located approximately 400 ft to the south. Four gaging stations (GS23, GS24, GS25, and GS55), as well as two surface water sampling stations (SW045 and SW046) are located downgradient, between IHSS Group 800-5 and the SID. Gaging station GS55 is a Performance Monitoring Location, which is part of the Integrated Monitoring Program (IMP) (DOE 2003). The four gaging stations and two surface water sampling locations reflect surface water conditions in this area of the IA. Surface water quality at these locations may not be attributed to any single upgradient IHSS Group. Surface water data, retrieved from SWD on May 27, 2004, were reviewed for these locations. Surface water AL exceedances at these three locations are summarized in Table 7. VOC surface water AL exceedances included bromodichloromethane, chloroform, methylene chloride, and tetrachloroethene. Tetrachloroethene was not detected in any surface soil samples, and was detected at two subsurface soil sampling locations (CF33-002 and CF33-007) at levels slightly above the RL (refer to Table 3). Methylene chloride was detected in both groundwater and surface water at downgradient sampling locations in exceedance of the associated ALs. However, this analyte was not detected at any soil sampling location for IHSS Group 800-5.

**Table 7**  
**Surface Water Exceedances Summary**

Location Code	Analyte	Result Range	Surface Water AL	Detection Limit	Background	Result Unit
<b>Total Results</b>						
GS23	Bromodichloromethane	0.960	0.56	-	0.220	ug/L
GS23	Chloroform	21.000	5.7	-	0.230	ug/L
GS23	Copper	0.017 - 0.033	0.016	0.015	-	mg/L
GS23	Zinc	0.666	0.141	0.155	-	mg/L
GS24	Aluminum	3.500 - 27.000	0.087	3.447	-	mg/L
GS24	Arsenic	0.007 - 0.010	0.0000018	0.005	-	mg/L
GS24	Copper	0.017 - 0.041	0.016	0.015	-	mg/L
GS24	Lead	0.007 - 0.036	0.0065	0.007	-	mg/L
GS24	Plutonium-239/240	0.177 - 0.209	0.15	0.020	-	pCi/L
GS24	Zinc	0.160 - 0.600	0.141	0.155	-	mg/L
GS25	Aluminum	3.800 - 7.700	0.087	3.447	-	mg/L
GS25	Copper	0.023 - 0.130	0.016	0.015	-	mg/L
GS25	Lead	0.014 - 0.056	0.0065	0.007	-	mg/L
GS25	Zinc	0.158 - 0.700	0.141	0.155	-	mg/L
GS55	Aluminum	3.550 - 8.930	0.087	3.447	-	mg/L
GS55	Aluminum	3.680	0.087	3.447	-	mg/L
GS55	Lead	0.008 - 0.010	0.0065	0.007	-	mg/L
SW045	Mercury	0.700	0.00001	0.000	-	mg/L
SW045	Methylene chloride	10.000	4.7	-	5.000	ug/L

Location Code	Analyte	Result Range	Surface Water AL	Detection Limit	Background	Result Unit
SW045	Tetrachloroethene	2.000 - 8.000	0.8	-	5.000	ug/L
SW045	Tritium	638.000	500	494.150	-	pCi/L
SW045	Zinc	0.190	0.141	0.155	-	mg/L
SW046	bis(2-Ethylhexyl)phthalate	2.000	1.8	-	10.000	ug/L
SW046	Lead	0.009 - 0.024	0.0065	0.007	-	mg/L
SW046	Tetrachloroethene	1.000 - 6.000	0.8	-	5.000	ug/L
SW046	Tritium	1100.000	500	494.150	-	pCi/L
SW046	Zinc	0.162	0.141	0.155	-	mg/L
<b>Dissolved Results</b>						
SW045	Selenium	0.018	0.0046	0.010	-	mg/L
SW045	Mercury	0.002	0.00001	0.000	-	mg/L
SW045	Plutonium-239/240	2.570	0.15	0.520	-	pCi/L
SW046	Mercury	0.001	0.00001	0.000	-	mg/L

Groundwater flows to the southeast in this area toward Woman Creek, located approximately 900 ft to the southeast. Seven groundwater monitoring locations are located within 350 ft downgradient of IHSS Group 800-5. Groundwater data, retrieved from SWD on May 27, 2004, were reviewed for these wells. No Tier I groundwater AL exceedances were found. Wells with Tier II groundwater AL exceedances are summarized in Table 8. These wells reflect groundwater conditions in this area of the IA. Groundwater quality at these locations may not be attributed to any single upgradient IHSS Group. Monitoring wells surrounding the area will continue to be sampled as part of the IMP (DOE 2003). Further groundwater evaluation will be part of the groundwater Interim Measure/Interim Remedial Action (IM/IRA).

**Table 8**  
**Groundwater Exceedances Summary**

Location Code	Analyte	Result Range	Background	Detection Limit	Tier I AL	Tier II AL	Unit
<b>Total Results</b>							
5387	Aluminum	66.300	11.240	-	3650	36.5	mg/L
5387	Beryllium	0.006	0.003	-	0.4	0.004	mg/L
5387	Copper	2.440	0.035	-	130	1.3	mg/L
5387	Lead	0.076	0.011	-	1.5	0.015	mg/L
5387	Methylene chloride	8.000	-	1.000	500	5	ug/L
5387	Nickel	0.597	0.030	-	14	0.14	mg/L
35691	alpha-BHC	0.120	-	0.050	1.35	0.0135	ug/L
35691	Antimony	0.066	0.045	-	0.6	0.006	mg/L
35691	beta-BHC	0.055	-	0.050	4.73	0.0473	ug/L
<b>Dissolved Results</b>							
5387	Nickel	0.269 - 0.345	0.021	-	14	0.14	mg/L
5487	Copper	3.130	0.014	-	130	1.3	mg/L
5487	Manganese	1.730	0.162	-	172	1.72	mg/L
5487	Molybdenum	0.520	0.088	-	18.3	0.183	mg/L

Location Code	Analyte	Result Range	Background	Detection Limit	Tier I AL	Tier II AL	Unit
5487	Nickel	2.090 - 4.950	0.021	-	14	0.14	mg/L
5487	Zinc	43.500	0.050	-	1100	11	mg/L
35691	Selenium	0.059	0.044	-	5	0.05	mg/L
35691	Strontium-90	1.800 - 1.400	0.960	-	85.2	0.852	pCi/L
35691	Thallium	0.010	0.005	-	0.2	0.002	mg/L
35691	Uranium-235	2.508	1.480	-	101	1.01	pCi/L

#### 4.0 NFAA SUMMARY

Based on analytical results and the SSRS, action is not required, and an NFAA determination is justified for IHSS Group 800-5 based on the following:

- Concentrations of COCs were not detected above RFCA WRW ALs except for arsenic and benzo(a)pyrene. Both COCs were only slightly higher than the associated RFCA WRW ALs.
- IHSS Group 800-5 is located within an area of high erosion. However, this area will be regraded as part of the land reconfiguration. It is anticipated that approximately 3 feet of soil will be added to this area; therefore reducing the potential for erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 800-5 (DOE 2003). No PAH exceedances were detected in surface water or groundwater locations downgradient of IHSS Group 800-5. Concentrations of tetrachloroethene were detected at two surface water locations above the surface water AL. Although tetrachloroethene was detected at two subsurface soil sampling locations (CF33-002 and CF33-007), the detected concentrations were only slightly higher than the RL. Methylene chloride was detected in both groundwater and surface water at downgradient sampling locations in exceedance of the associated ALs. However, this analyte was not detected at any soil sampling location for IHSS Group 800-5. Further groundwater evaluation will be part of the groundwater IM/IRA.

Approval of this Data Summary Report constitutes regulatory agency concurrence that IHSS Group 800-5 is an NFAA Site. This information and the NFAA determination will be documented in the FY04 HRR. Ecological factors will be evaluated in the AAESE and the CRA.

#### 5.0 DATA QUALITY ASSESSMENT

The data quality objectives (DQOs) for this project are described in the IASAP (DOE 2001). All DQOs for this project were achieved based on the following:

- Regulatory agency-approved sampling program design (IASAP Addendum #IA-02-04 [DOE 2002a]), modified due to field conditions, in accordance with the IASAP (DOE 2001);

- Collection of samples in accordance with the sampling design; and
- Results of the Data Quality Assessment (DQA), as described in the following sections.

### **5.1 Data Quality Assessment Process**

The DQA process ensures that the type, quantity, and quality of environmental data used in decision making are defensible, and is based on the following guidance and requirements:

- U.S. Environmental Protection Agency (EPA) QA/G-4, 1994a, Guidance for the Data Quality Objective Process;
- EPA QA/G-9, 1998, Guidance for the Data Quality Assessment Process, Practical Methods for Data Analysis; and
- U.S. Department of Energy (DOE) Order 414.1A, 1999, Quality Assurance.

Verification and validation (V&V) of data are the primary components of the DQA. The final data are compared with original project DQOs and evaluated with respect to project decisions; uncertainty within the decisions; and quality criteria required for the data, specifically precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). Validation criteria are consistent with the following RFETS-specific documents and industry guidelines:

- EPA 540/R-94/012, 1994b, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review;
- EPA 540/R-94/013, 1994c, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review;
- Kaiser-Hill Company, L.L.C. (K-H) V&V Guidelines:
  - General Guidelines for Data Verification and Validation, DA-GR01-v1, 2002a
  - V&V Guidelines for Isotopic Determinations by Alpha Spectrometry, DA-RC01-v1, 2002b
  - V&V Guidelines for Volatile Organics, DA-SS01-v1, 2002c
  - V&V Guidelines for Semivolatile Organics, DA-SS02-v1, 2002d
  - V&V Guidelines for Metals, DA-SS05-v1, 2002e; and
- Lockheed-Martin, 1997, Evaluation of Radiochemical Data Usability, ES/ER/MS-5.

This report will be submitted to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Administrative Record (AR) for permanent

storage 30 days after being provided to the Colorado Department of Public Health and Environment (CDPHE) and/or EPA.

## **5.2 Verification and Validation of Results**

Verification ensures that data produced and used by the project are documented and traceable in accordance with quality requirements. Validation consists of a technical review of all data that directly support the project decisions so that any limitations of the data relative to project goals are delineated and the associated data are qualified accordingly. The V&V process defines the criteria that constitute data quality, namely PARCCS parameters. Data traceability and archival are also addressed. V&V criteria include the following:

- Chain-of-custody;
- Preservation and hold times;
- Instrument calibrations;
- Preparation blanks;
- Interference check samples (metals);
- Matrix spikes/matrix spike duplicates (MS/MSDs);
- Laboratory control samples (LCSs);
- Field duplicate measurements;
- Chemical yield (radiochemistry);
- Required quantitation limits/minimum detectable activities (sensitivity of chemical and radiochemical measurements, respectively); and
- Sample analysis and preparation methods.

Evaluation of V&V criteria ensures that PARCCS parameters are satisfactory (i.e., within tolerances acceptable to the project). Satisfactory V&V of laboratory quality controls are captured through application of validation “flags” or qualifiers to individual records.

Raw hard-copy data (for example, individual analytical data packages) are currently filed by report identification number (RIN) and maintained by K-H Analytical Services Division (ASD); older hard copies may reside in the Federal Center in Lakewood, Colorado. Electronic data are stored in the RFETS SWD.

Both real and QC data are included on the enclosed CD.

### **5.2.1 Accuracy**

The following measures of accuracy were evaluated:

- LCS evaluation;
- Surrogate evaluation;
- Field blank evaluation; and
- Sample MS evaluation.

Results are compared to method requirements and project goals. The results of these comparisons are summarized for RFCA COCs where the result could impact project decisions. Particular attention is paid to those values near ALs when QC results could indicate unacceptable levels of uncertainty for decision-making purposes.

### ***Laboratory Control Sample Evaluation***

The frequency of LCS measurements is presented in Table 9. As indicated in Table 9 LCSs were run for all methods except gamma spectroscopy and SW-846-6020 (metals by XRF). The onsite laboratories are not required to provide these data.

The minimum and maximum LCS results are tabulated by chemical for the entire project in Table 10. While not all LCS results are within tolerances, project decisions based on AL exceedances were not affected. LCS results that were outside of tolerances were reviewed to determine whether a potential bias might be indicated. LCS recoveries are not indicative of matrix effects because they are not prepared using site samples. LCS results do indicate whether the laboratory may be introducing a bias in the results.

Recoveries reported above the upper limit may indicate the actual sample results are less than reported. Because this is environmentally conservative, no further action is needed. The analytes with unacceptable low recoveries were evaluated. If the highest sample result divided by the lowest LCS recovery for that analyte is less than the AL, no further action is taken because any indicated bias is not great enough to make a falsely low sample result be above the AL. As a result of these analyses, the LCS recoveries for this project did not impact project decisions. Any qualifications of individual results due to LCS performance exceeding upper or lower tolerance limits are captured in the V&V flags, described in the Completeness Section 5.2.3.

**Table 9**  
**LCS Frequency**

Test Method	Lab Batch	Laboratory Control Standards
ALPHA SPEC	247986	Yes
ALPHA SPEC	247987	Yes
ALPHA SPEC	247989	Yes
SW-846 6010	3114458	Yes
SW-846 6010	3115480	Yes
SW-846 6010	4100462	Yes
SW-846 6010	4103225	Yes
SW-846 6010	4104163	Yes
SW-846 6010	4104248	Yes

Test Method	Lab Batch	Laboratory Control Standards
SW-846 6010	4104499	Yes
SW-846 6010	4105260	Yes
SW-846 6010	4105563	Yes
SW-846 6010	4107218	Yes
SW-846 6010	4113480	Yes
SW-846 6010	4114446	Yes
SW-846 6010	4119276	Yes
SW-846 8260	MS1 VOA_030313A	Yes
SW-846 8260	MS1 VOA_030401B	Yes
SW-846 8260	MS1 VOA_040412A	Yes
SW-846 8260	MS2 VOA_030314A	Yes
SW-846 8260	MS3 VOA_030404A	Yes
SW-846 8260	MS3 VOA_030407B	Yes
SW-846 8260	MS3 VOA_040406A	Yes
SW-846 8260	MS3 VOA_040407A	Yes
SW-846 8260	MS3 VOA_040408A	Yes
SW-846 8270	3076479	Yes
SW-846 8270	3096146	Yes
SW-846 8270	4100461	Yes
SW-846 8270	4103698	Yes
SW-846 8270	4104495	Yes
SW-846 8270	4105542	Yes

**Table 10**  
**LCS Evaluation Summary**

Test Method	CAS No.	Analyte	Minimum (%REC)	Maximum (%REC)
SW-846 8260	71-55-6	1,1,1-Trichloroethane	85.78	110.6
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	84.25	110.2
SW-846 8260	79-00-5	1,1,2-Trichloroethane	87.83	101.7
SW-846 8260	75-34-3	1,1-Dichloroethane	82.77	112.6
SW-846 8260	75-35-4	1,1-Dichloroethene	87.5	126.2
SW-846 8270	120-82-1	1,2,4-Trichlorobenzene	66	74
SW-846 8260	95-50-1	1,2-Dichlorobenzene	93.76	114.7
SW-846 8260	107-06-2	1,2-Dichloroethane	81.9	99.5
SW-846 8260	78-87-5	1,2-Dichloropropane	87.37	105.4
SW-846 8260	106-46-7	1,4-Dichlorobenzene	93.2	118.4
SW-846 8270	95-95-4	2,4,5-Trichlorophenol	60	78
SW-846 8270	88-06-2	2,4,6-Trichlorophenol	63	77
SW-846 8270	120-83-2	2,4-Dichlorophenol	63	75
SW-846 8270	105-67-9	2,4-Dimethylphenol	67	74

Test Method	CAS No.	Analyte	Minimum (%REC)	Maximum (%REC)
SW-846 8270	51-28-5	2,4-Dinitrophenol	39	67
SW-846 8270	121-14-2	2,4-Dinitrotoluene	67	79
SW-846 8270	606-20-2	2,6-Dinitrotoluene	66	77
SW-846 8260	78-93-3	2-Butanone	50.68	100.7
SW-846 8270	91-58-7	2-Chloronaphthalene	61	75
SW-846 8270	95-57-8	2-Chlorophenol	63	75
SW-846 8270	91-57-6	2-Methylnaphthalene	65	74
SW-846 8270	95-48-7	2-Methylphenol	65	73
SW-846 8270	88-74-4	2-Nitroaniline	64	77
SW-846 8270	91-94-1	3,3'-Dichlorobenzidine	46	58
SW-846 8270	534-52-1	4,6-Dinitro-2-methylphenol	49	66
SW-846 8270	106-47-8	4-Chloroaniline	30	57
SW-846 8260	108-10-1	4-Methyl-2-pentanone	72.5	110.6
SW-846 8270	106-44-5	4-Methylphenol	64	73
SW-846 8270	100-02-7	4-Nitrophenol	59	79
SW-846 8270	83-32-9	Acenaphthene	61	75
SW-846 8260	67-64-1	Acetone	30.88	100.7
SW-846 6010	7429-90-5	Aluminum	84	101
SW-846 8270	120-12-7	Anthracene	62	76
SW-846 6010	7440-36-0	Antimony	89	96
SW-846 6010	7440-38-2	Arsenic	89	97
SW-846 6010	7440-39-3	Barium	94	99
SW-846 8260	71-43-2	Benzene	88.42	109.7
SW-846 8270	56-55-3	Benzo(a)anthracene	59	75
SW-846 8270	50-32-8	Benzo(a)pyrene	61	77
SW-846 8270	205-99-2	Benzo(b)fluoranthene	56	79
SW-846 8270	207-08-9	Benzo(k)fluoranthene	57	74
SW-846 8270	65-85-0	Benzoic Acid	33	59
SW-846 8270	100-51-6	Benzyl Alcohol	64	78
SW-846 6010	7440-41-7	Beryllium	95	105
SW-846 8270	111-44-4	bis(2-Chloroethyl)ether	59	79
SW-846 8270	39638-32-9	bis(2-Chloroisopropyl)ether	59	83
SW-846 8270	117-81-7	bis(2-Ethylhexyl)phthalate	56	74
SW-846 8260	75-27-4	Bromodichloromethane	94.11	103.7
SW-846 8260	75-25-2	Bromoform	89.86	107.3
SW-846 8260	74-83-9	Bromomethane	58.06	128.9
SW-846 8270	85-68-7	Butylbenzylphthalate	54	75
SW-846 6010	7440-43-9	Cadmium	89	93
SW-846 8260	75-15-0	Carbon Disulfide	84.18	129.8
SW-846 8260	56-23-5	Carbon Tetrachloride	82.6	110.5
SW-846 8260	108-90-7	Chlorobenzene	87.18	111.6
SW-846 8260	75-00-3	Chloroethane	75.1	125.2

<b>Test Method</b>	<b>CAS No.</b>	<b>Analyte</b>	<b>Minimum (%REC)</b>	<b>Maximum (%REC)</b>
SW-846 8260	67-66-3	Chloroform	87.18	106.1
SW-846 8260	74-87-3	Chloromethane	46.48	137.6
SW-846 6010	7440-47-3	Chromium	92	100
SW-846 8270	218-01-9	Chrysene	60	76
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	71	100
SW-846 6010	7440-48-4	Cobalt	89	96
SW-846 6010	7440-50-8	Copper	88	94
SW-846 8270	84-74-2	Di-n-butylphthalate	58	78
SW-846 8270	117-84-0	Di-n-octylphthalate	53	72
SW-846 8270	53-70-3	Dibenz(a,h)anthracene	62	75
SW-846 8270	132-64-9	Dibenzofuran	66	76
SW-846 8260	124-48-1	Dibromochloromethane	91.21	106.8
SW-846 8270	84-66-2	Diethylphthalate	63	78
SW-846 8270	131-11-3	Dimethylphthalate	63	75
SW-846 8260	100-41-4	Ethylbenzene	88.53	115.3
SW-846 8270	206-44-0	Fluoranthene	61	78
SW-846 8270	86-73-7	Fluorene	63	76
SW-846 8270	118-74-1	Hexachlorobenzene	65	77
SW-846 8270	87-68-3	Hexachlorobutadiene	65	77
SW-846 8270	77-47-4	Hexachlorocyclopentadiene	48	73
SW-846 8270	67-72-1	Hexachloroethane	62	73
SW-846 8270	193-39-5	Indeno(1,2,3-cd)pyrene	62	76
SW-846 6010	7439-89-6	Iron	93	102
SW-846 8270	78-59-1	Isophorone	62	96
SW-846 6010	7439-92-1	Lead	91	97
SW-846 6010	7439-93-2	Lithium	90	106
SW-846 6010	7439-96-5	Manganese	91	98
SW-846 6010	7439-97-6	Mercury	96	102
SW-846 8260	75-09-2	Methylene chloride	87.63	111.1
SW-846 6010	7439-98-7	Molybdenum	87	96
SW-846 8270	86-30-6	n-Nitrosodiphenylamine	69	90
SW-846 8270	621-64-7	n-Nitrosodipropylamine	60	76
SW-846 8270	91-20-3	Naphthalene	63	73
SW-846 6010	7440-02-0	Nickel	91	96
SW-846 8270	98-95-3	Nitrobenzene	63	74
SW-846 8270	87-86-5	Pentachlorophenol	48	64
SW-846 8270	108-95-2	Phenol	63	76
SW-846 8270	129-00-0	Pyrene	54	74
SW-846 6010	7782-49-2	Selenium	85	97
SW-846 6010	7440-22-4	Silver	89	96
SW-846 6010	7440-24-6	Strontium	93	98
SW-846 8260	100-42-5	Styrene	87.83	114.5

Test Method	CAS No.	Analyte	Minimum (%REC)	Maximum (%REC)
SW-846 8260	127-18-4	Tetrachloroethene	92.75	116.8
SW-846 6010	7440-31-5	Tin	87	91
SW-846 8260	108-88-3	Toluene	92.82	134.6
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	95.69	110.5
SW-846 8260	79-01-6	Trichloroethene	87.29	105.9
SW-846 6010	11-09-6	Uranium, Total	92	97
SW-846 6010	7440-62-2	Vanadium	91	98
SW-846 8260	75-01-4	Vinyl chloride	61.74	141.5
SW-846 8260	1330-20-7	Xylene	90.06	114.5
SW-846 6010	7440-66-6	Zinc	90	96

### ***Surrogate Evaluation***

The minimum and maximum surrogate results are tabulated by chemical for the entire project in Table 11. Surrogates are added to every sample, and therefore surrogate recoveries only impact individual samples. Unacceptable surrogate recoveries can indicate potential matrix effects. Surrogate recoveries reported above 100 percent may indicate the actual sample results are less than reported. Because this is environmentally conservative, no further action is needed. Therefore, only the lowest recoveries were evaluated. If the maximum sample result divided by the lowest percent recovery is less than the WRW AL for that analyte, no further action is taken because any indicated bias is not great enough to correct a false low sample result to one above the AL. The lowest surrogate recoveries for this project were reviewed, and the associated samples results were not near enough to the AL to indicate project decisions would be impacted. Any qualifications of results due to surrogate results are captured in the V&V flags, described in Section 5.2.3.

**Table 11**  
**Surrogate Recovery Summary**

Number of Samples	Surrogate	Minimum (%REC)	Maximum (%REC)
<b>VOC Surrogate Recoveries</b>			
19	4-Bromofluorobenzene	90.91	107.1
19	Deuterated 1,2-dichloroethane	92.16	116.4
19	Deuterated Toluene	85.45	105.4
<b>SVOC Surrogate Recoveries</b>			
19	2-Fluorobiphenyl	47	74
19	2-Fluorophenol	55	82
19	Deuterated Nitrobenzene	54	80
19	p-Terphenyl-d14	53	83

### **Field Blank Evaluation**

Results of the field QA analyses are given in Table 12. Detectable amounts of contaminants within the blanks, which could indicate possible cross-contamination of samples, are evaluated if the same contaminant is detected in the associated real samples. When the real result is less than 10 times the blank result for laboratory contaminants and 5 times the result for non-laboratory contaminants, the real result is eliminated. While some of the blank results indicate that cross-contamination may have occurred (toluene and uranium-235), project decisions were not affected because all real results were less than the ALs.

**Table 12**  
**Field QA Summary**

Laboratory	CAS No.	Analyte	Sample QC Code	Detected Value	Result Unit
URS	67-64-1	Acetone	TB	28	ug/L
URS	71-43-2	Benzene	TB	2	ug/L
URS	75-27-4	Bromodichloromethane	RNS	0.7	ug/L
URS	91-20-3	Naphthalene	TB	1	ug/L
URS	108-88-3	Toluene	FB	1.7	ug/L
URS	108-88-3	Toluene	RNS	2.6	ug/L
URS	108-88-3	Toluene	TB	3.6	ug/L
URS	15117-96-1	Uranium-235	EB	0.0901	pCi/g
URS	15117-96-1	Uranium-235	FB	0.137	pCi/g
URS	15117-96-1	Uranium-235	RNS	0.144	pCi/g
URS	7440-61-1	Uranium-238	EB	1.76	pCi/g
URS	7440-61-1	Uranium-238	FB	2.32	pCi/g
URS	7440-61-1	Uranium-238	RNS	2.18	pCi/g

Field Blanks (TB = Trip, RNS = Rinse, FB = Field, EB = Equipment Blank) results greater than detection limits (not \*U\* Qualified)

### **Sample Matrix Spike Evaluation**

The minimum and maximum MS results are summarized by chemical for the entire project in Table 13. Organic analytes with unacceptable low recoveries resulted in a review of the LCS recoveries. According to the EPA data validation guidelines, if organic matrix spike recoveries are low, then the LCS recovery is to be checked and, if acceptable, no action is to be taken. For this project, these checks indicate no decisions were impacted for organic analytes. While benzo(a)pyrene, as well as other PAHs, had low recoveries, project decisions were not affected because benzo(a)pyrene was detected at concentrations greater than the WRW AL. Benzo(a)pyrene exceeded the WRW AL at sampling location CF33-007; therefore a low bias of this analyte would still exceed the WRW and would not impact decisions regarding this analyte. Additionally, the LCS recoveries were checked and were acceptable for the PAHs.

For inorganics, the associated sample results were divided by the lowest percent recovery for each analyte. If the resulting number is less than the AL, decisions were not

impacted, therefore no action was taken. For this project, all results were acceptable, however, barium and manganese had 0 percent recovery as a low. For these analytes, the AL was at least a factor of three times higher than the highest sample result, therefore no decisions were impacted.

**Table 13**  
**Sample MS Evaluation Summary**

Analyte	Minimum (%REC)	Maximum (%REC)	Number of Laboratory Samples	Number of Laboratory Batches
1,1,1-Trichloroethane	66.11	100.4	5	5
1,1,2,2-Tetrachloroethane	46.17	85.42	5	5
1,1,2-Trichloroethane	69.6	95.64	5	5
1,1-Dichloroethane	74.3	108.8	5	5
1,1-Dichloroethene	60.76	94.52	5	5
1,2,4-Trichlorobenzene	47.76	78	5	5
1,2,4-Trichlorobenzene	54	75	6	6
1,2-Dichlorobenzene	57.22	90.37	5	5
1,2-Dichloroethane	72.64	100.2	5	5
1,2-Dichloropropane	70.42	103.5	5	5
1,4-Dichlorobenzene	57.38	92.69	5	5
2,4,5-Trichlorophenol	54	77	6	6
2,4,6-Trichlorophenol	51	78	6	6
2,4-Dichlorophenol	52	80	6	6
2,4-Dimethylphenol	55	79	6	6
2,4-Dinitrophenol	26	57	6	6
2,4-Dinitrotoluene	57	81	6	6
2,6-Dinitrotoluene	56	78	6	6
2-Butanone	68.73	186.5	5	5
2-Chloronaphthalene	53	75	6	6
2-Chlorophenol	52	79	6	6
2-Methylnaphthalene	56	79	6	6
2-Methylphenol	54	78	6	6
2-Nitroaniline	59	85	6	6
3,3'-Dichlorobenzidine	43	68	6	6
4,6-Dinitro-2-methylphenol	34	60	6	6
4-Chloroaniline	45	72	6	6
4-Methyl-2-pentanone	69.27	111.2	5	5
4-Methylphenol	54	80	6	6
4-Nitrophenol	44	79	6	6
Acenaphthene	54	78	6	6
Acetone	75	297.4	5	5
Aluminum	1800	10900	5	5
Anthracene	29	83	6	6
Antimony	34	60	4	4

Analyte	Minimum (%REC)	Maximum (%REC)	Number of Laboratory Samples	Number of Laboratory Batches
Arsenic	88	97	4	4
Barium	0	102	4	4
Benzene	71.69	99.75	5	5
Benzo(a)anthracene	0	79	6	6
Benzo(a)pyrene	0	76	6	6
Benzo(b)fluoranthene	1.7	78	6	6
Benzo(k)fluoranthene	0	73	6	6
Benzoic Acid	11	62	6	6
Benzyl Alcohol	49	83	6	6
Beryllium	96	105	3	3
bis(2-Chloroethyl)ether	53	87	6	6
bis(2-Chloroisopropyl)ether	50	89	6	6
bis(2-Ethylhexyl)phthalate	50	77	6	6
Bromodichloromethane	66.98	102.3	5	5
Bromoform	67.95	96.78	5	5
Bromomethane	70.35	117	5	5
Butylbenzylphthalate	48	81	6	6
Cadmium	87	92	4	4
Carbon Disulfide	59.89	93.85	5	5
Carbon Tetrachloride	64.74	98.87	5	5
Chlorobenzene	65.71	93.33	5	5
Chloroethane	62.02	104	5	5
Chloroform	71.8	103.6	5	5
Chloromethane	74.15	159.5	5	5
Chromium	105	140	4	4
Chrysene	0	76	6	6
cis-1,3-Dichloropropene	68.65	99.06	5	5
Cobalt	87	98	4	4
Copper	96	102	4	4
Di-n-butylphthalate	51	85	6	6
Di-n-octylphthalate	47	77	6	6
Dibenz(a,h)anthracene	41	75	6	6
Dibenzofuran	56	78	6	6
Dibromochloromethane	66.36	93.28	5	5
Diethylphthalate	56	82	6	6
Dimethylphthalate	55	80	6	6
Ethylbenzene	64.5	89.6	5	5
Fluoranthene	53	87	5	5
Fluorene	54	78	6	6
Hexachlorobenzene	57	77	6	6
Hexachlorobutadiene	43.54	76.96	5	5

Analyte	Minimum (%REC)	Maximum (%REC)	Number of Laboratory Samples	Number of Laboratory Batches
Hexachlorobutadiene	55	78	6	6
Hexachlorocyclopentadiene	35	70	6	6
Hexachloroethane	53	78	6	6
Indeno(1,2,3-cd)pyrene	16	78	6	6
Iron	576	2020	4	4
Isophorone	54	103	6	6
Lead	90	95	4	4
Lithium	94	110	3	3
Manganese	0	117	4	4
Mercury	51	97	4	4
Methylene chloride	71.64	92.7	5	5
Molybdenum	82	90	4	4
n-Nitrosodiphenylamine	60	97	6	6
n-Nitrosodipropylamine	51	85	6	6
Naphthalene	54.53	81.07	5	5
Naphthalene	54	79	6	6
Nickel	90	95	4	4
Nitrobenzene	54	81	6	6
Pentachlorophenol	32	66	6	6
Phenol	52	79	6	6
Pyrene	49	84	5	5
Selenium	86	100	4	4
Silver	86	96	4	4
Strontium	93	113	4	4
Styrene	63.16	89.38	5	5
Tetrachloroethene	60.04	89.98	5	5
Tin	83	90	4	4
Toluene	65.02	89.32	5	5
trans-1,3-Dichloropropene	61.49	90.43	5	5
Trichloroethene	70.04	136.7	5	5
Uranium, Total	89	94	4	4
Vanadium	96	139	4	4
Vinyl chloride	62.07	124.9	5	5
Xylene	64.46	89.1	5	5
Zinc	73	102	4	4

### 5.2.2 Precision

#### *Matrix Spike Duplicate Evaluation*

Laboratory precision is measured through use of MSDs which are summarized in Table 14. The analytes with the highest relative percent differences (RPDs) were

reviewed by comparing the highest sample result to the AL. If the highest samples were sufficiently below the AL, no further action is needed. For this project, the reviews indicated decisions were not impacted. While some of the RPDs appear to be high (aluminum, benzoic acid, iron, manganese, mercury, vanadium, and zinc), they would not result in rejection of data that affects project decisions.

**Table 14**  
**Sample MSD Evaluation Summary**

<b>Test Method</b>	<b>CAS No.</b>	<b>Analyte</b>	<b>Max RPD (%)</b>
SW-846 8260	71-55-6	1,1,1-Trichloroethane	19.45
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	15.19
SW-846 8260	79-00-5	1,1,2-Trichloroethane	5.40
SW-846 8260	75-34-3	1,1-Dichloroethane	12.67
SW-846 8260	75-35-4	1,1-Dichloroethene	29.30
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	17.34
SW-846 8270	120-82-1	1,2,4-Trichlorobenzene	11.27
SW-846 8260	95-50-1	1,2-Dichlorobenzene	6.31
SW-846 8260	107-06-2	1,2-Dichloroethane	5.38
SW-846 8260	78-87-5	1,2-Dichloropropane	5.76
SW-846 8260	106-46-7	1,4-Dichlorobenzene	5.46
SW-846 8270	95-95-4	2,4,5-Trichlorophenol	16.00
SW-846 8270	88-06-2	2,4,6-Trichlorophenol	12.84
SW-846 8270	120-83-2	2,4-Dichlorophenol	11.92
SW-846 8270	105-67-9	2,4-Dimethylphenol	12.08
SW-846 8270	51-28-5	2,4-Dinitrophenol	25.35
SW-846 8270	121-14-2	2,4-Dinitrotoluene	16.54
SW-846 8270	606-20-2	2,6-Dinitrotoluene	13.53
SW-846 8260	78-93-3	2-Butanone	32.92
SW-846 8270	91-58-7	2-Chloronaphthalene	13.56
SW-846 8270	95-57-8	2-Chlorophenol	13.51
SW-846 8270	91-57-6	2-Methylnaphthalene	13.51
SW-846 8270	95-48-7	2-Methylphenol	13.70
SW-846 8270	88-74-4	2-Nitroaniline	15.19
SW-846 8270	91-94-1	3,3'-Dichlorobenzidine	24.76
SW-846 8270	534-52-1	4,6-Dinitro-2-methylphenol	20.18
SW-846 8270	106-47-8	4-Chloroaniline	14.93
SW-846 8260	108-10-1	4-Methyl-2-pentanone	12.92
SW-846 8270	106-44-5	4-Methylphenol	18.46
SW-846 8270	100-02-7	4-Nitrophenol	24.00
SW-846 8270	83-32-9	Acenaphthene	13.33
SW-846 8260	67-64-1	Acetone	31.04
SW-846 6010	7429-90-5	Aluminum	37.46
SW-846 8270	120-12-7	Anthracene	15.58

<b>Test Method</b>	<b>CAS No.</b>	<b>Analyte</b>	<b>Max RPD (%)</b>
SW-846 6010	7440-36-0	Antimony	12.99
SW-846 6010	7440-38-2	Arsenic	1.14
SW-846 6010	7440-39-3	Barium	20.16
SW-846 8260	71-43-2	Benzene	8.43
SW-846 8270	56-55-3	Benzo(a)anthracene	17.24
SW-846 8270	50-32-8	Benzo(a)pyrene	17.14
SW-846 8270	205-99-2	Benzo(b)fluoranthene	30.51
SW-846 8270	207-08-9	Benzo(k)fluoranthene	13.14
SW-846 8270	65-85-0	Benzoic Acid	87.18
SW-846 8270	100-51-6	Benzyl Alcohol	21.78
SW-846 6010	7440-41-7	Beryllium	3.08
SW-846 8270	111-44-4	bis(2-Chloroethyl)ether	23.08
SW-846 8270	39638-32-9	bis(2-Chloroisopropyl)ether	17.07
SW-846 8270	117-81-7	bis(2-Ethylhexyl)phthalate	25.64
SW-846 8260	75-27-4	Bromodichloromethane	6.74
SW-846 8260	75-25-2	Bromoform	9.00
SW-846 8260	74-83-9	Bromomethane	12.69
SW-846 8270	85-68-7	Butylbenzylphthalate	27.59
SW-846 6010	7440-43-9	Cadmium	5.59
SW-846 8260	75-15-0	Carbon Disulfide	29.51
SW-846 8260	56-23-5	Carbon Tetrachloride	23.94
SW-846 8260	108-90-7	Chlorobenzene	3.97
SW-846 8260	75-00-3	Chloroethane	20.93
SW-846 8260	67-66-3	Chloroform	9.73
SW-846 8260	74-87-3	Chloromethane	21.37
SW-846 6010	7440-47-3	Chromium	9.86
SW-846 8270	218-01-9	Chrysene	16.67
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	3.81
SW-846 6010	7440-48-4	Cobalt	4.17
SW-846 6010	7440-50-8	Copper	7.04
SW-846 8270	84-74-2	Di-n-butylphthalate	21.14
SW-846 8270	117-84-0	Di-n-octylphthalate	25.45
SW-846 8270	53-70-3	Dibenz(a,h)anthracene	14.29
SW-846 8270	132-64-9	Dibenzofuran	12.24
SW-846 8260	124-48-1	Dibromochloromethane	4.97
SW-846 8270	84-66-2	Diethylphthalate	16.39
SW-846 8270	131-11-3	Dimethylphthalate	15.38
SW-846 8260	100-41-4	Ethylbenzene	7.96
SW-846 8270	206-44-0	Fluoranthene	23.08
SW-846 8270	86-73-7	Fluorene	13.70
SW-846 8270	118-74-1	Hexachlorobenzene	13.11
SW-846 8270	87-68-3	Hexachlorobutadiene	13.70

<b>Test Method</b>	<b>CAS No.</b>	<b>Analyte</b>	<b>Max RPD (%)</b>
SW-846 8260	87-68-3	Hexachlorobutadiene	4.22
SW-846 8270	77-47-4	Hexachlorocyclopentadiene	14.29
SW-846 8270	67-72-1	Hexachloroethane	15.17
SW-846 8270	193-39-5	Indeno(1,2,3-cd)pyrene	16.67
SW-846 6010	7439-89-6	Iron	138.82
SW-846 8270	78-59-1	Isophorone	13.11
SW-846 6010	7439-92-1	Lead	6.12
SW-846 6010	7439-93-2	Lithium	2.15
SW-846 6010	7439-96-5	Manganese	88.31
SW-846 6010	7439-97-6	Mercury	39.37
SW-846 8260	75-09-2	Methylene chloride	8.99
SW-846 6010	7439-98-7	Molybdenum	3.39
SW-846 8270	86-30-6	n-Nitrosodiphenylamine	15.17
SW-846 8270	621-64-7	n-Nitrosodipropylamine	15.19
SW-846 8270	91-20-3	Naphthalene	13.51
SW-846 8260	91-20-3	Naphthalene	11.10
SW-846 6010	7440-02-0	Nickel	10.31
SW-846 8270	98-95-3	Nitrobenzene	17.45
SW-846 8270	87-86-5	Pentachlorophenol	20.00
SW-846 8270	108-95-2	Phenol	13.56
SW-846 8270	129-00-0	Pyrene	21.05
SW-846 6010	7782-49-2	Selenium	3.21
SW-846 6010	7440-22-4	Silver	4.60
SW-846 6010	7440-24-6	Strontium	21.15
SW-846 8260	100-42-5	Styrene	15.18
SW-846 8260	127-18-4	Tetrachloroethene	16.76
SW-846 6010	7440-31-5	Tin	4.82
SW-846 8260	108-88-3	Toluene	11.65
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	6.02
SW-846 8260	79-01-6	Trichloroethene	18.71
SW-846 6010	11-09-6	Uranium, Total	5.46
SW-846 6010	7440-62-2	Vanadium	41.31
SW-846 8260	75-01-4	Vinyl chloride	32.65
SW-846 8260	1330-20-7	Xylene	9.57
SW-846 6010	7440-66-6	Zinc	73.04

### ***Field Duplicate Evaluation***

Field duplicate results reflect sampling precision, or overall repeatability of the sampling process. The frequency of field duplicate collection should exceed 1 field duplicate per 20 real samples, or 5 percent. Table 15 indicates that sampling frequencies were adequate for all samples collected except for alpha spectroscopy and SW-846 6010/6010B.

**Table 15**  
**Field Duplicate Sample Frequency Summary**

Test Method	Sample Code	Number of Samples	% Duplicate Samples
ALPHA SPECTROSCOPY	REAL	2	0.00
	DUP	0	
GAMMA SPECTROSCOPY	REAL	19	5.26
	DUP	1	
SW-846 6010/6010B	REAL	13	0.00
	DUP	0	
SW-846 6200	REAL	8	12.50
	DUP	1	
SW-846 8260	REAL	19	15.79
	DUP	3	
SW-846 8270/8270B	REAL	19	15.79
	DUP	3	

The RPDs indicate how much variation exists in the field duplicate analyses. The EPA data validation guidelines state that “there are no required review criteria for field duplicate analyses comparability.” For the DQA, the highest Max RPDs were reviewed. The highest sample amount for those analytes were corrected for the associated RPD (Table 16), and the resulting number was compared to the AL. For this project, none of the corrected numbers were greater than the AL, other than those already greater than their AL, therefore project decisions were not impacted.

**Table 16**  
**RPD Evaluation Summary**

Laboratory	Analyte	Max of RPD (%)
ESTLDEN	1,2,4-Trichlorobenzene	7.41
ESTLDEN	2,4,5-Trichlorophenol	7.41
ESTLDEN	2,4,6-Trichlorophenol	7.41
ESTLDEN	2,4-Dichlorophenol	7.41
ESTLDEN	2,4-Dimethylphenol	7.41
ESTLDEN	2,4-Dinitrophenol	7.41
ESTLDEN	2,4-Dinitrotoluene	7.41
ESTLDEN	2,6-Dinitrotoluene	7.41
ESTLDEN	2-Chloronaphthalene	7.41
ESTLDEN	2-Chlorophenol	7.41
ESTLDEN	2-Methylnaphthalene	111.48
ESTLDEN	2-Methylphenol	7.41
ESTLDEN	2-Nitroaniline	7.41
ESTLDEN	4,6-Dinitro-2-methylphenol	7.41
ESTLDEN	4-Chloroaniline	6.45

Laboratory	Analyte	Max of RPD (%)
ESTLDEN	4-Methylphenol	7.41
ESTLDEN	4-Nitrophenol	7.41
ESTLDEN	Acenaphthene	92.13
ESTLDEN	Anthracene	92.13
URS	Arsenic	0.00
URS	Barium	30.12
ESTLDEN	Benzo(a)anthracene	75.41
ESTLDEN	Benzo(a)pyrene	71.19
ESTLDEN	Benzo(b)fluoranthene	56.60
ESTLDEN	Benzo(k)fluoranthene	7.41
ESTLDEN	Benzoic Acid	7.41
ESTLDEN	Benzyl Alcohol	6.45
ESTLDEN	bis(2-Chloroethyl)ether	7.41
ESTLDEN	bis(2-Chloroisopropyl)ether	7.41
ESTLDEN	bis(2-Ethylhexyl)phthalate	7.41
ESTLDEN	Butylbenzylphthalate	7.41
ESTLDEN	Chrysene	92.96
URS	Copper	6.29
ESTLDEN	Di-n-butylphthalate	7.41
ESTLDEN	Di-n-octylphthalate	7.41
ESTLDEN	Dibenz(a,h)anthracene	7.41
ESTLDEN	Dibenzofuran	37.50
ESTLDEN	Diethylphthalate	7.41
ESTLDEN	Dimethylphthalate	7.41
ESTLDEN	Fluoranthene	131.88
ESTLDEN	Fluorene	82.57
ESTLDEN	Hexachlorobenzene	7.41
ESTLDEN	Hexachlorobutadiene	7.41
ESTLDEN	Hexachlorocyclopentadiene	7.41
ESTLDEN	Hexachloroethane	7.41
ESTLDEN	Indeno(1,2,3-cd)pyrene	7.41
URS	Iron	10.57
ESTLDEN	Isophorone	7.41
ESTLDEN	n-Nitrosodiphenylamine	7.41
ESTLDEN	n-Nitrosodipropylamine	7.41
ESTLDEN	Naphthalene	58.50
ESTLDEN	Nitrobenzene	7.41
ESTLDEN	Pentachlorophenol	7.41
ESTLDEN	Phenol	7.41
ESTLDEN	Pyrene	134.73
URS	Strontium	1.52
URS	Zinc	17.92

### 5.2.3 Completeness

Based on original project DQOs, a minimum of 25 percent of ER Program analytical (and radiological) results must be formally verified and validated. Of that percentage, no more than 10 percent of the results may be rejected, which ensures that analytical laboratory practices are consistent with quality requirements. Table 17 shows the number and percentage of validated records (codes without “1”), the number and percentage of verified records (codes with “1”), and the percentage of rejected records for each analyte group. Only 15 percent of the SW-846 6010 records were validated. However, association with previous and subsequent validated records indicates that the data is acceptable.

**Table 17**  
**Validation and Verification Summary**

Validation Qualifier Code	Total of CAS Number	Alpha Spec	Gamma Spectroscopy	SW-846 6010	SW-846 6200	SW-846 8260	SW-846 8270
J	9	0	0	2	5	2	0
J1	41	0	0	41	0	0	0
JB	2	0	0	0	0	2	0
UJ	18	0	0	3	2	13	0
UJ1	27	0	0	10	0	16	1
V	978	10	30	41	137	343	417
V1	1108	0	27	202	0	308	571
Total	2183	10	57	299	144	684	989
Validated	1007	10	30	46	144	360	417
% Validated	46.13%	100.00%	52.63%	15.38%	100.00%	52.63%	42.16%
Verified	1176	0	27	253	0	324	572
% Verified	53.87%	0.00%	47.37%	84.62%	0.00%	47.37%	57.84%

Notes:

Validated - J, V, JB, UJ  
Verified - 1, J1, V1, B1, UJ1

### 5.2.4 Sensitivity

RLs, in units of ug/kg for organics, mg/kg for metals, and picocuries per gram (pCi/g) for radionuclides, were compared with RFCA WRW ALs. Adequate sensitivities of analytical methods were attained for all COCs that affect project decisions. “Adequate” sensitivity is defined as an RL less than an analyte’s associated AL, typically less than one-half the AL.

## 5.3 Summary of Data Quality

RPDs greater than 35 percent indicate the sampling precision limits of some analytes have been exceeded. No records were rejected. Only 15 percent of the SW-846 6010 records were validated. If additional V&V information is received, IHSS Group 800-5 records will be updated in SWD. Data qualified as a result of additional data will be assessed as part of the CRA process. Data collected and used for IHSS Group 800-5 are adequate for decision making based on ER Program Goals.

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## **Appendix A**

### **Correspondence**