NOTICE

All drawings located at the end of the document.

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Draft Data Summary Report for IHSS Group 600-3, IHSS 600-120.1 (Fiberglass Area North of Building 664)

• Environmental Restoration •
Rocky Flats Environmental Technology Site

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Draft Data Summary Report for IHSS Group 600-3, IHSS 600-120.1 (Fiberglass Area North of Building 664)

April 2004

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Draft Data Summary Report for IHSS Group 600-3, IHSS 600-120.1 (Fiberglass Area North of Building 664)

Approval received from the Colorado Department of Public Health and Environment
(_____)
Approval letter contained in the Administrative Record

April 2004

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Enclosure

Compact disc containing normalized real and quality control data

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ACRONYMS

AAESE	Accelerated Action Ecological Screening Evaluation
AL	action level
AR	Administrative Record
ASD	Analytical Services Division
CAS	Chemical Abstract Service
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm^2	square centimeter
COC	contaminant of concern
CRA	Comprehensive Risk Assessment
DOE	U S Department of Energy
dpm	disintegrations per minute
DQA	Data Quality Assessment
DQO	data quality objective
EPA	U S Environmental Protection Agency
ER	Environmental Restoration
ER RSOP	Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation
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
IMP	Integrated Monitoring Program
K-H	Kaiser-Hill Company, L L C
LCS	laboratory control sample
µg/kg	micrograms per kilogram (may be found as ug/kg)
µg/L	micrograms per liter (may be found as ug/L)
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
NA or N/A	not applicable
NFAA	No Further Accelerated Action
NLR	no longer representative
OPWL	Original Process Waste Line
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
pCi/g	picocuries per gram
PDSR	Pre-Demolition Survey Report
POE	Point of Evaluation
ppm	parts per million

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QC	quality control
RFCA	Rocky Flats Cleanup Agreement
RFETS or Site	Rocky Flats Environmental Technology Site
RIN	report identification number
RL	reporting limit
RPD	relative percent difference
RSOP	RFCA Standard Operating Protocol
SAP	Sampling and Analysis Plan
SOR	sum of ratios
SSRS	Subsurface Soil Risk Screen
SVOC	semivolatile organic compound
SWD	Soil Water Database
V&V	verification and validation
VOC	volatile organic compound
WRW	wildlife refuge worker

1.0 INTRODUCTION

This Data Summary Report summarizes accelerated action characterization data collection activities conducted at Individual Hazardous Substance Site (IHSS) Group 600-3 at the Rocky Flats Environmental Technology Site (RFETS or Site) in Golden, Colorado Activities were planned and executed in accordance with the Industrial Area (IA) Sampling and Analysis Plan (SAP) (IASAP) (DOE 2001) and IASAP Addendum #IA-04-05 (DOE 2003a)

IHSS Group 600-3 results are compared to wildlife refuge worker (WRW) action levels (ALs) described in the Rocky Flats Cleanup Agreement (RFCA) Modification (DOE et al 2003) Ecological effects will be evaluated in the Accelerated Action Ecological Screening Evaluation (AAESE) and the ecological risk assessment portion of the Sitewide Comprehensive Risk Assessment (CRA)

Approval of this Data Summary Report constitutes regulatory agency concurrence that IHSS Group 600-3 is a No Further Accelerated Action (NFAA) Site This information and NFAA determination will be documented in the Fiscal Year (FY) 04 Historical Release Report (HRR)

2.0 SITE CHARACTERIZATION

IHSS Group 600-3 consists of IHSS 600-120 1, the Fiberglass Area North of Building 664, which also includes Building 668 The general location of IHSS Group 600-3 is shown on Figure 1, and a detailed location for IHSS 600-120 1 is shown on Figure 2

IHSS Group 600-3 information consists of historical knowledge (DOE 1992-2003), previously collected analytical data (DOE 2000), a Pre-Demolition Survey Report (PDSR) (DOE 2003b), and soil disturbance data collected from one location Historical information and existing characterization data are summarized in Section 2 1 Characterization data collected in accordance with IASAP Addendum #IA-04-05 are summarized in Section 2 2 Existing sampling locations and results greater than background means plus two standard deviations or method detection limits (MDLs) are presented on Figure 3

2.1 Existing Data

IHSS Group 600-3 and IHSS 600-120 1 consist of the area beneath and around Building 668 where waste packing boxes were coated with fiberglass Building 668 was a wooden framed structure with deteriorating walls constructed of transite panels over a single concrete slab The structure and slab were removed by Kaiser-Hill Company, L L C (K-H) in January 2004 Fiberglass activities occurred in the area from 1972 to 1979 The fiberglass process may have resulted in spills of polyester resin, peroxide catalyst materials, and cleaning solvents, although no documentation of spills was indicated in the HRR research (DOE 1992-2003)

The PDSR results indicated fixed plutonium-239/240 was present (a maximum of 148 disintegrations per minute [dpm] per 100 square centimeters [cm^2]) on the slab along the western side of the building (Figure 3) (DOE 2003b)

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The PDSR results also indicated that the semivolatile organic compound (SVOC) hexachlorobenzene (3 8 parts per million [ppm]) was present in a concrete core collected in the northwestern corner of slab (Figure 3) (DOE 2003b)

On September 19, 2003, a surface soil sample was collected in support of the soil disturbance process just west of the middle part of the Building 668 slab (Figure 3), and adjacent to an area on the slab with fixed plutonium contamination This sample was in addition to those collected as part of IASAP Addendum #IA-04-05 Gamma spectroscopy analytical results indicated the following (detections only) uranium-238 = 2 318 picocuries per gram (pCi/g), derived uranium-234 = 2 318 pCi/g, and derived total uranium = 6 884 pCi/g Results were above background means plus two standard deviations but below RFCA ALs

2.2 Characterization Data

Characterization sampling locations and deviations from the planned sampling locations, as described in IASAP Addendum #IA-04-05 (DOE 2003a), are presented in Table 1 A sampling summary is provided in Table 2 All accelerated action analytical results greater than background means plus two standard deviations or reporting limits (RLs) are presented in Table 3 Two files containing real and quality control (QC) data for the project are included on the enclosed compact disc These files contain normalized data (Chemical Abstracts Service [CAS] numbers, analyte names, and units have been normalized, and plutonium and uranium estimated values from high-purity germanium [HPGe] analyses have been added)

The sampling specification table (Table 3) from IASAP FY04 Addendum #IA-04-05 indicates that a volatile organic compound (VOC) sample was to be collected from surface soil at statistical location number BZ36-027 (DOE 2003a) (This location is shown on Figures 4 and 5 of this report) Collection of this sample was inadvertently missed This was the only surface VOC sample proposed in the SAP because it was the only location beneath the slab at Building 668 The rest of the BZ36-027 surface sample suite (radionuclides, metals, and SVOCs) were collected on January 20, 2004

In consultation with the Colorado Department of Public Health and Environment (CDPHE), it was decided that returning to location BZ36-027 to collect this surface VOC sample, on or after February 25, 2004, would not be required for the following reasons (see Contact Record for February 26, 2004, in Appendix A)

- The time between exposure of location BZ36-027 to the atmosphere and sampling for VOCs would be at least one month VOCs that might have been present at this location could have volatilized during this time

- Soil disturbance at the site during Building 668 slab removal would have further accentuated volatilization of any potential VOCs from location BZ36-027

- All subsurface soil (0 5 to 1 5 feet [ft]) VOC concentrations for the sample collected at location BZ36-027 on January 20, 2004, were nondetections

- Subsurface soil VOC results for the other seven accelerated action locations at IHSS Group 600-3 were also nondetections or estimated values near RLs

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Table 1
IHSS Group 600-3 Characterization Sampling Deviations

Location	Proposed Easting	Proposed Northing	Actual Easting	Actual Northing	Actual Media	Actual Depth Interval (ft)	Actual Analytes	Type/Comments
BZ35-012-01	2082716 355	748541 740	2082716 398	748541 709	Surface Soil	0-0 5	Radionuclides, Metals, SVOCs	Statistical, location and depth as proposed
BZ35-012-01	2082716 355	748541 740	2082716 398	748541 709	Subsurface Soil	0 5-1 5	Radionuclides, Metals, VOCs, SVOCs	Statistical, location as proposed, interval shortened due to refusal
BZ35-013-01	2082714 978	748558 861	2082714 964	748558 810	Surface Soil	0-0 5	Radionuclides, Metals, SVOCs	Biased, targeted fixed radioactive contamination on the slab, location and depth as proposed
BZ35-013-01	2082714 978	748558 861	2082714 964	748558 810	Subsurface Soil	0 5-1 5	Radionuclides, Metals, VOCs, SVOCs	Biased, targeted fixed radioactive contamination on the slab, location as proposed, interval shortened due to refusal
BZ35-014-01	2082734 249	748528 783	2082734 213	748528 763	Surface Soil	0-0 5	Radionuclides, Metals, SVOCs	Biased, targeted south side of slab, location and depth as proposed
BZ35-014-01	2082734 249	748528 783	2082734 213	748528 763	Subsurface Soil	0 5-1 5	Radionuclides, Metals, VOCs, SVOCs	Biased, targeted south side of slab, location as proposed, interval shortened due to refusal
BZ36-027	2082728 872	748575 494	2082728 921	748575 503	Surface Soil	0-0 5	Radionuclides, Metals, SVOCs	Statistical, location and depth as proposed, VOC sample inadvertently not collected, decision made not to return (see Contact Report 2/25/04)
BZ36-027	2082728 872	748575 494	2082728 921	748575 503	Subsurface Soil	0 5-1 5	Radionuclides, Metals, VOCs, SVOCs	Statistical, location as proposed, interval shortened due to refusal
BZ36-028	2082733 467	748587 376	2082734 286	748594 299	Surface Soil	0-0 5	Radionuclides, Metals, SVOCs	Biased, targeted north side of slab, location and depth as proposed

Location	Proposed Easting	Proposed Northing	Actual Easting	Actual Northing	Actual Media	Actual Depth Interval (ft)	Actual Analytes	Type/Comments
BZ36-028	2082733 467	748587 376	2082734 286	748594 299	Subsurface Soil	0 5-1 5	Radionuclides, Metals, VOCs, SVOCs	Biased, targeted north side of slab, location as proposed, interval shortened due to refusal
BZ36-029	2082716 410	748579 824	2082714 640	748578 810	Surface Soil	0-0 5	Radionuclides, Metals, SVOCs	Biased, targeted fixed radioactive contamination on the slab, depth as proposed, location moved 1 7 ft west and 1 ft south away from slope leading into excavation
BZ36-029	2082716 410	748579 824	2082714 640	748578 810	Subsurface Soil	0 5-1 5	Radionuclides, Metals, VOCs, SVOCs	Biased, targeted fixed radioactive contamination on the slab, location moved 1 7 ft west and 1 ft south away from slope leading into excavation, interval shortened due to refusal
CA35-007	2082751 845	748547 777	2082751 869	748547 745	Subsurface Soil	0 33-0 83	Radionuclides, Metals, SVOCs	Statistical, location as proposed, interval modified to begin below asphalt
CA35-007	2082751 845	748547 777	2082751 869	748547 745	Subsurface Soil	0 83-1 83	Radionuclides, Metals, VOCs, SVOCs	Statistical, location as proposed, interval adjusted for asphalt and shortened due to refusal
CA36-031	2082741 389	748609 248	2082737 396	748609 204	Surface Soil	0-0 5	Radionuclides, Metals, SVOCs	Statistical, depth as proposed, location moved 4 ft west to clear conex
CA36-031	2082741 389	748609 248	2082737 396	748609 204	Subsurface Soil	0 5-2 1	Radionuclides, Metals, VOCs, SVOCs	Statistical, location moved 4 ft west to clear conex, interval shortened - no recovery 2 1-2 5 ft

Table 2
IHSS Group 600-3 Actual Sampling and Analysis Summary

Criteria	Number
Number of Sampling Locations	8
Number of Samples	16 (7 surface, 9 subsurface)
Number of Radionuclide Analyses	20 (2 surface alpha spectroscopy, 2 subsurface alpha spectroscopy, 7 surface gamma spectroscopy, 9 subsurface gamma spectroscopy)
Number of Metal Analyses	16 (7 surface, 9 subsurface)
Number of SVOC Analyses	16 (7 surface, 9 subsurface)
Number of VOC Analyses	8 (8 subsurface, 1 missed at surface)

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Table 3
IHSS Group 600-3 Results Greater Than Background Means Plus Two Standard Deviations or Reporting Limits

Location	Actual Easting	Actual Northing	Analyte	Result	RL	WRW AL	Background Mean + 2 Standard Deviations	Unit	Start Depth	End Depth
BZ35-012-01	2082716 40	748541 71	Benzo(a)anthracene	83	26	34900	NA	ug/kg	0	0 5
BZ35-012-01	2082716 40	748541 71	Benzo(a)pyrene	85	43	3490	NA	ug/kg	0	0 5
BZ35-012-01	2082716 40	748541 71	Benzo(b)fluoranthene	58	31	34900	NA	ug/kg	0	0 5
BZ35-012-01	2082716 40	748541 71	Benzo(k)fluoranthene	110	34	349000	NA	ug/kg	0	0 5
BZ35-012-01	2082716 40	748541 71	Chrysene	100	30	3490000	NA	ug/kg	0	0 5
BZ35-012-01	2082716 40	748541 71	Fluoranthene	190	24	27200000	NA	ug/kg	0	0 5
BZ35-012-01	2082716 40	748541 71	Indeno(1,2,3-cd)pyrene	60	24	34900	NA	ug/kg	0	0 5
BZ35-012-01	2082716 40	748541 71	Pyrene	230	140	22100000	NA	ug/kg	0	0 5
BZ35-012-01	2082716 40	748541 71	Uranium-235	0 212	0 134	8	0 094	pCi/g	0	0 5
BZ35-012-01	2082716 40	748541 71	Uranium-238	2 166	1 576	351	2	pCi/g	0	0 5
BZ35-012-01	2082716 40	748541 71	Benzo(a)anthracene	60	26	34900	NA	ug/kg	0 5	1 5
BZ35-012-01	2082716 40	748541 71	Benzo(a)pyrene	56	43	3490	NA	ug/kg	0 5	1 5
BZ35-012-01	2082716 40	748541 71	Benzo(b)fluoranthene	55	31	34900	NA	ug/kg	0 5	1 5
BZ35-012-01	2082716 40	748541 71	Benzo(k)fluoranthene	60	34	349000	NA	ug/kg	0 5	1 5
BZ35-012-01	2082716 40	748541 71	Chrysene	74	30	3490000	NA	ug/kg	0 5	1 5
BZ35-012-01	2082716 40	748541 71	Fluoranthene	140	24	27200000	NA	ug/kg	0 5	1 5
BZ35-012-01	2082716 40	748541 71	Pyrene	150	140	22100000	NA	ug/kg	0 5	1 5
BZ35-012-01	2082716 40	748541 71	Uranium-235	0 173	0 132	8	0 12	pCi/g	0 5	1 5
BZ35-012-01	2082716 40	748541 71	Uranium-238	1 926	1 404	351	1 49	pCi/g	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Acenaphthene	130	32	40800000	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Anthracene	120	25	204000000	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Benzo(a)anthracene	390	26	34900	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Benzo(a)pyrene	430	42	3490	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Benzo(b)fluoranthene	310	30	34900	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Benzo(k)fluoranthene	420	33	349000	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	bis(2-Ethylhexyl)phthalate	180	75	1970000	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Chrysene	490	29	3490000	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Dibenz(a,h)anthracene	140	26	3490	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Dimethylphthalate	460	42	1000000000	NA	ug/kg	0	0 5

Location	Actual Easting	Actual Northing	Analyte	Result	RL	WRW AL	Background Mean + 2 Standard Deviations	Unit	Start Depth	End Depth
BZ35-013-01	2082714 96	748558 81	Fluoranthene	1000	24	27200000	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Fluorene	81	35	40800000	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Hexachlorobenzene	290	38	17200	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Indeno(1,2,3-cd)pyrene	280	24	34900	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Pyrene	850	140	22100000	NA	ug/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Zinc	79	0 45	307000	73 76	mg/kg	0	0 5
BZ35-013-01	2082714 96	748558 81	Acetone	18	5	102000000	NA	ug/kg	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Benzo(a)anthracene	98	26	34900	NA	ug/kg	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Benzo(a)pyrene	110	42	3490	NA	ug/kg	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Benzo(b)fluoranthene	92	30	34900	NA	ug/kg	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Benzo(k)fluoranthene	99	34	349000	NA	ug/kg	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Chrysene	130	29	3490000	NA	ug/kg	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Fluoranthene	220	24	27200000	NA	ug/kg	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Indeno(1,2,3-cd)pyrene	68	24	34900	NA	ug/kg	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Methylene chloride	1 7	0 87	2530000	NA	ug/kg	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Plutonium-239/240	0 126	0 076	50	0 02	pCi/g	0 5	1 5
BZ35-013-01	2082714 96	748558 81	Pyrene	240	140	22100000	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Acenaphthene	38	32	40800000	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Anthracene	39	25	204000000	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Benzo(a)anthracene	150	26	34900	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Benzo(a)pyrene	170	42	3490	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Benzo(b)fluoranthene	170	30	34900	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Benzo(k)fluoranthene	170	33	349000	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Chrysene	200	29	3490000	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Dimethylphthalate	130	42	1000000000	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Fluoranthene	330	24	27200000	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Hexachlorobenzene	110	38	17200	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Indeno(1,2,3-cd)pyrene	120	24	34900	NA	ug/kg	0	0 5
BZ35-014-01	2082734 21	748528 76	Pyrene	380	140	22100000	NA	ug/kg	0	0 5
BZ35-014-01	*2082734 21*	*748528 76*	*Uranium-234*	*2 665*	*1 622*	*300*	*2 253*	*pCi/g*	*0*	*0 5*
BZ35-014-01	2082734 21	748528 76	Uranium-238	2 665	1 622	351	2	pCi/g	0	0 5
BZ35-014-01	2082734 21	748528 76	Zinc	80	0 45	307000	73 76	mg/kg	0	0 5

Location	Actual Easting	Actual Northing	Analyte	Result	RL	WRW AL	Background Mean + 2 Standard Deviations	Unit	Start Depth	End Depth
BZ35-014-01	2082734 21	748528 76	Acenaphthene	42	32	40800000	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Anthracene	41	24	204000000	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Benzo(a)anthracene	110	26	34900	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Benzo(a)pyrene	140	42	3490	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Benzo(b)fluoranthene	110	30	34900	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Benzo(k)fluoranthene	150	33	349000	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Chrysene	150	29	3490000	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Fluoranthene	280	23	27200000	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Indeno(1,2,3-cd)pyrene	79	23	34900	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Pyrene	310	140	22100000	NA	ug/kg	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Uranium-235	0 177	0 143	8	0 12	pCi/g	0 5	1 5
BZ35-014-01	2082734 21	748528 76	Uranium-238	2 07	1 433	351	1 49	pCi/g	0 5	1 5
BZ36-027	*2082728 92*	*748575 50*	*Uranium-234*	*4 522*	*1 841*	*300*	*2 253*	*pCi/g*	*0*	*0 5*
BZ36-027	2082728 92	748575 50	Uranium-235	0 255	0 131	8	0 094	pCi/g	0	0 5
BZ36-027	2082728 92	748575 50	Uranium-238	4 522	1 841	351	2	pCi/g	0	0 5
BZ36-027	*2082728 92*	*748575 50*	*Uranium-234*	*3 758*	*2 167*	*300*	*2 64*	*pCi/g*	*0 5*	*1 5*
BZ36-027	2082728 92	748575 50	Uranium-235	0 215	0 15	8	0 12	pCi/g	0 5	1 5
BZ36-027	2082728 92	748575 50	Uranium-238	3 758	2 167	351	1 49	pCi/g	0 5	1 5
BZ36-028	2082734 29	748594 30	bis(2-Ethylhexyl)phthalate	89	79	1970000	NA	ug/kg	0	0 5
BZ36-028	2082734 29	748594 30	Dimethylphthalate	380	44	1000000000	NA	ug/kg	0	0 5
BZ36-028	2082734 29	748594 30	Hexachlorobenzene	290	39	17200	NA	ug/kg	0	0 5
BZ36-028	2082734 29	748594 30	Acenaphthene	37	33	40800000	NA	ug/kg	0 5	1 5
BZ36-028	2082734 29	748594 30	Benzo(a)anthracene	120	26	34900	NA	ug/kg	0 5	1 5
BZ36-028	2082734 29	748594 30	Benzo(a)pyrene	150	43	3490	NA	ug/kg	0 5	1 5
BZ36-028	2082734 29	748594 30	Benzo(b)fluoranthene	130	31	34900	NA	ug/kg	0 5	1 5
BZ36-028	2082734 29	748594 30	Benzo(k)fluoranthene	140	34	349000	NA	ug/kg	0 5	1 5
BZ36-028	2082734 29	748594 30	Chrysene	170	30	3490000	NA	ug/kg	0 5	1 5
BZ36-028	2082734 29	748594 30	Fluoranthene	270	24	27200000	NA	ug/kg	0 5	1 5
BZ36-028	2082734 29	748594 30	Hexachlorobenzene	200	38	17200	NA	ug/kg	0 5	1 5
BZ36-028	2082734 29	748594 30	Indeno(1,2,3-cd)pyrene	86	24	34900	NA	ug/kg	0 5	1 5
BZ36-028	2082734 29	748594 30	Pyrene	320	140	22100000	NA	ug/kg	0 5	1 5
BZ36-028	2082734 29	748594 30	Uranium-235	0 195	0 136	8	0 12	pCi/g	0 5	1 5

Location	Actual Easting	Actual Northing	Analyte	Result	RL	WRW AL	Background Mean + 2 Standard Deviations	Unit	Start Depth	End Depth
BZ36-028	2082734 29	748594 30	Uranium-238	2 493	1 446	351	1 49	pCi/g	0 5	1 5
BZ36-029	2082714 64	748578 81	Benzo(a)anthracene	58	26	34900	NA	ug/kg	0	0 5
BZ36-029	2082714 64	748578 81	Benzo(a)pyrene	62	42	3490	NA	ug/kg	0	0 5
BZ36-029	2082714 64	748578 81	Benzo(b)fluoranthene	40	30	34900	NA	ug/kg	0	0 5
BZ36-029	2082714 64	748578 81	Benzo(k)fluoranthene	71	33	349000	NA	ug/kg	0	0 5
BZ36-029	2082714 64	748578 81	Chrysene	74	29	3490000	NA	ug/kg	0	0 5
BZ36-029	2082714 64	748578 81	Fluoranthene	140	24	27200000	NA	ug/kg	0	0 5
BZ36-029	2082714 64	748578 81	Pyrene	140	140	22100000	NA	ug/kg	0	0 5
BZ36-029	*2082714 64*	*748578 81*	*Uranium-234*	*4 7*	*2 088*	*300*	*2 253*	*pCi/g*	*0*	*0 5*
BZ36-029	2082714 64	748578 81	Uranium-235	0 225	0 154	8	0 094	pCi/g	0	0 5
BZ36-029	2082714 64	748578 81	Uranium-238	4 7	2 088	351	2	pCi/g	0	0 5
BZ36-029	2082714 64	748578 81	Acenaphthene	120	33	40800000	NA	ug/kg	0 5	1 5
BZ36-029	2082714 64	748578 81	Anthracene	110	25	204000000	NA	ug/kg	0 5	1 5
BZ36-029	2082714 64	748578 81	Benzo(a)anthracene	330	26	34900	NA	ug/kg	0 5	1 5
BZ36-029	2082714 64	748578 81	Benzo(a)pyrene	390	42	3490	NA	ug/kg	0 5	1 5
BZ36-029	2082714 64	748578 81	Benzo(b)fluoranthene	340	30	34900	NA	ug/kg	0 5	1 5
BZ36-029	2082714 64	748578 81	Benzo(k)fluoranthene	370	34	349000	NA	ug/kg	0 5	1 5
BZ36-029	2082714 64	748578 81	Chrysene	440	29	3490000	NA	ug/kg	0 5	1 5
BZ36-029	2082714 64	748578 81	Fluoranthene	890	24	27200000	NA	ug/kg	0 5	1 5
BZ36-029	2082714 64	748578 81	Fluorene	82	36	40800000	NA	ug/kg	0 5	1 5
BZ36-029	2082714 64	748578 81	Indeno(1,2,3-cd)pyrene	230	24	34900	NA	ug/kg	0 5	1 5
BZ36-029	2082714 64	748578 81	Pyrene	890	140	22100000	NA	ug/kg	0 5	1 5
BZ36-029	*2082714 64*	*748578 81*	*Uranium-234*	*3 607*	*1 98*	*300*	*2 64*	*pCi/g*	*0 5*	*1 5*
BZ36-029	2082714 64	748578 81	Uranium-235	0 18	0 139	8	0 12	pCi/g	0 5	1 5
BZ36-029	2082714 64	748578 81	Uranium-238	3 607	1 98	351	1 49	pCi/g	0 5	1 5
CA35-007	2082751 87	748547 75	bis(2-Ethylhexyl)phthalate	200	76	1970000	NA	ug/kg	0 33	0 83
CA35-007	2082751 87	748547 75	Dimethylphthalate	460	42	1000000000	NA	ug/kg	0 33	0 83
CA35-007	2082751 87	748547 75	Hexachlorobenzene	260	38	17200	NA	ug/kg	0 33	0 83
CA35-007	*2082751 87*	*748547 75*	*Uranium-234*	*4 208*	*1 833*	*300*	*2 64*	*pCi/g*	*0 33*	*0 83*
CA35-007	2082751 87	748547 75	Uranium-235	0 203	0 14	8	0 12	pCi/g	0 33	0 83
CA35-007	2082751 87	748547 75	Uranium-238	4 208	1 833	351	1 49	pCi/g	0 33	0 83
CA35-007	2082751 87	748547 75	Dimethylphthalate	89	42	1000000000	NA	ug/kg	0 83	1 83

Location	Actual Easting	Actual Northing	Analyte	Result	RL	WRW AL	Background Mean + 2 Standard Deviations	Unit	Start Depth	End Depth
CA35-007	*2082751 87*	*748547 75*	*Uranium-234*	*4 367*	*2 244*	*300*	*2 64*	*pCi/g*	*0 83*	*1 83*
CA35-007	2082751 87	748547 75	Uranium-235	0 206	0 16	8	0 12	pCi/g	0 83	1 83
CA35-007	2082751 87	748547 75	Uranium-238	4 367	2 244	351	1 49	pCi/g	0 83	1 83
CA36-031	2082737 40	748609 20	Acenaphthene	45	32	40800000	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Anthracene	39	24	204000000	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Benzo(a)anthracene	120	25	34900	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Benzo(a)pyrene	130	41	3490	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Benzo(b)fluoranthene	120	29	34900	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Benzo(k)fluoranthene	120	33	349000	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Chrysene	150	28	3490000	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Copper	19	0 044	40900	18 06	mg/kg	0	0 5
CA36-031	2082737 40	748609 20	Dimethylphthalate	130	41	1000000000	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Fluoranthene	260	23	27200000	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Hexachlorobenzene	380	37	17200	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Indeno(1,2,3-cd)pyrene	90	23	34900	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Iron	19000	1 4	307000	18037	mg/kg	0	0 5
CA36-031	2082737 40	748609 20	Manganese	400	0 17	3480	365 08	mg/kg	0	0 5
CA36-031	2082737 40	748609 20	Pyrene	290	140	22100000	NA	ug/kg	0	0 5
CA36-031	2082737 40	748609 20	Acetone	7	5 3	102000000	NA	ug/kg	0 5	2 1
CA36-031	2082737 40	748609 20	Benzo(a)anthracene	54	28	34900	NA	ug/kg	0 5	2 1
CA36-031	2082737 40	748609 20	Benzo(a)pyrene	61	45	3490	NA	ug/kg	0 5	2 1
CA36-031	2082737 40	748609 20	Benzo(b)fluoranthene	62	32	34900	NA	ug/kg	0 5	2 1
CA36-031	2082737 40	748609 20	Benzo(k)fluoranthene	53	36	349000	NA	ug/kg	0 5	2 1
CA36-031	2082737 40	748609 20	Chrysene	64	31	3490000	NA	ug/kg	0 5	2 1
CA36-031	2082737 40	748609 20	Fluoranthene	110	25	27200000	NA	ug/kg	0 5	2 1
CA36-031	2082737 40	748609 20	Hexachlorobenzene	170	41	17200	NA	ug/kg	0 5	2 1
CA36-031	2082737 40	748609 20	Methylene chloride	1 3	0 93	2530000	NA	ug/kg	0 5	2 1
CA36-031	2082737 40	748609 20	Plutonium-239/240	0 091	0 069	50	0 02	pCi/g	0 5	2 1

µg/kg = micrograms per kilogram (usually appears as ug/kg) mg/kg = milligrams per kilogram pCi/g = picocuries per gram NA = not applicable
Italic type indicates result derived by calculation based on another analysis

Figure 4 shows accelerated action surface soil sampling locations and analytical results greater than background means plus two standard deviations or RLs Figure 5 presents accelerated action subsurface soil results greater than background means plus two standard deviations or RLs There were no surface or subsurface WRW AL exceedances

Plutonium-239/240 and hexachlorobenzene, discussed in the PDSR (Figure 3), were also detected during accelerated action sampling at concentrations greater than background means plus two standard deviations or RLs but not greater than ALs (Figures 4 and 5)

Note that on Figure 3 the position of the conexes north of the Building 668 slab is the same as that shown in IASAP FY04 Addendum #IA-04-05 (DOE 2003a) and Environmental Restoration (ER) RFCA Standard Operating Protocol (RSOP) for Routine Soil Remediation (ER RSOP) Notification #04-01 (DOE 2003c) On Figures 2, 4, and 5 here, the locations of the two westernmost conexes have been updated to reflect their current position These two conexes were moved to provide better access to proposed sampling location CA36-031, making implementation of the action described in the January 12, 2004, Contact Record unnecessary (see Appendix A)

2.3 Analytical Results

Analytical results indicate there were no exceedances of the WRW ALs

2.4 Sums of Ratios

RFCA sums of ratios (SORs) were calculated for IHSS Group 600-3 sampling locations based on the accelerated action analytical data for the contaminants of concern (COCs) Radionuclide SORs included americium-241, plutonium-239/240, uranium-234, uranium-235, and uranium-238 when results were greater than background means plus two standard deviations Plutonium-239/240 activities were derived from americium-241 activities (that is, plutonium-239/240 activity = americium-241 gamma spectroscopy activity x 5 7) where HPGe detection was used for analysis Table 4 presents the radionuclide SORs for surface and subsurface soil All SORs for radionuclides in surface and subsurface soil were less than one

Table 4
RFCA SORs Based on IHSS Group 600-3 Radionuclide Activities

Location	Latitude	Longitude	Start Depth (ft)	End Depth (ft)	SORs to WRW AL
BZ35-012-01	748541 709	2082716 398	0	0 5	0 033
BZ35-012-01	748541 709	2082716 398	0 5	1 5	0 027
BZ35-013-01	748558 810	2082714 964	0 5	1 5	0 001
BZ35-014-01	748528 763	2082734 213	0	0 5	0 016
BZ35-014-01	748528 763	2082734 213	0 5	1 5	0 028
BZ36-027	748575 503	2082728 921	0	0 5	0 060
BZ36-027	748575 503	2082728 921	0 5	1 5	0 050
BZ36-028	748594 299	2082734 286	0 5	1 5	0 032
BZ36-029	748578 810	2082714 640	0	0 5	0 057
BZ36-029	748578 810	2082714 640	0 5	1 5	0 045
CA35-007	748547 745	2082751 869	0 33	0 83	0 051

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Location	Latitude	Longitude	Start Depth (ft)	End Depth (ft)	SORs to WRW AL
CA35-007	748547 745	2082751 869	0 83	1 83	0 053
CA36-031	748609 204	2082737 396	0 5	2 1	0 001

Because all nonradionuclide analytical results were less than 10 percent of their WRW ALs, the nonradionuclide SOR calculation was not performed

2.5 Summary Statistics

Tables 5 and 6 provide summary statistics calculated by analyte for IHSS Group 600-3 surface and subsurface soil sampling locations, respectively Inclusion in these tables implies that an analyte has a WRW AL, was detected, and, in the case of metals and radionuclides, that the detection was greater than background means plus two standard deviations

Table 5
Surface Soil Summary Statistics

Analyte	Number of Samples	Detection Frequency	Mean	Maximum	WRW AL	Background Mean + 2 Standard Deviations	Unit
Acenaphthene	7	42 86%	71	130	40800000	NA	ug/kg
Anthracene	7	42 86%	66	120	204000000	NA	ug/kg
Benzo(a)anthracene	7	71 43%	160 2	390	34900	NA	ug/kg
Benzo(a)pyrene	7	71 43%	175 4	430	3490	NA	ug/kg
Benzo(b)fluoranthene	7	71 43%	139 6	310	34900	NA	ug/kg
Benzo(k)fluoranthene	7	71 43%	178 2	420	349000	NA	ug/kg
bis(2-Ethylhexyl)phthalate	7	28 57%	134 5	180	1970000	NA	ug/kg
Chrysene	7	71 43%	202 8	490	3490000	NA	ug/kg
Copper	7	14 29%	19	19	40900	18 06	mg/kg
Dibenz(a,h)anthracene	7	14 29%	140	140	3490	NA	ug/kg
Dimethylphthalate	7	57 14%	275	460	1000000000	NA	ug/kg
Fluoranthene	7	71 43%	384	1000	27200000	NA	ug/kg
Fluorene	7	14 29%	81	81	40800000	NA	ug/kg
Hexachlorobenzene	7	57 14%	267 5	380	17200	NA	ug/kg
Indeno(1,2,3-cd)pyrene	7	57 14%	137 5	280	34900	NA	ug/kg
Iron	7	14 29%	19000	19000	307000	18037	mg/kg
Manganese	7	14 29%	400	400	3480	365 08	mg/kg
Pyrene	7	71 43%	378	850	22100000	NA	ug/kg
Uranium-234	*7*	*42 86%*	*3 962*	*4 7*	*300*	*2 253*	*pCi/g*
Uranium-235	7	42 86%	0 231	0 255	8	0 094	pCi/g
Uranium-238	7	57 14%	3 513	4 7	351	2	pCi/g
Zinc	7	28 57%	79 5	80	307000	73 76	mg/kg

Italic type indicates result derived by calculation based on other analyses

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Table 6
Subsurface Soil Summary Statistics

Analyte	Number of Samples	Detection Frequency	Mean	Maximum	WRW AL	Background Mean + 2 Standard Deviations	Unit
Acenaphthene	9	33 33%	66 333	120	40800000	NA	ug/kg
Acetone	8	25 00%	12 5	18	102000000	NA	ug/kg
Anthracene	9	22 22%	75 5	110	204000000	NA	ug/kg
Benzo(a)anthracene	9	66 67%	128 667	330	34900	NA	ug/kg
Benzo(a)pyrene	9	66 67%	151 167	390	3490	NA	ug/kg
Benzo(b)fluoranthene	9	66 67%	131 5	340	34900	NA	ug/kg
Benzo(k)fluoranthene	9	66 67%	145 333	370	349000	NA	ug/kg
bis(2-Ethylhexyl)phthalate	9	11 11%	200	200	1970000	NA	ug/kg
Chrysene	9	66 67%	171 333	440	3490000	NA	ug/kg
Dimethylphthalate	9	22 22%	274 5	460	1000000000	NA	ug/kg
Fluoranthene	9	66 67%	318 333	890	27200000	NA	ug/kg
Fluorene	9	11 11%	82	82	40800000	NA	ug/kg
Hexachlorobenzene	9	33 33%	210	260	17200	NA	ug/kg
Indeno(1,2,3-cd)pyrene	9	44 44%	115 75	230	34900	NA	ug/kg
Methylene chloride	8	25 00%	1 5	1 7	2530000	NA	ug/kg
Plutonium-239/240	9	22 22%	0 109	0 126	50	0 02	pCi/g
Pyrene	9	55 56%	382	890	22100000	NA	ug/kg
Uranium-234	*9*	*44 44%*	*3 985*	*4 367*	*300*	*2 64*	*pCi/g*
Uranium-235	9	77 78%	0 193	0 215	8	0 12	pCi/g
Uranium-238	9	77 78%	3 204	4 367	351	1 49	pCi/g

Italic type indicates result derived by calculation based on other analyses

3.0 SUBSURFACE SOIL RISK SCREEN

The Subsurface Soil Risk Screen (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 Modification Table 3 ALs for the WRW?

Yes As shown in Table 3, all subsurface soil results greater than the background means plus two standard deviations from IHSS Group 600-3 are less than RFCA WRW ALs

Screen 2 – Is there a potential for subsurface soil to become surface soil (landslides and erosion areas identified on Figure 1 of the RFCA Modification)?

No IHSS Group 600-3 is not located in an area susceptible to landslides or high erosion based on RFCA Modification Attachment 5, Figure 1 (DOE et al 2003)

Screen 3 – Does subsurface soil contamination for radionuclides exceed criteria defined in RFCA Modification Section 5 3 and Attachment 14? Note Attachment 14 refers to Original Process Waste Lines (OPWL) which are not present in IHSS Group 600-3

No As shown in Table 3 (this document), radionuclide concentrations are well below soil WRW ALs

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

Contaminant migration via erosion and groundwater are two possible pathways whereby surface water could become contaminated from IHSS Group 600-3 Runoff from IHSS Group 600-3 flows into the Central Avenue Ditch and through gauging stations GS-38 and GS-10 (DOE 2002a) GS-38 receives flow from the southwestern portion of the IA, including IA Areas 100, 400, and 600 No AL exceedances have occurred at GS-38 GS-10 is a RFCA surface water Point of Evaluation (POE) Exceedances of surface water ALs have been detected at GS-10, however, this station receives water from a large part of the IA, and, therefore, surface water quality at GS-10 cannot be attributable to any single IHSS Group

Groundwater around IHSS Group 600-3 is not monitored routinely Tetrachloroethene (61 micrograms per liter [µg/L]) and cadmium (6 2 µg/L) are present in the closest routinely monitored Integrated Monitoring Program (IMP) well, P416889 The well is approximately 325 ft south and parallel to the topographic gradient The closest downgradient IMP well, P320089, is approximately 425 ft away and also contains tetrachloroethene (391 µg/L) (DOE 2003d)

Non-IMP well 84002, downgradient 60 ft to the east, was found to contain tetrachloroethene (29 9 µg/L) and trichloroethene (2 89 µg/L) as reported in the 2001 RFCA Annual Groundwater Monitoring Report (DOE 2002b) (Figures 3, 4, and 5) This study concluded that the contamination was part of the IA Plume The Plume was not attributable to operations associated with IHSS Group 600-3 The 2001 Annual Report suggests that tetrachloroethene in 84002 and P416889 versus P320089 originate from different sources These analytes were not detected in soil from IHSS Group 600-3

4.0 NO LONGER REPRESENTATIVE SAMPLING LOCATIONS

The existing surface soil sampling (historic) locations, shown on Figure 3, within or adjacent to the boundary of IHSS Group 600-3 were disturbed by slab removal activities However, because no soil was removed, general soil data from IHSS Group 600-3 are still considered representative of the IHSS Group even though specific existing (historic) sampling location data may not be That is, there are no no longer representative (NLR) sampling locations

5.0 NO FURTHER ACCELERATED ACTION SUMMARY

Based on analytical results and the SSRS, action is not required and an NFAA determination is justified for IHSS Group 600-3 because of the following

- There are no WRW AL exceedances at IHSS Group 600-3
- Migration of contamination to surface water through erosion is unlikely because this IHSS Group is not in an area prone to landslides or erosion
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 600-3 The

VOC contamination present in groundwater, though notably not present in IHSS Group 600-3 soil, is considered part of the IA Plume, which will be further evaluated in a future decision document

6.0 DATA QUALITY ASSESSMENT

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

- Regulatory agency-approved sampling program design (IASAP Addendum #IA-04-05 [DOE 2003a]), modified, due to field conditions, in accordance with the IASAP (DOE 2001),
- Collection of samples in accordance with the sampling design or concurrence by regulatory agencies with modifications to the sampling plan, and
- Results of the Data Quality Assessment (DQA), as described in the following sections

6.1 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), 1994a, Guidance for the Data Quality Objective Process, QA/G-4,
- EPA, 1998, Guidance for the Data Quality Assessment Process, Practical Methods for Data Analysis, QA/G-9, and
- U S Department of Energy (DOE), 1999, Quality Assurance, Order 414 1A

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, 1994b, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, 540/R-94/012,
- EPA, 1994c, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, 540/R-94/013,
- 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, and

V&V Guidelines for Metals, DA-SS05-v3, 2002e, and

- Lockheed-Martin, 1997, Evaluation of Radiochemical Data Usability, ES/ER/MS-5

This Data Summary 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 CDPHE and/or EPA

6.2 V&V 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 considerations 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 (that is, 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 are maintained by K-H Analytical Services Division (ASD) Older hardcopies may reside in the Federal Center in Lakewood, Colorado Electronic data are stored in the RFETS Soil Water Database (SWD)

Both real and QC data sets addressed in this report are included on the enclosed compact disc in Microsoft Access 2000 format

6.2.1 Accuracy

The following measures of accuracy were considered

- 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 results 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

LCS Evaluation

The frequency of LCS measurements, at least one analysis per batch, was adequate relative to each laboratory batch, as shown in Table 7 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 potentially unacceptable low recoveries were evaluated in the following manner If the maximum sample result divided by the lowest LCS recovery for that analyte is less than the WRW AL, 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 All calculations for minimum LCS recoveries resulted in values less than the WRW

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Table 7
LCS Evaluation Summary

Chemical Abstracts Service Number (CAS)	Analyte	Minimum Result	Maximum Result	Unit	Number of Laboratory Analyses	Number of Laboratory Batches	Test Method
7429-90-5	Aluminum	90	97	%REC	4	3	SW-846 6010
7440-36-0	Antimony	85	98	%REC	4	3	SW-846 6010
7440-38-2	Arsenic	93	97	%REC	4	3	SW-846 6010
7440-39-3	Barium	98	101	%REC	4	3	SW-846 6010
7440-41-7	Beryllium	100	102	%REC	4	3	SW-846 6010
7440-43-9	Cadmium	94	98	%REC	4	3	SW-846 6010
7440-47-3	Chromium	94	97	%REC	4	3	SW-846 6010
7440-48-4	Cobalt	93	97	%REC	4	3	SW-846 6010
7440-50-8	Copper	93	96	%REC	4	3	SW-846 6010
7439-89-6	Iron	97	99	%REC	4	3	SW-846 6010
7439-92-1	Lead	96	100	%REC	4	3	SW-846 6010
7439-93-2	Lithium	92	97	%REC	4	3	SW-846 6010
7439-96-5	Manganese	93	97	%REC	4	3	SW-846 6010
7439-97-6	Mercury	95	101	%REC	4	3	SW-846 6010
7439-98-7	Molybdenum	86	95	%REC	4	3	SW-846 6010
7440-02-0	Nickel	95	99	%REC	4	3	SW-846 6010
7782-49-2	Selenium	94	102	%REC	4	3	SW-846 6010
7440-22-4	Silver	91	95	%REC	4	3	SW-846 6010
7440-24-6	Strontium	97	99	%REC	4	3	SW-846 6010
7440-31-5	Tin	81	91	%REC	4	3	SW-846 6010
11-09-7	Uranium, Total	100	103	%REC	4	3	SW-846 6010
7440-62-2	Vanadium	95	97	%REC	4	3	SW-846 6010
7440-66-6	Zinc	94	97	%REC	4	3	SW-846 6010
71-55-6	1,1,1-Trichloroethane	83	109 5	%REC	6	6	SW-846 8260
79-34-5	1,1,2,2-Tetrachloroethane	83 92	117	%REC	6	6	SW-846 8260
79-00-5	1,1,2-Trichloroethane	88 59	101	%REC	6	6	SW-846 8260
75-34-3	1,1-Dichloroethane	89 14	113 6	%REC	6	6	SW-846 8260
75-35-4	1,1-Dichloroethene	87	125 9	%REC	6	6	SW-846 8260
120-82-1	1,2,4-Trichlorobenzene	79 14	96	%REC	6	6	SW-846 8260
95-50-1	1,2-Dichlorobenzene	85 12	105	%REC	6	6	SW-846 8260
107-06-2	1,2-Dichloroethane	87	108 8	%REC	6	6	SW-846 8260
78-87-5	1,2-Dichloropropane	89 14	113 2	%REC	6	6	SW-846 8260
106-46-7	1,4-Dichlorobenzene	83 7	109	%REC	6	6	SW-846 8260
78-93-3	2-Butanone	44 13	92	%REC	6	6	SW-846 8260
108-10-1	4-Methyl-2-pentanone	78 86	116	%REC	6	6	SW-846 8260
67-64-1	Acetone	36 71	82	%REC	6	6	SW-846 8260
71-43-2	Benzene	87 29	111 5	%REC	6	6	SW-846 8260
75-27-4	Bromodichloromethane	84 95	102 9	%REC	6	6	SW-846 8260
75-25-2	Bromoform	85 3	103 7	%REC	6	6	SW-846 8260

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Chemical Abstracts Service Number (CAS)	Analyte	Minimum Result	Maximum Result	Unit	Number of Laboratory Analyses	Number of Laboratory Batches	Test Method
74-83-9	Bromomethane	66 35	133	%REC	6	6	SW-846 8260
75-15-0	Carbon Disulfide	81 95	132	%REC	6	6	SW-846 8260
56-23-5	Carbon Tetrachloride	83	108 3	%REC	6	6	SW-846 8260
108-90-7	Chlorobenzene	88 31	103	%REC	6	6	SW-846 8260
75-00-3	Chloroethane	82 75	138 3	%REC	6	6	SW-846 8260
67-66-3	Chloroform	89	107 5	%REC	6	6	SW-846 8260
74-87-3	Chloromethane	55 38	189 6	%REC	6	6	SW-846 8260
10061-01-5	cis-1,3-Dichloropropene	88 89	112 2	%REC	6	6	SW-846 8260
124-48-1	Dibromochloromethane	91	100 5	%REC	6	6	SW-846 8260
100-41-4	Ethylbenzene	90 11	104	%REC	6	6	SW-846 8260
87-68-3	Hexachlorobutadiene	82 86	94	%REC	6	6	SW-846 8260
75-09-2	Methylene chloride	86	130 7	%REC	6	6	SW-846 8260
91-20-3	Naphthalene	70 29	96	%REC	6	6	SW-846 8260
100-42-5	Styrene	91 73	108 2	%REC	6	6	SW-846 8260
127-18-4	Tetrachloroethene	89 33	97 94	%REC	6	6	SW-846 8260
108-88-3	Toluene	92 34	105	%REC	6	6	SW-846 8260
10061-02-6	trans-1,3-Dichloropropene	90 71	113	%REC	6	6	SW-846 8260
79-01-6	Trichloroethene	84	109 1	%REC	6	6	SW-846 8260
75-01-4	Vinyl chloride	72 65	194 4	%REC	6	6	SW-846 8260
1330-20-7	Xylene	91 63	105 9	%REC	6	6	SW-846 8260
120-82-1	1,2,4-Trichlorobenzene	59	72	%REC	4	3	SW-846 8270
95-95-4	2,4,5-Trichlorophenol	63	74	%REC	4	3	SW-846 8270
88-06-2	2,4,6-Trichlorophenol	62	72	%REC	4	3	SW-846 8270
120-83-2	2,4-Dichlorophenol	61	71	%REC	4	3	SW-846 8270
105-67-9	2,4-Dimethylphenol	59	70	%REC	4	3	SW-846 8270
51-28-5	2,4-Dinitrophenol	48	64	%REC	4	3	SW-846 8270
121-14-2	2,4-Dinitrotoluene	63	74	%REC	4	3	SW-846 8270
606-20-2	2,6-Dinitrotoluene	63	74	%REC	4	3	SW-846 8270
91-58-7	2-Chloronaphthalene	60	71	%REC	4	3	SW-846 8270
95-57-8	2-Chlorophenol	61	71	%REC	4	3	SW-846 8270
91-57-6	2-Methylnaphthalene	62	74	%REC	4	3	SW-846 8270
95-48-7	2-Methylphenol	61	71	%REC	4	3	SW-846 8270
88-74-4	2-Nitroaniline	65	69	%REC	4	3	SW-846 8270
91-94-1	3,3'-Dichlorobenzidine	40	46	%REC	4	3	SW-846 8270
534-52-1	4,6-Dinitro-2-methylphenol	50	65	%REC	4	3	SW-846 8270
106-47-8	4-Chloroaniline	25	43	%REC	4	3	SW-846 8270
106-44-5	4-Methylphenol	64	72	%REC	4	3	SW-846 8270
100-02-7	4-Nitrophenol	63	71	%REC	4	3	SW-846 8270
83-32-9	Acenaphthene	60	70	%REC	4	3	SW-846 8270
120-12-7	Anthracene	59	70	%REC	4	3	SW-846 8270
56-55-3	Benzo(a)anthracene	58	67	%REC	4	3	SW-846 8270
50-32-8	Benzo(a)pyrene	59	68	%REC	4	3	SW-846 8270

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Chemical Abstracts Service Number (CAS)	Analyte	Minimum Result	Maximum Result	Unit	Number of Laboratory Analyses	Number of Laboratory Batches	Test Method
205-99-2	Benzo(b)fluoranthene	54	66	%REC	4	3	SW-846 8270
207-08-9	Benzo(k)fluoranthene	59	73	%REC	4	3	SW-846 8270
65-85-0	Benzoic Acid	29	54	%REC	4	3	SW-846 8270
100-51-6	Benzyl Alcohol	61	70	%REC	4	3	SW-846 8270
111-44-4	bis(2-Chloroethyl)ether	58	67	%REC	4	3	SW-846 8270
39638-32-9	bis(2-Chloroisopropyl)ether	55	66	%REC	4	3	SW-846 8270
117-81-7	bis(2-Ethylhexyl)phthalate	62	73	%REC	4	3	SW-846 8270
85-68-7	Butylbenzylphthalate	59	70	%REC	4	3	SW-846 8270
218-01-9	Chrysene	57	65	%REC	4	3	SW-846 8270
53-70-3	Dibenz(a,h)anthracene	56	67	%REC	4	3	SW-846 8270
132-64-9	Dibenzofuran	60	74	%REC	4	3	SW-846 8270
84-66-2	Diethylphthalate	63	74	%REC	4	3	SW-846 8270
131-11-3	Dimethylphthalate	61	71	%REC	4	3	SW-846 8270
84-74-2	Di-n-butylphthalate	60	74	%REC	4	3	SW-846 8270
117-84-0	Di-n-octylphthalate	58	67	%REC	4	3	SW-846 8270
206-44-0	Fluoranthene	55	68	%REC	4	3	SW-846 8270
86-73-7	Fluorene	60	70	%REC	4	3	SW-846 8270
118-74-1	Hexachlorobenzene	62	73	%REC	4	3	SW-846 8270
87-68-3	Hexachlorobutadiene	59	72	%REC	4	3	SW-846 8270
77-47-4	Hexachlorocyclopentadiene	28	56	%REC	4	3	SW-846 8270
67-72-1	Hexachloroethane	62	71	%REC	4	3	SW-846 8270
193-39-5	Indeno(1,2,3-cd)pyrene	58	68	%REC	4	3	SW-846 8270
78-59-1	Isophorone	58	67	%REC	4	3	SW-846 8270
91-20-3	Naphthalene	59	70	%REC	4	3	SW-846 8270
98-95-3	Nitrobenzene	62	70	%REC	4	3	SW-846 8270
86-30-6	n-Nitrosodiphenylamine	71	88	%REC	4	3	SW-846 8270
621-64-7	n-Nitrosodipropylamine	61	68	%REC	4	3	SW-846 8270
87-86-5	Pentachlorophenol	55	64	%REC	4	3	SW-846 8270
108-95-2	Phenol	61	70	%REC	4	3	SW-846 8270
129-00-0	Pyrene	56	68	%REC	4	3	SW-846 8270

Therefore, LCS recoveries did not impact project decisions Any qualification of individual results due to LCS performance exceeding upper or lower tolerance limits is also captured in the V&V flags, described in Section 6 2 3.

Surrogate Evaluation

The frequency of surrogate measurements, relative to each laboratory batch, is given in Table 8 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 VOC or SVOC sample, and, therefore, surrogate recoveries only impact individual samples Unacceptable surrogate recoveries can indicate potential matrix effects Surrogate recoveries reported above 100 percent may

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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

Table 8
Surrogate Recovery Summary

VOC Surrogate Recoveries					
Number of Samples	CAS Number	Analyte	Minimum	Maximum	Unit
8	17060-07-0	1,2-Dichloroethane -d4	79	116 2	%REC
8	460-00-4	Bromofluorobenzene	84	113 9	%REC
8	2037-26-5	Toluene - d8	89	113	%REC
SVOC Surrogate Recoveries					
Number of Samples	CAS Number	Analyte	Minimum	Maximum	Unit
16	321-60-8	2-Fluorobiphenyl	58	74	%REC
16	4165-60-0	Nitrobenzene-d5	58	77	%REC
16	367-12-4	o-Fluorophenol	59	76	%REC
16	1718-51-0	Terphenyl-d14	48	73	%REC

Field Blank Evaluation

Field blank analyses are provided in Table 9 Detectable amounts of contaminants within blanks, which could indicate possible cross-contamination of samples, are evaluated if the same contaminant is detected in associated real samples When real results are less than 10 times the blank results for laboratory contaminants (5 times the results for nonlaboratory contaminants), the real result is eliminated Conversely, if the chemicals detected in the blanks had concentrations less than one-tenth the WRW AL, then sample results should not be affected by blank contamination No analyte detected in a blank exceeded one-tenth its WRW AL Therefore, blank contamination did not adversely impact project decisions

Table 9
Field Blank Summary

Sample QC Code	Test Method	Analyte	Maximum Detected Value	Result Unit
RNS	Gamma Spectroscopy	Uranium-235	0 134	PCI/G-WET
RNS	Gamma Spectroscopy	Uranium-235	0 154	PCI/G-WET
RNS	Gamma Spectroscopy	Uranium-238	2 5	PCI/G-WET
RNS	Gamma Spectroscopy	Uranium-238	1 45	PCI/G-WET
RNS	SW-846 6010	Aluminum	0 13	mg/L
RNS	SW-846 6010	Aluminum	0 026	mg/L
RNS	SW-846 6010	Barium	0 0013	mg/L
RNS	SW-846 6010	Beryllium	0 00064	mg/L
RNS	SW-846 6010	Iron	0 086	mg/L
RNS	SW-846 6010	Lead	0 0026	mg/L
RNS	SW-846 6010	Lithium	0 0033	mg/L

Sample QC Code	Test Method	Analyte	Maximum Detected Value	Result Unit
RNS	SW-846 6010	Manganese	0 0032	mg/L
RNS	SW-846 6010	Strontium	0 001	mg/L
RNS	SW-846 6010	Zinc	0 013	mg/L
TB	SW-846 8260	2-Butanone	9 6	ug/L
TB	SW-846 8260	Acetone	10	ug/L

Field blank (trip = TB, rinse = RNS, field = FB) results greater than detection limits (not *U* qualified)

Sample Matrix Spike Evaluation

MS measurements are summarized in Table 10 The frequency of MS measurements was adequate based on at least one MS per batch Table 10 also provides a summary of the minimum and maximum MS results by chemical for the project LCS recoveries for organic analyses with potentially low unacceptable recoveries were reviewed According to the EPA data validation guidelines (EPA 1994b), if organic MS recoveries are low, then the LCS recovery is to be checked and, if acceptable, no action is taken For this project, these checks indicate no decisions were impacted for organic analytes with low MS recoveries (refer to previous section)

For inorganics with MS recoveries greater than zero, the maximum sample results were divided by the lowest percent recovery for each analyte If the resulting number was less than the WRW AL, decisions were not impacted For this project, all inorganic results with MS recoveries greater than zero were acceptable based on this criterion Therefore, analytical accuracy for inorganics was not affected by MS recoveries greater than zero percent and project decisions were not impacted

Zinc had a minimum percent recovery of zero The WRW AL for zinc is more than 3,000 times greater than the maximum sample result (307,000 mg/kg [WRW AL]/80 mg/kg [max result] = 3,837), therefore, no decisions were impacted

Table 10
Sample Matrix Spike Evaluation Summary

Test Method	CAS Number	Analyte	Minimum	Maximum	Unit	Number of MS Samples	Number of Lab Batches
SW-846 6010	7429-90-5	Aluminum	2140	3160	%REC	3	3
SW-846 6010	7440-36-0	Antimony	38	55	%REC	3	3
SW-846 6010	7440-38-2	Arsenic	88	98	%REC	3	3
SW-846 6010	7440-39-3	Barium	97	126	%REC	3	3
SW-846 6010	7440-41-7	Beryllium	93	102	%REC	3	3
SW-846 6010	7440-43-9	Cadmium	67	96	%REC	3	3
SW-846 6010	7440-47-3	Chromium	94	103	%REC	3	3
SW-846 6010	7440-48-4	Cobalt	92	109	%REC	3	3
SW-846 6010	7440-50-8	Copper	98	183	%REC	3	3
SW-846 6010	7439-89-6	Iron	87	1330	%REC	3	3
SW-846 6010	7439-92-1	Lead	76	97	%REC	3	3

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Test Method	CAS Number	Analyte	Minimum	Maximum	Unit	Number of MS Samples	Number of Lab Batches
SW-846 6010	7439-93-2	Lithium	97	100	%REC	3	3
SW-846 6010	7439-96-5	Manganese	27	76	%REC	3	3
SW-846 6010	7439-97-6	Mercury	29	99	%REC	3	3
SW-846 6010	7439-98-7	Molybdenum	84	89	%REC	3	3
SW-846 6010	7440-02-0	Nickel	90	97	%REC	3	3
SW-846 6010	7782-49-2	Selenium	90	103	%REC	3	3
SW-846 6010	7440-22-4	Silver	87	100	%REC	3	3
SW-846 6010	7440-24-6	Strontium	93	99	%REC	3	3
SW-846 6010	7440-31-5	Tin	78	89	%REC	3	3
SW-846 6010	11-09-7	Uranium, Total	94	99	%REC	3	3
SW-846 6010	7440-62-2	Vanadium	100	108	%REC	3	3
SW-846 6010	7440-66-6	Zinc	0	93	%REC	3	3
SW-846 8260	71-55-6	1,1,1-Trichloroethane	75	107	%REC	4	4
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	91	117	%REC	4	4
SW-846 8260	79-00-5	1,1,2-Trichloroethane	86	105 4	%REC	4	4
SW-846 8260	75-34-3	1,1-Dichloroethane	83 67	112 1	%REC	4	4
SW-846 8260	75-35-4	1,1-Dichloroethene	69 69	105 3	%REC	4	4
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	53	91 4	%REC	4	4
SW-846 8260	95-50-1	1,2-Dichlorobenzene	82	104 4	%REC	4	4
SW-846 8260	107-06-2	1,2-Dichloroethane	84 82	114 2	%REC	4	4
SW-846 8260	78-87-5	1,2-Dichloropropane	88 04	108 4	%REC	4	4
SW-846 8260	106-46-7	1,4-Dichlorobenzene	84	105 1	%REC	4	4
SW-846 8260	78-93-3	2-Butanone	83	187 5	%REC	4	4
SW-846 8260	108-10-1	4-Methyl-2-pentanone	88	114	%REC	4	4
SW-846 8260	67-64-1	Acetone	67	210	%REC	4	4
SW-846 8260	71-43-2	Benzene	85	110 7	%REC	4	4
SW-846 8260	75-27-4	Bromodichloromethane	86	115 4	%REC	4	4
SW-846 8260	75-25-2	Bromoform	79	102	%REC	4	4
SW-846 8260	74-83-9	Bromomethane	67 02	149 8	%REC	4	4
SW-846 8260	75-15-0	Carbon Disulfide	64 58	112 2	%REC	4	4
SW-846 8260	56-23-5	Carbon Tetrachloride	74	105 7	%REC	4	4
SW-846 8260	108-90-7	Chlorobenzene	86	107 6	%REC	4	4
SW-846 8260	75-00-3	Chloroethane	58 78	139 6	%REC	4	4
SW-846 8260	67-66-3	Chloroform	84	112 7	%REC	4	4
SW-846 8260	74-87-3	Chloromethane	39 96	164 7	%REC	4	4
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	86 61	106 3	%REC	4	4
SW-846 8260	124-48-1	Dibromochloromethane	85	98 55	%REC	4	4
SW-846 8260	100-41-4	Ethylbenzene	87	106 7	%REC	4	4
SW-846 8260	87-68-3	Hexachlorobutadiene	39	89 07	%REC	4	4
SW-846 8260	75-09-2	Methylene chloride	74 12	92 11	%REC	4	4
SW-846 8260	91-20-3	Naphthalene	54	90 54	%REC	4	4
SW-846 8260	100-42-5	Styrene	86	105 1	%REC	4	4
SW-846 8260	127-18-4	Tetrachloroethene	83	99 81	%REC	4	4
SW-846 8260	108-88-3	Toluene	88	98 38	%REC	4	4

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Test Method	CAS Number	Analyte	Minimum	Maximum	Unit	Number of MS Samples	Number of Lab Batches
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	92	108	%REC	4	4
SW-846 8260	79-01-6	Trichloroethene	75	107 2	%REC	4	4
SW-846 8260	75-01-4	Vinyl chloride	40 91	133 9	%REC	4	4
SW-846 8260	1330-20-7	Xylene	84	110 7	%REC	4	4
SW-846 8270	120-82-1	1,2,4-Trichlorobenzene	63	65	%REC	3	3
SW-846 8270	95-95-4	2,4,5-Trichlorophenol	64	68	%REC	3	3
SW-846 8270	88-06-2	2,4,6-Trichlorophenol	61	66	%REC	3	3
SW-846 8270	120-83-2	2,4-Dichlorophenol	62	67	%REC	3	3
SW-846 8270	105-67-9	2,4-Dimethylphenol	64	66	%REC	3	3
SW-846 8270	51-28-5	2,4-Dinitrophenol	29	50	%REC	3	3
SW-846 8270	121-14-2	2,4-Dinitrotoluene	60	71	%REC	3	3
SW-846 8270	606-20-2	2,6-Dinitrotoluene	63	70	%REC	3	3
SW-846 8270	91-58-7	2-Chloronaphthalene	64	66	%REC	3	3
SW-846 8270	95-57-8	2-Chlorophenol	64	69	%REC	3	3
SW-846 8270	91-57-6	2-Methylnaphthalene	66	67	%REC	3	3
SW-846 8270	95-48-7	2-Methylphenol	63	70	%REC	3	3
SW-846 8270	88-74-4	2-Nitroaniline	59	72	%REC	3	3
SW-846 8270	91-94-1	3,3'-Dichlorobenzidine	37	54	%REC	3	3
SW-846 8270	534-52-1	4,6-Dinitro-2-methylphenol	41	50	%REC	3	3
SW-846 8270	106-47-8	4-Chloroaniline	30	58	%REC	3	3
SW-846 8270	106-44-5	4-Methylphenol	65	72	%REC	3	3
SW-846 8270	100-02-7	4-Nitrophenol	51	79	%REC	3	3
SW-846 8270	83-32-9	Acenaphthene	63	64	%REC	3	3
SW-846 8270	120-12-7	Anthracene	62	65	%REC	3	3
SW-846 8270	56-55-3	Benzo(a)anthracene	61	63	%REC	3	3
SW-846 8270	50-32-8	Benzo(a)pyrene	62	65	%REC	3	3
SW-846 8270	205-99-2	Benzo(b)fluoranthene	63	72	%REC	3	3
SW-846 8270	207-08-9	Benzo(k)fluoranthene	61	62	%REC	3	3
SW-846 8270	65-85-0	Benzoic Acid	0	31	%REC	3	3
SW-846 8270	100-51-6	Benzyl Alcohol	63	77	%REC	3	3
SW-846 8270	111-44-4	bis(2-Chloroethyl)ether	60	64	%REC	3	3
SW-846 8270	39638-32-9	bis(2-Chloroisopropyl)ether	59	69	%REC	3	3
SW-846 8270	117-81-7	bis(2-Ethylhexyl)phthalate	66	73	%REC	3	3
SW-846 8270	85-68-7	Butylbenzylphthalate	65	66	%REC	3	3
SW-846 8270	218-01-9	Chrysene	60	63	%REC	3	3
SW-846 8270	53-70-3	Dibenz(a,h)anthracene	58	62	%REC	3	3
SW-846 8270	132-64-9	Dibenzofuran	66	67	%REC	3	3
SW-846 8270	84-66-2	Diethylphthalate	65	70	%REC	3	3
SW-846 8270	131-11-3	Dimethylphthalate	65	79	%REC	3	3
SW-846 8270	84-74-2	Di-n-butylphthalate	66	68	%REC	3	3
SW-846 8270	117-84-0	Di-n-octylphthalate	64	69	%REC	3	3
SW-846 8270	206-44-0	Fluoranthene	61	65	%REC	3	3
SW-846 8270	86-73-7	Fluorene	64	65	%REC	3	3
SW-846 8270	118-74-1	Hexachlorobenzene	65	88	%REC	3	3

Test Method	CAS Number	Analyte	Minimum	Maximum	Unit	Number of MS Samples	Number of Lab Batches
SW-846 8270	87-68-3	Hexachlorobutadiene	61	65	%REC	3	3
SW-846 8270	77-47-4	Hexachlorocyclopentadiene	24	59	%REC	3	3
SW-846 8270	67-72-1	Hexachloroethane	64	67	%REC	3	3
SW-846 8270	193-39-5	Indeno(1,2,3-cd)pyrene	59	63	%REC	3	3
SW-846 8270	78-59-1	Isophorone	60	68	%REC	3	3
SW-846 8270	91-20-3	Naphthalene	63	66	%REC	3	3
SW-846 8270	98-95-3	Nitrobenzene	63	70	%REC	3	3
SW-846 8270	86-30-6	n-Nitrosodiphenylamine	74	81	%REC	3	3
SW-846 8270	621-64-7	n-Nitrosodipropylamine	61	70	%REC	3	3
SW-846 8270	87-86-5	Pentachlorophenol	43	57	%REC	3	3
SW-846 8270	108-95-2	Phenol	63	72	%REC	3	3
SW-846 8270	129-00-0	Pyrene	59	65	%REC	3	3

6.2.2 Precision

Precision is measured by evaluating both MSDs and field duplicates as described in the following sections

Matrix Spike Duplicate Evaluation

Laboratory precision is measured through the use of MSDs Adequate frequency of MSD measurements is indicated by at least one MSD in each laboratory batch Table 11 indicates that MSD frequencies are adequate The analytes with the highest relative percent differences (RPDs) (>35 percent) are reviewed by comparing the highest sample result to the WRW AL For analytes with RPDs greater than 35 percent, if the highest sample results are sufficiently below the ALs, no further action is needed

Table 11
Sample MSD Evaluation Summary

Test Method	CAS Number	Analyte	Number of Sample Pairs	Number of Lab Batches	Maximum RPD
SW-846 6010	7429-90-5	Aluminum	3	3	89 69
SW-846 6010	7440-36-0	Antimony	3	3	15 00
SW-846 6010	7440-38-2	Arsenic	3	3	4 44
SW-846 6010	7440-39-3	Barium	3	3	20 37
SW-846 6010	7440-41-7	Beryllium	3	3	8 78
SW-846 6010	7440-43-9	Cadmium	3	3	33 04
SW-846 6010	7440-47-3	Chromium	3	3	71 67
SW-846 6010	7440-48-4	Cobalt	3	3	11 17
SW-846 6010	7440-50-8	Copper	3	3	13 33
SW-846 6010	7439-89-6	Iron	3	3	188 23
SW-846 6010	7439-92-1	Lead	3	3	9 80
SW-846 6010	7439-93-2	Lithium	3	3	4 00
SW-846 6010	7439-96-5	Manganese	3	3	152 51
SW-846 6010	7439-97-6	Mercury	3	3	26 87

Test Method	CAS Number	Analyte	Number of Sample Pairs	Number of Lab Batches	Maximum RPD
SW-846 6010	7439-98-7	Molybdenum	3	3	3 51
SW-846 6010	7440-02-0	Nickel	3	3	21 36
SW-846 6010	7782-49-2	Selenium	3	3	4 74
SW-846 6010	7440-22-4	Silver	3	3	4 88
SW-846 6010	7440-24-6	Strontium	3	3	8 25
SW-846 6010	7440-31-5	Tin	3	3	5 00
SW-846 6010	11-09-7	Uranium, Total	3	3	4 04
SW-846 6010	7440-62-2	Vanadium	3	3	22 22
SW-846 6010	7440-66-6	Zinc	2	2	22 01
SW-846 8260	71-55-6	1,1,1-Trichloroethane	4	4	5 48
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	4	4	8 61
SW-846 8260	79-00-5	1,1,2-Trichloroethane	4	4	10 43
SW-846 8260	75-34-3	1,1-Dichloroethane	4	4	4 47
SW-846 8260	75-35-4	1,1-Dichloroethene	4	4	3 48
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	4	4	33 40
SW-846 8260	95-50-1	1,2-Dichlorobenzene	4	4	23 42
SW-846 8260	107-06-2	1,2-Dichloroethane	4	4	9 64
SW-846 8260	78-87-5	1,2-Dichloropropane	4	4	9 03
SW-846 8260	106-46-7	1,4-Dichlorobenzene	4	4	22 68
SW-846 8260	78-93-3	2-Butanone	4	4	25 65
SW-846 8260	108-10-1	4-Methyl-2-pentanone	4	4	27 22
SW-846 8260	67-64-1	Acetone	4	4	35 26
SW-846 8260	71-43-2	Benzene	4	4	6 63
SW-846 8260	75-27-4	Bromodichloromethane	4	4	12 13
SW-846 8260	75-25-2	Bromoform	4	4	17 10
SW-846 8260	74-83-9	Bromomethane	4	4	22 17
SW-846 8260	75-15-0	Carbon Disulfide	4	4	4 56
SW-846 8260	56-23-5	Carbon Tetrachloride	4	4	4 46
SW-846 8260	108-90-7	Chlorobenzene	4	4	13 56
SW-846 8260	75-00-3	Chloroethane	4	4	23 18
SW-846 8260	67-66-3	Chloroform	4	4	6 32
SW-846 8260	74-87-3	Chloromethane	4	4	32 55
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	4	4	13 18
SW-846 8260	124-48-1	Dibromochloromethane	4	4	7 50
SW-846 8260	100-41-4	Ethylbenzene	4	4	12 87
SW-846 8260	87-68-3	Hexachlorobutadiene	4	4	21 65
SW-846 8260	75-09-2	Methylene chloride	4	4	16 78
SW-846 8260	91-20-3	Naphthalene	4	4	30 16
SW-846 8260	100-42-5	Styrene	4	4	23 69
SW-846 8260	127-18-4	Tetrachloroethene	4	4	5 65
SW-846 8260	108-88-3	Toluene	4	4	6 61
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	4	4	9 26
SW-846 8260	79-01-6	Trichloroethene	4	4	8 84
SW-846 8260	75-01-4	Vinyl chloride	4	4	19 60

Test Method	CAS Number	Analyte	Number of Sample Pairs	Number of Lab Batches	Maximum RPD
SW-846 8260	1330-20-7	Xylene	4	4	19 01
SW-846 8270	120-82-1	1,2,4-Trichlorobenzene	3	3	8 26
SW-846 8270	95-95-4	2,4,5-Trichlorophenol	3	3	4 80
SW-846 8270	88-06-2	2,4,6-Trichlorophenol	3	3	6 78
SW-846 8270	120-83-2	2,4-Dichlorophenol	3	3	6 45
SW-846 8270	105-67-9	2,4-Dimethylphenol	3	3	7 87
SW-846 8270	51-28-5	2,4-Dinitrophenol	3	3	23 01
SW-846 8270	121-14-2	2,4-Dinitrotoluene	3	3	4 58
SW-846 8270	606-20-2	2,6-Dinitrotoluene	3	3	6 15
SW-846 8270	91-58-7	2-Chloronaphthalene	3	3	6 45
SW-846 8270	95-57-8	2-Chlorophenol	3	3	7 87
SW-846 8270	91-57-6	2-Methylnaphthalene	3	3	7 87
SW-846 8270	95-48-7	2-Methylphenol	3	3	7 87
SW-846 8270	88-74-4	2-Nitroaniline	3	3	5 71
SW-846 8270	91-94-1	3,3'-Dichlorobenzidine	3	3	11 43
SW-846 8270	534-52-1	4,6-Dinitro-2-methylphenol	3	3	9 52
SW-846 8270	106-47-8	4-Chloroaniline	3	3	12 84
SW-846 8270	106-44-5	4-Methylphenol	3	3	6 06
SW-846 8270	100-02-7	4-Nitrophenol	3	3	12 84
SW-846 8270	83-32-9	Acenaphthene	3	3	6 45
SW-846 8270	120-12-7	Anthracene	3	3	4 80
SW-846 8270	56-55-3	Benzo(a)anthracene	3	3	3 13
SW-846 8270	50-32-8	Benzo(a)pyrene	3	3	3 17
SW-846 8270	205-99-2	Benzo(b)fluoranthene	3	3	10 22
SW-846 8270	207-08-9	Benzo(k)fluoranthene	3	3	13 74
SW-846 8270	65-85-0	Benzoic Acid	2	2	70 13
SW-846 8270	100-51-6	Benzyl Alcohol	3	3	6 45
SW-846 8270	111-44-4	bis(2-Chloroethyl)ether	3	3	3 08
SW-846 8270	39638-32-9	bis(2-Chloroisopropyl)ether	3	3	5 22
SW-846 8270	117-81-7	bis(2-Ethylhexyl)phthalate	3	3	4 65
SW-846 8270	85-68-7	Butylbenzylphthalate	3	3	4 51
SW-846 8270	218-01-9	Chrysene	3	3	4 65
SW-846 8270	53-70-3	Dibenz(a,h)anthracene	3	3	3 51
SW-846 8270	132-64-9	Dibenzofuran	3	3	6 15
SW-846 8270	84-66-2	Diethylphthalate	3	3	4 44
SW-846 8270	131-11-3	Dimethylphthalate	3	3	19 44
SW-846 8270	84-74-2	Di-n-butylphthalate	3	3	6 15
SW-846 8270	117-84-0	Di-n-octylphthalate	3	3	4 26
SW-846 8270	206-44-0	Fluoranthene	3	3	4 96
SW-846 8270	86-73-7	Fluorene	3	3	6 35
SW-846 8270	118-74-1	Hexachlorobenzene	3	3	6 06
SW-846 8270	87-68-3	Hexachlorobutadiene	3	3	8 13
SW-846 8270	77-47-4	Hexachlorocyclopentadiene	3	3	8 00
SW-846 8270	67-72-1	Hexachloroethane	3	3	8 13

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Test Method	CAS Number	Analyte	Number of Sample Pairs	Number of Lab Batches	Maximum RPD
SW-846 8270	193-39-5	Indeno(1,2,3-cd)pyrene	3	3	3 45
SW-846 8270	78-59-1	Isophorone	3	3	6 67
SW-846 8270	91-20-3	Naphthalene	3	3	7 87
SW-846 8270	98-95-3	Nitrobenzene	3	3	6 25
SW-846 8270	86-30-6	n-Nitrosodiphenylamine	3	3	6 37
SW-846 8270	621-64-7	n-Nitrosodipropylamine	3	3	7 87
SW-846 8270	87-86-5	Pentachlorophenol	3	3	8 40
SW-846 8270	108-95-2	Phenol	3	3	6 25
SW-846 8270	129-00-0	Pyrene	3	3	4 96

Analytes with RPDs greater than 35 percent include aluminum, chromium, iron, manganese, acetone, and benzoic acid The maximum manganese result is 8 7 times less than its WRW AL The other three metals range between 12 7 and 16 2 times less than their respective WRW ALs Acetone and benzoic acid are several hundred thousand to several million times less than their WRW ALs Precision is not impacted by the MSD evaluation and, therefore, neither are project decisions

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 12 indicates that duplicate frequencies were inadequate with respect to radionuclides analyzed using alpha spectroscopy

Table 12
Field Duplicate Sample Frequency Summary

Test Method	Sample Code	Number of Samples	% Duplicate Samples
Alpha Spectroscopy	REAL	4	0%
Gamma Spectroscopy	REAL	12	8 33%
Gamma Spectroscopy	DUP	1	
SW-846 6010	REAL	16	18 75%
SW-846 6010	DUP	3	
SW-846 8260	REAL	8	25 00%
SW-846 8260	DUP	2	
SW-846 8270	REAL	16	18 75%
SW-846 8270	DUP	3	

Duplicate sample RPDs indicate how much variation exists in the field duplicate analyses, duplicate sample RPDs are provided in Table 13

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Table 13
RPD Evaluation Summary

Lab Code	Analyte	Maximum RPD
ESTLDEN	Aluminum	25 88
ESTLDEN	Barium	20 16
ESTLDEN	Chromium	11 54
ESTLDEN	Cobalt	8 33
ESTLDEN	Copper	24 30
ESTLDEN	Iron	15 38
ESTLDEN	Lead	24 30
ESTLDEN	Lithium	8 92
ESTLDEN	Manganese	28 57
ESTLDEN	Nickel	13 19
ESTLDEN	Strontium	7 41
ESTLDEN	Vanadium	17 39
ESTLDEN	Zinc	19 35
ESTLDEN	1,2,4-Trichlorobenzene	2 78
ESTLDEN	2,4,5-Trichlorophenol	2 78
ESTLDEN	2,4,6-Trichlorophenol	2 78
ESTLDEN	2,4-Dichlorophenol	2 78
ESTLDEN	2,4-Dimethylphenol	2 78
ESTLDEN	2,4-Dinitrophenol	2 82
ESTLDEN	2-Chloronaphthalene	2 78
ESTLDEN	2-Chlorophenol	2 78
ESTLDEN	2-Methylnaphthalene	2 78
ESTLDEN	2-Methylphenol	2 78
ESTLDEN	2-Nitroaniline	2 82
ESTLDEN	3,3'-Dichlorobenzidine	0 00
ESTLDEN	4,6-Dinitro-2-methylphenol	2 82
ESTLDEN	4-Chloroaniline	0 00
ESTLDEN	4-Methylphenol	2 78
ESTLDEN	4-Nitrophenol	2 82
ESTLDEN	Acenaphthene	2 82
ESTLDEN	Anthracene	2 82
ESTLDEN	Benzo(a)anthracene	1 42
ESTLDEN	Benzo(a)pyrene	1 42
ESTLDEN	Benzo(b)fluoranthene	1 42
ESTLDEN	Benzo(k)fluoranthene	1 42
ESTLDEN	Benzoic Acid	2 82
ESTLDEN	Benzyl Alcohol	0 00
ESTLDEN	bis(2-Chloroethyl)ether	2 78
ESTLDEN	bis(2-Chloroisopropyl)ether	2 78
ESTLDEN	bis(2-Ethylhexyl)phthalate	2 78
ESTLDEN	Butylbenzylphthalate	2 78
ESTLDEN	Chrysene	1 42
ESTLDEN	Dibenz(a,h)anthracene	2 78

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Lab Code	Analyte	Maximum RPD
ESTLDEN	Dibenzofuran	2 78
ESTLDEN	Diethylphthalate	2 78
ESTLDEN	Dimethylphthalate	2 78
ESTLDEN	Di-n-butylphthalate	2 78
ESTLDEN	Di-n-octylphthalate	2 78
ESTLDEN	Fluoranthene	1 42
ESTLDEN	Fluorene	2 78
ESTLDEN	Hexachlorobenzene	2 78
ESTLDEN	Hexachlorobutadiene	2 78
ESTLDEN	Hexachlorocyclopentadiene	2 78
ESTLDEN	Hexachloroethane	2 78
ESTLDEN	Indeno(1,2,3-cd)pyrene	2 78
ESTLDEN	Isophorone	2 78
ESTLDEN	Naphthalene	2 78
ESTLDEN	Nitrobenzene	2 78
ESTLDEN	n-Nitrosodiphenylamine	2 78
ESTLDEN	n-Nitrosodipropylamine	38 66
ESTLDEN	Pentachlorophenol	2 82
ESTLDEN	Phenol	2 78
ESTLDEN	Pyrene	1 42

The EPA data validation guidelines state that "there are no required review criteria for field duplicate analyses comparability" (EPA 1994b) For the DQA, the highest maximum RPDs (> 35 percent) are normally reviewed In the case of IHSS Group 600-3, all RPD results were below 35 percent Therefore, project decisions were not impacted by the maximum RPD values Note that because there were no detections greater than five times the detection limits, VOCs do not appear in Table 13

6.2.3 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 14 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

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Table 14
Validation and Verification Summary

Validation Qualifier Code	Total of CAS Numbers	Alpha Spectroscopy Analyses	Gamma Spectroscopy Analyses	Metals Analyses	VOC Analyses	SVOC Analyses
J	65	10	0	55	0	0
J1	50	0	0	50	0	0
R1	1	0	0	1	0	0
V	683	0	18	120	131	414
V1	695	10	18	121	130	416
JB	3	0	0	0	1	2
JB1	1	0	0	0	1	0
UJ	9	0	0	9	0	0
UJ1	13	0	0	12	1	0
Total	1520	20	36	368	264	832
Validated	760	10	18	184	132	416
% Validated	50 00%	50 00%	50 00%	50 00%	50 00%	50 00%
Verified	760	10	18	184	132	416
% Verified	50 00%	50 00%	50 00%	50 00%	50 00%	50 00%
Rejected	1	0	0	1	0	0
% Rejected	0 07%	0 00%	0 00%	0 27%	0 00%	0 00%

Validations J = Estimated, JB = Estimated with possible laboratory contamination,
R = Rejected, UJ = Estimated detection limit, V = Validated
Verifications J1 = Estimated, JB1 = Estimated with possible laboratory contamination,
R1 = Rejected, UJ1 = Estimated detection limit, V1 = Verified

Analytical records and results indicate these data are adequate because the frequency of validation is within project quality requirements and in compliance with the RFETS validation goal of 25 percent A mercury analysis was rejected because of poor predigestion MS recovery and calibration of the instrument detection limit was older than 3 months from the date of the analysis Rejections are less than the 10 percent maximum specified in the DQOs Validation and verification procedures indicate that project analytical data are suitable for making decisions

6.2.4 Sensitivity

Reporting limits, in units of µg/kg for organics, mg/kg for metals, and pCi/g for radionuclides, were compared with the 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 an RL that is less than an analyte's associated AL, typically less than one-half the AL

6.3 Summary of Data Quality

LCS, surrogate, field blank, MS, MSD, field duplicate frequency, and real-duplicate RPD maximum results were acceptable or did not impact project decisions Only one metal analysis was rejected, however, this did not impact project decisions Compliance with the project quality requirements and RFETS validation goal of 25 percent of all analytical

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records indicates these data are adequate Data collected and used for IHSS Group 600-3 are adequate for decision making

7.0 REFERENCES

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K-H, 2002a, General Guidelines for Data Verification and Validation, DA-GR01-v2, October

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K-H, 2002c, V&V Guidelines for Volatile Organics, DA-SS01-v3, October

K-H, 2002d, V&V Guidelines for Semivolatile Organics, DA-SS02-v3, October

K-H, 2002e, V&V Guidelines for Metals, DA-SS05-v3, October

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Appendix A

Correspondence

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ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
ER REGULATORY CONTACT RECORD

Date/Time: January 12, 2004/ 1000 am

Site Contact(s): Annette Primrose Norma Castaneda

Phone: 303 966-4385 303 966-4226

Regulatory Contact: David Kruchek

Phone: 303 692-3328

Agency: CDPHE

Purpose of Contact: IHSS Group 600-3 - Moved sample location

Discussion

Characterization of IHSS Group 600-3 (IHSS 120 1 B668 area) has begun Statistical sampling location CA36-031 is located beneath one of a series of conexs staged in this area This sample location is near historical samples previously collected in this area At these locations, no analytes approached action levels Therefore, this sample location will be moved to the northwest corner of IHSS 120 1 in the rectangle defined by the southern edge of the western conex and the IHSS boundary This location is in the area of a previously sampled location with an elevated beryllium concentration

Contact Record Prepared By: Annette Primrose

Required Distribution		Additional Distribution (choose names as applicable)
S Bell, RFFO	D Mayo, K-H RISS	M Broussard, K-H RISSL
Brooks, K-H ESS	J Mead, K-H ESS	J Hindman, CDPHE
L Butler, K-H RISS	S Nesta, K-H RISS	G Kleeman, USEPA
C Deck, K-H Legal	K North, K-H ESS	D Kruchek, CDPHE
R DiSalvo, RFFO	T Rehder, USEPA	L Norland, K-H RISS
S Gunderson, CDPHE	D Shelton, K-H	A Primrose, K-H RISS
J Legare, RFFO	C Spreng, CDPHE	E Pottorff, CDPHE
		S Tower, DOE

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ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
ER REGULATORY CONTACT RECORD

Date/Time: February 10, 2004/ 0830

Site Contact(s): Annette Primrose
Phone: 303 966-4385

Regulatory Contact: David Kruchek
Phone: 303 692-3328

Agency: CDPHE

Purpose of Contact: IHSS Group 600-3 Backfill

Discussion

Sample results were received from the recent 600-3 (B668) investigation No results were above wildlife worker action levels At two locations, lead results slightly exceeded the ecological action level of 25 6 mg/kg

BZ35-012 at the southwest corner of the former slab with 30 mg/kg lead

BZ36-028 at the northern edge of the former slab with 43 mg/kg lead

The wildlife refuge worker action level for lead is 1,000 mg/kg

Based on this information, it was agreed that the excavation resulting from the slab removal can be backfilled

Contact Record Prepared By: Annette Primrose

Required Distribution		Additional Distribution
M Aguilar, USEPA	R McCallister, DOE-RFFO	_____
S Bell, DOE-RFFO	J Mead, K-H ESS	_____
J Berardini, K-H	S Nesta, K-H RISS	_____
B Birk, DOE-RFFO	L Norland, K-H RISS	_____
L Brooks, K-H ESS	K North, K-H ESS	_____
M Broussard, K-H RISS	E Pottorff, CDPHE	_____
L Butler, K-H RISS	A Primrose, K-H RISS	_____
G Carnival, K-H RISS	R Schassburger, DOE-RFFO	_____
N Castaneda, DOE-RFFO	S Serreze, K-H RISS	_____
C Deck, K-H Legal	D Shelton, K-H ESS	_____
S Gunderson, CDPHE	C Spreng, CDPHE	_____
M Keating, K-H RISS	S Surovchak, DOE-RFFO	_____
G Kleeman, USEPA	K Wiemelt, K-H RISS	_____
D Kruchek, CDPHE	C Zahm, K-H Legal	_____
D Mayo, K-H RISS		

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ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
ENVIRONMENTAL RESTORATION
REGULATORY CONTACT RECORD

Date/Time: February 25, 2004 / 2 40 PM

Site Contact(s): Marcella Broussard
Phone: 303-966-6007

Regulatory Contact: David Kruchek
Phone: 303-692-3328

Agency: CDPHE

Purpose of Contact: IHSS Group 600-3 Surface VOC Sample

Discussion

The sampling specification table (Table 3) from IASAP FY04 Addendum #IA-04-05 indicates that a VOC sample was to be collected from surface soil at statistical location BZ36-027 (Location BZ36-027 is shown on Figure 3 of the SAP) This was the only surface VOC sample proposed in the SAP because it was the only location beneath the slab at Building 668 This sample was not collected at the time that the rest of the surface suite (radionuclides, metals, and SVOCs) at BZ36-027 was collected on 1/20/04

In discussion with Mr Kruchek it was decided that returning to BZ36-027 to collect this surface VOC sample, on or after 2/25/04, was unnecessary for the following reasons-

The time between exposure of location BZ36-027 to the atmosphere and sampling for VOCs would be at least a month This would give any VOCs that might have been present a chance to volatilize, making detection improbable

Soil disturbance at the site during removal of the Building 668 slab would have further accentuated volatilization of any potential VOCs from location BZ36-027

The subsurface (0 5-1 5 ft) VOC sample collected at BZ36-027 on 1/20/04 returned results that were all non-detections (U-qualified)

Subsurface VOC analyses for the other 7 accelerated action locations at IHSS Group 600-3 also returned results that were non-detections or estimates near detection limits (U or J/JB qualified)

Contact Record Prepared By: Marcella Broussard

Required Distribution

S Bell, RFFO
J Berardini, K-H
L Brooks, K-H ESS
M Broussard, K-H RISS
L Butler, K-H RISS
G Carnival, K-H RISS
N Castaneda, RFFO
C Deck, K-H Legal
R DiSalvo, RFFO
S Gunderson, CDPHE
M Keating, K-H RISS
G Kleeman, USEPA
D Kruchek, CDPHE
D Mayo, K-H RISS
R McCalister, DOE
J Mead, K-H ESS
S Nesta, K-H RISS
L Norland, K-H RISS
K North, K-H ESS
E Pottorff, CDPHE
A Primrose, K-H RISS
T Rehder, USEPA
S Serreze, RISS
D Shelton, K-H
C Spreng, CDPHE
S Surovchak, RFFO
K Wiemelt, K-H RISS
C Zahm, K-H

50/50

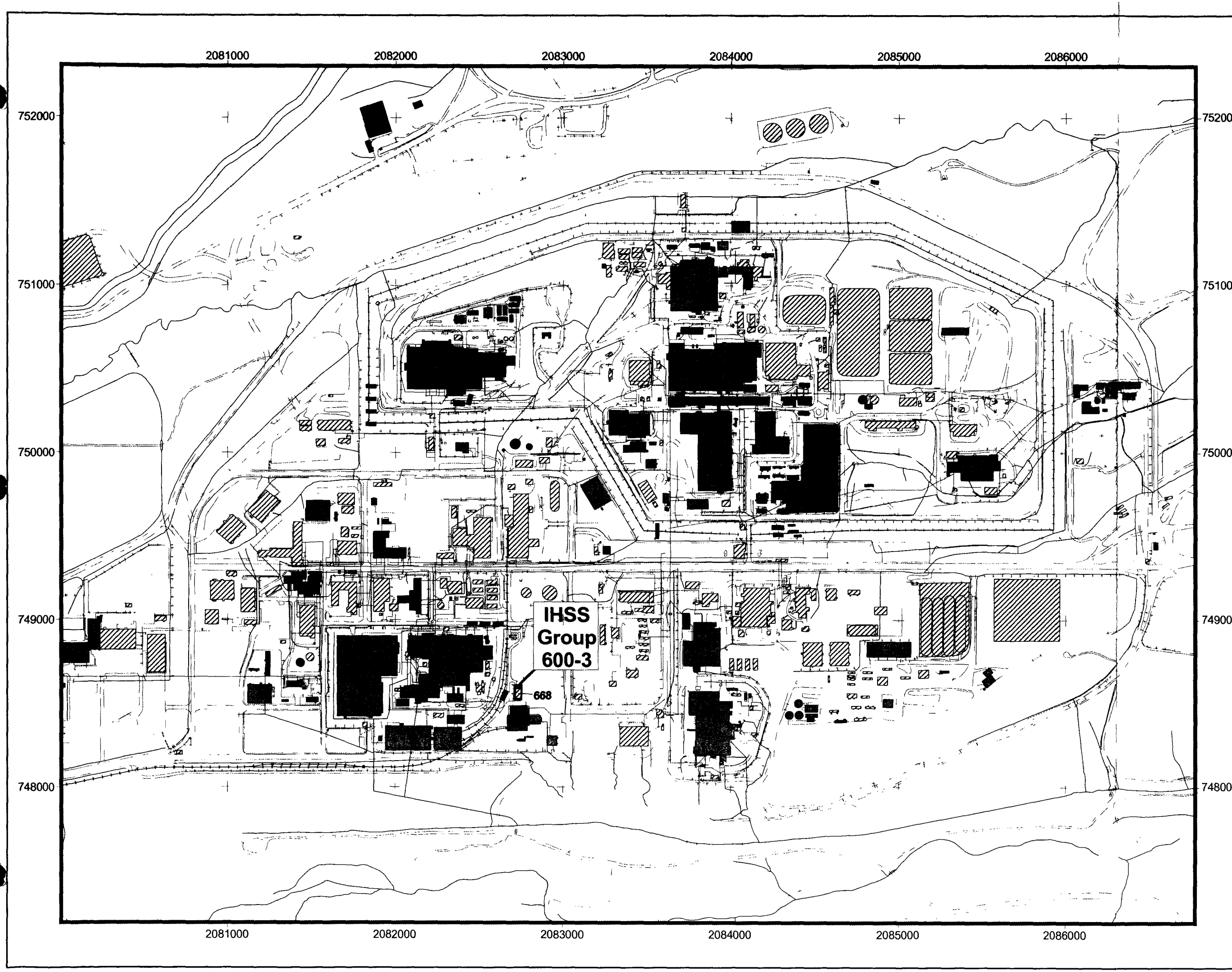


Figure 1

IHSS Group 600-3 General Location

KEY

- IHSS Group 600-3
- IHSS 600-120 1
- Demolished building
- Standing building
- Paved road
- Dirt road
- Trail
- Fence
- Railroad
- Sewer
- Surface drainage

DRAFT

W
S

200 0 200 400 600 800 Feet

Scale = 1 6500

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD 27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared for

KAISER•HILL COMPANY

Prepared by [redacted]

Date 4/27/04

F le W/P ojects/Fy2004/600-3/600-3_d ta_summary apr

9

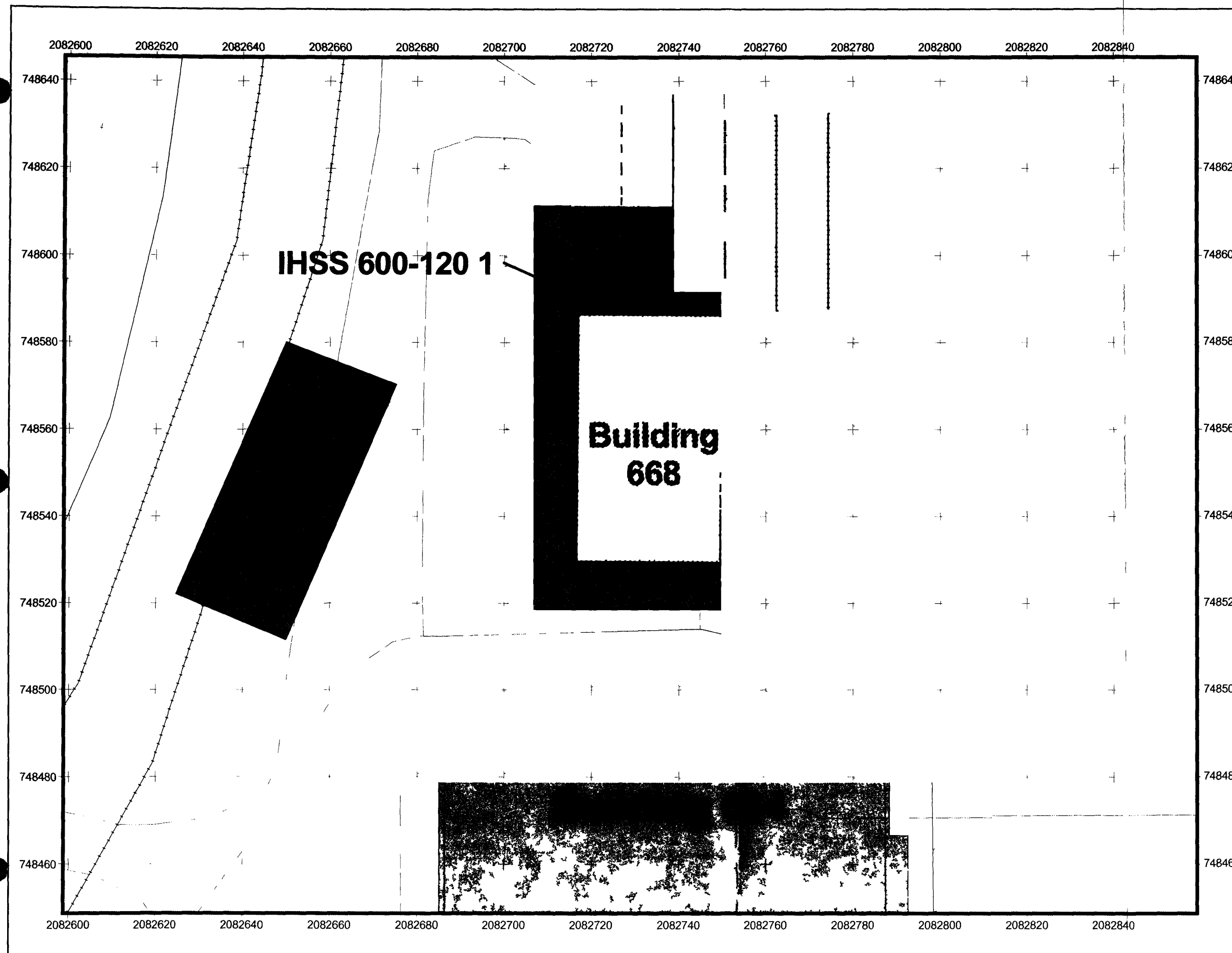


Figure 2
IHSS Group 600 3
IHSS 600 120 1
Detailed Location

KEY

- IHSS 600-120 1
- Building demolished
- Building standing
- Asphalt
- Conex
- Paved road
- Railroad
- Dirt road
- Sewers
- Fences
- Surface drainage

DRAFT

W

10 0 10 20 30 Feet

Scale = 1 250

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD 27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared for

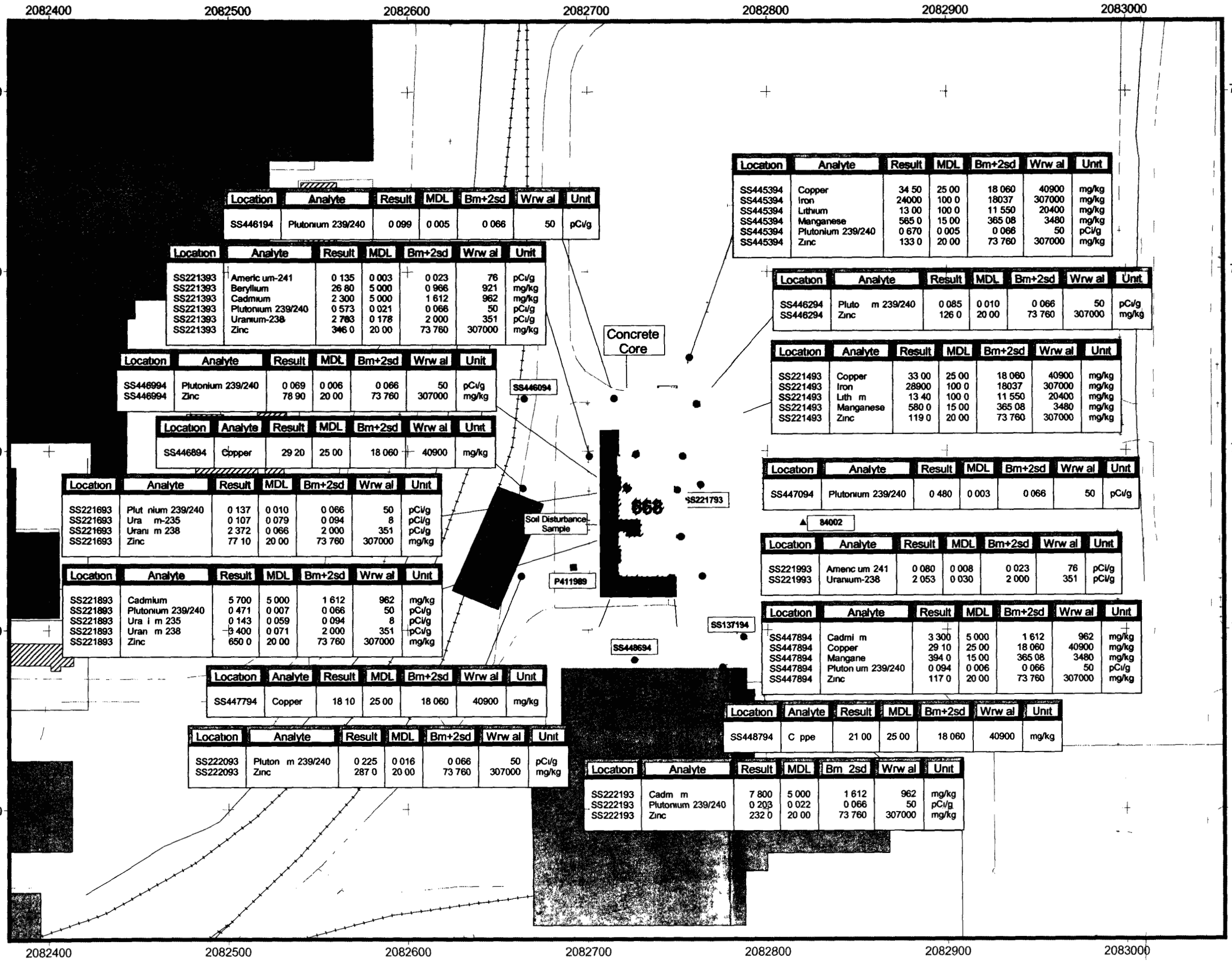
KAISER•HILL COMPANY

Prepared by [redacted]

Date 4/27/04

F le W/P ojects/Fy2004/600-3/600-3_data_summary apr

10



Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS446194	Plutonium 239/240	0 099	0 005	0 066	50	pCi/g

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS221393	Americ um-241	0 135	0 003	0 023	76	pCi/g
SS221393	Beryllium	26 80	5 000	0 966	921	mg/kg
SS221393	Cadmium	2 300	5 000	1 612	962	mg/kg
SS221393	Plutonium 239/240	0 573	0 021	0 066	50	pCi/g
SS221393	Uranium-238	2 783	0 178	2 000	351	pCi/g
SS221393	Zinc	346 0	20 00	73 760	307000	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS446994	Plutonium 239/240	0 069	0 006	0 066	50	pCi/g
SS446994	Zinc	78 90	20 00	73 760	307000	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS446894	Copper	29 20	25 00	18 060	40900	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS221693	Plut nium 239/240	0 137	0 010	0 066	50	pCi/g
SS221693	Ura m-235	0 107	0 079	0 094	8	pCi/g
SS221693	Uranı m 238	2 372	0 066	2 000	351	pCi/g
SS221693	Zinc	77 10	20 00	73 760	307000	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS221893	Cadmium	5 700	5 000	1 612	962	mg/kg
SS221893	Plutonium 239/240	0 471	0 007	0 066	50	pCi/g
SS221893	Ura i m 235	0 143	0 059	0 094	8	pCi/g
SS221893	Uran m 238	3 400	0 071	2 000	351	pCi/g
SS221893	Zinc	650 0	20 00	73 760	307000	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS447794	Copper	18 10	25 00	18 060	40900	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS222093	Pluton m 239/240	0 225	0 016	0 066	50	pCi/g
SS222093	Zinc	287 0	20 00	73 760	307000	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS445394	Copper	34 50	25 00	18 060	40900	mg/kg
SS445394	Iron	24000	100 0	18037	307000	mg/kg
SS445394	Lithium	13 00	100 0	11 550	20400	mg/kg
SS445394	Manganese	565 0	15 00	365 08	3480	mg/kg
SS445394	Plutonium 239/240	0 670	0 005	0 066	50	pCi/g
SS445394	Zinc	133 0	20 00	73 760	307000	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS446294	Pluto m 239/240	0 085	0 010	0 066	50	pCi/g
SS446294	Zinc	126 0	20 00	73 760	307000	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS221493	Copper	33 00	25 00	18 060	40900	mg/kg
SS221493	Iron	28900	100 0	18037	307000	mg/kg
SS221493	Lith m	13 40	100 0	11 550	20400	mg/kg
SS221493	Manganese	580 0	15 00	365 08	3480	mg/kg
SS221493	Zinc	119 0	20 00	73 760	307000	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS447094	Plutonium 239/240	0 480	0 003	0 066	50	pCi/g

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS221993	Amenc um 241	0 080	0 008	0 023	76	pCi/g
SS221993	Uranium-238	2 053	0 030	2 000	351	pCi/g

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS447894	Cadmi m	3 300	5 000	1 612	962	mg/kg
SS447894	Copper	29 10	25 00	18 060	40900	mg/kg
SS447894	Mangane	394 0	15 00	365 08	3480	mg/kg
SS447894	Pluton um 239/240	0 094	0 006	0 066	50	pCi/g
SS447894	Zinc	117 0	20 00	73 760	307000	mg/kg

Location	Analyte	Result	MDL	Bm+2sd	Wrw al	Unit
SS448794	C ppe	21 00	25 00	18 060	40900	mg/kg

Location	Analyte	Result	MDL	Bm 2sd	Wrw al	Unit
SS222193	Cadm m	7 800	5 000	1 612	962	mg/kg
SS222193	Plutonium 239/240	0 203	0 022	0 066	50	pCi/g
SS222193	Zinc	232 0	20 00	73 760	307000	mg/kg

Figure 3
IHSS Group 600-3
IHSS 600-120 1
Existing Surface and Subsurface Characterization Data

KEY

- Surface soil sampling location with concentrations greater than background and less than WRW ALs
- Surface soil sampling location with concentrations less than background or method detection limits
- Subsurface soil sampling location (1) with concentrations less than back ground or method detection limits
- Groundwater Monitoring Well
- IHSS Group 600-3
- Former location of fixed surface plutonium contamination on slab (slab removed)
- Building demolished
- Building standing
- Asphalt
- Conex
- Paved road
- Dirt road
- Fence
- Railroad
- Sewer
- Surface drainage

DRAFT

W S

20 0 20 40 60 80 Feet

Scale = 1 650

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD 27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared for

KAISER•HILL COMPANY

Prepared by [redacted]

Dat 4/27/04

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Analyte	Result	Rl	Wrw al	Bg+2sd	Unit	Start depth	End depth
Acenaphthene	45 00	32 00	40800000		ug/kg	0 0	0 5
Anthracene	39 00	24 00	204000000		ug/kg	0 0	0 5
Benzo( )anthracene	190 0	26 00	34900		ug/kg	0 0	0 5
Benzo(a)pyrene	130 0	47 00	3490		ug/kg	0 0	0 5
Benzo(b)fluoranthene	120 0	29 00	34900		ug/kg	0 0	0 5
Benzo(k)fluoranthene	120 0	33 00	349000		ug/kg	0 0	0 5
Chrysene	150 0	28 00	3490000		ug/kg	0 0	0 5
Copper	19 00	0 044	40800	18 06	mg/kg	0 0	0 5
Dimethylphthalate	130 0	41 00	1000000000		ug/kg	0 0	0 5
Fluoranthene	200 0	23 00	27200000		ug/kg	0 0	0 5
Hexachlorobenzene	380 0	37 00	17200		ug/kg	0 0	0 5
Indeno(1 2,3-cd)pyrene	90 00	23 00	34900		ug/kg	0 0	0 5
Iron	19000	1 400	307000	18037	mg/kg	0 0	0 5
Manganese	400 0	0 170	3480	365 08	mg/kg	0 0	0 5
Pyrene	290 0	140 0	22100000		ug/kg	0 0	0 5

Analyte	Result	Rl	Wrw al	Bg+2sd	Unit	Start depth	End depth
Benzo( )anthracene	58 00	26 00	34900		ug/kg	0 0	0 5
Benzo(a)pyrene	52 00	42 00	3490		ug/kg	0 0	0 5
Benzo(b)fluoranthene	40 00	30 00	34900		ug/kg	0 0	0 5
Benzo(k)fluoranthene	71 00	33 00	349000		ug/kg	0 0	0 5
Chrysene	74 00	29 00	3490000		ug/kg	0 0	0 5
Fluoranthen	140 0	24 00	27200000		ug/kg	0 0	0 5
Pyrene	140 0	140 0	22100000		ug/kg	0 0	0 5
Uranium 234	4 700	2 088	300	2 253	pCi/g	0 0	0 5
Uranium-235	0 225	0 134	8	0 094	pCi/g	0 0	0 5
Uranium-238	4 700	2 088	351	2	pCi/g	0 0	0 5

Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
bis(2-Ethylhexyl)phthalat	89 00	79 00	1970000		ug/kg	0 0	0 5
Dimethylphthalate	380 0	44 00	1000000000		ug/kg	0 0	0 5
Hexachlorobenzene	290 0	39 00	17200		ug/kg	0 0	0 5

Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
Uranium 234	4 522	1 841	300	2 253	pCi/g	0 0	0 5
Uranium 235	0 265	0 131	8	0 094	pCi/g	0 0	0 5
Ur nium 238	4 522	1 841	351	2	pCi/g	0 0	0 5

Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
Acenaphthene	130 0	32 00	40800000		ug/kg	0 0	0 5
Anthracene	120 0	25 00	204000000		ug/kg	0 0	0 5
Benzo( )anthracene	350 0	26 00	34900		ug/kg	0 0	0 5
Benzo(a)pyrene	330 0	47 00	3490		ug/kg	0 0	0 5
Benzo(b)fluoranthene	310 0	29 00	34900		ug/kg	0 0	0 5
Benzo(k)fluoranthene	420 0	33 00	349000		ug/kg	0 0	0 5
bis(2-Ethylhexyl)phthalat	180 0	75 00	1970000		ug/kg	0 0	0 5
Chrysene	490 0	28 00	3490000		ug/kg	0 0	0 5
Dibenz(a h)anthracene	140 0	26 00	3490		ug/kg	0 0	0 5
Dimethylphthalat	460 0	42 00	1000000000		ug/kg	0 0	0 5
Fluoranthene	1000	24 00	27200000		ug/kg	0 0	0 5
Fluorene	91 00	35 00	4080000		ug/kg	0 0	0 5
Hexachlorobenzene	290 0	38 00	17200		ug/kg	0 0	0 5
Indeno(1 2 3-cd)pyrene	280 0	24 00	34900		ug/kg	0 0	0 5
Pyrene	850 0	140 0	22100000		ug/kg	0 0	0 5
Zinc	79 00	0 450	307000	73 76	mg/kg	0 0	0 5

Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
Benzo( )anthracene	83 00	26 00	34900		ug/kg	0 0	0 5
Benzo(a)pyrene	85 00	43 00	3490		ug/kg	0 0	0 5
Benzo(b)fluoranthene	52 00	31 00	34900		ug/kg	0 0	0 5
Benzo(k)fluoranthene	110 0	34 00	349000		ug/kg	0 0	0 5
Chrysene	100 0	30 00	3490000		ug/kg	0 0	0 5
Fluoranthene	190 0	24 00	27200000		ug/kg	0 0	0 5
Indeno(1 2 3-cd)pyrene	60 00	24 00	34900		ug/kg	0 0	0 5
Pyrene	230 0	140 0	22100000		ug/kg	0 0	0 5
Uranium 235	0 212	0 134	8	0 094	pCi/g	0 0	0 5
Uranium 238	2 166	1 576	351	2	pCi/g	0 0	0 5

Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
Acenaphthene	38 00	32 00	40800000		ug/kg	0 0	0 5
Anthracene	39 00	25 00	204000000		ug/kg	0 0	0 5
Benzo( )anthracene	150 0	26 00	34900		ug/kg	0 0	0 5
Benzo(a)pyrene	170 0	47 00	3490		ug/kg	0 0	0 5
Benzo(b)fluoranthen	170 0	30 00	34900		ug/kg	0 0	0 5
Benzo(k)fluoranthene	170 0	33 00	349000		ug/kg	0 0	0 5
Chrysene	200 0	29 00	3490000		ug/kg	0 0	0 5
Dimethylphthalat	130 0	42 00	1000000000		ug/kg	0 0	0 5
Fluoranthene	330 0	24 00	27200000		ug/kg	0 0	0 5
Hexachlorobenzene	110 0	38 00	17200		ug/kg	0 0	0 5
Indeno(1 2 3-cd)pyrene	120 0	24 00	34900		ug/kg	0 0	0 5
Pyrene	380 0	140 0	22100000		ug/kg	0 0	0 5
Uranium 234	2 685	1 622	300	2 253	pCi/g	0 0	0 5
Uranium 238	2 685	1 622	351	2	pCi/g	0 0	0 5
Zinc	80 00	0 450	307000	73 76	mg/kg	0 0	0 5

FIGURE 4

IHSS Group 600-3
Accelerated Action
Surface Soil Sampling
Locations and Results
Greater than Background Means
Plus Two Standard Deviations
or Reporting limits

KEY

- Detection greater than Background Means + 2 Standard Deviations or Reporting Limits and less than Wildlife Refuge Worker Action Level
- Sample without detections
- Groundwater monitoring well
- IHSS 600-120 1
- Building demolished
- Building standing
- Asphalt
- Conex
- Paved road
- Railroad
- Dirt road
- Sewer
- Fence
- Surface drainage

DRAFT

W S

10 0 10 20 30 40 50 60 70 Feet

Scale = 1 450

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD 27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared for

KAISER•HILL COMPANY

Prepared by [redacted]

Dat 4/27/04

F I W/P ojects/Fy2004/600-3/600-3_data_ mmary apr

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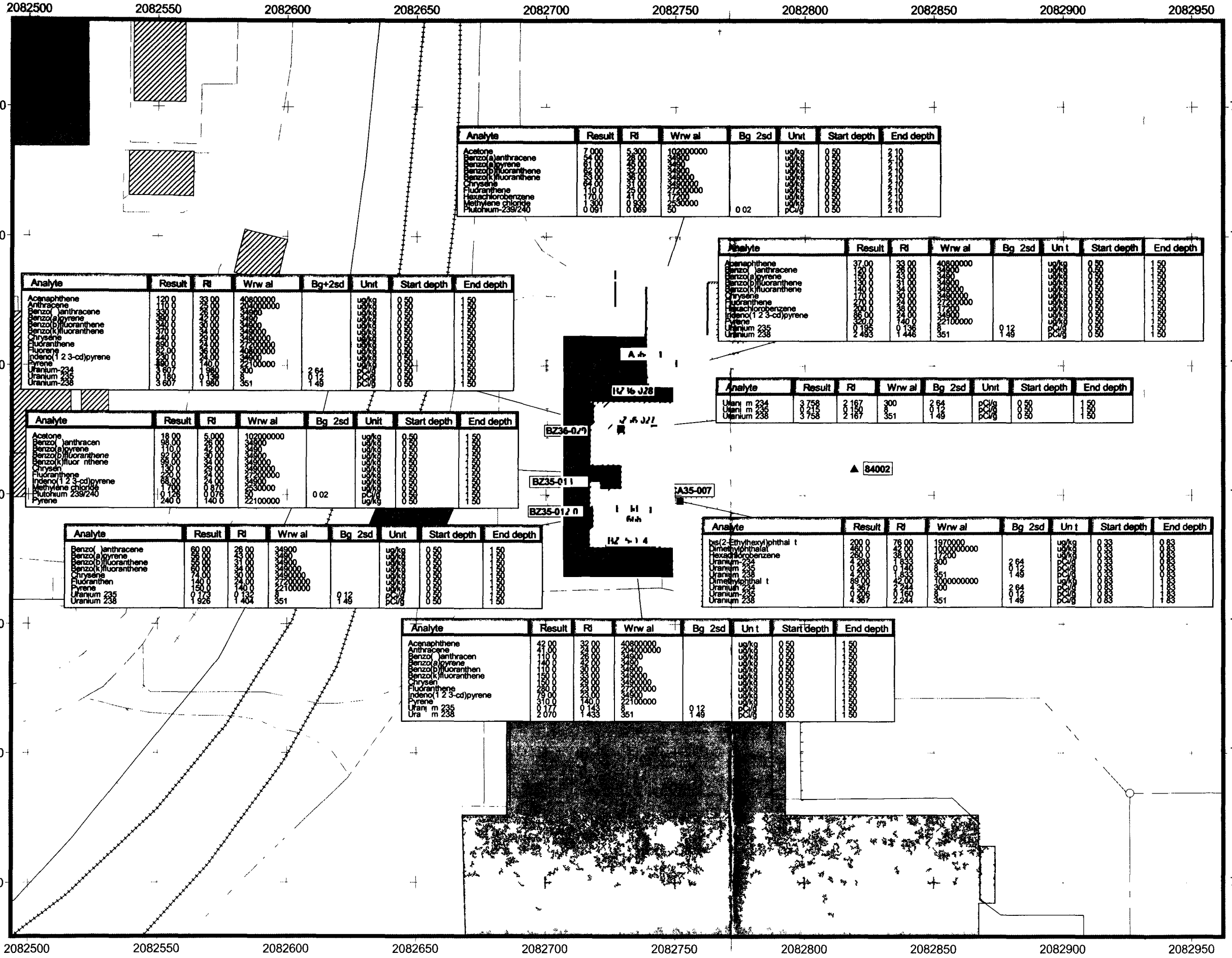
FIGURE 5

IHSS Group 600-3 Accelerated Action Subsurface Soil Sampling Locations and Results Greater than Background Means Plus Two Standard Deviations or Reporting limits



Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
Acetone	7 000	5 300	102000000		ug/kg	0 50	2 10
Benzo(a)anthracene	54 00	26 00	34900		ug/kg	0 50	2 10
Benzo(a)pyrene	61 00	42 00	3490		ug/kg	0 50	2 10
Benzo(b)fluoranthene	64 00	30 00	34900		ug/kg	0 50	2 10
Benzo(k)fluoranthene	53 00	36 00	349000		ug/kg	0 50	2 10
Chrysene	64 00	31 00	3490000		ug/kg	0 50	2 10
Fluoranthene	110 0	25 00	27200000		ug/kg	0 50	2 10
Hexachlorobenzene	170 0	41 00	17200		ug/kg	0 50	2 10
Methylene chloride	1 300	0 930	2530000		ug/kg	0 50	2 10
Plutohium-239/240	0 091	0 069	50	0 02	pCi/g	0 50	2 10

Analyte	Result	Rl	Wrw al	Bg+2sd	Unit	Start depth	End depth
Acenaphthene	120 0	33 00	40800000		ug/kg	0 50	1 50
Anthracene	110 0	25 00	204000000		ug/kg	0 50	1 50
Benzo( )anthracene	330 0	26 00	34900		ug/kg	0 50	1 50
Benzo(a)pyrene	390 0	42 00	3490		ug/kg	0 50	1 50
Benzo(b)fluoranthene	340 0	30 00	34900		ug/kg	0 50	1 50
Benzo(k)fluoranthene	370 0	33 00	349000		ug/kg	0 50	1 50
Chrysene	440 0	29 00	3490000		ug/kg	0 50	1 50
Fluoranthene	890 0	23 00	27200000		ug/kg	0 50	1 50
Fluorene	82 00	36 00	40800000		ug/kg	0 50	1 50
Indeno(1 2 3-cd)pyrene	290 0	24 00	34900		ug/kg	0 50	1 50
Pyrene	880 0	140 0	22100000		ug/kg	0 50	1 50
Uranium-234	3 607	1 980	300	2 64	pCi/g	0 50	1 50
Uranium 235	0 180	0 139	8	0 12	pCi/g	0 50	1 50
Uranium-238	3 607	1 980	351	1 49	pCi/g	0 50	1 50

Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
Acenaphthene	37 00	33 00	40800000		ug/kg	0 50	1 50
Benzo( )anthracene	120 0	26 00	34900		ug/kg	0 50	1 50
Benzo(a)pyrene	150 0	43 00	3490		ug/kg	0 50	1 50
Benzo(b)fluoranthene	130 0	31 00	34900		ug/kg	0 50	1 50
Benzo(k)fluoranthene	140 0	34 00	349000		ug/kg	0 50	1 50
Chrysene	170 0	30 00	3490000		ug/kg	0 50	1 50
Fluoranthene	270 0	24 00	27200000		ug/kg	0 50	1 50
Hexachlorobenzene	200 0	38 00	17200		ug/kg	0 50	1 50
Indeno(1 2 3-cd)pyrene	85 00	24 00	34900		ug/kg	0 50	1 50
Pyrene	320 0	140 0	22100000		ug/kg	0 50	1 50
Uranium 235	0 195	0 136	8	0 12	pCi/g	0 50	1 50
Uranium 238	2 493	1 446	351	1 49	pCi/g	0 50	1 50

Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
Uranium 234	3 758	2 167	300	2 64	pCi/g	0 50	1 50
Uranium 235	0 215	0 150	8	0 12	pCi/g	0 50	1 50
Uranium 238	3 758	2 167	351	1 49	pCi/g	0 50	1 50

Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
Acetone	18 00	5.000	102000000		ug/kg	0.50	1 50
Benzo( )anthracen	98 00	26 00	34900		ug/kg	0 50	1 50
Benzo(a)pyrene	110.0	42 00	3490		ug/kg	0 50	1 50
Benzo(b)fluoranthene	92 00	30 00	34900		ug/kg	0 50	1 50
Benzo(k)fluor nthene	95 00	34 00	349000		ug/kg	0 50	1 50
Chrysen	130 0	29 00	3490000		ug/kg	0 50	1 50
Fluoranthene	230 0	24 00	27200000		ug/kg	0 50	1 50
Indeno(1 2 3-cd)pyrene	68.00	24 00	34900		ug/kg	0 50	1 50
Methylene chloride	1 700	0 870	2530000		ug/kg	0 50	1 50
Plutohium 239/240	0 126	0 076	50	0 02	pCi/g	0 50	1 50
Pyrene	240 0	140 0	22100000		ug/kg	0 50	1 50

Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
Benzo( )anthracene	60 00	26 00	34900		ug/kg	0 50	1 50
Benzo(a)pyrene	52 00	43 00	3490		ug/kg	0 50	1 50
Benzo(b)fluoranthene	50 00	31 00	34900		ug/kg	0 50	1 50
Benzo(k)fluoranthene	50 00	34 00	349000		ug/kg	0 50	1 50
Chrysene	74.00	30 00	3490000		ug/kg	0 50	1 50
Fluoranthen	140 0	24.00	27200000		ug/kg	0 50	1 50
Pyrene	150.0	140 0	22100000		ug/kg	0 50	1 50
Uranium 235	0 173	0 132	8	0 12	pCi/g	0 50	1 50
Uranium 238	1 926	1 404	351	1 49	pCi/g	0 50	1 50

Analyte	Result	Rl	Wrw al	Bg 2sd	Unit	Start depth	End depth
bis(2-Ethylhexyl)phthal t	200 0	76 00	1970000		ug/kg	0 33	0 83
Dimethylphthalat	460 0	42 00	1000000000		ug/kg	0 33	0 83
Hexachlorobenzene	260 0	38 00	17200		ug/kg	0 33	0 83
Uranium-234	4 208	1 833	300	2 64	pCi/g	0 33	0 83
Uranium 235	0 233	0 140	8	0 12	pCi/g	0 33	0 83
Uranium 238	4 208	1 833	351	1 49	pCi/g	0 33	0 83
Dimethylphthal t	88 00	42 00	1000000000		ug/kg	0 83	1 83
Uranium 234	4 367	2 244	300	2 64	pCi/g	0 83	1 83
Uranium-235	0 206	0 160	8	0 12	pCi/g	0 83	1 83
Uranium 238	4 367	2.244	351	1 49	pCi/g	0 83	1 83

Analyte	Result	Rl	Wrw al	Bg 2sd	Unt	Start depth	End depth
Acenaphthene	42 00	32 00	40800000		ug/kg	0 50	1 50
Anthracene	41 00	24 00	204000000		ug/kg	0 50	1 50
Benzo( )anthracen	110 0	26 00	34900		ug/kg	0 50	1 50
Benzo(a)pyrene	140 0	42 00	3490		ug/kg	0 50	1 50
Benzo(b)fluoranthen	110 0	30 00	34900		ug/kg	0 50	1 50
Benzo(k)fluoranthene	150 0	33 00	349000		ug/kg	0 50	1 50
Chrysen	150 0	29 00	3490000		ug/kg	0 50	1 50
Fluoranthene	280 0	23 00	27200000		ug/kg	0 50	1 50
Indeno(1 2 3-cd)pyrene	79 00	23 00	34900		ug/kg	0 50	1 50
Pyrene	310.0	140.0	22100000		ug/kg	0 50	1 50
Uranium 235	0 177	0 143	8	0 12	pCi/g	0 50	1 50
Uranium 238	2 070	1 433	351	1 49	pCi/g	0 50	1 50

KEY

- Detection greater than Background Means + 2 Standard Deviations or Reporting Limits and less than Wildlife Refuge Worker Action Level
- Groundwater monitoring well
- IHSS 600-120 1
- Building demolished
- Building standing
- Asphalt
- Conex
- Paved road
- Railroad
- Dirt road
- Sewer
- Fence
- Surface drainage

DRAFT

10 0 10 20 30 40 50 60 70 Feet

Scale = 1 450

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD 27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared for

KAISER•HILL COMPANY

Prepared by [redacted]

D te 4/27/04

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