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COMPANY

# Draft Data Summary Report
# IHSS Group 600-5
# PAC 600-1004

Environmental Restoration
Rocky Flats Environmental Technology Site

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# Draft Data Summary Report
# IHSS Group 600-5
# PAC 600-1004

June 2004

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Approval received from the Colorado Department of Public Health and Environment

(  )

Approval letter contained in the Administrative Record

**June 2004**

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Appendix A – Correspondence

## ENCLOSURE

Compact Disc Containing Standardized 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 No | Chemical Abstract Service Number |
| CD | compact disk |
| CDPHE | Colorado Department of Public Health and Environment |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| COC | contaminant of concern |
| CRA | Comprehensive Risk Assessment |
| DOE | U S Department of Energy |
| DQA | Data Quality Assessment |
| DQO | data quality objective |
| EPA | U S Environmental Protection Agency |
| ER | Environmental Restoration |
| ER RSOP | Environmental Restoration RSOP for Routine Soil Remediation |
| FB | field blank |
| ft | feet |
| FY | Fiscal Year |
| HRR | Historical Release Report |
| IA | Industrial Area |
| IASAP | Industrial Area Sampling and Analysis Plan |
| IHSS | Individual Hazardous Substance Site |
| IM/IRA | Interim Measure/Interim Remedial Action |
| IMP | Integrated Monitoring Program |
| K-H | Kaiser-Hill Company, L L C |
| LCS | laboratory control sample |
| ug/kg | micrograms per kilogram |
| ug/L | micrograms per liter |
| mg/kg | milligrams per kilogram |
| mg/L | milligrams per liter |
| MS | matrix spike |
| MSD | matrix spike duplicate |
| NA | not applicable |
| NFAA | No Further Accelerated Action |
| PAC | Potential Area of Concern |
| PARCCS | precision, accuracy, representativeness, completeness, comparability, and sensitivity |
| pCi/g | picocuries per gram |
| pCi/L | picocuries per liter |
| QC | Quality Control |
| RFCA | Rocky Flats Cleanup Agreement |
| RFETS or Site | Rocky Flats Environmental Technology Site |



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| | |
|---|---|
| RIN | report identification number |
| RL | Reporting Limit |
| RNS | rinse blank |
| RPD | relative percent difference |
| RSOP | RFCA Standard Operating Protocol |
| SAP | Sampling and Analysis Plan |
| SBD | sample beginning depth |
| SED | sample end depth |
| SOR | sum of ratios |
| SSRS | Subsurface Soil Risk Screen |
| SWD | Soil Water Database |
| TB | trip blank |
| V&V | verification and validation |
| VOC | volatile organic compound |
| WRW | wildlife refuge worker |

# 1.0 INTRODUCTION

This Data Summary Report summarizes accelerated action characterization conducted at Individual Hazardous Substance Site (IHSS) Group 600-5 at the Rocky Flats Environmental Technology Site (RFETS or Site) in Golden, Colorado These activities were planned and executed in accordance with the Industrial Area (IA) Sampling and Analysis Plan (SAP) (IASAP) (DOE 2001) and IASAP Addendum #IA-04-09 (DOE 2004) Results are compared to wildlife refuge worker (WRW) action levels (ALs) described in the Rocky Flats Cleanup Agreement (RFCA) Modification (DOE et al 2003) Potential ecological risk associated with the results will be evaluated in the Accelerated Action Ecological Screening Evaluation (AAESE) and the ecological portion of the Sitewide Comprehensive Risk Assessment (CRA)

This IHSS Group consists of one Potential Area of Concern (PAC)

- PAC 600-1004 – Central Avenue Ditch Cleaning

The location of IHSS Group 600-5 and PAC 600-1004 are shown on Figure 1

Approval of this Data Summary Report constitutes regulatory agency concurrence of IHSS Group 600-5 as a No Further Accelerated Action (NFAA) Site This information and NFAA determination will be documented in the Fiscal Year (FY) 2004 Historical Release Report (HRR)

# 2.0 SITE CHARACTERIZATION

IHSS Group 600-5 information consists of historical knowledge (DOE 1992-2003), historical sampling data, and recent sampling data Historical information and data are summarized in Section 2 1 Characterization data collected in accordance with IASAP Addendum #IA-04-09 (DOE 2004) are presented in Section 2 2

## 2.1 Historical Information and Data

PAC 600-1004 is an area of potentially contaminated soil previously removed from the Central Avenue Ditch, and spread on the level area adjacent to the two large fuel oil tanks that were located at the southwestern corner of Central Avenue and Seventh Street (IHSS 152) This activity was observed by the Colorado Department of Health (now the Colorado Department of Public Health and Environment [CDPHE]) in September 1993, and the operation was immediately shut down due to the potential of cross-contaminating IHSSs PAC 600-1004 is the area where the excavated soil was spread, and is designated as Central Avenue Ditch Cleaning

Existing information and data for this IHSS are available in Appendix C of the IASAP (DOE 2001), the Historical Release Reports (HRRs) (DOE 1992-2003), and the Final Closeout Report for IHSS Group 600-2 (PAC 400-802, Storage Shed South of Building 334) (DOE 2003a)



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## 2.2 Accelerated Action Characterization Data

The characterization of PAC 600-1004 involved 14 sampling locations Sampling and analysis specifications for 9 of these locations (BZ39-034, CA39-013-01, CA39-014, CA39-015, CA39-016, CB39-005, CB39-006, CB39-007, and CB39-008) were described in IASAP Addendum #IA-04-09 (DOE 2004) Deviations from these specifications are summarized in Table 1 Deviations associated with the 5 other locations (BZ39-005, CA39-000, CA39-002, CA39-012, and CA39-013) are discussed as part of the Final Closeout Report for IHSS Group 600-2 (PAC 400-802, Storage Shed South of Building 334) (DOE 2003a) These deviations were documented and approved in an ER Regulatory Contact Record dated April 13, 2004 (Appendix A) A summary of the actual sampling and analysis is presented in Table 2

Accelerated action soil sampling locations and analytical results for IHSS Group 600-5 are summarized in Table 3, and shown on Figures 2 and 3 for surface and subsurface soil, respectively Only results greater than background means plus two standard deviations or reporting limits (RLs) are shown Data show that all contaminant concentrations are less than RFCA WRW ALs The data, retrieved from the RFETS Soil Water Database (SWD) on May 18, 2004, are provided on the enclosed compact disc The compact disc contains standardized real and quality control (QC) data (Chemical Abstracts Service numbers [CAS No ], analyte names, and units)



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**Table 1**
**IHSS Group 600-5 Characterization Sampling Deviations**

| IHSS/PAC/UBC Site | Location | Proposed Northing | Proposed Easting | Actual Northing | Actual Easting | Media | Actual Depth (ft) | Actual Analyte | Comments |
|---|---|---|---|---|---|---|---|---|---|
| PAC 600-1004 | BZ39-034 | 749278 927 | 2082701 224 | 749272 940 | 2082701 365 | Surface soil | 0 0-0 5 | Metals<br>Radionuclides<br>SVOCs | Biased sample relocated 6 feet south of location in approved SAP (this location did not target a specific release, was intended for additional aerial coverage only) B interval shortened due to sampling refusal |
| | | | | | | Subsurface soil | 0 5-1 0 | Metals<br>Radionuclides<br>SVOCs<br>VOCs | |
| | CA39-013-01 | 749248 448 | 2082873 101 | 749248 424 | 2082873 061 | Surface soil | 0 0-0 5 | Metals<br>Radionuclides<br>SVOCs | B interval shortened due to sampling refusal |
| | | | | | | Subsurface soil | 0 5-1 5 | Metals<br>Radionuclides<br>SVOCs<br>VOCs | |
| | CA39-014 | 749273 510 | 2082847 257 | 749273 462 | 2082847 279 | Surface soil | 0 0-0 5 | Metals<br>Radionuclides<br>SVOCs | B interval shortened due to sampling refusal |
| | | | | | | Subsurface soil | 0 5-1 5 | Metals<br>Radionuclides<br>SVOCs<br>VOCs | |
| | CA39-015 | 749258 298 | 2082907 727 | 749258 328 | 2082907 733 | Surface soil | 0 0-0 5 | Metals<br>Radionuclides<br>SVOCs | B interval shortened due to sampling refusal |
| | | | | | | Subsurface soil | 0 5-2 0 | Metals<br>Radionuclides<br>SVOCs<br>VOCs | |
| | CA39-016 | 749283 360 | 2082881 883 | 749274 662 | 2082882 379 | Surface soil | 0 0-0 5 | Metals<br>Radionuclides<br>SVOCs | Statistical sample relocated 8 5 feet south of proposed location due to utility corridor interference B interval shortened due to sampling refusal |
| | | | | | | Subsurface soil | 0 5-2 0 | Metals<br>Radionuclides<br>SVOCs<br>VOCs | |

| IHSS/PAC/UBC Site | Location | Proposed Northing | Proposed Easting | Actual Northing | Actual Easting | Media | Actual Depth (ft) | Actual Analyte | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | CB39-005 | 749268 148 | 2082942 353 | 749268 185 | 2082942 394 | Surface soil | 0 0-0 5 | Metals<br>Radionuclides<br>SVOCs | B interval shortened due to sampling refusal |
| | | | | | | Subsurface soil | 0 5-2 0 | Metals<br>Radionuclides<br>SVOCs<br>VOCs | |
| | CB39-006 | 749252 936 | 2083002 823 | 749252 906 | 2083002 891 | Surface soil | 0 0-0 5 | Metals<br>Radionuclides<br>SVOCs | No deviations from the planned sampling specification |
| | | | | | | Subsurface soil | 0 5-2 5 | Metals<br>Radionuclides<br>SVOCs<br>VOCs | |
| | CB39-007 | 749277 998 | 2082976 979 | 749277 977 | 2082977 024 | Surface soil | 0 0-0 5 | Metals<br>Radionuclides<br>SVOCs | B interval shortened due to sampling refusal |
| | | | | | | Subsurface soil | 0 5-1 5 | Metals<br>Radionuclides<br>SVOCs<br>VOCs | |
| | CB39-008 | 749287 848 | 2083011 606 | 749281 859 | 2083011 585 | Surface soil | 0 0-0 5 | Metals<br>Radionuclides<br>SVOCs | Statistical sample relocated 3 5 feet south of proposed location due to utility corridor interference |
| | | | | | | Subsurface soil | 0 5-2 5 | Metals<br>Radionuclides<br>SVOCs<br>VOCs | |

**Table 2**
**IHSS Group 600-5 Sampling and Analysis Summary**

| IHSS Group | Category | Total Number of Samples Collected |
|---|---|---|
| 600-5 | Number of Sampling Locations | 9 |
| | Number of Samples | 18 |
| | Number of Metal Analyses | 18 |
| | Number of Radionuclide Analyses | 18 |
| | Number of SVOC Analyses | 18 |
| | Number of VOC Analyses | 9 |
| 600-2 | Number of Sampling Locations | 5 |
| | Number of Samples | 10 |
| | Number of Metal Analyses | 6 |
| | Number of Radionuclide Analyses | 8 |
| | Number of SVOC Analyses | 6 |
| | Number of VOC Analyses | 8 |

**Table 3**
**IHSS Group 600-5 Results Greater Than Background Means Plus Two Standard Deviations or Reporting Limits**

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PAC 600-1004 | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Acenaphthene | 130 000 | 32 000 | - | 40800000 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Anthracene | 240 000 | 25 000 | - | 204000000 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Benzo(a)anthracene | 760 000 | 26 000 | - | 34900 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Benzo(a)pyrene | 890 000 | 42 000 | - | 3490 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Benzo(b)fluoranthene | 650 000 | 30 000 | - | 34900 000 | ug/kg |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Benzo(k)fluoranthene | 820 000 | 33 000 | - | 349000 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Chrysene | 930 000 | 29 000 | - | 3490000 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Dibenz(a,h)anthracene | 310 000 | 26 000 | - | 3490 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Fluoranthene | 1800 000 | 24 000 | - | 27200000 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Fluorene | 110 000 | 35 000 | - | 40800000 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Indeno(1,2,3-cd)pyrene | 590 000 | 24 000 | - | 34900 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Pyrene | 1400 000 | 140 000 | - | 22100000 000 | ug/kg |
| | *BZ39-034* | *749278 910* | *2082701 200* | *0 00* | *0 50* | *Uranium-234* | *3 373* | - | *2 253* | *300 000* | *pCi/g* |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Uranium-235 | 0 240 | - | 0 094 | 8 000 | pCi/g |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 00 | 0 50 | Uranium-238 | 3 373 | - | 2 000 | 351 000 | pCi/g |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 50 | 1 00 | Benzo(a)anthracene | 47 000 | 28 000 | - | 34900 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 50 | 1 00 | Benzo(k)fluoranthene | 53 000 | 36 000 | - | 349000 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 50 | 1 00 | Chrysene | 56 000 | 31 000 | - | 3490000 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 50 | 1 00 | Fluoranthene | 96 000 | 25 000 | - | 27200000 000 | ug/kg |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 50 | 1 00 | Uranium-235 | 0 172 | - | 0 120 | 8 000 | pCi/g |
| | BZ39-034 | 749278 910 | 2082701 200 | 0 50 | 1 00 | Uranium-238 | 2 269 | - | 1 490 | 351 000 | pCi/g |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 00 | 0 50 | Benzo(a)anthracene | 100 000 | 29 000 | - | 34900 000 | ug/kg |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 00 | 0 50 | Benzo(a)pyrene | 130 000 | 46 000 | - | 3490 000 | ug/kg |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 00 | 0 50 | Benzo(b)fluoranthene | 93 000 | 33 000 | - | 34900 000 | ug/kg |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 00 | 0 50 | Benzo(k)fluoranthene | 110 000 | 37 000 | - | 349000 000 | ug/kg |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 00 | 0 50 | Chrysene | 120 000 | 32 000 | - | 3490000 000 | ug/kg |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 00 | 0 50 | Fluoranthene | 150 000 | 26 000 | - | 27200000 000 | ug/kg |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 00 | 0 50 | Indeno(1,2,3-cd)pyrene | 110 000 | 26 000 | - | 34900 000 | ug/kg |
| | *CA39-013-01* | *749248 424* | *2082873 061* | *0 00* | *0 50* | *Uranium-234* | *4 545* | - | *2 253* | *300 000* | *pCi/g* |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 00 | 0 50 | Uranium-235 | 0 276 | - | 0 094 | 8 000 | pCi/g |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 00 | 0 50 | Uranium-238 | 4 545 | - | 2 000 | 351 000 | pCi/g |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *CA39-013-01* | *749248 424* | *2082873 061* | *0 50* | *1 50* | *Uranium-234* | *4 280* | - | *2 640* | *300 000* | *pCi/g* |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 50 | 1 50 | Uranium-235 | 0 272 | - | 0 120 | 8 000 | pCi/g |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 50 | 1 50 | Uranium-238 | 4 280 | - | 1 490 | 351 000 | pCi/g |
| | CA39-013-01 | 749248 424 | 2082873 061 | 0 50 | 1 50 | Zinc | 150 000 | - | 139 100 | 307000 000 | mg/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Acenaphthene | 63 000 | 33 000 | - | 40800000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Anthracene | 210 000 | 25 000 | - | 204000000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Benzo(a)anthracene | 530 000 | 26 000 | - | 34900 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Benzo(a)pyrene | 460 000 | 43 000 | - | 3490 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Benzo(b)fluoranthene | 370 000 | 31 000 | - | 34900 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Benzo(k)fluoranthene | 470 000 | 34 000 | - | 349000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Chrysene | 590 000 | 30 000 | - | 3490000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Dibenz(a,h)anthracene | 140 000 | 26 000 | - | 3490 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Fluoranthene | 1300 000 | 24 000 | - | 27200000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Fluorene | 68 000 | 36 000 | - | 40800000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Indeno(1,2,3-cd)pyrene | 290 000 | 24 000 | - | 34900 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Pyrene | 1000 000 | 140 000 | - | 22100000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 00 | 0 50 | Uranium-235 | 0 148 | - | 0 094 | 8 000 | pCi/g |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Acenaphthene | 90 000 | 32 000 | - | 40800000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Anthracene | 110 000 | 25 000 | - | 204000000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Benzo(a)anthracene | 150 000 | 26 000 | - | 34900 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Benzo(a)pyrene | 160 000 | 42 000 | - | 3490 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Benzo(b)fluoranthene | 94 000 | 30 000 | - | 34900 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Benzo(k)fluoranthene | 140 000 | 33 000 | - | 349000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Chrysene | 170 000 | 29 000 | - | 3490000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Dibenzofuran | 39 000 | 37 000 | - | 2950000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Fluoranthene | 420 000 | 24 000 | - | 27200000 000 | ug/kg |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Fluorene | 77 000 | 35 000 | - | 40800000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Naphthalene | 63 000 | 33 000 | - | 3090000 000 | ug/kg |
| | CA39-014 | 749273 462 | 2082847 279 | 0 50 | 1 50 | Pyrene | 370 000 | 140 000 | - | 22100000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | Acenaphthene | 62 000 | 35 000 | - | 40800000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | Anthracene | 61 000 | 27 000 | - | 204000000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | Benzo(a)anthracene | 120 000 | 28 000 | - | 34900 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | Benzo(a)pyrene | 140 000 | 46 000 | - | 3490 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | Benzo(b)fluoranthene | 88 000 | 33 000 | - | 34900 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | Benzo(k)fluoranthene | 89 000 | 36 000 | - | 349000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | bis(2-Ethylhexyl)phthalate | 94 000 | 82 000 | - | 1970000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | Chrysene | 140 000 | 32 000 | - | 3490000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | Fluoranthene | 280 000 | 26 000 | - | 27200000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | Plutonium-239/240 | 0 578 | - | 0 066 | 50 000 | pCi/g |
| | CA39-015 | 749258 328 | 2082907 733 | 0 00 | 0 50 | Pyrene | 260 000 | 150 000 | - | 22100000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | 2-Methylnaphthalene | 40 000 | 35 000 | - | 20400000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Acenaphthene | 200 000 | 34 000 | - | 40800000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Anthracene | 190 000 | 26 000 | - | 204000000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Benzo(a)anthracene | 350 000 | 27 000 | - | 34900 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Benzo(a)pyrene | 360 000 | 44 000 | - | 3490 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Benzo(b)fluoranthene | 310 000 | 32 000 | - | 34900 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Benzo(k)fluoranthene | 280 000 | 35 000 | - | 349000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Chrysene | 400 000 | 31 000 | - | 3490000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Dibenzofuran | 66 000 | 40 000 | - | 2950000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Fluoranthene | 990 000 | 25 000 | - | 27200000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Fluorene | 150 000 | 38 000 | - | 40800000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Indeno(1,2,3-cd)pyrene | 270 000 | 25 000 | - | 34900 000 | ug/kg |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Naphthalene | 110 000 | 35 000 | - | 3090000 000 | ug/kg |
| | CA39-015 | 749258 328 | 2082907 733 | 0 50 | 2 00 | Pyrene | 890 000 | 150 000 | - | 22100000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | Anthracene | 43 000 | 24 000 | - | 204000000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | Benzo(a)anthracene | 110 000 | 25 000 | - | 34900 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | Benzo(a)pyrene | 140 000 | 40 000 | - | 3490 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | Benzo(b)fluoranthene | 100 000 | 29 000 | - | 34900 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | Benzo(k)fluoranthene | 140 000 | 32 000 | - | 349000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | bis(2-Ethylhexyl)phthalate | 130 000 | 72 000 | - | 1970000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | Chrysene | 140 000 | 28 000 | - | 3490000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | Fluoranthene | 270 000 | 23 000 | - | 27200000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | Indeno(1,2,3-cd)pyrene | 86 000 | 23 000 | - | 34900 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | Pyrene | 240 000 | 130 000 | - | 22100000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 00 | 0 50 | Uranium-235 | 0 138 | - | 0 094 | 8 000 | pCi/g |
| | CA39-016 | 749274 662 | 2082882 379 | 0 50 | 2 00 | Benzo(a)anthracene | 120 000 | 25 000 | - | 34900 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 50 | 2 00 | Benzo(a)pyrene | 140 000 | 41 000 | - | 3490 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 50 | 2 00 | Benzo(b)fluoranthene | 150 000 | 30 000 | - | 34900 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 50 | 2 00 | Benzo(k)fluoranthene | 99 000 | 33 000 | - | 349000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 50 | 2 00 | Chrysene | 160 000 | 29 000 | - | 3490000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 50 | 2 00 | Fluoranthene | 270 000 | 23 000 | - | 27200000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 50 | 2 00 | Indeno(1,2,3-cd)pyrene | 110 000 | 23 000 | - | 34900 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 50 | 2 00 | Pyrene | 250 000 | 140 000 | - | 22100000 000 | ug/kg |
| | CA39-016 | 749274 662 | 2082882 379 | 0 50 | 2 00 | Uranium-235 | 0 150 | - | 0 120 | 8 000 | pCi/g |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Acenaphthene | 220 000 | 36 000 | - | 40800000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Anthracene | 240 000 | 27 000 | - | 204000000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Benzo(a)anthracene | 510 000 | 29 000 | - | 34900 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Benzo(a)pyrene | 550 000 | 47 000 | - | 3490 000 | ug/kg |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Benzo(b)fluoranthene | 390 000 | 33 000 | - | 34900 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Benzo(k)fluoranthene | 510 000 | 37 000 | - | 349000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | bis(2-Ethylhexyl)phthalate | 96 000 | 83 000 | - | 1970000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Chrysene | 630 000 | 32 000 | - | 3490000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Dibenzofuran | 72 000 | 42 000 | - | 2950000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Fluoranthene | 1400 000 | 26 000 | - | 27200000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Fluorene | 160 000 | 39 000 | - | 40800000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Indeno(1,2,3-cd)pyrene | 420 000 | 26 000 | - | 34900 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Iron | 20000 000 | - | 18037 000 | 307000 000 | mg/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Naphthalene | 79 000 | 37 000 | - | 3090000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Pyrene | 1200 000 | 160 000 | - | 22100000 000 | ug/kg |
| | *CB39-005* | *749268 185* | *2082942 394* | *0 00* | *0 50* | *Uranium-234* | *4 753* | - | *2 253* | *300 000* | *pCi/g* |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Uranium-235 | 0 365 | - | 0 094 | 8 000 | pCi/g |
| | CB39-005 | 749268 185 | 2082942 394 | 0 00 | 0 50 | Uranium-238 | 4 753 | - | 2 000 | 351 000 | pCi/g |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Acenaphthene | 150 000 | 33 000 | - | 40800000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Anthracene | 170 000 | 26 000 | - | 204000000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Benzo(a)anthracene | 360 000 | 27 000 | - | 34900 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Benzo(a)pyrene | 430 000 | 43 000 | - | 3490 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Benzo(b)fluoranthene | 390 000 | 31 000 | - | 34900 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Benzo(k)fluoranthene | 310 000 | 34 000 | - | 349000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Chrysene | 450 000 | 30 000 | - | 3490000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Dibenzofuran | 48 000 | 39 000 | - | 2950000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Fluoranthene | 1100 000 | 24 000 | - | 27200000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Fluorene | 110 000 | 37 000 | - | 40800000 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Indeno(1,2,3-cd)pyrene | 300 000 | 24 000 | - | 34900 000 | ug/kg |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Pyrene | 890 000 | 140 000 | - | 22100000 000 | ug/kg |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *CB39-005* | *749268 185* | *2082942 394* | *0 50* | *2 00* | *Uranium-234* | *5 150* | - | *2 640* | *300 000* | *pCi/g* |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Uranium-235 | 0 271 | - | 0 120 | 8 000 | pCi/g |
| | CB39-005 | 749268 185 | 2082942 394 | 0 50 | 2 00 | Uranium-238 | 5 150 | - | 1 490 | 351 000 | pCi/g |
| | CB39-006 | 749252 906 | 2083002 891 | 0 00 | 0 50 | Benzo(a)anthracene | 72 000 | 28 000 | - | 34900 000 | ug/kg |
| | CB39-006 | 749252 906 | 2083002 891 | 0 00 | 0 50 | Benzo(b)fluoranthene | 60 000 | 33 000 | - | 34900 000 | ug/kg |
| | CB39-006 | 749252 906 | 2083002 891 | 0 00 | 0 50 | Benzo(k)fluoranthene | 80 000 | 36 000 | - | 349000 000 | ug/kg |
| | CB39-006 | 749252 906 | 2083002 891 | 0 00 | 0 50 | Chrysene | 93 000 | 32 000 | - | 3490000 000 | ug/kg |
| | CB39-006 | 749252 906 | 2083002 891 | 0 00 | 0 50 | Fluoranthene | 150 000 | 26 000 | - | 27200000 000 | ug/kg |
| | *CB39-006* | *749252 906* | *2083002 891* | *0 00* | *0 50* | *Uranium-234* | *2 375* | - | *2 253* | *300 000* | *pCi/g* |
| | CB39-006 | 749252 906 | 2083002 891 | 0 00 | 0 50 | Uranium-235 | 0 128 | - | 0 094 | 8 000 | pCi/g |
| | CB39-006 | 749252 906 | 2083002 891 | 0 00 | 0 50 | Uranium-238 | 2 375 | - | 2 000 | 351 000 | pCi/g |
| | CB39-006 | 749252 906 | 2083002 891 | 0 50 | 2 50 | Uranium-235 | 0 162 | - | 0 120 | 8 000 | pCi/g |
| | CB39-006 | 749252 906 | 2083002 891 | 0 50 | 2 50 | Uranium-238 | 1 979 | - | 1 490 | 351 000 | pCi/g |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Acenaphthene | 110 000 | 33 000 | - | 40800000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Anthracene | 160 000 | 25 000 | - | 204000000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Benzo(a)anthracene | 430 000 | 26 000 | - | 34900 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Benzo(a)pyrene | 520 000 | 43 000 | - | 3490 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Benzo(b)fluoranthene | 360 000 | 31 000 | - | 34900 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Benzo(k)fluoranthene | 500 000 | 34 000 | - | 349000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Chrysene | 510 000 | 29 000 | - | 3490000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Dibenz(a,h)anthracene | 170 000 | 26 000 | - | 3490 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Fluoranthene | 960 000 | 24 000 | - | 27200000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Fluorene | 81 000 | 36 000 | - | 40800000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Indeno(1,2,3-cd)pyrene | 390 000 | 24 000 | - | 34900 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Pyrene | 870 000 | 140 000 | - | 22100000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 00 | 0 50 | Uranium-235 | 0 116 | - | 0 094 | 8 000 | pCi/g |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Acenaphthene | 93 000 | 32 000 | - | 40800000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Anthracene | 140 000 | 25 000 | - | 204000000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Benzo(a)anthracene | 410 000 | 26 000 | - | 34900 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Benzo(a)pyrene | 460 000 | 42 000 | - | 3490 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Benzo(b)fluoranthene | 360 000 | 30 000 | - | 34900 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Benzo(k)fluoranthene | 400 000 | 33 000 | - | 349000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Chrysene | 520 000 | 29 000 | - | 3490000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Fluoranthene | 940 000 | 24 000 | - | 27200000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Fluorene | 71 000 | 35 000 | - | 40800000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Indeno(1,2,3-cd)pyrene | 320 000 | 24 000 | - | 34900 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Pyrene | 770 000 | 140 000 | - | 22100000 000 | ug/kg |
| | CB39-007 | 749277 977 | 2082977 024 | 0 50 | 1 50 | Uranium-235 | 0 174 | - | 0 120 | 8 000 | pCi/g |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | 2-Methylnaphthalene | 60 000 | 33 000 | - | 20400000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Acenaphthene | 270 000 | 32 000 | - | 40800000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Anthracene | 280 000 | 24 000 | - | 204000000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Benzo(a)anthracene | 680 000 | 25 000 | - | 34900 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Benzo(a)pyrene | 720 000 | 41 000 | - | 3490 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Benzo(b)fluoranthene | 630 000 | 30 000 | - | 34900 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Benzo(k)fluoranthene | 570 000 | 33 000 | - | 349000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | bis(2-Ethylhexyl)phthalate | 180 000 | 74 000 | - | 1970000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Chrysene | 820 000 | 29 000 | - | 3490000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Fluoranthene | 1600 000 | 23 000 | - | 27200000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Fluorene | 190 000 | 35 000 | - | 40800000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Indeno(1,2,3-cd)pyrene | 490 000 | 23 000 | - | 34900 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Naphthalene | 150 000 | 33 000 | - | 3090000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Pyrene | 1300 000 | 140 000 | - | 22100000 000 | ug/kg |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CB39-008 | 749281 859 | 2083011 585 | 0 00 | 0 50 | Zinc | 130 000 | - | 73 760 | 307000 000 | mg/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Acenaphthene | 73 000 | 31 000 | - | 40800000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Anthracene | 92 000 | 24 000 | - | 204000000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Benzo(a)anthracene | 260 000 | 25 000 | - | 34900 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Benzo(a)pyrene | 280 000 | 41 000 | - | 3490 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Benzo(b)fluoranthene | 200 000 | 29 000 | - | 34900 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Benzo(k)fluoranthene | 250 000 | 33 000 | - | 349000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | bis(2-Ethylhexyl)phthalate | 79 000 | 73 000 | - | 1970000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Chrysene | 320 000 | 28 000 | - | 3490000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Fluoranthene | 650 000 | 23 000 | - | 27200000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Fluorene | 57 000 | 35 000 | - | 40800000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Indeno(1,2,3-cd)pyrene | 200 000 | 23 000 | - | 34900 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Lead | 63 100 | - | 24 970 | 1000 000 | mg/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Pyrene | 580 000 | 140 000 | - | 22100000 000 | ug/kg |
| | CB39-008 | 749281 859 | 2083011 585 | 0 50 | 2 50 | Zinc | 150 000 | - | 139 100 | 307000 000 | mg/kg |
| IHSS 157 1 | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Acenaphthene | 130 000 | 46 000 | - | 40800000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Anthracene | 170 000 | 79 000 | - | 204000000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Benzo(a)anthracene | 340 000 | 39 000 | - | 34900 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Benzo(a)pyrene | 400 000 | 95 000 | - | 3490 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Benzo(b)fluoranthene | 340 000 | 100 000 | - | 34900 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Benzo(k)fluoranthene | 330 000 | 94 000 | - | 349000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Chrysene | 410 000 | 54 000 | - | 3490000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Fluoranthene | 980 000 | 85 000 | - | 27200000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Indeno(1,2,3-cd)pyrene | 300 000 | 48 000 | - | 34900 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Pyrene | 780 000 | 40 000 | - | 22100000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 00 | 0 50 | Uranium-235 | 0 095 | - | 0 094 | 8 000 | pCi/g |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Acenaphthene | 120 000 | 47 000 | - | 40800000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Anthracene | 280 000 | 80 000 | - | 204000000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Benzo(a)anthracene | 820 000 | 40 000 | - | 34900 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Benzo(a)pyrene | 890 000 | 96 000 | - | 3490 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Benzo(b)fluoranthene | 700 000 | 100 000 | - | 34900 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Benzo(k)fluoranthene | 720 000 | 95 000 | - | 349000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Chrysene | 960 000 | 55 000 | - | 3490000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Fluoranthene | 1600 000 | 86 000 | - | 27200000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Indeno(1,2,3-cd)pyrene | 660 000 | 49 000 | - | 34900 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Lead | 39 100 | - | 24 970 | 1000 000 | mg/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Pyrene | 1600 000 | 41 000 | - | 22100000 000 | ug/kg |
| | BZ39-005 | 749251 806 | 2082717 533 | 0 50 | 0 58 | Tetrachloroethene | 1 900 | 1 000 | - | 615000 000 | ug/kg |
| | CA39-000 | 749277 090 | 2082768 855 | 0 00 | 0 33 | Anthracene | 86 000 | 80 000 | - | 204000000 000 | ug/kg |
| | CA39-000 | 749277 090 | 2082768 855 | 0 00 | 0 33 | Benzo(a)anthracene | 300 000 | 40 000 | - | 34900 000 | ug/kg |
| | CA39-000 | 749277 090 | 2082768 855 | 0 00 | 0 33 | Benzo(a)pyrene | 330 000 | 96 000 | - | 3490 000 | ug/kg |
| | CA39-000 | 749277 090 | 2082768 855 | 0 00 | 0 33 | Benzo(b)fluoranthene | 240 000 | 100 000 | - | 34900 000 | ug/kg |
| | CA39-000 | 749277 090 | 2082768 855 | 0 00 | 0 33 | Benzo(k)fluoranthene | 260 000 | 95 000 | - | 349000 000 | ug/kg |
| | CA39-000 | 749277 090 | 2082768 855 | 0 00 | 0 33 | Chrysene | 330 000 | 55 000 | - | 3490000 000 | ug/kg |
| | CA39-000 | 749277 090 | 2082768 855 | 0 00 | 0 33 | Fluoranthene | 650 000 | 86 000 | - | 27200000 000 | ug/kg |
| | CA39-000 | 749277 090 | 2082768 855 | 0 00 | 0 33 | Indeno(1,2,3-cd)pyrene | 250 000 | 49 000 | - | 34900 000 | ug/kg |
| | CA39-000 | 749277 090 | 2082768 855 | 0 00 | 0 33 | Pyrene | 630 000 | 41 000 | - | 22100000 000 | ug/kg |
| | CA39-000 | 749277 090 | 2082768 855 | 0 00 | 0 33 | Uranium-235 | 0 168 | - | 0 094 | 8 000 | pCi/g |
| PAC 400-802 | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Antimony | 10 000 | - | 0 470 | 409 000 | mg/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Barium | 607 000 | - | 141 260 | 26400 000 | mg/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Benzo(a)anthracene | 48 000 | 41 000 | - | 34900 000 | ug/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | bis(2-Ethylhexyl)phthalate | 160 000 | 72 000 | - | 1970000 000 | ug/kg |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Chromium | 30 400 | - | 16 990 | 268 000 | mg/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Chrysene | 57 000 | 56 000 | - | 3490000 000 | ug/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Copper | 56 600 | - | 18 060 | 40900 000 | mg/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Iron | 29700 000 | - | 18037 000 | 307000 000 | mg/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Manganese | 552 000 | - | 365 080 | 3480 000 | mg/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Nickel | 31 800 | - | 14 910 | 20400 000 | mg/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Pyrene | 84 000 | 42 000 | - | 22100000 000 | ug/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Strontium | 264 000 | - | 48 940 | 613000 000 | mg/kg |
| | *CA39-002* | *749253 099* | *2082801 073* | *0 00* | *0 50* | *Uranium-234* | *6 000* | - | *2 253* | *300 000* | *pCi/g* |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Uranium-235 | 0 300 | - | 0 094 | 8 000 | pCi/g |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Uranium-238 | 6 000 | - | 2 000 | 351 000 | pCi/g |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Vanadium | 81 000 | - | 45 590 | 7150 000 | mg/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 00 | 0 50 | Zinc | 130 000 | - | 73 760 | 307000 000 | mg/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 50 | 2 50 | Naphthalene | 5 100 | 5 100 | - | 3090000 000 | ug/kg |
| | CA39-002 | 749253 099 | 2082801 073 | 0 50 | 2 50 | Uranium-235 | 0 200 | - | 0 120 | 8 000 | pCi/g |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Acenaphthene | 160 000 | 47 000 | - | 40800000 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Anthracene | 160 000 | 80 000 | - | 204000000 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Barium | 731 000 | - | 141 260 | 26400 000 | mg/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Benzo(a)anthracene | 330 000 | 40 000 | - | 34900 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Benzo(a)pyrene | 360 000 | 96 000 | - | 3490 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Benzo(b)fluoranthene | 310 000 | 100 000 | - | 34900 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Benzo(k)fluoranthene | 310 000 | 95 000 | - | 349000 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | bis(2-Ethylhexyl)phthalate | 76 000 | 71 000 | - | 1970000 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Chromium | 24 100 | - | 16 990 | 268 000 | mg/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Chrysene | 380 000 | 54 000 | - | 3490000 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Copper | 55 800 | - | 18 060 | 40900 000 | mg/kg |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Dibenz(a,h)anthracene | 100 000 | 48 000 | - | 3490 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Fluoranthene | 880 000 | 86 000 | - | 27200000 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Fluorene | 130 000 | 78 000 | - | 40800000 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Indeno(1,2,3-cd)pyrene | 230 000 | 49 000 | - | 34900 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Iron | 33400 000 | - | 18037 000 | 307000 000 | mg/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Manganese | 520 000 | - | 365 080 | 3480 000 | mg/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Naphthalene | 120 000 | 72 000 | - | 3090000 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Nickel | 36 500 | - | 14 910 | 20400 000 | mg/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Pyrene | 810 000 | 41 000 | - | 22100000 000 | ug/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Strontium | 279 000 | - | 48 940 | 613000 000 | mg/kg |
| | *CA39-012* | *749254 559* | *2082827 131* | *0 00* | *0 40* | *Uranium-234* | *3 000* | - | *2 253* | *300 000* | *pCi/g* |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Uranium-238 | 3 000 | - | 2 000 | 351 000 | pCi/g |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Vanadium | 74 100 | - | 45 590 | 7150 000 | mg/kg |
| | CA39-012 | 749254 559 | 2082827 131 | 0 00 | 0 40 | Zinc | 171 000 | - | 73 760 | 307000 000 | mg/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Acenaphthene | 78.000 | 47 000 | - | 40800000 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Anthracene | 220 000 | 80 000 | - | 204000000 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Arsenic | 14 800 | - | 10 090 | 22 200 | mg/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Barium | 742 000 | - | 141 260 | 26400 000 | mg/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Benzo(a)anthracene | 870 000 | 40 000 | - | 34900 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Benzo(a)pyrene | 940 000 | 97 000 | - | 3490 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Benzo(b)fluoranthene | 890 000 | 100 000 | - | 34900 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Benzo(k)fluoranthene | 850 000 | 96 000 | - | 349000 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | bis(2-Ethylhexyl)phthalate | 79 000 | 71 000 | - | 1970000 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Chromium | 47 700 | - | 16 990 | 268 000 | mg/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Chrysene | 190 000 | 55 000 | - | 3490000 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Copper | 78 700 | - | 18 060 | 40900 000 | mg/kg |

| IHSS, PAC, or UBC Site | Location Code | Actual Easting | Actual Northing | Start Depth (ft) | End Depth (ft) | Analyte | Result | Reporting Limit | Background Mean Plus Two Standard Deviations | WRW AL | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Dibenz(a,h)anthracene | 240 000 | 49 000 | - | 3490 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Fluoranthene | 1800 000 | 87 000 | - | 27200000 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Fluorene | 82 000 | 78 000 | - | 40800000 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Indeno(1,2,3-cd)pyrene | 540 000 | 50 000 | - | 34900 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Iron | 41300 000 | - | 18037 000 | 307000 000 | mg/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Nickel | 64 100 | - | 14 910 | 20400 000 | mg/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Pyrene | 1600 000 | 41 000 | - | 22100000 000 | ug/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Strontium | 179 000 | - | 48 940 | 613000 000 | mg/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Tin | 5 700 | - | 2 900 | 613000 000 | mg/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Uranium-235 | 0 200 | - | 0 094 | 8 000 | pCi/g |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Vanadium | 118 000 | - | 45 590 | 7150 000 | mg/kg |
| | CA39-013 | 749289 822 | 2082820 485 | 0 00 | 0 50 | Zinc | 184 000 | - | 73 760 | 307000 000 | mg/kg |
| | *CA39-013* | *749289 822* | *2082820 485* | *0 50* | *0 80* | *Uranium-234* | *5 000* | - | *2 640* | *300 000* | *pCi/g* |
| | CA39-013 | 749289 822 | 2082820 485 | 0 50 | 0 80 | Uranium-235 | 0 224 | - | 0 120 | 8 000 | pCi/g |
| | CA39-013 | 749289 822 | 2082820 485 | 0 50 | 0 80 | Uranium-238 | 5 000 | - | 1 490 | 351 000 | pCi/g |

## 2.3 Sums of Ratios

RFCA sums of ratios (SORs) were calculated for the IHSS Group 600-5 sampling locations SOR calculations were based on accelerated action analytical data for the radionuclides of concern (americium-241, plutonium-239/240, uranium-234, uranium-235, and uranium-238) with activities greater than background means plus two standard deviations Table 4 presents the SORs All radionuclide SORs are less than 1

**Table 4**
**RFCA SORs Based on IHSS Group 600-5 Radionuclide Activities**

| Location | Start Depth (ft) | End Depth (ft) | SOR |
|---|---|---|---|
| BZ39-005 | 0 0 | 0 5 | 0 012 |
| BZ39-034 | 0 0 | 0 5 | 0 051 |
| BZ39-034 | 0 5 | 1 0 | 0 028 |
| CA39-000 | 0 0 | 0 5 | 0 021 |
| CA39-002 | 0 0 | 0 5 | 0 075 |
| CA39-002 | 0 5 | 2 5 | 0 025 |
| CA39-012 | 0 0 | 0 5 | 0 019 |
| CA39-013 | 0 0 | 0 5 | 0 025 |
| CA39-013 | 0 5 | 0 8 | 0 059 |
| CA39-013-01 | 0 0 | 0 5 | 0 063 |
| CA39-013-01 | 0 5 | 1 5 | 0 060 |
| CA39-014 | 0 0 | 0 5 | 0 018 |
| CA39-015 | 0 0 | 0 5 | 0 005 |
| CA39-016 | 0 0 | 0 5 | 0 017 |
| CA39-016 | 0 5 | 2 0 | 0 019 |
| CB39-005 | 0 0 | 0 5 | 0 075 |
| CB39-005 | 0 5 | 2 0 | 0 066 |
| CB39-006 | 0 0 | 0 5 | 0 031 |
| CB39-006 | 0 5 | 2 5 | 0 026 |
| CB39-007 | 0 0 | 0 5 | 0 015 |
| CB39-007 | 0 5 | 1 5 | 0 022 |

SORs for non-radionuclides were calculated for all surface soil sampling locations where analyte concentrations were detected at 10 percent or more of a contaminant's WRW AL SORs for non-radionuclides are presented in Table 5 As shown, all SORs for non-radionuclides in surface soil are less than 1 Subsurface soil SORs for non-radionuclides were not calculated because subsurface soil concentrations are evaluated as part of the Subsurface Soil Risk Screen (SSRS) in Section 3 0



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**Table 5**
**IHSS Group 600-5 Non-Radionuclide Surface Soil SORs**

| Location Code | SOR to WRW |
|---|---|
| CA39-002 | 0 185 |
| CA39-013 | 0 177 |

## 2.4 Summary Statistics

Summary statistics, by analyte, were calculated for the IHSS Group 600-5 sampling locations and are presented in Tables 6 and 7 for surface and subsurface soil, respectively

**Table 6**
**Surface Soil Summary Statistics**

| Analyte | Number of Samples | Detection Frequency | Mean Concentration | Maximum Concentration | WRW AL | Background Mean Plus Two Standard Deviations | RL | Unit |
|---|---|---|---|---|---|---|---|---|
| 2-Methylnaphthalene | 14 | 7 14% | 60 000 | 60 000 | 20400000 | - | 33 000 | ug/kg |
| Acenaphthene | 14 | 64 29% | 135 889 | 270 000 | 40800000 | - | 37 889 | ug/kg |
| Anthracene | 14 | 78 57% | 170 000 | 280 000 | 204000000 | - | 45 091 | ug/kg |
| Antimony | 14 | 7 14% | 10 000 | 10 000 | 409 | 0 470 | - | mg/kg |
| Arsenic | 14 | 7 14% | 14 800 | 14 800 | 22 2 | 10 090 | - | mg/kg |
| Barium | 14 | 21 43% | 693 333 | 742 000 | 26400 | 141 260 | - | mg/kg |
| Benzo(a)anthracene | 14 | 100 00% | 371 429 | 870 000 | 34900 | - | 31 571 | ug/kg |
| Benzo(a)pyrene | 14 | 85 71% | 465 000 | 940 000 | 3490 | - | 61 000 | ug/kg |
| Benzo(b)fluoranthene | 14 | 92 86% | 347 769 | 890 000 | 34900 | - | 52 538 | ug/kg |
| Benzo(k)fluoranthene | 14 | 92 86% | 387 615 | 850 000 | 349000 | - | 53 231 | ug/kg |
| bis(2-Ethylhexyl)phthalate | 14 | 50 00% | 116 429 | 180 000 | 1970000 | - | 75 000 | ug/kg |
| Chromium | 14 | 21 43% | 34 067 | 47 700 | 268 | 16 990 | - | mg/kg |
| Chrysene | 14 | 100 00% | 381 429 | 930 000 | 3490000 | - | 39 071 | ug/kg |
| Copper | 14 | 21 43% | 63 700 | 78 700 | 40900 | 18 060 | - | mg/kg |
| Dibenz(a,h)anthracene | 14 | 35 71% | 192 000 | 310 000 | 3490 | - | 35 000 | ug/kg |
| Dibenzofuran | 14 | 7 14% | 72 000 | 72 000 | 2950000 | - | 42 000 | ug/kg |
| Fluoranthene | 14 | 92 86% | 940 000 | 1800 000 | 27200000 | - | 43 538 | ug/kg |
| Fluorene | 14 | 50 00% | 117 286 | 190 000 | 40800000 | - | 48 143 | ug/kg |
| Indeno(1,2,3-cd)pyrene | 14 | 78 57% | 336 000 | 590 000 | 34900 | - | 33 273 | ug/kg |
| Iron | 14 | 28 57% | 31100 000 | 41300 000 | 307000 | 18037 000 | - | mg/kg |
| Manganese | 14 | 14 29% | 536 000 | 552 000 | 3480 | 365 080 | - | mg/kg |
| Naphthalene | 14 | 21 43% | 116 333 | 150 000 | 3090000 | - | 47 333 | ug/kg |
| Nickel | 14 | 21 43% | 44 133 | 64 100 | 20400 | 14 910 | - | mg/kg |
| Plutonium-239/240 | 14 | 7 14% | 0 578 | 0 578 | 50 | 0 066 | - | pCi/g |
| Pyrene | 14 | 85 71% | 847 833 | 1600 000 | 22100000 | - | 100 417 | ug/kg |
| Strontium | 14 | 21 43% | 240 667 | 279 000 | 613000 | 48 940 | - | mg/kg |
| Tin | 14 | 7 14% | 5 700 | 5 700 | 613000 | 2 900 | - | mg/kg |
| Uranium-234 | 14 | 42 86% | 4 008 | 6 000 | 300 | 2 253 | - | pCi/g |



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| Analyte | Number of Samples | Detection Frequency | Mean Concentration | Maximum Concentration | WRW AL | Background Mean Plus Two Standard Deviations | RL | Unit |
|---|---|---|---|---|---|---|---|---|
| Uranium-235 | 14 | 78 57% | 0 198 | 0 365 | 8 | 0 094 | - | pCi/g |
| Uranium-238 | 14 | 42 86% | 4 008 | 6 000 | 351 | 2 000 | - | pCi/g |
| Vanadium | 14 | 21 43% | 91 033 | 118 000 | 7150 | 45 590 | - | mg/kg |
| Zinc | 14 | 28 57% | 153 750 | 184 000 | 307000 | 73 760 | - | mg/kg |

**Table 7**
**Subsurface Soil Summary Statistics**

| Analyte | Number of Samples | Detection Frequency | Mean Concentration | Maximum Concentration | WRW AL | Background Mean Plus Two Standard Deviations | RL | Unit |
|---|---|---|---|---|---|---|---|---|
| 2-Methylnaphthalene | 10 | 10 00% | 40 000 | 40 000 | 20400000 | - | 35 000 | ug/kg |
| Acenaphthene | 10 | 60 00% | 121 000 | 200 000 | 40800000 | - | 34 833 | ug/kg |
| Anthracene | 10 | 60 00% | 163 667 | 280 000 | 204000000 | - | 34 333 | ug/kg |
| Benzo(a)anthracene | 10 | 80 00% | 314 625 | 820 000 | 34900 | - | 28 000 | ug/kg |
| Benzo(a)pyrene | 10 | 70 00% | 388 571 | 890 000 | 3490 | - | 49 857 | ug/kg |
| Benzo(b)fluoranthene | 10 | 70 00% | 314 857 | 700 000 | 34900 | - | 40 286 | ug/kg |
| Benzo(k)fluoranthene | 10 | 80 00% | 281 500 | 720 000 | 349000 | - | 41 500 | ug/kg |
| bis(2-Ethylhexyl)phthalate | 10 | 10 00% | 79 000 | 79 000 | 1970000 | - | 73 000 | ug/kg |
| Chrysene | 10 | 80 00% | 379 500 | 960 000 | 3490000 | - | 32 750 | ug/kg |
| Dibenzofuran | 10 | 30 00% | 51 000 | 66 000 | 2950000 | - | 38 667 | ug/kg |
| Fluoranthene | 10 | 80 00% | 758 250 | 1600 000 | 27200000 | - | 31 750 | ug/kg |
| Fluorene | 10 | 50 00% | 93 000 | 150 000 | 40800000 | - | 36 000 | ug/kg |
| Indeno(1,2,3-cd)pyrene | 10 | 60 00% | 310 000 | 660 000 | 34900 | - | 28 000 | ug/kg |
| Lead | 10 | 20 00% | 51 100 | 63 100 | 1000 | 24 970 | - | mg/kg |
| Naphthalene | 12 | 25 00% | 59 367 | 110 000 | 3090000 | - | 24 367 | ug/kg |
| Pyrene | 10 | 70 00% | 764 286 | 1600 000 | 22100000 | - | 127 286 | ug/kg |
| Tetrachloroethene | 12 | 8 33% | 1 900 | 1 900 | 615000 | - | 1 000 | ug/kg |
| Uranium-234 | 12 | 25 00% | 4 810 | 5 150 | 300 | 2 640 | - | pCi/g |
| Uranium-235 | 12 | 66 67% | 0 203 | 0 272 | 8 | 0 120 | - | pCi/g |
| Uranium-238 | 12 | 41 67% | 3 736 | 5 150 | 351 | 1 490 | - | pCi/g |
| Zinc | 10 | 20 00% | 150 000 | 150 000 | 307000 | 139 100 | - | mg/kg |

## 3.0 SUBSURFACE SOIL RISK SCREEN

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

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

Yes All subsurface soil results are less than RFCA WRW ALs

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

No Based upon Figure 1 of RFCA Modification Attachment 5 (DOE et al 2003), the entire IHSS Group is not located in an area considered prone to landslides or erosion

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

No All radiological activities in this IHSS Group were below criteria specified in Section 5 3 and Attachment 14

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

Contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated by IHSS Group 600-5 COCs Migration via erosion is unlikely because IHSS Group 600-5 is not located in an area prone to landslides or erosion

Surface water runoff from PAC 600-1004 flows to the Central Avenue Ditch located immediately adjacent to the north Gaging station GS30 is located on the northeast corner of PAC 600-1004 within the Central Avenue Ditch Surface water data in SWD does not indicate any AL exceedances at this location Three gaging stations (GS38, GS27, and GS28) are located within 1,000-feet downgradient of PAC 600-1004 These three locations are Performance Monitoring Locations, which are part of the Integrated Monitoring Program (IMP) (DOE 2003b) These gaging stations reflect surface water conditions in this area of the IA Surface water quality at these locations may not be attributed to any single upgradient IHSS Group Surface water AL exceedances at these three locations are summarized in Table 8

**Table 8**
**Surface Water Exceedance Summary**

| Location Code | Analyte | Result Range | Surface Water Action Level | Detection Limit | Background | Result Unit |
|---|---|---|---|---|---|---|
| | | | Total Results | | | |
| GS27 | Aluminum | 5 200 - 46 000 | 0 087 | - | 3 447 | mg/L |
| GS27 | Americium-241 | 0 155 - 27 330 | 0 15 | - | 0 020 | pCi/L |
| GS27 | Arsenic | 0 007 - 0 017 | 0 000018 | - | 0 005 | mg/L |
| GS27 | Copper | 0 043 - 0 088 | 0 016 | - | 0 015 | mg/L |
| GS27 | Lead | 0 007 - 0 100 | 0 0065 | - | 0 007 | mg/L |
| GS27 | Plutonium-239/240 | 0 154 - 90 000 | 0 15 | - | 0 020 | pCi/L |
| GS27 | Zinc | 0 360 - 0 860 | 0 141 | - | 0 155 | mg/L |
| GS28 | Aluminum | 3 800 - 7 200 | 0 087 | - | 3 447 | mg/L |
| GS28 | Americium-241 | 0 189 - 0 240 | 0 15 | - | 0 020 | pCi/L |
| GS28 | Copper | 0 024 | 0 016 | - | 0 015 | mg/L |
| GS28 | Lead | 0 007 - 0 011 | 0 0065 | - | 0 007 | mg/L |
| GS28 | Plutonium-239/240 | 0 171 - 0 852 | 0 15 | - | 0 020 | pCi/L |
| GS28 | Zinc | 0 159 - 0 211 | 0 141 | - | 0 155 | mg/L |



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| Location Code | Analyte | Result Range | Surface Water Action Level | Detection Limit | Background | Result Unit |
|---|---|---|---|---|---|---|
| GS38 | Aluminum | 4 405 - 16 400 | 0 087 | - | 3 447 | mg/L |
| GS38 | Arsenic | 0 006 - 0 007 | 0 000018 | - | 0 005 | mg/L |
| GS38 | Copper | 0 018 - 0 039 | 0 016 | - | 0 015 | mg/L |
| GS38 | Lead | 0 008 - 0 036 | 0 0065 | - | 0 007 | mg/L |
| GS38 | Plutonium-239/240 | 0 174 - 0 345 | 0 15 | - | 0 020 | pCi/L |
| GS38 | Zinc | 0 161 - 0 688 | 0 141 | - | 0 155 | mg/L |

Groundwater flow in this area is to the northeast towards South Walnut Creek, approximately 3,000 feet away One groundwater monitoring well (85202) is located directly south of PAC 600-1004 Three groundwater wells (84402, P215789, and 84502) are located downgradient (within 550 feet) of PAC 600-1004 Groundwater data, retrieved from SWD on May 20, 2004, was reviewed for these wells Tier I and Tier II groundwater AL exceedances for these wells are summarized in Table 9 No AL exceedances were detected in well 84502 These wells reflect groundwater conditions in this area of the IA Groundwater quality at these locations may not be attributed to any single upgradient IHSS Group Monitoring wells around the area will continue to be sampled as part of the IMP (DOE 2003b) Further groundwater evaluation will be part of the groundwater plume Interim Measure/Interim Remedial Action (IM/IRA)

**Table 9**
**Groundwater Exceedance Summary**

| Location Code | Analyte | Result Range | Background | Detection Limit | Tier I | Tier II | Units |
|---|---|---|---|---|---|---|---|
| Dissolved Results | | | | | | | |
| P215789 | Thallium | 0 005 | 0 005 | - | 0 2 | 0 002 | mg/L |
| Total Results | | | | | | | |
| 84402 | Trichloroethene | 13 000 - 107 000 | - | 0 220 - 0 230 | 500 | 5 | ug/L |
| 85202 | Tetrachloroethene | 22 000 - 78 000 | - | 0 200 - 1 100 | 500 | 5 | ug/L |
| 85202 | Trichloroethene | 30 000 - 35 000 | - | 0 200 - 0 240 | 500 | 5 | ug/L |
| 85202 | Vinyl chloride | 8 100 - 16 000 | - | 0 260 - 0 300 | 200 | 2 | ug/L |
| P215789 | 1,1-Dichloroethene | 7 010 - 98 000 | - | 0 200 - 25 000 | 700 | 7 | ug/L |
| P215789 | Aluminum | 95 200 | 11 240 | - | 3650 | 36 5 | mg/L |
| P215789 | Barium | 2 010 | 0 193 | - | 200 | 2 | mg/L |
| P215789 | bis(2-Ethylhexyl)phthalate | 13 000 - 15 000 | - | 10 000 | 600 | 6 | ug/L |
| P215789 | Lead | 0 040 | 0 011 | - | 1 5 | 0 015 | mg/L |
| P215789 | Manganese | 3 220 - 4 620 | 0 296 | - | 172 | 1 72 | mg/L |
| P215789 | Methylene chloride | 25 000 | - | 25 000 | 500 | 5 | ug/L |
| P215789 | Radium-226 | 22 000 | 0 620 | - | 2000 | 20 | pCi/L |
| P215789 | Tetrachloroethene | 6 000 - 24 000 | - | 0 100 - 25 000 | 500 | 5 | ug/L |
| P215789 | Trichloroethene | 476 000 - 1500 000 | - | 0 100 - 50 000 | 500 | 5 | ug/L |



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## 4.0 NFAA SUMMARY

Based on analytical results and the SSRS, action is not required, and an NFAA determination is justified for IHSS Group 600-5 because of the following

- Concentrations of COCs were not detected above RFCA WRW ALs
- Migration of contaminants to surface water through erosion is unlikely because the area is not 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 600-5 The groundwater contamination is considered part of the IA Plume, which will be further evaluated in a future decision document

Approval of this Data Summary Report constitutes regulatory agency concurrence that IHSS Group 600-5 is an NFAA site This information and the NFAA determination will be documented in the FY04 HRR Ecological factors will be evaluated in the AAESE and the CRA

## 5.0 DATA QUALITY ASSESSMENT

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

- Regulatory agency-approved sampling program design (IASAP Addendum #IA-04-09 [DOE 2004]), modified due to field conditions, in accordance with the IASAP (DOE 2001),
- Collection of samples in accordance with the sampling design, and
- Results of the Data Quality Assessment (DQA), as described in the following sections

### 5.1 Data Quality Assessment Process

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

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

Verification and validation (V&V) of data are the primary components of the DQA The final data are compared with original project DQOs and evaluated with respect to project decisions, uncertainty within the decisions, and quality criteria required for the data,



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specifically precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) Validation criteria are consistent with the following RFETS-specific documents and industry guidelines

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

This report will be submitted to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Administrative Record (AR) for permanent storage 30 days after being provided to the Colorado Department of Public Health and Environment (CDPHE) and/or EPA

## 5.2 Verification and Validation of Results

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

- Chain-of-custody,
- Preservation and hold times,
- Instrument calibrations,
- Preparation blanks,
- Interference check samples (metals),



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- Matrix spikes/matrix spike duplicates (MS/MSDs),
- Laboratory control samples (LCSs),
- Field duplicate measurements,
- Chemical yield (radiochemistry),
- Required quantitation limits/minimum detectable activities (sensitivity of chemical and radiochemical measurements, respectively), and
- Sample analysis and preparation methods

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

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

Both real and QC data are included on the enclosed CD

### 5.2.1 Accuracy

The following measures of accuracy were evaluated

- LCS evaluation,
- Surrogate evaluation,
- Field blank evaluation, and
- Sample MS evaluation

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

*Laboratory Control Sample Evaluation*

The frequency of LCS measurements, relative to each laboratory batch, is given in Table 10 LCS frequency was adequate based on at least one LCS per batch The minimum and maximum LCS results are also tabulated by chemical for the entire project While not all LCS results are within tolerances, project decisions based on AL exceedances were not affected LCS results that were outside of tolerances were reviewed to determine whether a potential bias might be indicated LCS recoveries are not indicative of matrix effects 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 Since this is environmentally conservative, no further action is needed The analytes with unacceptable low recoveries were evaluated If the highest sample result is less than the AL divided by the lowest LCS recovery for that analyte, no further action is taken because any indicated bias is not great enough to make a falsely low sample result be above the AL As a result of these analyses, the LCS recoveries for this project did not impact project decisions Any qualifications of individual results due to LCS performance exceeding upper or lower tolerance limits are captured in the V&V flags, described in the Completeness Section 5 4 3

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

| CAS No | Analyte | Minimum | Maximum | Number of Laboratory Samples | Number of Laboratory Batches | Unit | Test Method |
|---|---|---|---|---|---|---|---|
| 71-55-6 | 1,1,1-Trichloroethane | 83 | 97 11 | 3 | 3 | %REC | SW-846 8260 |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | 85 05 | 103 6 | 3 | 3 | %REC | SW-846 8260 |
| 79-00-5 | 1,1,2-Trichloroethane | 85 15 | 103 9 | 3 | 3 | %REC | SW-846 8260 |
| 75-34-3 | 1,1-Dichloroethane | 97 52 | 101 1 | 3 | 3 | %REC | SW-846 8260 |
| 75-35-4 | 1,1-Dichloroethene | 78 | 114 6 | 4 | 4 | %REC | SW-846 8260 |
| 120-82-1 | 1,2,4-Trichlorobenzene | 77 | 77 | 1 | 1 | %REC | SW-846 8270 |
| 120-82-1 | 1,2,4-Trichlorobenzene | 96 84 | 96 84 | 1 | 1 | %REC | SW-846 8260 |
| 120-82-1 | 1,2,4-Trichlorobenzene | 65 | 77 | 5 | 3 | %REC | SW-846 8270B |
| 95-50-1 | 1,2-Dichlorobenzene | 93 | 97 03 | 3 | 3 | %REC | SW-846 8260 |
| 107-06-2 | 1,2-Dichloroethane | 84 9 | 99 32 | 3 | 3 | %REC | SW-846 8260 |
| 78-87-5 | 1,2-Dichloropropane | 98 25 | 102 | 3 | 3 | %REC | SW-846 8260 |
| 106-46-7 | 1,4-Dichlorobenzene | 91 | 96 51 | 3 | 3 | %REC | SW-846 8260 |
| 106-46-7 | 1,4-Dichlorobenzene | 63 | 70 | 5 | 3 | %REC | SW-846 8270B |
| 95-95-4 | 2,4,5-Trichlorophenol | 81 | 81 | 1 | 1 | %REC | SW-846 8270 |
| 88-06-2 | 2,4,6-Trichlorophenol | 81 | 81 | 1 | 1 | %REC | SW-846 8270 |
| 120-83-2 | 2,4-Dichlorophenol | 79 | 79 | 1 | 1 | %REC | SW-846 8270 |
| 105-67-9 | 2,4-Dimethylphenol | 78 | 78 | 1 | 1 | %REC | SW-846 8270 |
| 51-28-5 | 2,4-Dinitrophenol | 68 | 68 | 1 | 1 | %REC | SW-846 8270 |
| 121-14-2 | 2,4-Dinitrotoluene | 70 | 88 | 5 | 3 | %REC | SW-846 8270B |
| 121-14-2 | 2,4-Dinitrotoluene | 82 | 82 | 1 | 1 | %REC | SW-846 8270 |
| 606-20-2 | 2,6-Dinitrotoluene | 84 | 84 | 1 | 1 | %REC | SW-846 8270 |
| 78-93-3 | 2-Butanone | 53 23 | 106 8 | 3 | 3 | %REC | SW-846 8260 |
| 91-58-7 | 2-Chloronaphthalene | 79 | 79 | 1 | 1 | %REC | SW-846 8270 |
| 95-57-8 | 2-Chlorophenol | 80 | 80 | 1 | 1 | %REC | SW-846 8270 |
| 95-57-8 | 2-Chlorophenol | 70 | 82 | 5 | 3 | %REC | SW-846 8270B |
| 91-57-6 | 2-Methylnaphthalene | 79 | 79 | 1 | 1 | %REC | SW-846 8270 |
| 95-48-7 | 2-Methylphenol | 79 | 79 | 1 | 1 | %REC | SW-846 8270 |
| 88-74-4 | 2-Nitroaniline | 80 | 80 | 1 | 1 | %REC | SW-846 8270 |
| 91-94-1 | 3,3'-Dichlorobenzidine | 72 | 72 | 1 | 1 | %REC | SW-846 8270 |
| 534-52-1 | 4,6-Dinitro-2-methylphenol | 69 | 69 | 1 | 1 | %REC | SW-846 8270 |
| 106-47-8 | 4-Chloroaniline | 63 | 63 | 1 | 1 | %REC | SW-846 8270 |



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| CAS No. | Analyte | Minimum | Maximum | Number of Laboratory Samples | Number of Laboratory Batches | Unit | Test Method |
|---|---|---|---|---|---|---|---|
| 108-10-1 | 4-Methyl-2-pentanone | 63 22 | 98 | 3 | 3 | %REC | SW-846 8260 |
| 106-44-5 | 4-Methylphenol | 81 | 81 | 1 | 1 | %REC | SW-846 8270 |
| 100-02-7 | 4-Nitrophenol | 85 | 85 | 1 | 1 | %REC | SW-846 8270 |
| 100-02-7 | 4-Nitrophenol | 71 | 85 | 5 | 3 | %REC | SW-846 8270B |
| 83-32-9 | Acenaphthene | 65 | 80 | 5 | 3 | %REC | SW-846 8270B |
| 83-32-9 | Acenaphthene | 78 | 78 | 1 | 1 | %REC | SW-846 8270 |
| 67-64-1 | Acetone | 51 49 | 135 1 | 3 | 3 | %REC | SW-846 8260 |
| 7429-90-5 | Aluminum | 94 | 113 | 2 | 2 | %REC | SW-846 6010/6010B |
| 120-12-7 | Anthracene | 82 | 82 | 1 | 1 | %REC | SW-846 8270 |
| 7440-36-0 | Antimony | 94 | 114 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-38-2 | Arsenic | 92 | 93 7 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-39-3 | Barium | 97 | 109 | 2 | 2 | %REC | SW-846 6010/6010B |
| 71-43-2 | Benzene | 90 | 104 | 4 | 4 | %REC | SW-846 8260 |
| 56-55-3 | Benzo(a)anthracene | 78 | 78 | 1 | 1 | %REC | SW-846 8270 |
| 50-32-8 | Benzo(a)pyrene | 82 | 82 | 1 | 1 | %REC | SW-846 8270 |
| 205-99-2 | Benzo(b)fluoranthene | 74 | 74 | 1 | 1 | %REC | SW-846 8270 |
| 207-08-9 | Benzo(k)fluoranthene | 81 | 81 | 1 | 1 | %REC | SW-846 8270 |
| 65-85-0 | Benzoic Acid | 56 | 56 | 1 | 1 | %REC | SW-846 8270 |
| 100-51-6 | Benzyl Alcohol | 86 | 86 | 1 | 1 | %REC | SW-846 8270 |
| 7440-41-7 | Beryllium | 87 | 93 9 | 2 | 2 | %REC | SW-846 6010/6010B |
| 111-44-4 | bis(2-Chloroethyl)ether | 76 | 76 | 1 | 1 | %REC | SW-846 8270 |
| 39638-32-9 | bis(2-Chloroisopropyl)ether | 77 | 77 | 1 | 1 | %REC | SW-846 8270 |
| 117-81-7 | bis(2-Ethylhexyl)phthalate | 79 | 79 | 1 | 1 | %REC | SW-846 8270 |
| 75-27-4 | Bromodichloromethane | 87 34 | 101 4 | 3 | 3 | %REC | SW-846 8260 |
| 75-25-2 | Bromoform | 79 1 | 99 54 | 3 | 3 | %REC | SW-846 8260 |
| 74-83-9 | Bromomethane | 94 25 | 130 3 | 3 | 3 | %REC | SW-846 8260 |
| 85-68-7 | Butylbenzylphthalate | 84 | 84 | 1 | 1 | %REC | SW-846 8270 |
| 7440-43-9 | Cadmium | 91 | 99 7 | 2 | 2 | %REC | SW-846 6010/6010B |
| 75-15-0 | Carbon Disulfide | 74 | 122 4 | 3 | 3 | %REC | SW-846 8260 |
| 56-23-5 | Carbon Tetrachloride | 81 | 96 3 | 3 | 3 | %REC | SW-846 8260 |
| 108-90-7 | Chlorobenzene | 95 64 | 98 | 4 | 4 | %REC | SW-846 8260 |
| 75-00-3 | Chloroethane | 92 34 | 124 2 | 3 | 3 | %REC | SW-846 8260 |
| 67-66-3 | Chloroform | 92 | 98 85 | 3 | 3 | %REC | SW-846 8260 |
| 74-87-3 | Chloromethane | 75 14 | 158 5 | 3 | 3 | %REC | SW-846 8260 |
| 7440-47-3 | Chromium | 93 | 105 | 2 | 2 | %REC | SW-846 6010/6010B |
| 218-01-9 | Chrysene | 76 | 76 | 1 | 1 | %REC | SW-846 8270 |
| 10061-01-5 | cis-1,3-Dichloropropene | 90 2 | 99 46 | 3 | 3 | %REC | SW-846 8260 |
| 7440-48-4 | Cobalt | 89 | 112 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-50-8 | Copper | 98 | 110 | 2 | 2 | %REC | SW-846 6010/6010B |
| 84-74-2 | Di-n-butylphthalate | 87 | 87 | 1 | 1 | %REC | SW-846 8270 |
| 117-84-0 | Di-n-octylphthalate | 76 | 76 | 1 | 1 | %REC | SW-846 8270 |



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| CAS No. | Analyte | Minimum | Maximum | Number of Laboratory Samples | Number of Laboratory Batches | Unit | Test Method |
|---|---|---|---|---|---|---|---|
| 53-70-3 | Dibenz(a,h)anthracene | 74 | 74 | 1 | 1 | %REC | SW-846 8270 |
| 132-64-9 | Dibenzofuran | 81 | 81 | 1 | 1 | %REC | SW-846 8270 |
| 124-48-1 | Dibromochloromethane | 88 09 | 100 2 | 3 | 3 | %REC | SW-846 8260 |
| 84-66-2 | Diethylphthalate | 79 | 79 | 1 | 1 | %REC | SW-846 8270 |
| 131-11-3 | Dimethylphthalate | 79 | 79 | 1 | 1 | %REC | SW-846 8270 |
| 100-41-4 | Ethylbenzene | 96 39 | 101 5 | 3 | 3 | %REC | SW-846 8260 |
| 206-44-0 | Fluoranthene | 84 | 84 | 1 | 1 | %REC | SW-846 8270 |
| 86-73-7 | Fluorene | 77 | 77 | 1 | 1 | %REC | SW-846 8270 |
| 118-74-1 | Hexachlorobenzene | 80 | 80 | 1 | 1 | %REC | SW-846 8270 |
| 87-68-3 | Hexachlorobutadiene | 94 82 | 94 82 | 1 | 1 | %REC | SW-846 8260 |
| 87-68-3 | Hexachlorobutadiene | 78 | 78 | 1 | 1 | %REC | SW-846 8270 |
| 77-47-4 | Hexachlorocyclopentadiene | 66 | 66 | 1 | 1 | %REC | SW-846 8270 |
| 67-72-1 | Hexachloroethane | 78 | 78 | 1 | 1 | %REC | SW-846 8270 |
| 193-39-5 | Indeno(1,2,3-cd)pyrene | 75 | 75 | 1 | 1 | %REC | SW-846 8270 |
| 7439-89-6 | Iron | 94 | 189 | 2 | 2 | %REC | SW-846 6010/6010B |
| 78-59-1 | Isophorone | 80 | 80 | 1 | 1 | %REC | SW-846 8270 |
| 7439-92-1 | Lead | 93 | 108 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7439-93-2 | Lithium | 94 | 109 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7439-96-5 | Manganese | 92 | 109 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7439-97-6 | Mercury | 98 | 100 | 2 | 2 | %REC | SW-846 6010/6010B |
| 75-09-2 | Methylene chloride | 96 39 | 103 | 3 | 3 | %REC | SW-846 8260 |
| 7439-98-7 | Molybdenum | 88 | 105 | 2 | 2 | %REC | SW-846 6010/6010B |
| 86-30-6 | n-Nitrosodiphenylamine | 86 | 86 | 1 | 1 | %REC | SW-846 8270 |
| 621-64-7 | n-Nitrosodipropylamine | 81 | 81 | 1 | 1 | %REC | SW-846 8270 |
| 621-64-7 | n-Nitrosodipropylamine | 67 | 75 | 5 | 3 | %REC | SW-846 8270B |
| 91-20-3 | Naphthalene | 77 | 77 | 1 | 1 | %REC | SW-846 8270 |
| 91-20-3 | Naphthalene | 99 3 | 99 3 | 1 | 1 | %REC | SW-846 8260 |
| 7440-02-0 | Nickel | 94 | 106 | 2 | 2 | %REC | SW-846 6010/6010B |
| 98-95-3 | Nitrobenzene | 79 | 79 | 1 | 1 | %REC | SW-846 8270 |
| 87-86-5 | Pentachlorophenol | 56 | 69 | 5 | 3 | %REC | SW-846 8270B |
| 87-86-5 | Pentachlorophenol | 68 | 68 | 1 | 1 | %REC | SW-846 8270 |
| 108-95-2 | Phenol | 70 | 80 | 5 | 3 | %REC | SW-846 8270B |
| 108-95-2 | Phenol | 79 | 79 | 1 | 1 | %REC | SW-846 8270 |
| 129-00-0 | Pyrene | 75 | 75 | 1 | 1 | %REC | SW-846 8270 |
| 129-00-0 | Pyrene | 63 | 72 | 5 | 3 | %REC | SW-846 8270B |
| 7782-49-2 | Selenium | 85 1 | 93 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-22-4 | Silver | 97 4 | 102 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-24-6 | Strontium | 97 | 109 | 2 | 2 | %REC | SW-846 6010/6010B |
| 100-42-5 | Styrene | 97 | 101 2 | 3 | 3 | %REC | SW-846 8260 |
| 127-18-4 | Tetrachloroethene | 96 | 99 15 | 3 | 3 | %REC | SW-846 8260 |
| 7440-31-5 | Tin | 89 | 101 | 2 | 2 | %REC | SW-846 6010/6010B |



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| CAS No | Analyte | Minimum | Maximum | Number of Laboratory Samples | Number of Laboratory Batches | Unit | Test Method |
|---|---|---|---|---|---|---|---|
| 108-88-3 | Toluene | 96 | 115 6 | 4 | 4 | %REC | SW-846 8260 |
| 10061-02-6 | trans-1,3-Dichloropropene | 92 92 | 101 7 | 3 | 3 | %REC | SW-846 8260 |
| 79-01-6 | Trichloroethene | 95 99 | 99 19 | 4 | 4 | %REC | SW-846 8260 |
| 11-09-6 | Uranium, Total | 101 | 109 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-62-2 | Vanadium | 80 4 | 91 | 2 | 2 | %REC | SW-846 6010/6010B |
| 75-01-4 | Vinyl chloride | 89 02 | 151 7 | 3 | 3 | %REC | SW-846 8260 |
| 1330-20-7 | Xylene | 90 2 | 99 93 | 3 | 3 | %REC | SW-846 8260 |
| 7440-66-6 | Zinc | 85 | 110 | 2 | 2 | %REC | SW-846 6010/6010B |

Surrogate Evaluation

The frequency of surrogate measurements relative to each laboratory batch is given in Table 11 Surrogate frequency was adequate based on at least one set per sample The minimum and maximum surrogate results are also tabulated by chemical for the entire project Surrogates are added to every sample, and therefore surrogate recoveries only impact individual samples Unacceptable surrogate recoveries can indicate potential matrix effects The highest and lowest surrogate recoveries for this project were reviewed, and the associated samples results were not near enough to the AL to indicate project decisions would be impacted Any qualifications of results due to surrogate results are captured in the V&V flags, described in Section 5 2 3

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

| Number of Samples | Analyte | Minimum Concentration | Maximum Concentration | Unit |
|---|---|---|---|---|
| **VOC Surrogate Recoveries** | | | | |
| 12 | 4-Bromofluorobenzene | 87 | 114 9 | %REC |
| 12 | Deuterated 1,2-dichloroethane | 92 | 125 1 | %REC |
| 12 | Deuterated Toluene | 92 77 | 110 5 | %REC |
| **SVOC Surrogate Recoveries** | | | | |
| 24 | 2-Fluorobiphenyl | 49 | 75 | %REC |
| 24 | 2-Fluorophenol | 61 | 86 | %REC |
| 24 | Deuterated Nitrobenzene | 60 | 82 | %REC |
| 24 | p-Terphenyl-d14 | 51 | 86 | %REC |

*Field Blank Evaluation*

Results of the field blank analyses are given in Table 12 Detectable amounts of contaminants within the blanks, which could indicate possible cross-contamination of samples, are evaluated if the same contaminant is detected in the associated real samples When the real result is less than 10 times the blank result for laboratory contaminants and 5 times the result for non-laboratory contaminants, the real result is eliminated None of



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the chemicals were detected in the blanks at concentrations greater than one-tenth the AL Therefore, no sample results at or above the AL could have been impacted by the blanks

**Table 12**
**Field Blank Summary**

| Sample QC Code | Test Method | Analyte | Maximum Detected Value | Unit |
|---|---|---|---|---|
| FB | SW-846 8260 | 2-Butanone | 4 | ug/L |
| TB | SW-846 8260 | 2-Butanone | 5 | ug/L |
| TB | SW-846 8260 | Acetone | 2 5 | ug/L |
| FB | EPA 600 | Aluminum | 19 4 | ug/L |
| RNS | SW-846 6010/6010B | Aluminum | 23 | ug/L |
| RNS | SW-846 6010/6010B | Barium | 1 2 | ug/L |
| TB | SW8260B | Benzene | 0 91 | ug/L |
| TB | SW-846 8260 | Benzene | 0 91 | ug/L |
| RNS | SW-846 8270B | bis(2-Ethylhexyl)phthalate | 3 9 | ug/L |
| TB | SW8260B | Chlorobenzene | 1 2 | ug/L |
| TB | SW-846 8260 | Chlorobenzene | 1 2 | ug/L |
| FB | EPA 600 | Chromium | 0 65 | ug/L |
| RNS | EPA 600 | Chromium | 0 83 | ug/L |
| FB | EPA 600 | Copper | 17 | ug/L |
| RNS | EPA 600 | Copper | 1 9 | ug/L |
| RNS | SW-846 6010/6010B | Iron | 65 | ug/L |
| RNS | EPA 600 | Iron | 187 | ug/L |
| FB | EPA 600 | Lead | 0 269 | ug/L |
| RNS | EPA 600 | Lead | 0 317 | ug/L |
| RNS | SW-846 6010/6010B | Manganese | 1 1 | ug/L |
| FB | EPA 600 | Manganese | 0 59 | ug/L |
| RNS | EPA 600 | Manganese | 1 62 | ug/L |
| RNS | SW-846 6010/6010B | Mercury | 0 016 | ug/L |
| FB | SW-846 8270 | Phenol | 1 7 | ug/L |
| RNS | EPA 600 | Strontium | 6 3 | ug/L |
| RNS | SW-846 6010/6010B | Strontium | 0 53 | ug/L |
| FB | SW-846 8260 | Toluene | 1 3 | ug/L |
| TB | SW-846 8260 | Toluene | 1 4 | ug/L |
| TB | SW-846 8260 | Toluene | 1 3 | ug/L |
| TB | SW8260B | Toluene | 1 3 | ug/L |
| FB | GAMMAISOCS | Uranium-235 | 0 108 | pCi/g |
| FB | GAMMA SPECTROSCOPY | Uranium-235 | 0 108 | pCi/g |
| RNS | GAMMA SPECTROSCOPY | Uranium-235 | 0 201 | pCi/g |
| FB | GAMMAISOCS | Uranium-238 | 1 99 | pCi/g |
| FB | GAMMA SPECTROSCOPY | Uranium-238 | 1 99 | pCi/g |
| RNS | GAMMA SPECTROSCOPY | Uranium-238 | 2 66 | pCi/g |
| RNS | GAMMA SPECTROSCOPY | Uranium-238 | 2 66 | pCi/g |



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| Sample QC Code | Test Method | Analyte | Maximum Detected Value | Unit |
|---|---|---|---|---|
| RNS | SW-846 6010/6010B | Zinc | 16 4 | ug/L |
| FB | EPA 600 | Zinc | 3 7 | ug/L |
| RNS | EPA 600 | Zinc | 3 5 | ug/L |

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

*Sample Matrix Spike Evaluation*

The frequency of MS measurements, relative to each laboratory batch, was adequate based on at least one MS per batch The minimum and maximum MS results are summarized by chemical for the entire project in Table 13 Organic analytes with unacceptable low recoveries resulted in a review of the LCS recoveries According to the EPA data validation guidelines, if organic matrix spike recoveries are low, then the LCS recovery is to be checked and, if acceptable, no action is to be taken For this project, these checks indicate no decisions were impacted for organic analytes For inorganics, the associated sample results were divided by the lowest percent recovery for each analyte If the resulting number is less than the AL, decisions were not impacted, therefore no action was taken For this project, all results were acceptable, however, iron had 0% recovery as a low For this analyte, the action level was at least a factor of three times higher than the highest sample result, therefore no decisions were impacted

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

| CAS No | Analyte | Minimum Concentration | Maximum Concentration | Number of Laboratory Samples | Number of Laboratory Batches | Unit | Test Method |
|---|---|---|---|---|---|---|---|
| 71-55-6 | 1,1,1-Trichloroethane | 82 | 89 76 | 2 | 2 | %REC | SW-846 8260 |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | 101 5 | 105 | 2 | 2 | %REC | SW-846 8260 |
| 79-00-5 | 1,1 2-Trichloroethane | 99 62 | 103 | 2 | 2 | %REC | SW-846 8260 |
| 75-34-3 | 1 1-Dichloroethane | 87 08 | 97 | 2 | 2 | %REC | SW-846 8260 |
| 75-35-4 | 1,1-Dichloroethene | 74 5 | 99 | 3 | 3 | %REC | SW-846 8260 |
| 120-82-1 | 1,2 4-Trichlorobenzene | 67 | 67 | 1 | 1 | %REC | SW-846 8270 |
| 120-82-1 | 1 2 4-Trichlorobenzene | 55 | 57 | 2 | 2 | %REC | SW-846 8270B |
| 95-50-1 | 1,2-Dichlorobenzene | 88 | 90 78 | 2 | 2 | %REC | SW-846 8260 |
| 107-06-2 | 1 2-Dichloroethane | 90 | 100 8 | 2 | 2 | %REC | SW-846 8260 |
| 78-87-5 | 1 2-Dichloropropane | 91 93 | 100 | 2 | 2 | %REC | SW-846 8260 |
| 106-46-7 | 1 4-Dichlorobenzene | 91 62 | 92 | 2 | 2 | %REC | SW-846 8260 |
| 106-46 7 | 1,4-Dichlorobenzene | 50 | 51 | 2 | 2 | %REC | SW-846 8270B |
| 95-95-4 | 2,4 5-Trichlorophenol | 66 | 66 | 1 | 1 | %REC | SW-846 8270 |
| 88-06-2 | 2,4,6-Trichlorophenol | 65 | 65 | 1 | 1 | %REC | SW-846 8270 |
| 120-83-2 | 2 4-Dichlorophenol | 63 | 63 | 1 | 1 | %REC | SW-846 8270 |
| 105-67-9 | 2,4-Dimethylphenol | 66 | 66 | 1 | 1 | %REC | SW-846 8270 |
| 51-28-5 | 2 4-Dinitrophenol | 53 | 53 | 1 | 1 | %REC | SW-846 8270 |
| 121-14-2 | 2,4-Dinitrotoluene | 72 | 72 | 1 | 1 | %REC | SW-846 8270 |



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| CAS No | Analyte | Minimum Concentration | Maximum Concentration | Number of Laboratory Samples | Number of Laboratory Batches | Unit | Test Method |
|---|---|---|---|---|---|---|---|
| 121-14-2 | 2 4-Dinitrotoluene | 51 | 65 | 2 | 2 | %REC | SW-846 8270B |
| 606-20 2 | 2 6 Dinitrotoluene | 72 | 72 | 1 | 1 | %REC | SW-846 8270 |
| 78-93-3 | 2-Butanone | 91 | 111 | 2 | 2 | %REC | SW-846 8260 |
| 91-58-7 | 2-Chloronaphthalene | 67 | 67 | 1 | 1 | %REC | SW-846 8270 |
| 95-57-8 | 2 Chlorophenol | 68 | 68 | 1 | 1 | %REC | SW 846 8270 |
| 95-57 8 | 2 Chlorophenol | 59 | 61 | 2 | 2 | %REC | SW-846 8270B |
| 91-57 6 | 2 Methylnaphthalene | 68 | 68 | 1 | 1 | %REC | SW-846 8270 |
| 95-48-7 | 2 Methylphenol | 67 | 67 | 1 | 1 | %REC | SW-846 8270 |
| 88-74-4 | 2-Nitroaniline | 70 | 70 | 1 | 1 | %REC | SW-846 8270 |
| 91-94-1 | 3 3' Dichlorobenzidine | 61 | 61 | 1 | 1 | %REC | SW-846 8270 |
| 534-52 1 | 4,6-Dinitro-2-methylphenol | 54 | 54 | 1 | 1 | %REC | SW-846 8270 |
| 106-47-8 | 4-Chloroaniline | 58 | 58 | 1 | 1 | %REC | SW-846 8270 |
| 108-10-1 | 4-Methyl-2-pentanone | 102 | 117 | 2 | 2 | %REC | SW-846 8260 |
| 106-44-5 | 4 Methylphenol | 70 | 70 | 1 | 1 | %REC | SW-846 8270 |
| 100-02-7 | 4 Nitrophenol | 74 | 74 | 1 | 1 | %REC | SW-846 8270 |
| 100 02-7 | 4 Nitrophenol | 68 | 79 | 2 | 2 | %REC | SW-846 8270B |
| 83-32 9 | Acenaphthene | 65 | 65 | 1 | 1 | %REC | SW-846 8270 |
| 83-32-9 | Acenaphthene | 52 | 57 | 2 | 2 | %REC | SW-846 8270B |
| 67-64-1 | Acetone | 75 | 100 2 | 2 | 2 | %REC | SW-846 8260 |
| 7429-90 5 | Aluminum | 102 | 1660 | 2 | 2 | %REC | SW-846 6010/6010B |
| 120-12-7 | Anthracene | 60 | 60 | 1 | 1 | %REC | SW-846 8270 |
| 7440-36-0 | Antimony | 41 7 | 46 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-38 2 | Arsenic | 89 9 | 92 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-39 3 | Barium | 95 | 115 | 2 | 2 | %REC | SW-846 6010/6010B |
| 71-43-2 | Benzene | 87 | 102 | 3 | 3 | %REC | SW-846 8260 |
| 56-55-3 | Benzo(a)anthracene | 63 | 63 | 1 | 1 | %REC | SW-846 8270 |
| 50-32-8 | Benzo(a)pyrene | 61 | 61 | 1 | 1 | %REC | SW-846 8270 |
| 205-99-2 | Benzo(b)fluoranthene | 58 | 58 | 1 | 1 | %REC | SW-846 8270 |
| 207-08-9 | Benzo(k)fluoranthene | 61 | 61 | 1 | 1 | %REC | SW-846 8270 |
| 65 85-0 | Benzoic Acid | 47 | 47 | 1 | 1 | %REC | SW-846 8270 |
| 100-51-6 | Benzyl Alcohol | 71 | 71 | 1 | 1 | %REC | SW-846 8270 |
| 7440-41 7 | Beryllium | 75 3 | 88 | 2 | 2 | %REC | SW-846 6010/6010B |
| 111-44-4 | bis(2-Chloroethyl)ether | 68 | 68 | 1 | 1 | %REC | SW-846 8270 |
| 39638 32 9 | bis(2-Chloroisopropyl)ether | 64 | 64 | 1 | 1 | %REC | SW-846 8270 |
| 117-81-7 | bis(2 Ethylhexyl)phthalate | 65 | 65 | 1 | 1 | %REC | SW-846 8270 |
| 75 27-4 | Bromodichloromethane | 87 | 100 6 | 2 | 2 | %REC | SW-846 8260 |
| 75-25-2 | Bromoform | 92 | 106 4 | 2 | 2 | %REC | SW-846 8260 |
| 74-83-9 | Bromomethane | 70 4 | 105 | 2 | 2 | %REC | SW-846 8260 |
| 85-68 7 | Butylbenzylphthalate | 57 | 57 | 1 | 1 | %REC | SW-846 8270 |
| 7440-43-9 | Cadmium | 90 | 92 6 | 2 | 2 | %REC | SW-846 6010/6010B |
| 75-15-0 | Carbon Disulfide | 69 | 71 23 | 2 | 2 | %REC | SW-846 8260 |



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| CAS No | Analyte | Minimum Concentration | Maximum Concentration | Number of Laboratory Samples | Number of Laboratory Batches | Unit | Test Method |
|---|---|---|---|---|---|---|---|
| 56-23 5 | Carbon Tetrachloride | 74 | 88 86 | 2 | 2 | %REC | SW-846 8260 |
| 108-90-7 | Chlorobenzene | 90 | 97 | 3 | 3 | %REC | SW 846 8260 |
| 75-00 3 | Chloroethane | 74 05 | 99 | 2 | 2 | %REC | SW-846 8260 |
| 67 66-3 | Chloroform | 93 | 94 16 | 2 | 2 | %REC | SW-846 8260 |
| 74-87-3 | Chloromethane | 57 01 | 107 | 2 | 2 | %REC | SW 846 8260 |
| 7440-47-3 | Chromium | 92 | 257 | 2 | 2 | %REC | SW-846 6010/6010B |
| 218-01-9 | Chrysene | 61 | 61 | 1 | 1 | %REC | SW-846 8270 |
| 10061-01 5 | cis-1,3-Dichloropropene | 95 36 | 97 | 2 | 2 | %REC | SW-846 8260 |
| 7440-48-4 | Cobalt | 84 | 96 6 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-50 8 | Copper | 34 1 | 80 | 2 | 2 | %REC | SW-846 6010/6010B |
| 84-74-2 | Di-n-butylphthalate | 67 | 67 | 1 | 1 | %REC | SW-846 8270 |
| 117-84-0 | Di-n-octylphthalate | 64 | 64 | 1 | 1 | %REC | SW-846 8270 |
| 53-70 3 | Dibenz(a,h)anthracene | 62 | 62 | 1 | 1 | %REC | SW-846 8270 |
| 132-64-9 | Dibenzofuran | 69 | 69 | 1 | 1 | %REC | SW-846 8270 |
| 124-48-1 | Dibromochloromethane | 92 | 95 91 | 2 | 2 | %REC | SW-846 8260 |
| 84-66 2 | Diethylphthalate | 68 | 68 | 1 | 1 | %REC | SW-846 8270 |
| 131-11 3 | Dimethylphthalate | 71 | 71 | 1 | 1 | %REC | SW-846 8270 |
| 100-41-4 | Ethylbenzene | 86 73 | 94 | 2 | 2 | %REC | SW-846 8260 |
| 206-44-0 | Fluoranthene | 69 | 69 | 1 | 1 | %REC | SW-846 8270 |
| 86-73-7 | Fluorene | 65 | 65 | 1 | 1 | %REC | SW-846 8270 |
| 118-74-1 | Hexachlorobenzene | 62 | 62 | 1 | 1 | %REC | SW-846 8270 |
| 87-68-3 | Hexachlorobutadiene | 68 | 68 | 1 | 1 | %REC | SW-846 8270 |
| 77-47-4 | Hexachlorocyclopentadiene | 36 | 36 | 1 | 1 | %REC | SW-846 8270 |
| 67-72 1 | Hexachloroethane | 66 | 66 | 1 | 1 | %REC | SW-846 8270 |
| 193-39 5 | Indeno(1 2 3-cd)pyrene | 61 | 61 | 1 | 1 | %REC | SW-846 8270 |
| 7439-89 6 | Iron | 0 | 26 6 | 2 | 2 | %REC | SW-846 6010/6010B |
| 78 59 1 | Isophorone | 68 | 68 | 1 | 1 | %REC | SW-846 8270 |
| 7439 92 1 | Lead | 75 9 | 85 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7439 93 2 | Lithium | 96 6 | 99 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7439-96-5 | Manganese | 36 | 178 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7439-97 6 | Mercury | 101 | 101 | 1 | 1 | %REC | SW-846 6010/6010B |
| 75-09 2 | Methylene chloride | 87 82 | 105 | 2 | 2 | %REC | SW-846 8260 |
| 7439-98-7 | Molybdenum | 85 | 144 | 2 | 2 | %REC | SW-846 6010/6010B |
| 86 30 6 | n-Nitrosodiphenylamine | 74 | 74 | 1 | 1 | %REC | SW-846 8270 |
| 621-64-7 | n Nitrosodipropylamine | 66 | 66 | 1 | 1 | %REC | SW-846 8270 |
| 621 64-7 | n-Nitrosodipropylamine | 53 | 59 | 2 | 2 | %REC | SW-846 8270B |
| 91-20 3 | Naphthalene | 67 | 67 | 1 | 1 | %REC | SW-846 8270 |
| 7440-02-0 | Nickel | 87 | 170 | 2 | 2 | %REC | SW-846 6010/6010B |
| 98-95-3 | Nitrobenzene | 70 | 70 | 1 | 1 | %REC | SW-846 8270 |
| 87-86 5 | Pentachlorophenol | 37 | 37 | 1 | 1 | %REC | SW-846 8270 |
| 87-86 5 | Pentachlorophenol | 34 | 48 | 2 | 2 | %REC | SW-846 8270B |



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| CAS No | Analyte | Minimum Concentration | Maximum Concentration | Number of Laboratory Samples | Number of Laboratory Batches | Unit | Test Method |
|---|---|---|---|---|---|---|---|
| 108-95-2 | Phenol | 70 | 70 | 1 | 1 | %REC | SW-846 8270 |
| 108-95-2 | Phenol | 58 | 61 | 2 | 2 | %REC | SW-846 8270B |
| 129-00-0 | Pyrene | 56 | 56 | 1 | 1 | %REC | SW-846 8270 |
| 129-00-0 | Pyrene | 2 9 | 56 | 2 | 2 | %REC | SW-846 8270B |
| 7782-49-2 | Selenium | 75 8 | 96 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-22-4 | Silver | 92 9 | 99 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440 24-6 | Strontium | 67 8 | 87 | 2 | 2 | %REC | SW-846 6010/6010B |
| 100-42-5 | Styrene | 88 58 | 95 | 2 | 2 | %REC | SW-846 8260 |
| 127-18-4 | Tetrachloroethene | 87 37 | 95 | 2 | 2 | %REC | SW 846 8260 |
| 7440-31-5 | Tin | 88 | 88 3 | 2 | 2 | %REC | SW-846 6010/6010B |
| 108-88-3 | Toluene | 75 87 | 102 | 3 | 3 | %REC | SW-846 8260 |
| 10061-02-6 | trans-1 3 Dichloropropene | 91 81 | 98 | 2 | 2 | %REC | SW-846 8260 |
| 79-01-6 | Trichloroethene | 89 62 | 92 | 3 | 3 | %REC | SW-846 8260 |
| 11-09 6 | Uranium Total | 76 4 | 96 | 2 | 2 | %REC | SW-846 6010/6010B |
| 7440-62-2 | Vanadium | 68 8 | 85 | 2 | 2 | %REC | SW-846 6010/6010B |
| 75-01-4 | Vinyl chloride | 60 58 | 107 | 2 | 2 | %REC | SW-846 8260 |
| 1330-20 7 | Xylene | 87 07 | 94 | 2 | 2 | %REC | SW-846 8260 |
| 7440 66-6 | Zinc | 48 8 | 70 | 2 | 2 | %REC | SW-846 6010/6010B |

### 5.2.2 Precision

*Matrix Spike Duplicate Evaluation*

Laboratory precision is measured through use of MSDs Adequate frequency of MSD measurements is indicated by at least one MSD in each laboratory batch Table 14 indicates that MSD frequencies were adequate The analytes with the highest relative percent differences (RPDs) were reviewed by comparing the highest sample result to the AL If the highest samples were sufficiently below the AL, no further action is needed For this project, the reviews indicated decisions were not impacted While some of the RPDs appear to be high (aluminum, barium, chromium, cobalt, copper, iron, manganese, molybdenum, pyrene, vanadium, and zinc), they would not result in rejection of data that affects project decisions

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

| Analyte | Number of Sample Pairs | Number of Laboratory Batches | Max RPD (%) |
|---|---|---|---|
| 1 1 1-Trichloroethane | 2 | 2 | 2 47 |
| 1,1,2,2-Tetrachloroethane | 2 | 2 | 2 90 |
| 1,1,2-Trichloroethane | 2 | 2 | 3 96 |
| 1,1-Dichloroethane | 2 | 2 | 3 14 |
| 1,1-Dichloroethene | 3 | 3 | 3 08 |



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| Analyte | Number of Sample Pairs | Number of Laboratory Batches | Max RPD (%) |
|---|---|---|---|
| 1,2,4-Trichlorobenzene | 2 | 2 | 3 70 |
| 1,2,4-Trichlorobenzene | 1 | 1 | 7 75 |
| 1,2-Dichlorobenzene | 2 | 2 | 6 48 |
| 1,2-Dichloroethane | 2 | 2 | 2 25 |
| 1,2-Dichloropropane | 2 | 2 | 1 98 |
| 1,4-Dichlorobenzene | 2 | 2 | 1 98 |
| 1,4-Dichlorobenzene | 2 | 2 | 4 67 |
| 2,4,5-Trichlorophenol | 1 | 1 | 12 90 |
| 2,4,6-Trichlorophenol | 1 | 1 | 14 88 |
| 2,4-Dichlorophenol | 1 | 1 | 11 76 |
| 2,4-Dimethylphenol | 1 | 1 | 16 39 |
| 2,4-Dinitrophenol | 1 | 1 | 7 84 |
| 2,4-Dinitrotoluene | 1 | 1 | 19 85 |
| 2,4-Dinitrotoluene | 2 | 2 | 1 98 |
| 2,6-Dinitrotoluene | 1 | 1 | 18 18 |
| 2-Butanone | 2 | 2 | 6 82 |
| 2-Chloronaphthalene | 1 | 1 | 16 13 |
| 2-Chlorophenol | 1 | 1 | 9 23 |
| 2-Chlorophenol | 2 | 2 | 6 35 |
| 2-Methylnaphthalene | 1 | 1 | 12 50 |
| 2-Methylphenol | 1 | 1 | 11 02 |
| 2-Nitroaniline | 1 | 1 | 22 22 |
| 3,3'-Dichlorobenzidine | 1 | 1 | 14 04 |
| 4,6-Dinitro-2-methylphenol | 1 | 1 | 18 18 |
| 4-Chloroaniline | 1 | 1 | 16 82 |
| 4-Methyl-2-pentanone | 2 | 2 | 2 99 |
| 4-Methylphenol | 1 | 1 | 13 74 |
| 4-Nitrophenol | 1 | 1 | 12 95 |
| 4-Nitrophenol | 2 | 2 | 8 48 |
| Acenaphthene | 1 | 1 | 18 49 |
| Acenaphthene | 2 | 2 | 3 92 |
| Acetone | 2 | 2 | 6 90 |
| Aluminum | 2 | 2 | 67 73 |
| Anthracene | 1 | 1 | 6 90 |
| Antimony | 2 | 2 | 17 47 |
| Arsenic | 2 | 2 | 21 89 |
| Barium | 2 | 2 | 126 05 |
| Benzene | 3 | 3 | 2 99 |
| Benzo(a)anthracene | 1 | 1 | 17 24 |
| Benzo(a)pyrene | 1 | 1 | 15 93 |
| Benzo(b)fluoranthene | 1 | 1 | 3 51 |



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| Analyte | Number of Sample Pairs | Number of Laboratory Batches | Max RPD (%) |
|---|---|---|---|
| Benzo(k)fluoranthene | 1 | 1 | 17 86 |
| Benzoic Acid | 1 | 1 | 11 24 |
| Benzyl Alcohol | 1 | 1 | 7 30 |
| Beryllium | 2 | 2 | 3 91 |
| bis(2-Chloroethyl)ether | 1 | 1 | 12 50 |
| bis(2-Chloroisopropyl)ether | 1 | 1 | 4 80 |
| bis(2-Ethylhexyl)phthalate | 1 | 1 | 16 67 |
| Bromodichloromethane | 2 | 2 | 2 39 |
| Bromoform | 2 | 2 | 3 31 |
| Bromomethane | 2 | 2 | 0 96 |
| Butylbenzylphthalate | 1 | 1 | 11 11 |
| Cadmium | 2 | 2 | 2 77 |
| Carbon Disulfide | 2 | 2 | 2 94 |
| Carbon Tetrachloride | 2 | 2 | 1 34 |
| Chlorobenzene | 3 | 3 | 2 08 |
| Chloroethane | 2 | 2 | 3 81 |
| Chloroform | 2 | 2 | 3 28 |
| Chloromethane | 2 | 2 | 7 77 |
| Chromium | 2 | 2 | 64 95 |
| Chrysene | 1 | 1 | 17 86 |
| cis-1,3-Dichloropropene | 2 | 2 | 1 99 |
| Cobalt | 2 | 2 | 43 31 |
| Copper | 2 | 2 | 101 94 |
| Di-n-butylphthalate | 1 | 1 | 12 70 |
| Di-n-octylphthalate | 1 | 1 | 22 61 |
| Dibenz(a,h)anthracene | 1 | 1 | 8 40 |
| Dibenzofuran | 1 | 1 | 19 05 |
| Dibromochloromethane | 2 | 2 | 2 20 |
| Diethylphthalate | 1 | 1 | 10 85 |
| Dimethylphthalate | 1 | 1 | 16 79 |
| Ethylbenzene | 2 | 2 | 1 07 |
| Fluoranthene | 1 | 1 | 13 95 |
| Fluorene | 1 | 1 | 16 67 |
| Hexachlorobenzene | 1 | 1 | 1 63 |
| Hexachlorobutadiene | 1 | 1 | 4 32 |
| Hexachlorocyclopentadiene | 1 | 1 | 8 00 |
| Hexachloroethane | 1 | 1 | 0 00 |
| Indeno(1,2,3-cd)pyrene | 1 | 1 | 10 34 |
| Iron | 1 | 1 | 164 84 |
| Isophorone | 1 | 1 | 14 17 |
| Lead | 2 | 2 | 34 91 |



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| Analyte | Number of Sample Pairs | Number of Laboratory Batches | Max RPD (%) |
|---|---|---|---|
| Lithium | 2 | 2 | 14 77 |
| Manganese | 2 | 2 | 189 86 |
| Mercury | 1 | 1 | 1 96 |
| Methylene chloride | 2 | 2 | 1 28 |
| Molybdenum | 2 | 2 | 40 90 |
| n-Nitrosodiphenylamine | 1 | 1 | 17 65 |
| n-Nitrosodipropylamine | 1 | 1 | 11 20 |
| n-Nitrosodipropylamine | 2 | 2 | 3 70 |
| Naphthalene | 1 | 1 | 11 02 |
| Nickel | 2 | 2 | 14 71 |
| Nitrobenzene | 1 | 1 | 8 96 |
| Pentachlorophenol | 1 | 1 | 15 00 |
| Pentachlorophenol | 2 | 2 | 21 05 |
| Phenol | 1 | 1 | 17 05 |
| Phenol | 2 | 2 | 6 35 |
| Pyrene | 1 | 1 | 5 50 |
| Pyrene | 2 | 2 | 52 17 |
| Selenium | 2 | 2 | 2.73 |
| Silver | 2 | 2 | 1 28 |
| Strontium | 2 | 2 | 120 89 |
| Styrene | 2 | 2 | 3 27 |
| Tetrachloroethene | 2 | 2 | 3 21 |
| Tin | 2 | 2 | 0 68 |
| Toluene | 3 | 3 | 1 98 |
| trans-1,3-Dichloropropene | 2 | 2 | 2 06 |
| Trichloroethene | 3 | 3 | 3 31 |
| Uranium, Total | 2 | 2 | 1 72 |
| Vanadium | 2 | 2 | 128 11 |
| Vinyl chloride | 2 | 2 | 4 30 |
| Xylene | 2 | 2 | 1 22 |
| Zinc | 2 | 2 | 133 79 |

## *Field Duplicate Evaluation*

Field duplicate results reflect sampling precision, or overall repeatability of the sampling process The frequency of field duplicate collection should exceed 1 field duplicate per 20 real samples, or 5 percent Table 15 indicates that sampling frequencies were adequate except for radionuclides (alpha spectroscopy) and metals (6200)



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

| Test Method | Sample Code | Number of Samples | % Duplicate Samples |
|---|---|---|---|
| ALPHA SPEC | REAL | 2 | 0 00 |
| | DUP | 0 | |
| GAMMA SPECTROSCOPY | REAL | 26 | 7 69 |
| | DUP | 2 | |
| SW-846 6010/6010B | REAL | 21 | 9 52 |
| | DUP | 2 | |
| SW-846 6200 | REAL | 3 | 0 00 |
| | DUP | 0 | |
| SW-846 8260 | REAL | 12 | 8 33 |
| | DUP | 1 | |
| SW-846 8270/8270B | REAL | 24 | 8 33 |
| | DUP | 2 | |

The RPDs indicate how much variation exists in the field duplicate analyses The EPA data validation guidelines state that "there are no required review criteria for field duplicate analyses comparability" For the DQA, the highest Max RPDs were reviewed (antimony, arsenic, barium, benzo(a)anthracene, beryllium, chrysene, copper, fluoranthene, iron, lead, manganese, mercury, nickel, silver, strontium, vanadium, and zinc) The highest sample amount for those analytes were corrected for the associated RPD (Table 16), and the resulting number was compared to the AL For this project, none of the corrected numbers were greater than the AL, therefore project decisions were not impacted

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

| Analyte | Max of RPD (%) |
|---|---|
| 1,2,4-Trichlorobenzene | 3 73 |
| 2,4,5-Trichlorophenol | 3 73 |
| 2,4,6-Trichlorophenol | 3 73 |
| 2,4-Dichlorophenol | 3 73 |
| 2,4-Dimethylphenol | 3 73 |
| 2,4-Dinitrophenol | 5 00 |
| 2-Chloronaphthalene | 3 73 |
| 2-Chlorophenol | 3 73 |
| 2-Methylnaphthalene | 3 73 |
| 2-Methylphenol | 3 73 |
| 2-Nitroaniline | 5 00 |
| 3,3'-Dichlorobenzidine | 6 90 |
| 4,6-Dinitro-2-methylphenol | 5 00 |
| 4-Chloroaniline | 6 90 |
| 4-Methylphenol | 3 73 |
| 4-Nitrophenol | 5 00 |
| Aluminum | 79 12 |

| Analyte | Max of RPD (%) |
|---|---|
| Anthracene | 28 57 |
| Antimony | 173 13 |
| Arsenic | 78 95 |
| Barium | 45 14 |
| Benzo(a)anthracene | 76 92 |
| Benzo(a)pyrene | 22 22 |
| Benzo(b)fluoranthene | 16 67 |
| Benzo(k)fluoranthene | 29 21 |
| Benzoic Acid | 5 00 |
| Benzyl Alcohol | 6 90 |
| Beryllium | 37 17 |
| bis(2-Chloroethyl)ether | 3 73 |
| bis(2-Chloroisopropyl)ether | 3 73 |
| bis(2-Ethylhexyl)phthalate | 2 70 |
| Butylbenzylphthalate | 3 73 |
| Cadmium | 24 39 |
| Chromium | 31 71 |
| Chrysene | 85 71 |
| Cobalt | 10 98 |
| Copper | 73 42 |
| Di-n-butylphthalate | 3 73 |
| Di-n-octylphthalate | 3 73 |
| Dibenz(a,h)anthracene | 3 73 |
| Diethylphthalate | 3 73 |
| Dimethylphthalate | 3 73 |
| Fluoranthene | 93 33 |
| Hexachlorobenzene | 3 73 |
| Hexachlorobutadiene | 3 73 |
| Hexachlorocyclopentadiene | 3 73 |
| Hexachloroethane | 3 73 |
| Indeno(1,2,3-cd)pyrene | 24 00 |
| Iron | 72 11 |
| Isophorone | 3 73 |
| Lead | 138 19 |
| Lithium | 18 92 |
| Manganese | 132 84 |
| Mercury | 143 31 |
| Molybdenum | 0 00 |
| n-Nitrosodiphenylamine | 3 73 |
| n-Nitrosodipropylamine | 3 73 |
| Naphthalene | 2 70 |
| Nickel | 42 42 |
| Nitrobenzene | 3 73 |
| Pentachlorophenol | 5 00 |
| Phenol | 3 73 |
| Pyrene | 25 35 |

| Analyte | Max of RPD (%) |
|---|---|
| Selenium | 28 57 |
| Silver | 100 00 |
| Strontium | 107 79 |
| Tin | 0 00 |
| Uranium, Total | 26 36 |
| Vanadium | 41 99 |
| Zinc | 66 67 |

### 5.2.3 Completeness

Based on original project DQOs, a minimum of 25 percent of ER Program analytical (and radiological) results must be formally verified and validated Of that percentage, no more than 10 percent of the results may be rejected, which ensures that analytical laboratory practices are consistent with quality requirements Table 17 shows the number and percentage of validated records (codes without "1"), the number and percentage of verified records (codes with "1"), and the percentage of rejected records for each analyte group Less than 25 percent of IHSS Group 600-5 records were validated, and 33 percent to 100 percent of the records verified However, association with previous and subsequent validated records indicates that the data is acceptable

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

| Validation Qualifier Code | Total of CAS No. | Alpha Spec | Gamma Spectroscopy | SW-846 6010/6010B | SW-846 6200 | SW-846 8260 | SW-846 8270/8270B |
|---|---|---|---|---|---|---|---|
| No V&V | 9 | 0 | 9 | 0 | 0 | 0 | 0 |
| J | 3 | 0 | 0 | 0 | 2 | 1 | 0 |
| J1 | 391 | 0 | 0 | 390 | 1 | 0 | 0 |
| UJ | 12 | 0 | 0 | 0 | 0 | 12 | 0 |
| UJ1 | 34 | 0 | 0 | 28 | 0 | 2 | 4 |
| V | 201 | 0 | 0 | 0 | 34 | 59 | 108 |
| V1 | 1669 | 10 | 69 | 65 | 17 | 360 | 1148 |
| Total | 2319 | 10 | 78 | 483 | 54 | 434 | 1260 |
| Validated | 216 | 0 | 0 | 0 | 36 | 72 | 108 |
| % Validated | 9 31% | 0 00% | 0 00% | 0 00% | 66 67% | 16 59% | 8 57% |
| Verified | 2094 | 10 | 69 | 483 | 18 | 362 | 1152 |
| % Verified | 90 30% | 100 00% | 88 46% | 100 00% | 33 33% | 83 41% | 91 43% |

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

### 5.2.4 Sensitivity

RLs, in units of micrograms per kilogram (ug/kg) for organics, milligrams per kilogram (mg/kg) for metals, and picocuries per gram (pCi/g) for radionuclides, were compared with RFCA WRW ALs Adequate sensitivities of analytical methods were attained for



50

all COCs that affect project decisions "Adequate" sensitivity is defined as an RL less than an analyte's associated AL, typically less than one-half the AL

### 5.3 Summary of Data Quality

RPDs greater than 35 percent indicate the sampling precision limits of some analytes have been exceeded No records were rejected Less than 25 percent of the records for IHSS Group 600-5 were validated If additional V&V information is received, IHSS Group 600-5 records will be updated in SWD Data qualified as a result of additional data will be assessed as part of the CRA process Data collected and used for IHSS Group 600-5 are adequate for decision making based on ER Program Goals

## 6.0 REFERENCES

DOE, 1992-2003, Historical Release Reports for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, September

DOE, 1999a, Annual Historical Release Report for the Rocky Flats Plant, Golden, Colorado, September

DOE, 1999b, Order 414 1A, Quality Assurance

DOE, 2000, Industrial Area Data Summary Report, Rocky Flats Environmental Technology Site, Golden, Colorado, September

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

DOE, 2002, Environmental Restoration Rocky Flats Cleanup Agreement Standard Operating Protocol for Routine Soil Remediation, Rocky Flats Environmental Technology Site, Golden, Colorado, January

DOE, 2003a, Closeout Report for IHSS Group 600-2, PAC 400-802, Storage Shed South of Building 334, Rocky Flats Environmental Technology Site, Golden, Colorado, June

DOE, 2003b, Integrated Monitoring Plan, FY2004, Background Document, Rocky Flats Environmental Technology Site, Golden, Colorado, December

DOE, 2004, Industrial Area Sampling and Analysis Plan Addendum #IA-04-09, Rocky Flats Environmental Technology Site, Golden, Colorado, January

DOE, CDPHE, and EPA, 2003, Rocky Flats Cleanup Agreement Modification, Rocky Flats Environmental Technology Site, Golden, Colorado, June

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

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

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

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

K-H, 2002b, V&V Guidelines for Isotopic Determinations by Alpha Spectrometry, DA-RC01-v2, October

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

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

# Appendix A
# Correspondence

# ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
# ER REGULATORY CONTACT RECORD

| | |
|---|---|
| **Date/Time.** | April 13, 2004/ 1355 |
| **Site Contact(s).**<br>**Phone:** | Greg Pudlik<br>303-966-7698 |
| **Regulatory Contact.**<br>**Phone·** | Harlen Ainscough<br>303-692-3337 |
| **Agency** | CDPHE |
| **Purpose of Contact:** | Approval of proposed sample location offsets for IHSS Group 600-5, #IA-04-05 |

**Discussion**

On April, 13, 2004 an e-mail correspondence was sent to Mr Harlen Ainscough describing proposed sampling location off-sets at IHSS Group 600-5 – Central Avenue Ditch Cleaning

Because three sample locations in the approved SAP Addendum #IA-04-05 were located over the utility corridor along Central Avenue Ditch the following relocations were proposed

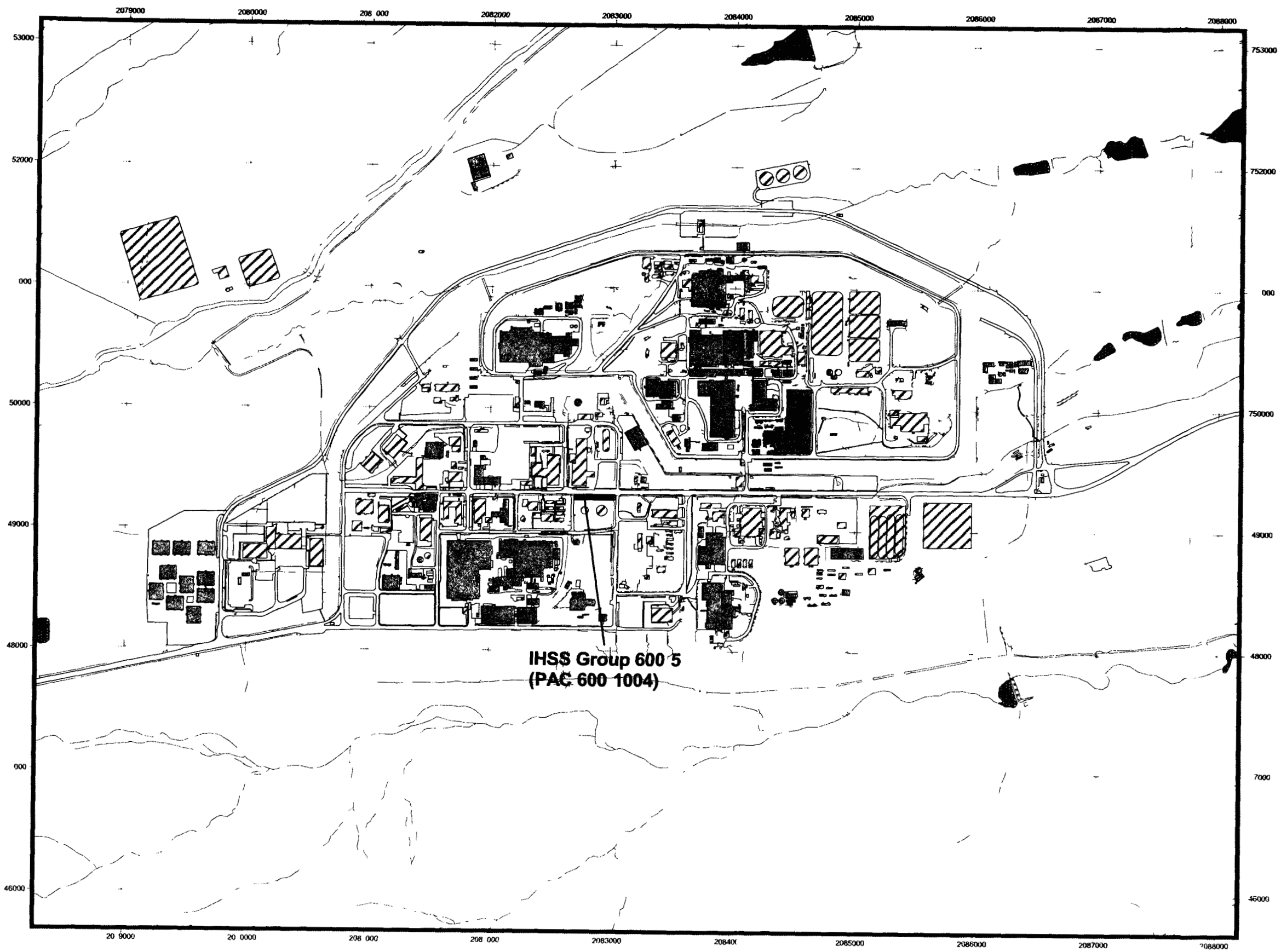
- BZ39-034 (biased location) relocate 6 feet south of location in approved SAP (this location did not target a specific release, was intended for additional sampling coverage only),
- CA39-016 (statistical location) relocate 8 5 feet south of proposed location in approved SAP, and
- CB39-008 (statistical location) relocate 3 5 feet south of proposed location in approved SAP

Mr Ainscough agreed, via e-mail, that the offsets were appropriate and approved of the proposed relocations The sample offsets will be explained in the discrepancy table in the data summary or closeout report

**Contact Record Prepared By·** Greg Pudlik

Required Distribution

S Bell, RFFO
J Berardini, K-H
L Brooks, K-H ESS
D Mayo, 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 Shelton, K-H
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
C Spreng, CDPHE
S Surovchak, RFFO
K Wiemelt, K-H RISS
C Zahm, K-H




# Figure 1
# IHSS Group 600 5
# Location Map

KEY

Dirt road

Paved road

Stream drainage or ditch

Fence

PAC

Pond

Structure

Demolished

Standing

Dis mer
Dra ata ubjec hange

500 0 500 1000 Feet

Scale 1 10 000

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD 27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by

[redacted]

D te M y 2004

Prepared for

KAISER•HILL
COMPANY

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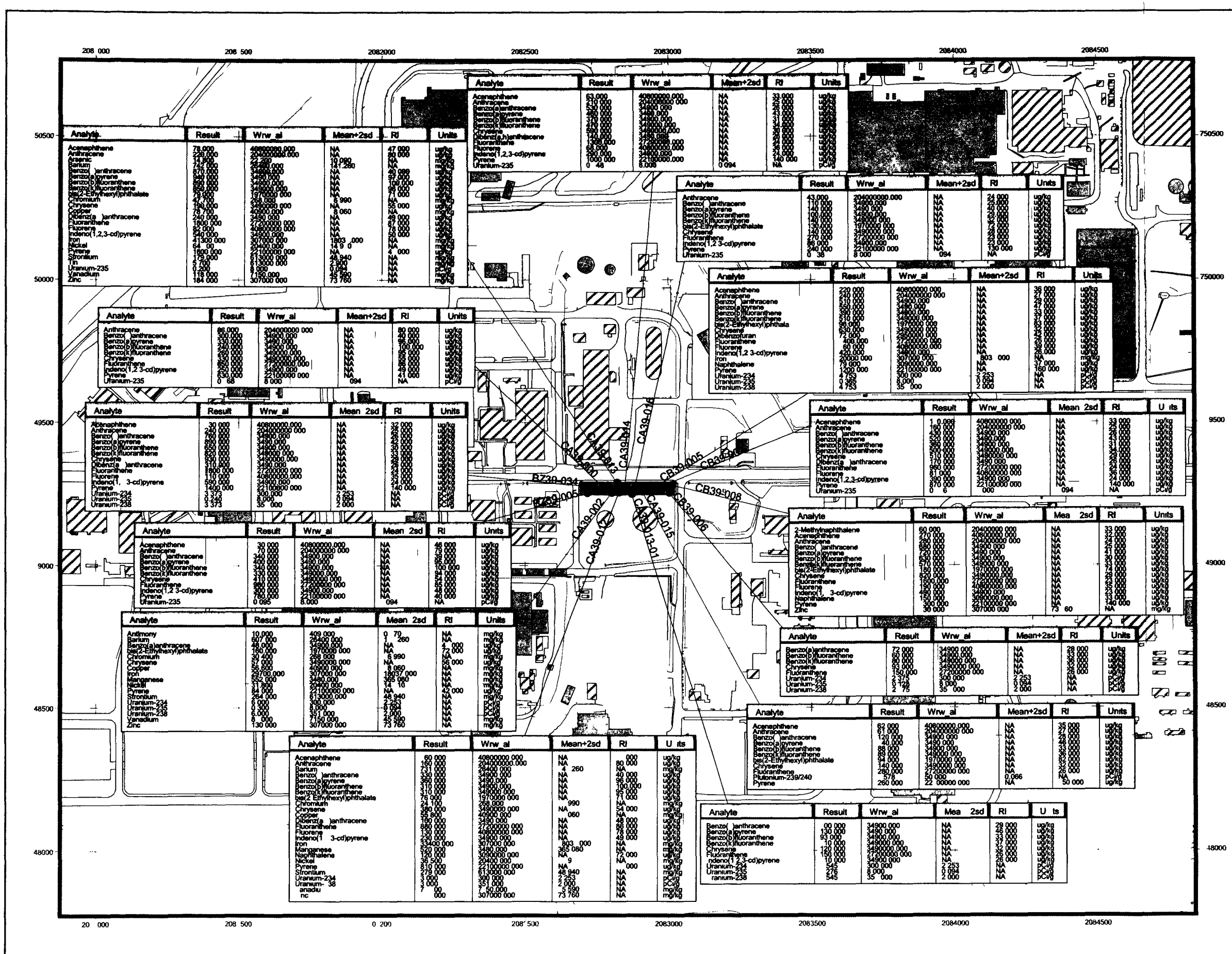


**Figure 2**
**IHSS Group 600-5 Surface Soil Results Greater Than Background Means Plus Two Standard Deviations or Reporting Limits**

KEY

Sampling Location
- Detected Above WRW AL
- Detected Above Background or RL
- Detected Below Background

Dirt road

Paved road

Stream drainage or ditch

Fence

PAC 600 1004

Structure
- Demolished
- Standing

Disclaimer
Draft ata Subjec hange

200 0 200 400 Feet

Scale 1 4 000

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD 27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by
[redacted]

D t May 2004

Prepared for

KAISER•HILL COMPANY

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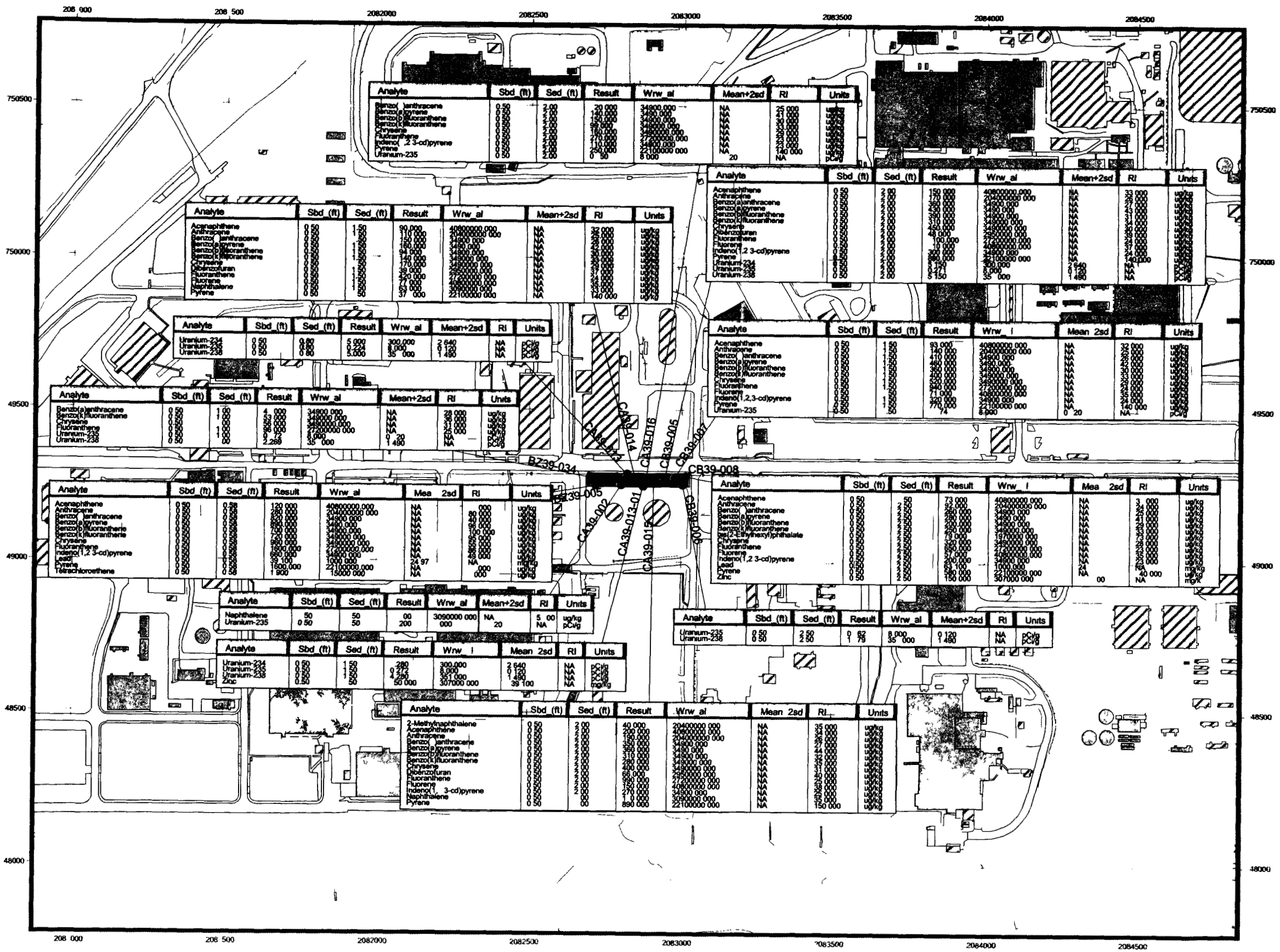
26




| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_al | Mean+2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 0.50 | 2.00 | 20.000 | 34900.000 | NA | 25.000 | ug/kg |
| Benzo(a)pyrene | 0.50 | 2.00 | 140.000 | 34900.000 | NA | 41.000 | ug/kg |
| Benzo(b)fluoranthene | 0.50 | 2.00 | 150.000 | 34900.000 | NA | 30.000 | ug/kg |
| Benzo(k)fluoranthene | 0.50 | 2.00 | 98.000 | 34900.000 | NA | 33.000 | ug/kg |
| Chrysene | 0.50 | 2.00 | 180.000 | 34900.000 | NA | 29.000 | ug/kg |
| Fluoranthene | 0.50 | 2.00 | 270.000 | 27200000.000 | NA | 25.000 | ug/kg |
| Indeno(1,2,3-cd)pyrene | 0.50 | 2.00 | 110.000 | 34900.000 | NA | 33.000 | ug/kg |
| Pyrene | 0.50 | 2.00 | 250.000 | 22100000.000 | NA | 140.000 | ug/kg |
| Uranium-235 | 0.50 | 2.00 | 0.50 | 8.000 | 20 | NA | pCi/g |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_al | Mean+2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Acenaphthene | 0.50 | 2.00 | 150.000 | 40800000.000 | NA | 33.000 | ug/kg |
| Anthracene | 0.50 | 2.00 | 170.000 | 204000000.000 | NA | 25.000 | ug/kg |
| Benzo(a)anthracene | 0.50 | 2.00 | 360.000 | 34900.000 | NA | 27.000 | ug/kg |
| Benzo(a)pyrene | 0.50 | 2.00 | 330.000 | 34900.000 | NA | 43.000 | ug/kg |
| Benzo(b)fluoranthene | 0.50 | 2.00 | 390.000 | 34900.000 | NA | 31.000 | ug/kg |
| Benzo(k)fluoranthene | 0.50 | 2.00 | 250.000 | 34900.000 | NA | 34.000 | ug/kg |
| Chrysene | 0.50 | 2.00 | 250.000 | 34900.000 | NA | 30.000 | ug/kg |
| Dibenzofuran | 0.50 | 2.00 | 48.000 | 2950000.000 | NA | 39.000 | ug/kg |
| Fluoranthene | 0.50 | 2.00 | 100.000 | 27200000.000 | NA | 31.000 | ug/kg |
| Fluorene | 0.50 | 2.00 | 10.000 | 40800000.000 | NA | 37.000 | ug/kg |
| Indeno(1,2,3-cd)pyrene | 0.50 | 2.00 | 300.000 | 34900.000 | NA | 34.000 | ug/kg |
| Pyrene | 0.50 | 2.00 | 390.000 | 22100000.000 | NA | 140.000 | ug/kg |
| Uranium-234 | 0.50 | 2.00 | 5.150 | 300.000 | 2.640 | NA | pCi/g |
| Uranium-235 | 0.50 | 2.00 | 0.275 | 8.000 | 0.120 | NA | pCi/g |
| Uranium-238 | 0.50 | 2.00 | 5.150 | 35.000 | 1.490 | NA | pCi/g |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_al | Mean+2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Acenaphthene | 0.50 | 1.50 | 99.000 | 40800000.000 | NA | 32.000 | ug/kg |
| Anthracene | 0.50 | 1.50 | 110.000 | 204000000.000 | NA | 25.000 | ug/kg |
| Benzo(a)anthracene | 0.50 | 1.50 | 150.000 | 34900.000 | NA | 27.000 | ug/kg |
| Benzo(a)pyrene | 0.50 | 1.50 | 150.000 | 34900.000 | NA | 43.000 | ug/kg |
| Benzo(b)fluoranthene | 0.50 | 1.50 | 94.000 | 34900.000 | NA | 30.000 | ug/kg |
| Benzo(k)fluoranthene | 0.50 | 1.50 | 140.000 | 34900.000 | NA | 33.000 | ug/kg |
| Chrysene | 0.50 | 1.50 | 170.000 | 34900.000 | NA | 29.000 | ug/kg |
| Dibenzofuran | 0.50 | 1.50 | 36.000 | 2950000.000 | NA | 39.000 | ug/kg |
| Fluoranthene | 0.50 | 1.50 | 420.000 | 27200000.000 | NA | 31.000 | ug/kg |
| Fluorene | 0.50 | 1.50 | 77.000 | 40800000.000 | NA | 37.000 | ug/kg |
| Naphthalene | 0.50 | 1.50 | 53.000 | 3090000.000 | NA | 34.000 | ug/kg |
| Pyrene | 0.50 | 50 | 37.000 | 22100000.000 | NA | 140.000 | ug/kg |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_al | Mean+2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Uranium-234 | 0.50 | 0.80 | 5.000 | 300.000 | 2.640 | NA | pCi/g |
| Uranium-235 | 0.50 | 0.80 | 0.275 | 8.000 | 0.120 | NA | pCi/g |
| Uranium-238 | 0.50 | 0.80 | 3.000 | 35.000 | 1.490 | NA | pCi/g |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_al | Mean+2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Benzo(a)anthracene | 0.50 | 1.00 | 4.000 | 34900.000 | NA | 28.000 | ug/kg |
| Benzo(k)fluoranthene | 0.50 | 1.00 | 53.000 | 34900.000 | NA | 36.000 | ug/kg |
| Chrysene | 0.50 | 1.00 | 96.000 | 34900.000 | NA | 31.000 | ug/kg |
| Fluoranthene | 0.50 | 1.00 | 120.000 | 27200000.000 | NA | 25.000 | ug/kg |
| Uranium-235 | 0.50 | 1.00 | 0.275 | 8.000 | 0.120 | NA | pCi/g |
| Uranium-238 | 0.50 | 1.00 | 2.268 | 35.000 | 1.490 | NA | pCi/g |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_l | Mean_2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Acenaphthene | 0.50 | 1.50 | 93.000 | 40800000.000 | NA | 32.000 | ug/kg |
| Anthracene | 0.50 | 1.50 | 140.000 | 204000000.000 | NA | 25.000 | ug/kg |
| Benzo(a)anthracene | 0.50 | 1.50 | 410.000 | 34900.000 | NA | 27.000 | ug/kg |
| Benzo(a)pyrene | 0.50 | 1.50 | 460.000 | 34900.000 | NA | 43.000 | ug/kg |
| Benzo(b)fluoranthene | 0.50 | 1.50 | 360.000 | 34900.000 | NA | 30.000 | ug/kg |
| Benzo(k)fluoranthene | 0.50 | 1.50 | 410.000 | 34900.000 | NA | 33.000 | ug/kg |
| Chrysene | 0.50 | 1.50 | 520.000 | 34900.000 | NA | 29.000 | ug/kg |
| Fluoranthene | 0.50 | 1.50 | 1.000 | 27200000.000 | NA | 25.000 | ug/kg |
| Fluorene | 0.50 | 50 | 71.000 | 40800000.000 | NA | 35.000 | ug/kg |
| Indeno(1,2,3-cd)pyrene | 0.50 | 1.50 | 320.000 | 34900.000 | NA | 34.000 | ug/kg |
| Pyrene | 0.50 | 1.50 | 770.000 | 22100000.000 | NA | 140.000 | ug/kg |
| Uranium-235 | 0.50 | 50 | 74 | 8.000 | 0.20 | NA | pCi/g |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_al | Mea 2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Acenaphthene | 0.50 | 0.58 | 120.000 | 40800000.000 | NA | 000 | ug/kg |
| Anthracene | 0.50 | 0.58 | 280.000 | 204000000.000 | NA | 80.000 | ug/kg |
| Benzo(a)anthracene | 0.50 | 0.58 | 820.000 | 34900.000 | NA | 40.000 | ug/kg |
| Benzo(a)pyrene | 0.50 | 0.58 | 890.000 | 34900.000 | NA | 96.000 | ug/kg |
| Benzo(b)fluoranthene | 0.50 | 0.58 | 700.000 | 34900.000 | NA | 100.000 | ug/kg |
| Benzo(k)fluoranthene | 0.50 | 0.58 | 720.000 | 34900.000 | NA | 95.000 | ug/kg |
| Chrysene | 0.50 | 0.58 | 950.000 | 34900.000 | NA | 85.000 | ug/kg |
| Fluoranthene | 0.50 | 0.58 | 1800.000 | 27200000.000 | NA | 86.000 | ug/kg |
| Indeno(1,2,3-cd)pyrene | 0.50 | 0.58 | 590.000 | 34900.000 | NA | 45.000 | ug/kg |
| Lead | 0.50 | 0.58 | 39.100 | 1000.000 | 24.97 | NA | mg/kg |
| Pyrene | 0.50 | 0.58 | 1600.000 | 22100000.000 | NA | 000 | ug/kg |
| Tetrachloroethene | 0.50 | 0.58 | 1.900 | 15000.000 | NA | 000 | ug/kg |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_l | Mea 2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Acenaphthene | 0.50 | 50 | 73.000 | 40800000.000 | NA | 3.000 | ug/kg |
| Anthracene | 0.50 | 2.50 | 92.000 | 204000000.000 | NA | 24.000 | ug/kg |
| Benzo(a)anthracene | 0.50 | 2.50 | 260.000 | 34900.000 | NA | 25.000 | ug/kg |
| Benzo(a)pyrene | 0.50 | 2.50 | 200.000 | 34900.000 | NA | 41.000 | ug/kg |
| Benzo(b)fluoranthene | 0.50 | 2.50 | 200.000 | 34900.000 | NA | 29.000 | ug/kg |
| Benzo(k)fluoranthene | 0.50 | 2.50 | 230.000 | 34900.000 | NA | 33.000 | ug/kg |
| bis(2-Ethylhexyl)phthalate | 0.50 | 2.50 | 791.000 | 1970000.000 | NA | 73.000 | ug/kg |
| Chrysene | 0.50 | 2.50 | 320.000 | 34900.000 | NA | 28.000 | ug/kg |
| Fluoranthene | 0.50 | 2.50 | 550.000 | 27200000.000 | NA | 23.000 | ug/kg |
| Fluorene | 0.50 | 2.50 | 57.000 | 40800000.000 | NA | 35.000 | ug/kg |
| Indeno(1,2,3-cd)pyrene | 0.50 | 2.50 | 200.000 | 34900.000 | NA | 23.000 | ug/kg |
| Lead | 0.50 | 2.50 | 63.100 | 1000.000 | 24 | NA | mg/kg |
| Pyrene | 0.50 | 2.50 | 530.000 | 22100000.000 | NA | 40.000 | ug/kg |
| Zinc | 0.50 | 2.50 | 150.000 | 307000.000 | 00 | NA | mg/kg |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_al | Mean+2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Naphthalene | 50 | 50 | 00 | 3090000.000 | NA | 5.00 | ug/kg |
| Uranium-235 | 0.50 | 50 | 200 | 000 | 20 | NA | pCi/g |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_al | Mean+2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Uranium-235 | 0.50 | 2.50 | 0.62 | 8.000 | 0.120 | NA | pCi/g |
| Uranium-238 | 0.50 | 2.50 | 1.75 | 35.000 | 1.490 | NA | pCi/g |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_l | Mean 2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| Uranium-234 | 0.50 | 1.50 | 280 | 300.000 | 2.640 | NA | pCi/g |
| Uranium-235 | 0.50 | 1.50 | 0.275 | 8.000 | 0.120 | NA | pCi/g |
| Uranium-238 | 0.50 | 1.50 | 4.256 | 351.000 | 1.490 | NA | pCi/g |
| Zinc | 0.50 | 50 | 50.000 | 307000.000 | 39.100 | NA | mg/kg |

| Analyte | Sbd (ft) | Sed (ft) | Result | Wrw_al | Mean 2sd | Rl | Units |
|---|---|---|---|---|---|---|---|
| 2-Methylnaphthalene | 0.50 | 2.00 | 40.000 | 20400000.000 | NA | 35.000 | ug/kg |
| Acenaphthene | 0.50 | 2.00 | 200.000 | 40800000.000 | NA | 34.000 | ug/kg |
| Anthracene | 0.50 | 2.00 | 130.000 | 204000000.000 | NA | 26.000 | ug/kg |
| Benzo(a)anthracene | 0.50 | 2.00 | 350.000 | 34900.000 | NA | 29.000 | ug/kg |
| Benzo(a)pyrene | 0.50 | 2.00 | 360.000 | 34900.000 | NA | 27.000 | ug/kg |
| Benzo(b)fluoranthene | 0.50 | 2.00 | 310.000 | 34900.000 | NA | 44.000 | ug/kg |
| Benzo(k)fluoranthene | 0.50 | 2.00 | 290.000 | 34900.000 | NA | 32.000 | ug/kg |
| Chrysene | 0.50 | 2.00 | 400.000 | 34900.000 | NA | 35.000 | ug/kg |
| Dibenzofuran | 0.50 | 2.00 | 66.000 | 2950000.000 | NA | 31.000 | ug/kg |
| Fluoranthene | 0.50 | 2.00 | 590.000 | 27200000.000 | NA | 40.000 | ug/kg |
| Fluorene | 0.50 | 2.00 | 150.000 | 40800000.000 | NA | 38.000 | ug/kg |
| Indeno(1,2,3-cd)pyrene | 0.50 | 2.00 | 270.000 | 34900.000 | NA | 28.000 | ug/kg |
| Naphthalene | 0.50 | 50 | 1.000 | 3090000.000 | NA | 42.000 | ug/kg |
| Pyrene | 0.50 | 00 | 890.000 | 22100000.000 | NA | 150.000 | ug/kg |

**Figure 3**
**IHSS Group 600-5 Subsurface Soil Results Greater Than Background Means Plus Two Standard Deviations or Reporting Limits**

KEY

Sampling Location
- Detected Above WRW AL
- Detected Above Background or RL
- Detected Below Background

Dirt road

Paved road

Stream drainage or ditch

Fence

PAC 600 1004

Structure
Demolished
Standing

Disclaimer
Draft Data Subject to hange

200 0 200 400 Feet

Scale 1 4 000

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD 27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by

D te M y 2004

Prepared for

KAISER•HILL COMPANY

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