Data Summary Report
IHSS Group 900-3

December 2003

Data Summary Report
IHSS Group 900-3

Approval received from the Colorado Department of Public Health and Environment

December 17, 2003.

Approval letter contained in the Administrative Record.

December 2003

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ENCLOSURES

Compact Disc - IHSS Group 900-3 Real and QC Data

ACRONYMS

AL	action level
AR	Administrative Record
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
DOE	U.S. Department of Energy
DQA	Data Quality Assessment
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ER	RSOP Environmental Restoration RFCA Standard Operating Procedure
HPGE	high-purity germanium detector
IA	Industrial Area
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
K-H	Kaiser-Hill Company L.L.C.
LCS	laboratory control sample
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
mg/kg	milligram per kilogram
MS/MSD	matrix spike/matrix spike duplicate
N/A	not applicable
ND	not detected
PAC	Potential Area of Concern
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
pCi/g	picocurie per gram
POC	Point of Compliance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RIN	report identification number
RL	reporting limit
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SD	standard deviation
SEP	Solar Evaporation Ponds
SOR	sum of ratio
SVOC	semi-volatile organic compound
ug/kg	microgram per kilogram
VOC	volatile organic compound

V&V	verification and validation

1.0 INTRODUCTION

This data summary report summarizes characterization activities conducted at Individual Hazardous Substance Site (IHSS) Group 900-3 (904 Pad, IHSS 900-213 [Figure 1]) at the Rocky Flats Environmental Technology Site (RFETS) in Golden, Colorado. Characterization activities were planned and executed in accordance with the Industrial Area Sampling and Analysis Plan (IASAP) (DOE 2001a) and IASAP Addendum #IA-03-01 (DOE 2002a).

2.0 SITE CHARACTERIZATION

IHSS Group 900-3 information consists of historical knowledge (DOE 1992-2001), 43 sampling locations with specifications as described in IASAP Addendum #IA-03-01 (DOE 2002a) and 11 sampling locations collected through the consultative process during the accelerated action investigation. The sampling specifications for the characterization samples collected are listed in Table 1. Note that the majority of samples were collected from beneath the 904 Pad asphalt. Reported sampling depths exclude the asphalt layer and reflect datum from the top of native soil. It should be noted that some samples also contained road base material, or a mixture of road base and native soil because it was difficult to differentiate between the two soil types.

The location of these samples and analytical results greater than background means plus two standard deviations or reporting limits is presented in Figure 2 and Table 2. A summary of the analytical results is presented in Table 3. Radionuclide Sum of Ratio (SOR) values are summarized in Table 4. Deviations from planned sampling specifications are presented in Table 5. The raw data are enclosed on a compact disc.

Additional sampling and analysis was performed in October 2003. This sampling event was supplemental to the initial IHSS Group 900-3 investigation, which was conducted in January 2003. The second sampling event became necessary because of uncertainty from the initial sampling event and when data from a 1989 report entitled *Interim Status Closure Plan, Solid Waste Management Unit 15*–Storage *Pad 904* (Rockwell International, 1989) revealed two potential radiological "hot spots" in the northeastern corner of the 904 Pad. Samples collected after excavation of contaminated soil and prior to the construction of the 904 Pad in 1987 indicated that two locations in the northeastern corner had plutonium activities in the 60 pCi/g range. Road base was placed across the site during the construction of the 904 Pad; therefore, it was necessary to determine whether the native soil in the northeastern potion of the site contained elevated plutonium activities.

Therefore, as a condition of No Further Accelerated Action (NFAA) approval, additional sampling and analysis was performed to verify the possibility of previous contamination. The area where the elevated samples were collected was located as precisely as possible based on the isopleth map from the 1989 report that showed the approximate locations of the elevated plutonium activities. Step-out samples were collected from 15 feet in each compass direction from the area of the original sample. In addition, one sample was collected to the north of the 904 Pad in the area not previously cored because of overhead power lines.

Figure 1

IHSS Group 900-3 Location Map

2080000 2081000 2082000 2083000 2084000 2085000 2086000 2087000

752000 751000 750000 749000 748000 747000

IHSS Group
900-3

900 - 213

Key

- Streams
- Fence
- IHSS Group 900-3
- Dirt Road
- Paved Area

Building

- Demolished
- Standing

N W E S

500 0 500 Feet

Scale = 1:10,000

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Prepared by: Date: July 2003

RADMS
Remedial Action Decision Management System

KAISER•HILL COMPANY

File:w:\Projects\FY2003\900-3\Confirmation\900-3_closeout_dr(rev_1).apr

Table 1
IHSS Group 900-3 Characterization Sampling Specifications

Location Code	Actual Easting	Actual Northing	Depth Interval	Analyte	Laboratory Method
CL37-000	2085116.92	748829.83	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CL37-001	2085108.21	748940.14	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CL38-000	2085109.33	749041.67	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CL39-000	2085107.09	749162.13	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM37-003[1]	2085202.28	748819.05	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM37-005[1]	2085139.72	748854.70	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM37-012	2085319.92	748823.27	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM37-014	2085264.42	748855.40	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM37-016[1]	2085201.87	748891.05	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM37-018[1]	2085139.31	748926.69	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM37-025	2085324.13	748887.90	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM37-027	2085264.01	748927.41	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0

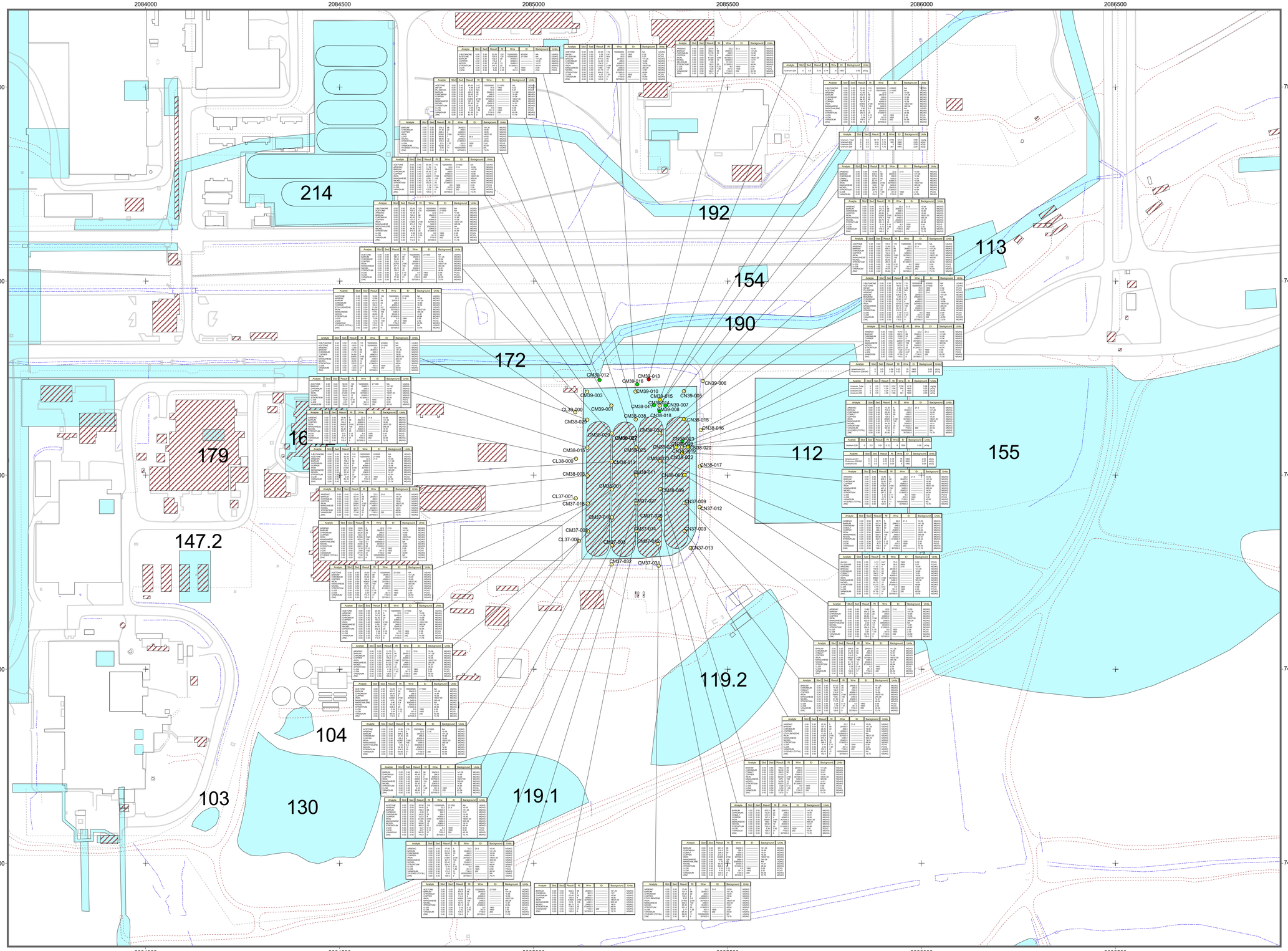
Location Code	Actual Easting	Actual Northing	Depth Interval	Analyte	Laboratory Method
CM37-031	2085322.33	748766.19	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM37-032	2085200.75	748769.60	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-001[1]	2085201.46	748963.05	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-003[1]	2085138.82	748998.80	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-009	2085326.16	748963.78	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-011	2085263.60	748999.40	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-013[1]	2085201.01	749035.04	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-015	2085138.48	749070.78	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-023	2085325.75	749035.78	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-025	2085263.18	749071.46	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-027[1]	2085200.69	749107.08	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-029[1]	2085138.11	749142.68	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-036	2085325.34	749107.76	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0

Location Code	Actual Easting	Actual Northing	Depth Interval	Analyte	Laboratory Method
CM38-038	2085262.77	749143.42	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM39-001	2085200.19	749179.07	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM39-003[1]	2085137.60	7492714.67	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM39-008	2085324.91	749179.61	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM39-010	2085262.42	749215.37	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM39-012	2085169.56	749244.63	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM39-013	2085296.64	749246.81	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CN37-003	2085389.13	748856.15	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CN37-009	2085388.72	748928.11	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CN37-012	2085427.69	748917.12	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CN37-013	2085404.41	748811.76	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CN38-003	2085388.31	749000.11	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CB38-009	2085382.79	749072.30	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0

Location Code	Actual Easting	Actual Northing	Depth Interval	Analyte	Laboratory Method
CN38-015	2085387.48	749144.08	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CN38-016	2085430.53	749116.01	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CN38-017	2085428.68	749021.97	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CN39-005	2085387.08	749216.11	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CN39-006	2085436.05	749242.37	0-0.5'	Radionuclides Metals VOCs Cyanide Nitrate an N	6200 HPGe 8260 SW9010B/SW9012A SW9056/E300.0
CM38-041	2085309.85	749180.00	0.3 - 1'	Radionuclides	Alpha Spectroscopy
CM39-014	2085324.85	749179.60	0- 1.1'	Radionuclides	HPGe
CM39-015	2085325.13	749194.51	1.2-2'	Radionuclides	Alpha Spectroscopy
CM39-016	2085266.89	749233.68	0-0.9'	Radionuclides	HPGe
CN38-018	2085324.35	749164.65	0.1 - 1.1'	Radionuclides	Alpha Spectroscopy
CN38-019	2085382.77	749072.29	0.1-0.9'	Radionuclides	HPGe
CN38-020	2085397.77	749072.29	0.1-1'	Radionuclides	Alpha Spectroscopy
CN38-021	2085367.77	749072.29	0.1-1.1'	Radionuclides	Alpha Spectroscopy
CN38-022	2085382.83	749057.32	0.2-1.1'	Radionuclides	Alpha Spectroscopy
CN38-023	2085383.34	749087.24	0.2-1.1'	Radionuclides	HPGe
CN39-007	2085339.84	749179.20	1 -2'	Radionuclides	HPGe

Figure 2

Surface Soil Sample Results Above Background Mean Plus Two Standard Deviations or MDLs at IHSS Group 900-3



Samples within the 904 Pad were collected beneath the asphalt.
Depth intervals for all samples reflect datum from the top of native soil.

Key

- Samples Greater Than WRW ALs
- Samples Greater Than ER ALs
- Samples Less Than ALs
- Streams
- Fence
- IHSS
- Dirt Road
- Paved Area

Building

- Demolished
- Standing
- OPWL
- NPWL

N
W E
S

100 0 100 200 Feet

Scale = 1:4,500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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

Prepared By:

RADMS
Remedial Action Decision Management System

KAISER•HILL COMPANY

File:w:\Projects\FY2003\900-3\Confirmation\900-3_closeout_dr(rev_1).apr

Date: July 2003

Table 2
Surface Soil Results Greater than Background Mean Plus Two Standard Deviations or Detection Limit

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CL37-000	2085116.92	748829.83	Arsenic	0	0.5	12.7	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	624	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	32.1	20	268	—	16.99	mg/kg
			Copper	0	0.5	155	4	40900	—	18.06	mg/kg
			Iron	0	0.5	34800	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	613	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	50	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	241	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	126	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	165	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.19	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	4.02	1.82	351	1600	2.00	pCi/g
CL37-001	2085108.21	748940.14	Arsenic	0	0.5	10.8	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	744	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	38.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	126	4	40900	—	18.06	mg/kg
			Iron	0	0.5	31500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	523	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	45.9	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	252	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	57.7	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	122	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.18	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	2.89	1.92	351	1600	2.00	pCi/g
			Naphthalene	0	0.5	1	5.1	3090000	—	NA	ug/kg
			Xylenes (total)	0	0.5	7	10	2040000	—	NA	ug/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CL38-000	2085109.33	749041.67	Arsenic	0	0.5	16.9	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	671	98	26400	—	141.26	mg/kg
			Copper	0	0.5	153	4	40900	—	18.06	mg/kg
			Iron	0	0.5	28400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	431	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	43.4	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	307	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	114	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	115	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.21	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	2.91	1.78	351	1600	2.00	pCi/g
CL39-000	2085107.09	749162.13	Arsenic	0	0.5	12.9	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	624	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	33.1	20	268	—	16.99	mg/kg
			Copper	0	0.5	160	4	40900	—	18.06	mg/kg
			Iron	0	0.5	48200	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1170	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	48.9	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	221	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	119	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	236	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.29	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	5.10	1.55	351	1600	2.00	pCi/g
			Acetone	0	0.5	10	100	102000000	211000	NA	ug/kg
			Ethylbenzene	0	0.5	21	5.2	4250000	—	NA	ug/kg
			Xylenes (total)	0	0.5	170	10	2040000	—	NA	ug/kg
CM37-003	2085202.28	748819.05	Arsenic	0	0.5	14.4	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	749	98	26400	—	141.26	mg/kg
			Cadmium	0	0.5	4.09	3	962	—	1.61	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Chromium	0	0.5	34.2	20	268	—	16.99	mg/kg
			Copper	0	0.5	122	4	40900	—	18.06	mg/kg
			Iron	0	0.5	44400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1160	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	56.6	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	495	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	96.2	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	110	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.27	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	4.07	2.12	351	1600	2.00	pCi/g
			Acetone	0	0.5	20	110	102000000	211000	NA	ug/kg
CM37-005	2085139.72	748854.7	Barium	0	0.5	901	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	56	20	268	—	16.99	mg/kg
			Copper	0	0.5	145	4	40900	—	18.06	mg/kg
			Iron	0	0.5	52000	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1470	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	76.2	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	638	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	96	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	112	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.24	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	3.54	1.72	351	1600	2.00	pCi/g
			Acetone	0	0.5	10	110	102000000	211000	NA	ug/kg
			Naphthalene	0	0.5	0.9	5.4	3090000	—	NA	ug/kg
CM37-012	2085319.92	748823.27	Barium	0	0.5	661	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	116	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	306	90	1550	—	10.91	mg/kg
			Copper	0	0.5	214	4	40900	—	18.06	mg/kg
			Iron	0	0.5	56300	2190	307000	—	18037.00	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Manganese	0	0.5	1590	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	99	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	628	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	100	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	121	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.33	0.12	8	1900	0.09	pCi/g
			U-238	0	0.5	4.43	1.75	351	1600	2.00	pCi/g
			Naphthalene	0	0.5	1.7	5.2	3090000	—	NA	ug/kg
CM37-014	2085264.42	748855.4	Barium	0	0.5	922	98	26400	—	141.26	mg/kg
			Cadmium	0	0.5	3.09	3	962	—	1.61	mg/kg
			Chromium	0	0.5	53.8	20	268	—	16.99	mg/kg
			Copper	0	0.5	140	4	40900	—	18.06	mg/kg
			Iron	0	0.5	57600	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1610	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	66.7	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	718	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	143	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	130	9	307000	—	73.76	mg/kg
CM37-016	2085201.87	748891.05	Arsenic	0	0.5	11.8	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	888	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	37.4	20	268	—	16.99	mg/kg
			Copper	0	0.5	158	4	40900	—	18.06	mg/kg
			Iron	0	0.5	45300	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1240	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	58.3	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	514	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	95.6	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	122	9	307000	—	73.76	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Acetone	0	0.5	10	110	102000000	211000	NA	ug/kg
			Naphthalene	0	0.5	1	5.3	3090000	—	NA	ug/kg
CM37-018	2085139.31	748926.69	Barium	0	0.5	799	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	33	20	268	—	16.99	mg/kg
			Copper	0	0.5	192	4	40900	—	18.06	mg/kg
			Iron	0	0.5	45400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1320	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	56.1	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	513	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	114	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	125	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.22	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	2.00	1.56	351	1600	2.00	pCi/g
			Acetone	0	0.5	15	110	102000000	211000	NA	ug/kg
CM37-025	2085324.13	748887.9	Barium	0	0.5	876	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	72	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	215	90	1550	—	10.91	mg/kg
			Copper	0	0.5	197	4	40900	—	18.06	mg/kg
			Iron	0	0.5	58000	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1840	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	92	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	705	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	128	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	125	9	307000	—	73.76	mg/kg
			U-238	0	0.5	3.39	1.83	351	1600	2.00	pCi/g
CM37-027	2085264.01	748927.41	Barium	0	0.5	878	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	55.6	20	268	—	16.99	mg/kg
			Copper	0	0.5	114	4	40900	—	18.06	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Iron	0	0.5	50500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1370	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	58.7	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	541	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	149	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	104	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.18	0.12	8	1900	0.09	pCi/g
			U-238	0	0.5	2.32	2.00	351	1600	2.00	pCi/g
			Acetone	0	0.5	30	110	102000000	211000	NA	ug/kg
CM37-031	2085322.33	748766.19	Arsenic	0	0.5	17.6	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	727	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	43.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	135	4	40900	—	18.06	mg/kg
			Iron	0	0.5	37400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	630	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	53.2	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	261	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	98.4	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	197	9	307000	—	73.76	mg/kg
			U-238	0	0.5	2.77	1.39	351	1600	2.00	pCi/g
			Ethylbenzene	0	0.5	9	5.6	4250000	—	NA	ug/kg
			Xylenes (total)	0	0.5	68	11	2040000	—	NA	ug/kg
CM37-032	2085200.75	748769.6	Arsenic	0	0.5	17.8	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	613	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	28.6	20	268	—	16.99	mg/kg
			Copper	0	0.5	150	4	40900	—	18.06	mg/kg
			Iron	0	0.5	31900	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	457	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	55.4	12	20400	—	14.91	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Strontium	0	0.5	224	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	113	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	126	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.25	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	3.05	1.89	351	1600	2.00	pCi/g
			Xylenes (total)	0	0.5	6	10	2040000	—	NA	ug/kg
CM38-001	2085201.46	748963.05	Arsenic	0	0.5	12.6	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	743	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	62.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	163	4	40900	—	18.06	mg/kg
			Iron	0	0.5	49800	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1180	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	80.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	552	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	120	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	119	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.24	0.16	8	1900	0.09	pCi/g
			U-238	0	0.5	2.59	1.65	351	1600	2.00	pCi/g
			Acetone	0	0.5	20	110	102000000	211000	NA	ug/kg
CM38-003	2085138.82	748998.8	Arsenic	0	0.4	12.9	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.4	601	98	26400	—	141.26	mg/kg
			Chromium	0	0.4	34.9	20	268	—	16.99	mg/kg
			Copper	0	0.4	128	4	40900	—	18.06	mg/kg
			Iron	0	0.4	35500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.4	953	158	3480	—	365.08	mg/kg
			Nickel	0	0.4	46	12	20400	—	14.91	mg/kg
			Strontium	0	0.4	380	20	613000	—	48.94	mg/kg
			Vanadium	0	0.4	71.9	31	7150	292	45.59	mg/kg
			Zinc	0	0.4	103	9	307000	—	73.76	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CM38-009	2085326.16	748963.78	Barium	0	0.5	795	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	99.3	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	285	90	1550	—	10.91	mg/kg
			Copper	0	0.5	214	4	40900	—	18.06	mg/kg
			Iron	0	0.5	59700	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1870	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	94.2	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	650	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	87.8	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	137	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.29	0.12	8	1900	0.09	pCi/g
			U-238	0	0.5	6.50	1.68	351	1600	2.00	pCi/g
CM38-011	2085263.6	748999.4	Barium	0	0.5	680	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	45.6	20	268	—	16.99	mg/kg
			Copper	0	0.5	118	4	40900	—	18.06	mg/kg
			Iron	0	0.5	39500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	988	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	50.3	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	424	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	89.6	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	103	9	307000	—	73.76	mg/kg
			U-238	0	0.5	6.25	1.49	351	1600	2.00	pCi/g
CM38-013	2085201.01	749035.04	Arsenic	0	0.5	14.1	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	706	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	30.9	20	268	—	16.99	mg/kg
			Copper	0	0.5	137	4	40900	—	18.06	mg/kg
			Iron	0	0.5	33400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	651	158	3480	—	365.08	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Nickel	0	0.5	50.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	297	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	82.2	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	105	9	307000	—	73.76	mg/kg
			U-238	0	0.5	3.39	1.96	351	1600	2.00	pCi/g
			2-butanone	0	0.5	19	110	192000000	433000	NA	ug/kg
			Acetone	0	0.5	83	110	102000000	211000	NA	ug/kg
CM38-015	2085138.48	749070.78	Barium	0	0.4	355	98	26400	—	141.26	mg/kg
			Chromium	0	0.4	26.3	20	268	—	16.99	mg/kg
			Copper	0	0.4	42.9	4	40900	—	18.06	mg/kg
			Iron	0	0.4	21200	2190	307000	—	18037.00	mg/kg
			Nickel	0	0.4	33.4	12	20400	—	14.91	mg/kg
			Strontium	0	0.4	183	20	613000	—	48.94	mg/kg
			Vanadium	0	0.4	70.9	31	7150	292	45.59	mg/kg
			U-235	0	0.4	0.25	0.18	8	1900	0.09	pCi/g
			U-238	0	0.4	2.91	1.88	351	1600	2.00	pCi/g
			Acetone	0	0.4	50	120	102000000	211000	NA	ug/kg
CM38-023	2085325.75	749035.78	Arsenic	0	0.5	18.7	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	612	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	84.9	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	189	90	1550	—	10.91	mg/kg
			Copper	0	0.5	198	4	40900	—	18.06	mg/kg
			Iron	0	0.5	39600	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	626	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	60.4	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	242	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	119	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	136	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.23	0.12	8	1900	0.09	pCi/g

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			U-238	0	0.5	4.72	1.53	351	1600	2.00	pCi/g
CM38-025	2085263.18	749071.46	Barium	0	0.5	493	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	29.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	104	4	40900	—	18.06	mg/kg
			Iron	0	0.5	24500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	391	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	32.8	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	145	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	91.5	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	83.7	9	307000	—	73.76	mg/kg
			Am-241[1]	0	0.5	4.96	0.37	76	1900	0.02	pCi/g
			Pu-239/240[1]	0	0.5	6.64	N/A	50	3800	0.07	pCi/g
			U-235	0	0.5	0.26	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	3.28	1.52	351	1600	2.00	pCi/g
			Acetone	0	0.5	80	110	102000000	211000	NA	ug/kg
CM38-027	2085200.69	749107.08	Barium	0	0.5	483	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	24.5	20	268	—	16.99	mg/kg
			Copper	0	0.5	135	4	40900	—	18.06	mg/kg
			Iron	0	0.5	25700	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	571	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	45.1	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	350	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	71.9	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	83.1	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.21	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	3.03	1.93	351	1600	2.00	pCi/g
			Acetone	0	0.5	22	110	102000000	211000	NA	ug/kg
CM38-029	2085138.11	749142.68	Arsenic	0	0.5	12.8	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	595	98	26400	—	141.26	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Chromium	0	0.5	41.7	20	268	—	16.99	mg/kg
			Copper	0	0.5	94.8	4	40900	—	18.06	mg/kg
			Iron	0	0.5	30900	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	553	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	39.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	225	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	133	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	105	9	307000	—	73.76	mg/kg
			U-238	0	0.5	2.55	1.23	351	1600	2.00	pCi/g
			2-butanone	0	0.5	23	110	192000000	433000	NA	ug/kg
			Acetone	0	0.5	100	110	102000000	211000	NA	ug/kg
CM38-036	2085325.34	749107.76	Arsenic	0	0.5	10.4	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	638	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	57.9	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	259	90	1550	—	10.91	mg/kg
			Copper	0	0.5	82.1	4	40900	—	18.06	mg/kg
			Iron	0	0.5	28800	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1040	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	58.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	290	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	124	31	7150	292	45.59	mg/kg
			U-238	0	0.5	2.72	1.90	351	1600	2.00	pCi/g
CM38-038	2085262.77	749143.42	Barium	0	0.5	432	98	26400	—	141.26	mg/kg
			Copper	0	0.5	116	4	40900	—	18.06	mg/kg
			Nickel	0	0.5	47.6	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	247	20	613000	—	48.94	mg/kg
			U-235	0	0.5	0.24	0.16	8	1900	0.09	pCi/g
			U-238	0	0.5	5.09	2.20	351	1600	2.00	pCi/g
			2-butanone	0	0.5	20	120	192000000	433000	NA	ug/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CM39-001	2085200.19	749179.07	Acetone	0	0.5	100	120	102000000	211000	NA	ug/kg
			Arsenic	0	0.4	11.5	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.4	755	98	26400	—	141.26	mg/kg
			Chromium	0	0.4	56.5	20	268	—	16.99	mg/kg
			Copper	0	0.4	137	4	40900	—	18.06	mg/kg
			Iron	0	0.4	44900	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.4	1030	158	3480	—	365.08	mg/kg
			Nickel	0	0.4	52.4	12	20400	—	14.91	mg/kg
			Strontium	0	0.4	453	20	613000	—	48.94	mg/kg
			Vanadium	0	0.4	132	31	7150	292	45.59	mg/kg
			Zinc	0	0.4	105	9	307000	—	73.76	mg/kg
			U-235	0	0.4	0.14	0.11	8	1900	0.09	pCi/g
			U-238	0	0.4	3.34	1.64	351	1600	2.00	pCi/g
			Acetone	0	0.4	60	110	102000000	211000	NA	ug/kg
CM39-003	2085137.6	749214.67	Arsenic	0	0.5	12.3	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	746	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	43	20	268	—	16.99	mg/kg
			Copper	0	0.5	127	4	40900	—	18.06	mg/kg
			Iron	0	0.5	41500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	974	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	54.6	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	410	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	144	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	112	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.26	0.15	8	1900	0.09	pCi/g
			U-238	0	0.5	4.47	2.00	351	1600	2.00	pCi/g
			2-butanone	0	0.5	20	120	192000000	433000	NA	ug/kg
			Acetone	0	0.5	100	120	102000000	211000	NA	ug/kg
			Naphthalene	0	0.5	1	6.1	3090000	—	NA	ug/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CM39-008	2085324.91	749179.61	Arsenic	0	0.5	12	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	534	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	38.8	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	96.3	90	1550	—	10.91	mg/kg
			Copper	0	0.5	191	4	40900	—	18.06	mg/kg
			Iron	0	0.5	35400	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	778	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	36.4	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	283	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	109	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	98.1	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.13	0.12	8	1900	0.09	pCi/g
			U-238	0	0.5	2.04	1.91	351	1600	2.00	pCi/g
			2-butanone	0	0.5	20	110	192000000	433000	NA	ug/kg
			Acetone	0	0.5	70	110	102000000	211000	NA	ug/kg
			Naphthalene	0	0.5	0.9	5.6	3090000	—	NA	ug/kg
CM39-010	2085262.42	749215.37	Barium	0	0.5	914	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	34	20	268	—	16.99	mg/kg
			Copper	0	0.5	154	4	40900	—	18.06	mg/kg
			Iron	0	0.5	51000	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1580	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	63.1	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	604	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	102	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	123	9	307000	—	73.76	mg/kg
			Am-241	0	0.5	5.26	0.41	76	1900	0.02	pCi/g
			Pu-239/240 (estimated)	0	0.5	8.61	N/A	50	3800	0.07	pCi/g
			U-238	0	0.5	4.31	1.93	351	1600	2.00	pCi/g
			Acetone	0	0.5	20	110	102000000	211000	NA	ug/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CM39-012	2085169.56	749244.63	Barium	0	0.5	574	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	21.4	20	268	—	16.99	mg/kg
			Copper	0	0.5	268	4	40900	—	18.06	mg/kg
			Iron	0	0.5	19300	2190	307000	—	18037.00	mg/kg
			Lead	**0**	**0.5**	**56.6**	**7**	**1000**	**25.6**	**54.62**	**mg/kg**
			Nickel	0	0.5	48.6	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	310	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	62.6	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	111	9	307000	—	73.76	mg/kg
			U-238	0	0.5	3.21	1.57	351	1600	2.00	pCi/g
			Xylenes (total)	0	0.5	3	11	2040000	—	NA	ug/kg
CM39-013	**2085296.64**	**749246.81**	**Arsenic**	**0**	**0.5**	**23.7**	**5**	**22.2**	**21.6**	**10.09**	**mg/kg**
			Barium	0	0.5	568	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	61.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	174	4	40900	—	18.06	mg/kg
			Iron	0	0.5	47300	2190	307000	—	18037.00	mg/kg
			Nickel	0	0.5	81.8	12	20400	—	14.91	mg/kg
			Selenium	0	0.5	1.33	1	5110	—	1.22	mg/kg
			Strontium	0	0.5	130	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	166	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	137	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.39	0.23	8	1900	0.09	pCi/g
			U-238	0	0.5	4.39	1.96	351	1600	2.00	pCi/g
CN37-003	2085389.13	748856.15	Barium	0	0.5	813	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	75	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	198	90	1550	—	10.91	mg/kg
			Copper	0	0.5	216	4	40900	—	18.06	mg/kg
			Iron	0	0.5	59900	2190	307000	—	18037.00	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Manganese	0	0.5	1930	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	91.6	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	712	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	118	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	129	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.24	0.15	8	1900	0.09	pCi/g
			U-238	0	0.5	3.16	1.61	351	1600	2.00	pCi/g
CN37-009	2085388.72	748928.11	Barium	0	0.5	898	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	81.3	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	232	90	1550	—	10.91	mg/kg
			Copper	0	0.5	214	4	40900	—	18.06	mg/kg
			Iron	0	0.5	54200	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1750	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	81.1	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	681	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	104	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	127	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.28	0.18	8	1900	0.09	pCi/g
			U-238	0	0.5	3.13	2.31	351	1600	2.00	pCi/g
CN37-012	2085427.69	748917.12	Arsenic	0	0.5	13.8	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	604	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	34.3	20	268	—	16.99	mg/kg
			Copper	0	0.5	66.6	4	40900	—	18.06	mg/kg
			Iron	0	0.5	30100	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	623	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	27.2	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	284	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	63.7	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	108	9	307000	—	73.76	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			U-235	0	0.5	0.21	0.15	8	1900	0.09	pCi/g
			U-238	0	0.5	3.91	1.74	351	1600	2.00	pCi/g
			Naphthalene	0	0.5	2	5.8	3090000	—	NA	ug/kg
CN37-013	2085404.41	748811.76	Arsenic	0	0.5	15.2	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	737	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	28.2	20	268	—	16.99	mg/kg
			Copper	0	0.5	90.2	4	40900	—	18.06	mg/kg
			Iron	0	0.5	31500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	570	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	43.7	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	246	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	102	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	152	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.14	0.11	8	1900	0.09	pCi/g
			U-238	0	0.5	2.55	1.87	351	1600	2.00	pCi/g
			Ethylbenzene	0	0.5	11	5.9	4250000	—	NA	ug/kg
			Xylenes (total)	0	0.5	92	12	2040000	—	NA	ug/kg
CN38-003	2085388.31	749000.11	Arsenic	0	0.5	11.4	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	739	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	95.7	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	206	90	1550	—	10.91	mg/kg
			Copper	0	0.5	160	4	40900	—	18.06	mg/kg
			Iron	0	0.5	46800	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	1260	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	85.7	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	512	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	97	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	111	9	307000	—	73.76	mg/kg
			Am-241	0	0.5	5.13	0.47	76	1900	0.02	pCi/g

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Pu-239/240 (estimated)	0	0.5	7.73	N/A	50	3800	0.07	pCi/g
			U-235	0	0.5	0.19	0.12	8	1900	0.09	pCi/g
			U-238	0	0.5	4.05	1.62	351	1600	2.00	pCi/g
CN38-009	2085382.79	749072.3	Arsenic	0	0.5	12.3	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	703	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	69.5	20	268	—	16.99	mg/kg
			Cobalt	0	0.5	105	90	1550	—	10.91	mg/kg
			Copper	0	0.5	125	4	40900	—	18.06	mg/kg
			Iron	0	0.5	36500	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	810	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	44.3	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	322	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	99.6	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	92.6	9	307000	—	73.76	mg/kg
			Xylenes (total)	0	0.5	7	11	2040000	—	NA	ug/kg
CN38-015	2085387.48	749144.08	Arsenic	0	0.5	17	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	639	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	56.8	20	268	—	16.99	mg/kg
			Copper	0	0.5	173	4	40900	—	18.06	mg/kg
			Iron	0	0.5	33100	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	607	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	39.1	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	232	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	120	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	118	9	307000	—	73.76	mg/kg
			Am-241	0	0.5	6.26	0.59	76	1900	0.02	pCi/g
			Pu-239/240(estimated)	0	0.5	15.09	N/A	50	3800	0.07	pCi/g
			U-235	0	0.5	0.19	0.13	8	1900	0.09	pCi/g
			U-238	0	0.5	3.33	2.23	351	1600	2.00	pCi/g

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			2-butanone	0	0.5	50	110	192000000	433000	NA	ug/kg
			Acetone	0	0.5	160	110	102000000	211000	NA	ug/kg
			Benzene	0	0.5	3	5.4	205000	—	NA	ug/kg
CN38-016	2085430.53	749116.01	Arsenic	0	0.5	15.1	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	692	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	25.6	20	268	—	16.99	mg/kg
			Copper	0	0.5	110	4	40900	—	18.06	mg/kg
			Iron	0	0.5	22800	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	448	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	32.3	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	320	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	57.2	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	114	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.24	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	4.52	2.07	351	1600	2.00	pCi/g
CN38-017	2085428.68	749021.97	Arsenic	0	0.5	13.9	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	605	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	32.6	20	268	—	16.99	mg/kg
			Copper	0	0.5	153	4	40900	—	18.06	mg/kg
			Iron	0	0.5	31200	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	447	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	49.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	261	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	107	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	120	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.12	0.11	8	1900	0.09	pCi/g
			U-238	0	0.5	3.72	2.74	351	1600	2.00	pCi/g
			Xylenes (total)	0	0.5	6	11	2040000	—	NA	ug/kg
CN39-005	2085387.08	749216.11	Arsenic	0	0.5	12.6	5	22.2	21.6	10.09	mg/kg

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
			Barium	0	0.5	800	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	43.1	20	268	—	16.99	mg/kg
			Copper	0	0.5	102	4	40900	—	18.06	mg/kg
			Iron	0	0.5	37600	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	728	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	58.5	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	265	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	78.7	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	93.8	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.28	0.16	8	1900	0.09	pCi/g
			U-238	0	0.5	4.02	1.78	351	1600	2.00	pCi/g
			Acetone	0	0.5	120	110	102000000	211000	NA	ug/kg
CN39-006	2085436.05	749242.37	Arsenic	0	0.5	11.1	5	22.2	21.6	10.09	mg/kg
			Barium	0	0.5	712	98	26400	—	141.26	mg/kg
			Chromium	0	0.5	27.1	20	268	—	16.99	mg/kg
			Copper	0	0.5	95.8	4	40900	—	18.06	mg/kg
			Iron	0	0.5	33200	2190	307000	—	18037.00	mg/kg
			Manganese	0	0.5	576	158	3480	—	365.08	mg/kg
			Nickel	0	0.5	46.7	12	20400	—	14.91	mg/kg
			Strontium	0	0.5	261	20	613000	—	48.94	mg/kg
			Vanadium	0	0.5	116	31	7150	292	45.59	mg/kg
			Zinc	0	0.5	148	9	307000	—	73.76	mg/kg
			U-235	0	0.5	0.18	0.14	8	1900	0.09	pCi/g
			U-238	0	0.5	3.72	1.84	351	1600	2.00	pCi/g
CM39-014	2085324.85	749179.60	Uranium, Total	0	0.5	13.19	5.11	2750	67.8	5.98	mg/kg
			Uranium-234	0	0.5	4.44	1.72	300	1800	2.25	pCi/g
			Uranium-235	0	0.5	0.26	0.15	8	1900	0.09	pCi/g
			Uranium-238	0	0.5	4.44	1.72	351	1600	2.00	pCi/g
CM39-015	2085325.13	749194.51	Uranium-235	0	0.5	0.15	0.14	8	1900	0.09	pCi/g

Location	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Units
CN38-019	2085382.77	749072.29	Uranium, Total	0	0.5	12.65	5.52	2750	67.8	5.98	mg/kg
			Uranium-234	0	0.5	4.26	1.86	300	1800	2.25	pCi/g
			Uranium-235	0	0.5	0.24	0.15	8	1900	0.09	pCi/g
			Uranium-238	0	0.5	4.26	1.86	351	1600	2.00	pCi/g
CN38-020	2085397.77	749072.29	Uranium-235	0	0.5	0.21	0.12	8	1900	0.09	pCi/g
CN38-021	2085367.77	749072.29	Americium-241	0	0.5	0.59	0.23	76	1900	0.02	pCi/g
			Plutonium-239/240	0	0.5	3.39	0.23	50	3800	0.07	pCi/g
CN38-022	2085382.83	749057.32	Americium-241	0	0.5	0.39	0.19	76	1900	0.02	pCi/g
			Plutonium-239/240	0	0.5	2.23	0.19	50	3800	0.07	pCi/g
			Uranium-235	0	0.5	0.13	0.09	8	1900	0.09	pCi/g

N/A – Not applicable.
Bold lettering denotes Ecological Receptor Action Level Exceedance.

Table 3
IHSS Group 900-3 Summary of Analytical Results

Media	Analyte Name	Number Samples	Detection Frequency	Mean	Minimum	Maximum	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Background	Unit
Surface Soil	Antimony	43	21%	5.42	3.50	24.80	409	—	N/A	mg/kg
	Arsenic	**43**	**91%**	**11.43**	**2.50**	**23.70**	**22.2**	**21.6**	**10.09**	**mg/kg**
	Barium	43	100%	694.02	355.00	922.00	26400	—	141.26	mg/kg
	Cadmium	43	5%	1.60	1.50	4.09	962	—	1.61	mg/kg
	Chromium	43	95%	46.87	10.00	116.00	268	—	16.99	mg/kg
	Cobalt	43	23%	83.17	45.00	306.00	1550	—	10.91	mg/kg
	Copper	43	100%	145.36	42.90	268.00	40900	—	18.06	mg/kg
	Cyanide, total	43	70%	0.20	0.14	0.35	20400	—	N/A	mg/kg
	Iron	43	100%	39058.14	12900.00	59900.00	307000	—	18037.00	mg/kg
	Lead	**43**	**100%**	**29.89**	**11.30**	**56.60**	**1000**	**25.6**	**54.62**	**mg/kg**
	Manganese	43	100%	917.70	186.00	1930.00	3480	—	365.08	mg/kg
	Nickel	43	100%	56.65	27.20	99.00	20400	—	14.91	mg/kg
	Nitrate as n	43	93%	3.85	2.20	28.00	1000000	—	N/A	mg/kg
	Selenium	43	7%	0.55	0.50	1.33	5110	—	1.22	mg/kg
	Strontium	43	100%	384.40	130.00	718.00	613000	—	48.94	mg/kg
	Tin	43	19%	2.54	2.00	6.61	613000	—	N/A	mg/kg
	Uranium, Total	54	98	9.53	2.76	19.30	2750	67.8	5.98	mg/kg
	Vanadium	43	100%	102.94	36.00	166.00	7150	292	45.59	mg/kg
	Zinc	43	100%	117.70	46.10	236.00	307000	—	73.76	mg/kg
	Am-241[1]	54	11%	0.68	0.39	1.47	76	1900	0.02	pCi/g
	Pu-239/240[1]	54	11%	3.89	2.23	8.36	50	3800	0.07	pCi/g
	U-235	54	72%	0.22	0.12	0.39	8	1900	0.09	pCi/g
	U-238	54	98%	3.21	0.93	6.50	351	1600	2.00	pCi/g
	2-butanone	43	14%	8.01	4.82	50.00	192000000	433000	N/A	ug/kg
	Acetone	43	44%	28.02	4.84	160.00	102000000	211000	N/A	ug/kg
	Benzene	43	2%	0.49	0.39	3.00	205000	—	N/A	ug/kg
	Ethylbenzene	43	7%	1.47	0.51	21.00	4250000	—	N/A	ug/kg
	Naphthalene	43	16%	0.56	0.40	2.00	3090000	—	N/A	ug/kg
	Xylenes (total)	43	19%	9.46	1.26	170.00	2040000	—	N/A	ug/kg

[1] $Pu^{239/240}$ and Am^{241} results inferred from HPGe Am^{241}

N/A – Not applicable; Bold lettering denotes Ecological Receptor Action Level Exceedance.

Table 4
Radionuclide Sum of Ratio Calculations

Media	Location Code	Depth Start (feet)	Depth End (feet)	WRW SOR
Surface Soil	CL37-000	0	0.5	0.04
	CL37-001	0	0.5	0.03
	CL38-000	0	0.5	0.03
	CL39-000	0	0.5	0.05
	CM37-003	0	0.5	0.05
	CM37-005	0	0.5	0.04
	CM37-012	0	0.5	0.05
	CM37-014	0	0.5	0.00
	CM37-016	0	0.5	0.00
	CM37-018	0	0.5	0.03
	CM37-025	0	0.5	0.01
	CM37-027	0	0.5	0.03
	CM37-031	0	0.5	0.01
	CM37-032	0	0.5	0.04
	CM38-001	0	0.5	0.04
	CM38-003	0	0.4	0.00
	CM38-009	0	0.5	0.05
	CM38-011	0	0.5	0.02
	CM38-013	0	0.5	0.01
	CM38-015	0	0.4	0.04
	CM38-023	0	0.5	0.04
	CM38-025	0	0.5	0.05
	CM38-027	0	0.5	0.03
	CM38-029	0	0.5	0.01
	CM38-036	0	0.5	0.01
	CM38-038	0	0.5	0.04
	CM39-001	0	0.4	0.03
	CM39-003	0	0.5	0.04
	CM39-008	0	0.5	0.02
	CM39-010	0	0.5	0.02
	CM39-012	0	0.5	0.01
	CM39-013	0	0.5	0.06
	CM39-014	0	0.5	0.06
	CM39-015	0	0.5	0.02
	CM39-016	0	0.5	0.06
	CN37-003	0	0.5	0.04
	CN37-009	0	0.5	0.04
	CN37-012	0	0.5	0.04
	CN37-013	0	0.5	0.03
	CN38-003	0	0.5	0.04
	CN38-009	0	0.5	0.00
	CN38-015	0	0.5	0.05
	CN38-016	0	0.5	0.04
	CN38-017	0	0.5	0.03

Media	Location Code	Depth Start (feet)	Depth End (feet)	WRW SOR
	CN38-019	0	0.5	0.06
	CN38-020	0	0.5	0.03
	CN38-021	0	0.5	0.04
	CN38-022	0	0.5	0.04
	CN39-005	0	0.5	0.05
	CN39-006	0	0.5	0.03

Table 5
IHSS Group 900-3 Deviations from Planned Sampling Specifications

IHSS Group	IHSS/PAC/ UBC Site	Location Code	Actual Easting	Actual Northing	Actual Depth Interval	Planned Depth Interval	Planned Location	Planned Easting	Planned Northing	Comment
900-3	900-213	CL37-000	2085116.92	748829.83	0-0.5	0-0.5	CL37-000	2085107.08	748832.02	Lateral offset due to the presence of a utility or other impediment, but closer to 904 Pad.
		CL37-001	2085108.21	748940.14	0-0.5	0-0.5	CL37-001	2085108.19	748940.18	No significant variations.
		CL38-000	2085109.33	749041.67	0-0.5	0-0.5	CL38-000	2085109.31	749041.66	No significant variations.
		CL39-000	2085107.09	749162.13	0-0.5	0-0.5	CL39-000	2085107.08	749162.09	No significant variations.
		CM37-003	2085202.28	748819.05	0-0.5	0-0.5	CM37-003	2085202.28	748819.05	No significant variations.
		CM37-005	2085139.72	748854.70	0-0.5	0-0.5	CM37-005	2085139.72	748854.70	No significant variations.
		CM37-012	2085319.92	748823.27	0-0.5	0-0.5	CM37-012	2085326.98	748819.76	Lateral offset due to the presence of a utility or other impediment.
		CM37-014	2085264.42	748855.40	0-0.5	0-0.5	CM37-014	2085264.42	748855.41	No significant variations..
		CM37-016	2085201.87	748891.05	0-0.5	0-0.5	CM37-016	2085201.87	748891.05	No significant variations.
		CM37-018	2085139.31	748926.69	0-0.5	0-0.5	CM37-018	2085139.31	748926.69	No significant variations.
		CM37-025	2085324.13	748887.90	0-0.5	0-0.5	CM37-025	2085326.57	748891.76	Lateral offset due to the presence of a utility or other impediment.
		CM37-027	2085264.01	748927.41	0-0.5	0-0.5	CM37-027	2085264.01	748927.41	No significant variations.
		CM37-031	2085322.33	748766.19	0-0.5	0-0.5	CM37-031	2085322.30	748766.23	No significant variations.
		CM37-032	2085200.75	748769.60	0-0.5	0-0.5	CM37-032	2085200.75	748769.57	No significant variations.
		CM38-001	2085201.46	748963.05	0-0.5	0-0.5	CM38-001	2085201.46	748963.05	No significant variations.
		CM38-003	2085138.82	748998.80	0-0.4	0-0.5	CM38-003	2085138.90	748998.69	No significant variations.
		CM38-009	2085326.16	748963.78	0-0.5	0-0.5	CM38-009	2085326.16	748963.76	No significant variations.
		CM38-011	2085263.60	748999.40	0-0.5	0-0.5	CM38-011	2085263.60	748999.40	No significant variations.
		CM38-013	2085201.01	749035.04	0-0.5	0-0.5	CM38-013	2085201.05	749035.05	No significant variations.
		CM38-015	2085138.48	749070.78	0-0.4	0-0.5	CM38-015	2085138.49	749070.69	No significant variations.
		CM38-023	2085325.75	749035.78	0-0.5	0-0.5	CM38-023	2085325.75	749035.76	No significant variations.
		CM38-025	2085263.18	749071.46	0-0.5	0-0.5	CM38-025	2085263.19	749071.40	No significant variations.
		CM38-027	2085200.69	749107.08	0-0.5	0-0.5	CM38-027	2085200.63	749107.05	No significant variations.

IHSS Group	IHSS/PAC/ UBC Site	Location Code	Actual Easting	Actual Northing	Actual Depth Interval	Planned Depth Interval	Planned Location	Planned Easting	Planned Northing	Comment
		CM38-029	2085138.11	749142.68	0-0.5	0-0.5	CM38-029	2085138.08	749142.69	No significant variations.
		CM38-036	2085325.34	749107.76	0-0.5	0-0.5	CM38-036	2085325.34	749107.76	No significant variations.
		CM38-038	2085262.77	749143.42	0-0.5	0-0.5	CM38-038	2085262.78	749143.40	No significant variations.
		CM39-001	2085200.19	749179.07	0-0.4	0-0.5	CM39-001	2085200.22	749179.05	No significant variations.
		CM39-003	2085137.60	749214.67	0-0.5	0-0.5	CM39-003	2085137.67	749214.69	No significant variations.
		CM39-008	2085324.91	749179.61	0-0.5	0-0.5	CM39-008	2085324.93	749179.76	No significant variations.
		CM39-010	2085262.42	749215.37	0-0.5	0-0.5	CM39-010	2085262.37	749215.40	No significant variations.
		CM39-012	2085169.56	749244.63	0-0.5	0-0.5	CM39-012	2085169.53	749244.61	No significant variations.
		CM39-013	2085296.64	749246.81	0-0.5	0-0.5	CM39-013	2085296.65	749246.84	No significant variations.
		CN37-003	2085389.13	748856.15	0-0.5	0-0.5	CN37-003	2085389.13	748856.12	No significant variations.
		CN37-009	2085388.72	748928.11	0-0.5	0-0.5	CN37-009	2085388.72	748928.12	No significant variations.
		CN37-012	2085427.69	748917.12	0-0.5	0-0.5	CN37-012	2085443.84	748911.19	Lateral offset due to the presence of a utility or other impediment, but closer to 904 Pad.
		CN37-013	2085404.41	748811.76	0-0.5	0-0.5	CN37-013	2085422.66	748804.14	Lateral offset due to the presence of a utility or other impediment, but closer to 904 Pad.
		CN38-003	2085388.31	749000.11	0-0.5	0-0.5	CN38-003	2085388.31	749000.12	No significant variations.
		CN38-009	2085382.79	749072.30	0-0.5	0-0.5	CN38-009	2085387.90	749072.11	Lateral offset due to the presence of a utility or other impediment.
		CN38-015	2085387.48	749144.08	0-0.5	0-0.5	CN38-015	2085387.49	749144.11	No significant variations.
		CN38-016	2085430.53	749116.01	0-0.5	0-0.5	CN38-016	2085441.61	749117.49	Lateral offset due to the presence of a utility or other impediment, but closer to 904 Pad.
		CN38-017	2085428.68	749021.97	0-0.5	0-0.5	CN38-017	2085442.73	749022.70	Lateral offset due to the presence of a utility or other impediment, but closer to 904 Pad.
		CN39-005	2085387.08	749216.11	0-0.5	0-0.5	CN39-005	2085387.08	749216.11	No significant variations.
		CN39-006	2085436.05	749242.37	0-0.5	0-0.5	CN39-006	2085436.04	749242.38	No significant variations.
		CM39-015	2085325.13	749194.51	0-0.5	0-0.5	CM39-015	2085323.34	749173.96	Sample locations moved closer to area of suspected contamination.
		CM39-016	2085266.89	749233.68	0-0.5	0-0.5	CM39-016	2085266.89	749233.68	No significant variations

IHSS Group	IHSS/PAC/ UBC Site	Location Code	Actual Easting	Actual Northing	Actual Depth Interval	Planned Depth Interval	Planned Location	Planned Easting	Planned Northing	Comment
		CM38-041	2085309.85	749180.00	0-0.5	0-0.5	CM38-041	2085289.43	749200.81	Sample locations moved closer to area of suspected contamination.
		CM39-014	2085324.85	749179.60	0-0.5	0-0.5	CM39-014	2085266.89	749233.68	Sample locations moved closer to area of suspected contamination.
		CN39-007	2085339.84	749179.20	0-0.5	0-0.5	CN39-007	2085359.02	749151.36	Sample locations moved closer to area of suspected contamination.
		CN38-018	2085324.35	749164.65	0-0.5	0-0.5	CN38-018	2085374.21	749077.89	Sample locations moved closer to area of suspected contamination.
		CN38-023	2085383.34	749087.24	0-0.5	0-0.5	CN38-023	2085400.34	749106.50	Sample locations moved closer to area of suspected contamination.
		CN38-019	2085382.77	749072.29	0-0.5	0-0.5	CN38-019	2085344.18	749053.87	Sample locations moved closer to area of suspected contamination.
		CN38-021	2085367.77	749072.29	0-0.5	0-0.5	CN38-021	2085401.05	749055.28	Sample locations moved closer to area of suspected contamination.
		CN38-020	2085397.77	749072.29	0-0.5	0-0.5	CN38-020	2085345.60	749105.08	Sample locations moved closer to area of suspected contamination.
		CN38-022	2085382.83	749057.32	0-0.5	0-0.5	CN38-022	2085356.19	749198.69	Sample locations moved closer to area of suspected contamination.

Note: No deviations between the planned and actual analyte suite.

Analytical results indicate that NFAA for IHSS Group 900-3 is warranted for the following reasons:

- None of the results from the October 2003 sampling event exceeded Rocky Flats Cleanup Agreement (RFCA) Wildlife Refuge Worker (WRW) or Ecological Receptor Action Levels (ALs) (DOE, et al 2003).

- All but one of the contaminants of concern (COCs) concentrations are less than RFCA WRW ALs (DOE, et al 2003). An exception includes a single arsenic value (23.7 mg/kg) in surface soil that slightly exceeded the corresponding WRW AL (22.2 mg/kg), Ecological Receptor AL (21.6 mg/kg), and background level (10.09 mg/kg);

- All but one of the COCs are less than RFCA Ecological Receptor ALs (DOE et al 2003). An exception includes one occurrence of lead in surface soil (56.6 mg/kg) that exceeded the corresponding Ecological Receptor AL (25.6 mg/kg); and

- There is no identified potential to exceed surface water standards at a Point of Compliance (POC) from this IHSS Group.

Approval of this Data Summary Report constitutes regulatory agency concurrence of this IHSS Group as an NFAA. This information and NFAA determination will be documented in the FY04 Historical Release Report (HRR).

2.1 Analytical Results

Several analytes including metals, radionuclides, volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs) were detected above background levels or laboratory reporting limits (RLs) at the majority of the sampling locations (Figure 2).

As shown in Figure 2, a single arsenic value (23.7 mg/kg) located north of the 904-Pad, exceeds the corresponding WRW AL (22.2 mg/kg). The magnitude of the exceedance is slightly greater than the corresponding background level (10.09 mg/kg).

A single lead occurrence (56.6 mg/kg) in surface soil, located north of the 904 Pad, exceeds the Ecological Receptor AL but is only slightly greater than the background level (54.62 mg/kg).

Because arsenic and lead ALs are only slightly greater than background, it is likely that these metal exceedances above ALs are due to natural variation in soil rather than a contaminant release. Also of note is the absence of associated COCs above ALs. For example, no other metals, radionuclides, or VOCs exceed ALs.

2.2 Sum of Ratios

Sum of ratio (SOR) calculations are based on analytical data for the radionuclides of concern (americium-241, plutonium-239/240, uranium-234, uranium-235, and uranium-238). As shown in Table 4, none of the radionuclide SOR values exceeded one. Therefore, no remedial or management actions are triggered.

3.0 DEVIATIONS FROM PLANNED SAMPLING SPECIFICATIONS

Deviations from the planned sampling specifications described in IASAP Addendum #IA-03-01 (DOE 2002a) are presented in Table 5.

4.0 DATA QUALITY ASSESSMENT

The Data Quality Objectives (DQOs) for this project are described in the IASAP (DOE 2002). All DQOs for this project were achieved based on the following:

- Regulatory agency approved sampling program design (IASAP Addendum #IA-03-01 [DOE 2002a);
- Collection of samples in accordance with the sampling design; and
- Results of the Data Quality Assessment (DQA) as described in the following sections.

4.1.1 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:

- 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
- DOE Order 414.1A, 1999, Quality Assurance.

Verification and Validation (V&V) of the 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-v2, 2002a.

- V&V Guidelines for Isotopic Determinations by Alpha Spectrometry, DA-RC01-v2, 2002b.
- V&V Guidelines for Volatile Organics, DA-SS01-v3, 2002c.
- V&V Guidelines for Semivolatile Organics, DA-SS02-v3, 2002d.
- V&V Guidelines for Metals, DA-SS05-v3, 2002e.
- 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.

4.1.2 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/MSD);
- Laboratory control samples (LCS);
- 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. Quality control (QC) samples are summarized and reported relative to two basic metrics: 1) the frequency of QC measurements (e.g., 1 sample per laboratory batch), and 2) the results, or performance, of the QC sample analyses. Generally, a minimum number of QC samples must be analyzed, and results must fall within predefined tolerance limits; violation of either of these criteria results in qualification or rejection of the data. Results are discussed relative to RFCA ALs to determine if project decisions are impacted. Based on the V&V criteria, the data quality is acceptable for project decisions.

Raw hardcopy data (e.g., individual analytical data packages) are currently filed by RIN and are maintained by Kaiser-Hill Analytical Services Division; older hardcopies may reside in the Federal Center in Lakewood, Colorado. Electronic data are stored in the RFETS Soil and Water Database (SWD).

Both real and QC data, as of December 15, 2003 are included on the enclosed CD in Microsoft ACCESS 2000 format.

4.1.3 Accuracy

The following measures of accuracy were evaluated:

- LCS Evaluation;
- Surrogate Evaluation;
- Blanks; and
- Sample MS Evaluation.

Laboratory Control Sample Evaluation

The frequency of LCS measurements, relative to each laboratory batch, is given in Table 6. LCS frequency was adequate based on at least one LCS per batch. The minimum and maximum LCS results are also tabulated, by chemical, for the entire project. 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 since 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 is less than the AL divided by the lowest LCS recovery for that analyte, no further action is taken because any indicated bias is not great enough to make a falsely low sample result be above the action limit. 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.

Surrogate Evaluation

The frequency of surrogate measurements, relative to each laboratory batch, is given in Table 7. Surrogate frequency was adequate based on at least one set per sample. The minimum and maximum surrogate results are also tabulated, by chemical, for the entire project. Surrogates are added to every sample, and therefore, surrogate recoveries only impact individual samples. Unacceptable surrogate recoveries can indicate potential matrix effects. The highest and 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 the Completeness Section.

Blank Evaluation

Results of the field blank analyses are given in Table 8. 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 nonlaboratory contaminants, the real result is eliminated. None of the chemicals were detected in the blanks at concentrations greater than one-tenth the AL. Therefore, no sample results at or above the AL could have been impacted by the blanks.

Table 6
Laboratory Control Summary

Test Method Name	CAS	Analyte	Min (%R)	Max (%R)	Number Analytes
SW-846 8260	71-55-6	1,1,1-Trichloroethane	76.93	102.6	8
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	86.85	124	8
SW-846 8260	79-00-5	1,1,2-Trichloroethane	84.53	101.7	8
SW-846 8260	75-34-3	1,1-Dichloroethane	76.06	92.66	8
SW-846 8260	75-35-4	1,1-Dichloroethene	81.85	103.9	8
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	91.21	103.6	8
SW-846 8260	95-50-1	1,2-Dichlorobenzene	92.9	102.2	8
SW-846 8260	107-06-2	1,2-Dichloroethane	76.55	91.81	8
SW-846 8260	78-87-5	1,2-Dichloropropane	85.09	113.5	8
SW-846 8260	106-46-7	1,4-Dichlorobenzene	92.34	102.4	8
SW-846 8260	78-93-3	2-Butanone	53.57	97.77	8
SW-846 8260	108-10-1	4-Methyl-2-pentanone	84.06	119.4	8
SW-846 8260	67-64-1	Acetone	41.12	86.34	8
SW-846 8260	71-43-2	Benzene	82.14	96.97	8
SW-846 8260	75-27-4	Bromodichloromethane	88.29	113	8
SW-846 8260	75-25-2	Bromoform	91.22	128.4	8
SW-846 8260	74-83-9	Bromomethane	53.61	94.04	8
SW-846 8260	75-15-0	Carbon Disulfide	79.54	98.7	8
SW-846 8260	56-23-5	Carbon Tetrachloride	74.34	99.52	8
SW-846 8260	108-90-7	Chlorobenzene	91.17	136.2	8
SW-846 8260	75-00-3	Chloroethane	66.57	105.6	8
SW-846 8260	67-66-3	Chloroform	79.99	96.47	8

Test Method Name	CAS	Analyte	Min (%R)	Max (%R)	Number Analytes
SW-846 8260	74-87-3	Chloromethane	53.27	82.93	8
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	67.34	80.35	8
SW9010B OR SW9012A	57-12-5	Cyanide	93	102	8
SW-846 8260	124-48-1	Dibromochloromethane	87.64	97.69	8
SW-846 8260	100-41-4	Ethylbenzene	89.72	122.3	8
SW-846 8260	87-68-3	Hexachlorobutadiene	84.16	103.8	8
SW-846 8260	75-09-2	Methylene chloride	80.66	95.26	8
SW-846 8260	91-20-3	Naphthalene	96.67	108.8	8
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	96	101	12
SW-846 8260	100-42-5	Styrene	90.09	102.2	8
SW-846 8260	127-18-4	Tetrachloroethene	88.11	101.9	8
SW-846 8260	108-88-3	Toluene	90.83	104.9	8
SW-846 8260	10061-02-6	Trans-1,3-Dichloropropene	89.4	105.2	8
SW-846 8260	79-01-6	Trichloroethene	81.22	106.5	8
SW-846 8260	75-01-4	Vinyl chloride	69.25	102	8
SW-846 8260	1330-20-7	Xylene	90.53	102.9	8

Table 7
Surrogate Recovery Summary

Number Samples	Analyte	Minimum (%R)	Maximum (%R)
43	1,2-Dichloroethane-D4	87.04	119.2
43	4-Bromofluorobenzene	87.04	130.5
43	Toluene-D8	85.19	110.9

Table 8
Blank Summary

Test Method Name	CAS	Analyte	Sample QC Code	Maximum	Result Unit	Lab Results Qualifier Code
SW-846 8260	67-64-1	Acetone	FB	10	ug/L	J
SW-846 8260	67-64-1	Acetone	RNS	10	ug/L	JB
SW-846 8260	67-64-1	Acetone	TB	20	ug/L	JB
SW8260B	67-64-1	Acetone	FB	10	ug/L	J
SW8260B	67-64-1	Acetone	TB	20	ug/L	JB
SW-846 6010	7429-90-5	Aluminum	RNS	0.044	mg/L	B
SW-846 6010	7440-39-3	Barium	RNS	0.0053	mg/L	B
SW-846 6010	7440-41-7	Beryllium	RNS	0.00067	mg/L	B
SW-846 6010	7440-50-8	Copper	RNS	0.0054	mg/L	B
E335.3, E335.4, SM4500-CN C,E	57-12-5	Cyanide	RNS	0.0066	mg/L	-
E335.3, E335.4, SM4500-CN C,E	57-12-5	Cyanide	RNS	0.0041	mg/L	B

Test Method Name	CAS	Analyte	Sample QC Code	Maximum	Result Unit	Lab Results Qualifier Code
SW-846 6010	7439-89-6	Iron	RNS	0.069	mg/L	B
SW-846 6010	7439-96-5	Manganese	RNS	0.031	mg/L	-
SW-846 6010	7439-96-5	Manganese	RNS	0.0034	mg/L	B
SW-846 6010	7439-97-6	Mercury	RNS	0.000017	mg/L	B
SW-846 8260	91-20-3	Naphthalene	TB	1	ug/L	J
SW8260B	91-20-3	Naphthalene	TB	1	ug/L	J
SW-846 6010	7440-02-0	Nickel	RNS	0.0059	mg/L	B
SW9056 OR E300.0	14797-55-8	Nitrate	RNS	0.21	mg/L	B
SW-846 6010	7440-24-6	Strontium	RNS	0.0013	mg/L	B
SW-846 6010	7440-31-5	Tin	RNS	0.0049	mg/L	B
GAMMA SPECTROSCOPY	15117-96-1	Uranium-235	RNS	0.193	pCi/g	-
GAMMA SPECTROSCOPY	7440-61-1	Uranium-238	RNS	2.21	pCi/g	-
SW-846 6010	7440-66-6	Zinc	RNS	0.021	mg/L	-

Sample Matrix Spike Evaluation

The frequency of MS measurements, relative to each laboratory batch, was adequate based on at least one MS per batch. The minimum and maximum MS results are summarized by chemical for the entire project in Table 9. 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. 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, so no action was taken.

Table 9
Sample Matrix Spike Evaluation

Test Method Name	CAS	Analyte	Minimum %REC	Maximum %REC	Number Samples	Number Lab Batches
SW-846 8260	71-55-6	1,1,1-Trichloroethane	78.32	99.36	6	6
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	64.46	99.13	6	6
SW-846 8260	79-00-5	1,1,2-Trichloroethane	76.7	98.22	6	6
SW-846 8260	75-34-3	1,1-Dichloroethane	87.09	98.57	6	6
SW-846 8260	75-35-4	1,1-Dichloroethene	82.32	88.15	6	6
SW-846 8260	71-55-6	1,1,1-Trichloroethane	78.32	99.36	6	6
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	64.46	99.13	6	6
SW-846 8260	79-00-5	1,1,2-Trichloroethane	76.7	98.22	6	6
SW-846 8260	75-34-3	1,1-Dichloroethane	87.09	98.57	6	6
SW-846 8260	75-35-4	1,1-Dichloroethene	82.32	88.15	6	6

Test Method Name	CAS	Analyte	Minimum %REC	Maximum %REC	Number Samples	Number Lab Batches
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	22.93	66.57	6	6
SW-846 8260	95-50-1	1,2-Dichlorobenzene	38.32	81.26	6	6
SW-846 8260	107-06-2	1,2-Dichloroethane	82.95	108.1	6	6
SW-846 8260	78-87-5	1,2-Dichloropropane	80.66	101.6	6	6
SW-846 8260	106-46-7	1,4-Dichlorobenzene	40	80.92	6	6
SW-846 8260	78-93-3	2-Butanone	96.15	140.4	6	6
SW-846 8260	108-10-1	4-Methyl-2-pentanone	62.39	94.8	6	6
SW-846 8260	67-64-1	Acetone	105.1	156.3	6	6
SW-846 8260	71-43-2	Benzene	79	96.24	6	6
SW-846 8260	75-27-4	Bromodichloromethane	74.37	96.8	6	6
SW-846 8260	75-25-2	Bromoform	61.04	103.4	6	6
SW-846 8260	74-83-9	Bromomethane	81.21	94.33	6	6
SW-846 8260	75-15-0	Carbon Disulfide	77.47	88.91	6	6
SW-846 8260	56-23-5	Carbon Tetrachloride	78.89	98.77	6	6
SW-846 8260	108-90-7	Chlorobenzene	63.65	97.87	6	6
SW-846 8260	75-00-3	Chloroethane	75.94	89.22	6	6
SW-846 8260	67-66-3	Chloroform	79.58	97.6	6	6
SW-846 8260	74-87-3	Chloromethane	90.47	120.7	6	6
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	86.65	125.8	6	6
SW9010B OR SW9012A	57-12-5	Cyanide	87	98	6	6
SW-846 8260	124-48-1	Dibromochloromethane	65.37	93.73	6	6
SW-846 8260	100-41-4	Ethylbenzene	67.46	93.62	6	6
SW-846 8260	87-68-3	Hexachlorobutadiene	27.58	68.09	6	6
SW-846 8260	75-09-2	Methylene chloride	82.82	93.91	6	6
SW-846 8260	91-20-3	Naphthalene	23.63	70.04	6	6
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	79	95	4	4
SW-846 8260	100-42-5	Styrene	58.37	91.16	6	6
SW-846 8260	127-18-4	Tetrachloroethene	67.09	86.7	6	6
SW-846 8260	108-88-3	Toluene	72.37	90.4	6	6
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	66.07	91.85	6	6
SW-846 8260	79-01-6	Trichloroethene	77.75	99.26	6	6
SW-846 8260	75-01-4	Vinyl chloride	74.21	97.3	6	6
SW-846 8260	1330-20-7	Xylene	66.52	86.76	6	6

4.1.4 Precision

Matrix Spike Duplicate Evaluation

Laboratory precision is measured through use of MSDs. Adequate frequency of MSD measurements is indicated by at least one MSD in each laboratory batch. Table 10 indicates that MSD frequencies were adequate. This analytes with the highest 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 relative percent differences (RPDs) appear to be high, they would not result in rejection of data that affects project decisions.

Table 10
Sample Matrix Spike Duplicate Evaluation

Test Method	CAS No.	Analyte	Number Sample Pairs	Number Laboratory Batches	Maximum RPD (%)
SW-846 8260	71-55-6	1,1,1-Trichloroethane	6	6	6.94
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	6	6	7.05
SW-846 8260	79-00-5	1,1,2-Trichloroethane	6	6	8.70
SW-846 8260	75-34-3	1,1-Dichloroethane	6	6	7.48
SW-846 8260	75-35-4	1,1-Dichloroethene	6	6	6.45
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	6	6	48.42
SW-846 8260	95-50-1	1,2-Dichlorobenzene	6	6	34.50
SW-846 8260	107-06-2	1,2-Dichloroethane	6	6	7.89
SW-846 8260	78-87-5	1,2-Dichloropropane	6	6	6.95
SW-846 8260	106-46-7	1,4-Dichlorobenzene	6	6	32.00
SW-846 8260	78-93-3	2-Butanone	6	6	10.97
SW-846 8260	108-10-1	4-Methyl-2-pentanone	6	6	7.47
SW-846 8260	67-64-1	Acetone	6	6	25.82
SW-846 8260	71-43-2	Benzene	6	6	8.61
SW-846 8260	75-27-4	Bromodichloromethane	6	6	8.59
SW-846 8260	75-25-2	Bromoform	6	6	19.96
SW-846 8260	74-83-9	Bromomethane	6	6	16.28
SW-846 8260	75-15-0	Carbon Disulfide	6	6	7.10
SW-846 8260	56-23-5	Carbon Tetrachloride	6	6	7.31
SW-846 8260	108-90-7	Chlorobenzene	6	6	11.34
SW-846 8260	75-00-3	Chloroethane	6	6	16.88
SW-846 8260	67-66-3	Chloroform	6	6	8.70
SW-846 8260	74-87-3	Chloromethane	6	6	15.04
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	6	6	12.11
SW9010B OR SW9012A	57-12-5	Cyanide	6	6	2.17
SW-846 8260	124-48-1	Dibromochloromethane	6	6	9.29
SW-846 8260	100-41-4	Ethylbenzene	6	6	11.88
SW-846 8260	87-68-3	Hexachlorobutadiene	6	6	29.63
SW-846 8260	75-09-2	Methylene chloride	6	6	8.34
SW-846 8260	91-20-3	Naphthalene	6	6	53.26
SW9056 OR E300.0 PREP E300.0	14797-55-8	Nitrate	4	4	5.59
SW-846 8260	100-42-5	Styrene	6	6	27.25
SW-846 8260	127-18-4	Tetrachloroethene	6	6	10.51
SW-846 8260	108-88-3	Toluene	6	6	9.11
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	6	6	11.52
SW-846 8260	79-01-6	Trichloroethene	6	6	8.53

Test Method	CAS No.	Analyte	Number Sample Pairs	Number Laboratory Batches	Maximum RPD (%)
SW-846 8260	75-01-4	Vinyl chloride	6	6	13.76
SW-846 8260	1330-20-7	Xylene	6	6	15.79

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 11 indicates that sampling frequencies were adequate except for radionuclides (alpha spectroscopy).

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 12) and the resulting number was compared to the AL. For this project, none of the corrected numbers were greater than the AL, so project decisions were not impacted.

With an RPD of 76 percent, copper was the only reported analyte to exceed the RPD threshold of 35 percent. The apparent analytical imprecision had no impact on project decisions given that copper values ranged up to 268 mg/kg, which is one-order of magnitude less than the WRW AL of 40,900 mg/kg.

Table 11
Field Duplicate Sample Frequency

Test Method	Sample Code	Number Samples	Collection Frequency (%)
ALPHA SPEC	REAL	6	0%
GAMMA SPECTROSCOPY	REAL	54	7%
GAMMA SPECTROSCOPY	DUP	4	
SW-846 6200	REAL	43	7%
SW-846 6200	DUP	3	
SW-846 8260	REAL	43	7%
SW-846 8260	DUP	3	
SW9010B OR SW9012A	REAL	43	7%
SW9010B OR SW9012A	DUP	3	
SW9056 OR E300.0 PREP E300.0	REAL	41	5%
SW9056 OR E300.0 PREP E300.0	DUP	2	

Table 12
Field Duplicate Results

Analyte	Max of Result RPD
Barium	11
Copper	76
Iron	4
Manganese	4
Nickel	0
Nitrate	4
Strontium	4
Zinc	13

Completeness

The required number of samples were collected in accordance with the approved IASAP Addendum #IA-03-01 (DOE, 2002a) and based on the consultative process. Based on this compliance, and an adequate percentage of validated sample results as explained below, the sample set is considered complete.

Twenty-five percent of the Environmental Restoration (ER) Program's analytical results are targeted for formal validation. 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 13 shows the number of validated records (codes without "1"), verified records (codes with "1"), and rejected records for each analytical group.

The Validation percentages given in Table 13 indicate that frequency goals were not attained for all analytical suites. However, these validation frequencies are within the ER Program validation goals. Visual spot checks on flags applied to radionuclide results, in hardcopy data packages, indicate at least a 50 percent frequency. As additional V&V information is received, IHSS Group 900-3 records will be updated in the SWD. Frequency of data qualification and inferences from it will also be assessed as part of the Comprehensive Risk Assessment.

4.1.5 Sensitivity

Reporting limits, in units of ug/kg for organics, mg/kg for metals, and pCi/g for radionuclides, were compared with RFCA WRW and Ecological Receptor ALs. Adequate sensitivities of analytical methods were attained for all COCs that affect project decisions. Adequate sensitivity is defined as a reporting limit less than an analyte's associated AL, typically less than one-half the AL.

4.1.6 Summary of Data Quality

Data quality is acceptable for project decisions based on the V&V criteria cited and with the qualifications given.

Table 13
Validation and Verification Summary

Qualifier Code	Number Records	Radionuclides	Metals-XRF (SW6200	VOCs (SW8260)	Cyanide (SW9010/9012)	Anions (SW9056/E300)
No V&V	54	54	0	0	0	0
1	108	108	0	0	0	0
J	10	0	10	0	0	0
J1	75	0	62	3	0	10
R1	2	0	0	0	0	2
U1	1	0	0	1	0	0
V	364	54	96	214	0	0
V1	2015	138	589	1266	22	0
JB1	20	0	0	20	0	0
UJ	4	0	2	2	0	0
UJ1	109	0	15	42	21	31
Total	2762	354	774	1548	43	43
Validated	378	54	108	216	0	0
% Validated	13.69%	15.25%	13.95%	13.95%	0.00%	0.00%
Verified	2330	246	77	66	21	43
% Verified	84.36%	69.49%	9.95%	4.26%	48.84%	100.00%
% Rejected	2	0	0.00%	0.00%	0.00%	4.65%

Key:
1,V1 – Verified
J, J1 - Estimated
UJ1 - Estimated detection limit
V – Validated
R, R1 - Rejected

5.0 REFERENCES

DOE, 1992-2001, Historical Release Reports for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

DOE, 1999, Order 414.1A, Quality Assurance.

DOE, 2000, Rocky Flats Cleanup Agreement (RFCA), Attachment 5, March.

DOE, 2001a, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002a. Industrial Area Sampling and Analysis Plan, FY03 Addendum #IA-03-01, IHSS Groups 300-3, 300-4, 400-8, 700-4, 800-1, and 900-3, Final.

DOE, 2002b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, CDPHE, EPA, 2003, Proposed RFCA Modifications, U.S. Department of Energy, Colorado Department of Public Health and Environment, and U.S. Environmental Protection Agency, Rocky Flats Environmental Technology Site, November.

EPA QA/G-4, 1994a, Guidance for the Data Quality Objective Process.

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.

EPA QA/G-9, 1998, Guidance for the Data Quality Assessment Process; Practical Methods for Data Analysis.

Kaiser-Hill (K-H), 2002a, General Guidelines for Data Verification and Validation, DA-GR01-v1, December.

K-H, 2002b, V&V Guidelines for Isotopic Determinations by Alpha Spectrometry, DARC01-v1, February.

Rockwell International, 1989, Interim Status Closure Plan, Solid Waste Management Unit 15 – Storage Pad 904, September.